DEPARTMENT OF DESIGN AND CONSTRUCTION
KA ʻOIHANA HAKULAU A ME KE KĀPILI
CITY AND COUNTY OF HONOLULU

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November 3, 2023

Mary Alice Evans, Director
State of Hawai'i
Office of Planning and Sustainable Development
Environmental Review Program
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

Draft Supplemental Environmental Impact Statement (D-SEIS) for the proposed U.S. Army Corps of Engineers Ala Wai Canal Flood Risk Management Project; Island of O'ahu, Honolulu District; Multiple Tax Map Keys (TMK) in Zone 2, Sections 3-4 and Sections 6-9

The City and County of Honolulu hereby submits a Draft Supplemental Environmental Impact Statement (D-SEIS) on behalf of the U.S. Army Corp of Engineers Ala Wai Canal Flood Risk Management Project located in the Honolulu District of the island of O'ahu (multiple tax map keys (TMKs) within Zone 2, Sections 3-4 and Sections 6-9).

We request this Draft Supplemental Environmental Impact Statement be published in the next available issue of The Environmental Notice, thereby initiating the public-comment period during which the public may submit comments to the City and County of Honolulu.

If there are any questions, please contact us at 808-768-8480.

Sincerely,

Digitally signed by Bryan Gallagher
Date: 2023.11.16 13:11:19 -10'00'

FOR Haku Milles, P.E., LEED AP
Director

From: webmaster@hawaii.gov
To: DBEDT OPSD Environmental Review Program
Subject: New online submission for The Environmental Notice
Date: Thursday, November 16, 2023 4:49:36 PM

Action Name

Ala Wai Canal Flood Risk Management Study, Honolulu, HI

Type of Document/Determination

Draft environmental impact statement (DEIS)

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds
- (5) Propose any use within the Waikīkī area of Oʻahu

Judicial district

Honolulu, Oʻahu

Tax Map Key(s) (TMK(s))

Various TMKs in Zone 2, Sections 3-4 and Sections 6-9.

Action type

Agency

Other required permits and approvals

National Environmental / Hawaii Policy Act (NEPA/HEPA) compliance; Clean Water Act §404 compliance; Department of Health §401 Water Quality Certification; National Pollutant Discharge Elimination System (NPDES) permit; Hawaii Revised Statutes (HRS) §343 compliance; HRS §6E Historic Preservation review; HAR 11-200, 13-275; National Historic Preservation Act (NHPA) §106 compliance; Coastal Zone Management Act (CZMA) compliance; Conservation District Use Permit, Stream Channel Alteration Permit; Special Management Area (SMA) permit; Waikiki Special District permit; Community Noise Permit; Grading and Building Permits; Fish and Wildlife Coordination Act (FWCA) compliance; Request for Use of State Lands

Proposing/determining agency

City and County of Honolulu - Department of Design and Construction

Agency contact name

Haku Milles

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650 S. King Street, 11th Floor
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United States
Map It

Accepting authority

Mayor - City and County of Honolulu

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Was this submittal prepared by a consultant?

No

Action summary

This Tentatively Selected Plan (TSP) would involve the construction of floodwalls at Woodlawn Bridge along the Mānoa Stream, at the confluence of the Mānoa and Pālolo Streams, along the Mānoa-Pālolo Canal, and along the Ala Wai Canal, as well as a detention basin at the Ala Wai Golf Course. This tentatively selected alternative also includes structure elevation and floodproofing of 70 structures to mitigate for induced flooding. The purpose of the tentatively selected plan is to reduce flood risk within the Ala Wai Watershed given that a high level of flood risk exists within the Ala Wai Watershed due to extensive urban development throughout the watershed, coupled with the watershed's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters).

Attached documents (signed agency letter & EA/EIS)

- Ala-Wai-DSEIS-City-Letterhead.pdf
- Ala-Wai-Canal_GRR_DRAFT_SEIS-Combined.pdf

Shapefile

- The location map for this Draft EIS is the same as the location map for the associated EIS Preparation Notice.

Action location map

- Action-Location-Map.zip

Authorized individual

Haku Milles

Authorization

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

Draft

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii

This document has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) and Hawaii Revised Statutes (HRS) Chapter 343.

Proponent (NEPA):
Pittsburgh District
U.S. Army Corps of Engineers
William S. Moorhead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222-4186

Non-Federal Sponsor and Agency (HRS Chapter 343):
City and County of Honolulu, Department of Design and Construction
650 S. King Street, 11th Floor
Honolulu, Hawaii 96813

November 2023

Ala Wai Canal General Reevaluation Report and Integrated Supplemental Environmental Impact Statement, Oahu, Hawaii

Document Type:	Draft General Reevaluation Report with Integrated Supplement Environmental Impact Statement
Responsible Agencies (Project Sponsors):	City and County of Honolulu U.S. Army Corps of Engineers
Study Authority:	Section 209 of the Flood Control Act of 1962 (Public Law 87-874)
Location:	Ala Wai Watershed, City and County of Honolulu; Oahu, Hawaii
Tax Map Key(s):	Various TMKs in Zone 2, Sections 3-4 and Sections 6-9.
Actions Requiring HRS Chapter 343 Review:	Use of State or County lands or the use of state or county funds and use within the Waikiki area of Oahu.
Determination:	The USACE and the City and County of Honolulu have determined that the proposed action requires the preparation of a supplemental EIS, based on the requirements of NEPA and Chapter 343.
Notes:	The City and County of Honolulu is the proposing agency for purposes of complying with Hawaii Revised Statutes (HRS) Chapter 343; the accepting authority would be the Governor of Hawaii. The USACE is the lead agency for purposes of complying with the National Environmental Policy Act (NEPA).

Abstract

This Draft General Reevaluation Report with Integrated Supplemental Environmental Impact Statement (Draft GRR/SEIS) has been prepared for the Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii. The purpose of the Ala Wai Canal Flood Risk Management Study is to reduce riverine flood risks in the Ala Wai Watershed. The study is authorized by Section 209 of the Flood Control Act of 1962 (Public Law 87-874), which is a general study authority for surveys in harbors and rivers in Hawaii "with a view to determining the advisability of improvements in the interest of navigation, flood control, hydroelectric power development, and other beneficial water uses, and related land resources." Section 209 does not authorize the implementation of the proposed action.

Flooding associated with a 1% annual exceedance probability (AEP) rainfall event would affect approximately 3,111 structures with an estimated $905,327,000 in structural damages alone (2023 price levels). In response to identified flood-related problems and opportunities, a series of flood risk management measures were identified and formulated into four alternatives, including the No Action alternative. The alternatives were evaluated through an iterative screening and reformulation process, resulting in the tentative selection of a plan for implementation. The tentatively selected plan would reduce flood risks by constructing one detention basin and concrete floodwalls averaging 6 feet high along Woodlawn Drive, Koali Road, and Kaimuki High School. In addition, concrete floodwalls averaging 6 feet high would be constructed on both sides of the Manoa-Palolo and Ala Wai canals. Potential adverse impacts include those related to biological resources, cultural resources, recreation, and aesthetic/visual resources; however, measures to avoid, minimize, and mitigate these impacts have been incorporated to the extent practicable. Although some degree of impact would occur, project analyses have not identified significant, unavoidable adverse impacts that would remain after implementation of proposed mitigation measures. The tentatively selected plan is the national economic development plan.

The City and County of Honolulu is the non-federal cost-sharing sponsor for all features. Based on October 2023 price levels, the estimated first costs of the TSP, including application of nonstructural mitigation measures for induced flooding, is $1.075 billion. The cost share apportionment is 65% Federal and 35% non-federal, therefore, the federal portion of the estimated first cost is $698,472,000 and the non-federal sponsor portion is $376,101,000. The non-Federal sponsor would provide all lands, easements, rights-of-way, relocations, and suitable borrow and disposal areas and would also assume responsibility for operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The estimated average annual OMRR&R cost is $359,000. The non-Federal sponsor will continue to participate in and comply with applicable Federal floodplain management and flood insurance programs.

This Draft GRR/SEIS is being made available for public review beginning November 24, 2023. The official closing date for the receipt of comments is January 8, 2024, 45 days from the date on which the notice of availability of this Draft GRR/SEIS appears in the Federal Register and The Environmental Review. Comments may be mailed to the address listed below. Comments may also be emailed to the email address listed below.

City and County of Honolulu
Department of Design and Construction
650 S. King Street, 11th Floor
Honolulu, HI 96813

Attention: Haku Milles
Dominic.Milles@honolulu.gov

U.S. Army Corps of Engineers
Honolulu District
230 Otake Street
Fort Shafter, HI 96858-5440
Attention: POH-PPC, Ala Wai
alawai@honolulu.gov

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Executive Summary

ES.1 Introduction

This Draft General Reevaluation Report (GRR) with a Supplemental Environmental Impact Statement (SEIS), subsequently referred to as "Draft GRR/SEIS", has been prepared for the Ala Wai Canal General Reevaluation Study, located on the Island of Oahu, Hawaii. It assesses the risk of flooding in the Ala Wai Watershed and describes a range of potential alternative plans formulated to reduce flood risk, with identification of a tentatively selected plan. It constitutes both a Draft GRR, in accordance with the U.S. Army Corps of Engineers (USACE) planning process, and a Draft Supplemental Environmental Impact Statement (SEIS), as required to comply with both the National Environmental Policy Act (NEPA) and Hawaii Revised Statutes (HRS) Chapter 343. Following public and governmental agency review, the Draft GRR/EIS is finalized and submitted to Headquarters USACE, the Assistant Secretary of the Army for Civil Works (ASA(CW)), and the Office of Management and Budget (OMB) for review and approval. If approved, a Chief of Engineers Report would be sent to Congress recommending authorization of the recommended plan described in the Final GRR/SEIS.

ES.2 Purpose and Need

The purpose of this study is to identify and select a tentative plan that will reduce flood risk within the Ala Wai Watershed given that a high level of flood risk exists within the Ala Wai Watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Manoa, and Palolo valleys. Flooding has occurred within the watershed on multiple occasions, resulting in recorded property damages and health and safety risks. Analyses conducted in support of this study show that the 1% annual exceedance probability (AEP) flood event—an event with a 1% chance of being equaled or exceeded in any given year—affects approximately 3,111 structures with an estimated $905,327,000 in structural damages alone (2023 price levels), not accounting for loss in business income or other similar economic losses. A map of the potential extent of inundation resulting from the 1% AEP flood event is illustrated in Figure ES-1. The Ala Wai watershed has approximately 200,000 residents. The watershed also contains the University of Hawai'i and the Waikiki District—a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state. This Draft GRR/EIS analyzes a series of alternatives designed to reduce the on-going flood risks throughout the Ala Wai watershed, including a no action plan, as well as various combinations of structural, non-structural, and natural and nature-based measures.

Figure ES-1: USACE Inundation Map of 1% AEP Flood Event

ES.3 Plan Formulation

The USACE's planning process is based on the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* promulgated in 1983 (U.S. Water Resources Council 1983). The Principles and Guidelines provide for development of reasonable plans that are responsive to Federal, state, and local concerns. A total of 224 management measures—or actions that can be taken to meet the planning objectives throughout the watershed—were identified by the USACE study team or brought forth by members of the public during public workshops held during the current Ala Wai Canal General Reevaluation Study or the previous feasibility study. All 224 management measures were evaluated and either retained or screened from further consideration prior to alternative formulation. A total of 30 management measures were retained and incorporated into the formulation of alternative plans.

A cornerstone approach to plan formulation was used. The cornerstone approach utilizes a single measure as the starting point for formulating an alternative plan. Subsequently, additional

measures are added which complement the cornerstone measure, and the additional measures are intended to increase both the effectiveness and efficiency of the alternative plan. Formulation of the alternative plan stops once no further measures can be incorporated into the alternative plan which make it more effective and efficient. A total of 9 alternatives were included in the initial array of alternative plans, including a no action plan (Alternative 0) and plans designed to store of floodwaters (Alternative 1), improve conveyance of floodwaters through use of existing infrastructure (Alternative 2A), floodwalls (Alternative 2B), and a 2nd canal outlet (Alternative 2C), diverting floodwaters from the upstream tributaries to the ocean through tunnels (Alternative 3), using natural and nature-based solutions to modify the watershed, (Alternative 4), increasing both storage and conveyance of floodwaters (Alternative 5), and reducing the consequences of flooding through application of nonstructural measures (Alternative 6). Plans included in the initial array were evaluated and reformulated to maximize their efficiency and effectiveness and determine whether they would move forward into the final array of alternatives.

The final array of alternatives consisted of the no action plan (Alternative 0), the storage alternative (Alternative 1), the floodwall conveyance alternative (Alternative 2B), the storage and conveyance hybrid alternative (Alternative 5), and the nonstructural plan (Alternative 6).

ES.4 Tentatively Selected Plan (TSP)

The USACE planning process requires detailed economic analyses (and associated refinements) to ensure that an alternative plan being considered for selection is economically justified, such that no other variation of that plan could be more economically beneficial (i.e., no other variation could better maximize the national economic development (NED) account). Specifically, these analyses include incremental justification (to ensure that each measure included in the alternative is economically justified) and optimization (to ensure that the scale of each measure maximizes benefits). In the case of this project, it was determined that the alternative plans in the final array provided a reasonable basis for evaluation and comparison, and that detailed economic analyses and refinements should only be performed for the higher-ranking alternative identified through the evaluation and comparison process. It was determined that similar analysis and refinements were not needed for the other action alternative in the final array, as they would not affect the relative comparison between the alternatives. Based on this approach, additional detailed economic analyses and design refinements were conducted for Alternative 5. Various increments and refinements were considered (with additional alternative number modifiers added accordingly), leading to identification of Alternative 5.3 as the NED plan. Alternative 5.3 includes floodwalls at Woodlawn Drive along the Manoa Stream, at the confluence of the Manoa and Palolo streams, along the Manoa-Palolo Canal, and along the Ala Wai Canal, as well as a detention basin at the Ala Wai Golf Course. Alternative 5.3 also includes structure elevation and floodproofing of 70 structures to mitigate for induced flooding. Federal policy requires that the NED plan be recommended for implementation unless there are overriding reasons for recommending another plan. The attributes of the NED plan were reviewed relative to the planning objectives, criteria, and engineering standards, and it was determined that there were no overriding reasons that warranted recommendation of another plan, such that the NED Plan was identified as the recommended plan. Alternative 5.3 is also the plan that reasonably maximizes benefits comprehensively in accordance with the established evaluation criteria.

ES.5 Performance of the TSP

The TSP maximizes benefits within the NED, regional economic development (RED), and other social effects (OSE) accounts, having the greatest net economic benefits, regional economic benefits (i.e., labor income and jobs supported), maximizing reductions in life safety risk, and maximizing benefits to socially vulnerable communities and populations. The TSP is the most equitable in terms of flood risk reduction by ensuring socially vulnerable communities experiencing recurring and frequent flooding receive comparable flood risk reduction opportunities as more affluent communities in the watershed.

The TSP will have only minor environmental impacts and is an acceptable plan from an environmental standpoint. Specifically, the recommended plan will not have significant impacts on the environment under the NEPA and will have no effect on federally listed species or designated critical habitat under the ESA. The TSP can be implemented in compliance with all applicable environmental laws and regulations.

ES.6 Costs and Benefits

The estimated first costs of the TSP associated with the structural features are $775 million, and the average annual cost is $29.8 million at an FY23 2.5% discount rate. The average annual costs of nonstructural mitigation are an additional $10.6 million, resulting in a total average annual cost of $40.4 million at an FY23 2.5% discount rate. Average annual net benefits for the TSP with and without the nonstructural mitigation measures are $17.9 million and $22.5 million, respectively. The benefit cost ratio (BCR) for the TSP with and without nonstructural mitigation measures is 1.8 and 1.4, respectively, at an FY23 discount rate of 2.5%.

ES.7 Cost Sharing

The City and County of Honolulu is the non-federal cost-sharing sponsor for all features. Based on October 2023 price levels, the estimated first costs of the TSP, including application of nonstructural mitigation measures for induced flooding, are $1.075 billion. The cost share apportionment is 65% Federal and 35% non-federal, therefore, the federal portion of the estimated first cost is $698,472,000 and the non-federal sponsor portion is $376,101,000. The non-Federal sponsor would provide all lands, easements, rights-of-way, relocations, and suitable borrow and disposal areas and would also assume responsibility for operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The estimated average annual OMRR&R cost is $359,000. The non-federal sponsor will continue to participate in and comply with applicable federal floodplain management and flood insurance programs.

ES.8 Environmental Impacts and Environmental Commitments

The TSP is the proposed action. The TSP is made up of measures, also referred to as project features, to minimize the extent of flooding within the Ala Wai watershed during frequent storm events.

The project footprint encompasses the physical location of the proposed action and all included measures, either individually or collectively, which includes the Ala Wai Canal and Manoa-Palolo Canal and portions of adjacent uplands along these areas as well as upland areas along Manoa Stream (Woodlawn Drive floodwall) and the Manoa and Palolo streams (Koali Road floodwall) that will be impacted to facilitate construction associated with the TSP shown in Figure 31: Conceptual Diagram of Alternative 5.3.

Action area includes the project footprint and areas outside of the the project footprint where indirect impacts from construction or implementation of the TSP could occur as well as the

marine aquatic habitat in the Ala Wai Small Boat Harbor and the marine aquatic habitat within 1,640 feet (500 meters) of the mouth of the Ala Wai Small Boat Harbor.

For less frequent storm events such as the 0.2% AEP flood event—an event with a .2% chance of being equaled or exceeded in any given year—project features induce flooding for some properties that do not already experience floodingunder the existing condition. Therefore, mitigation measures would be implemented to minimize the impacts of induced flooding from the proposed project. Potential nonstructural mitigation measures that could be applied include dry/wet floodproofing, elevation, and acquisition. In addition to nonstructural mitigation measures, it is possible that additional analyses during the pre-engineering and design (PED) phase could identify structural mitigation measures not currently included in the TSP, such as pump station(s), as being required to mitigate induced flooding.

Preliminary analyses undertaken during the development of alternative plans indicate expected technical challenges and inefficiencies associated with utilizing pumps for reducing induced flooding. Therefore, the current mitigation analysis excludes pump stations and focuses on potential application of nonstructural measures. Additional analysis would be conducted during PED to determine the precise number and location of structures recommended for dry/wet floodproofing, elevation, or acquisition, as well as to reconsider other structural mitigation measures, as appropriate. Supplemental NEPA analysis and coordination would be conducted in subsequent phases of the project, as appropriate, to ensure proper consideration is given to required mitigation actions.

Construction of the project would take approximately four years. All construction activities would comply with the City of Honolulu noise ordinance established by the State of Hawaii Department of Health (Noise Section). However, the use of certain pieces of construction equipment required for the project would create substantially increased levels of noise and vibration temporarily. To minimize these impacts, USACE would obtain an approved community noise permit from the City of Honolulu. In addition the following environmental commitments would be implemented to further minimize short-term adverse effects to noise and vibration levels within the action area: 1) use of appropriate level of sound attenuation during construction to meet local ordinances; 2) provide residents and businesses near the project footprint advance notice of project activities, schedule, anticipated traffic, and potential noise issues; 3) space apart haul trucks operating near sensitive receptors to avoid noise effects from simultaneous operation; 4) prohibit use of engineer brake (jake brake) within city limits; and 5) have the contractor properly maintain and tune engines of all equipment and maintain properly functioning mufflers on all internal combustion engines to minimize noise levels.

The proposed project is not expected to have direct adverse impacts on federally listed species; however, the project could have indirect adverse impacts. Therefore, to minimize potential adverse impacts to federally threatened and endangered species the following environmental measures would be implemented to 1) avoid and minimize potential project impacts to Hawaiian hoary bat, 2) avoid and minimize potential project impacts to Hawaiian seabirds, 3) avoid and minimize potential project impacts to Hawaiian waterbirds, and 4) avoid and minimize potential project impacts to green sea turtle, hawksbill sea turtle, and Hawaiian monk seal. For details regarding the avoidance and minimization measures briefly listed above refer to Section 3.4 of the main IFR/EIS.

Based on the studies conducted to date, it was determined that construction and operation of the proposed project could impact historic properties within the Direct Area of Potential Effect

(APE). Potential impacts include modifications that may affect the integrity and/or characteristic of historic properties. The following environmental commitments would be implemented to minimize adverse impacts to cultural resources: 1) historic buildings, bridges, and walls affected by construction would undergo appropriate historic documentation, and design input would be solicited from State Historic and Preservation Office (SHPO) and interested consulting parties and incorporated into the final design where feasible; 2) design input to minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated as feasible, into the final design and construction of floodwalls; 3) if previously unknown cultural resources are discovered, work in the immediate area would cease until the requirements in 36 CFR 800.13 are complied with; and 4) design input to further minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated as feasible, into the final design and construction of the floodwalls around the Ala Wai Canal. For additional details on the above environmental commitments refer to Section 3.5.1 of the main IFR/SEIS.

The proposed project includes mitigation measures for induced flooding as a result of project features. The implementation of nonstructural mitigation measures, primarily elevation of residential structures, would have potentially adverse impacts on land use and planning. Therefore, the following environmental commitments would be implemented to minimize adverse impacts to land use and planning: 1) phase construction to ensure there is adequate temporary housing available due to scarcity of housing in the area, and 2) simultaneously implement nonstructural measures for whole blocks or streets of residences so that construction windows within neighborhoods can be minimized.

The proposed project includes floodwalls that range in height from six to nine feet. This would result in the floodwalls becoming permanent landscape features. The floodwalls would typically be dominant and often only somewhat compatible to the action area being a coastal landscape commonly holding panoramic views of water. The floodwalls, being an enclosure by design, would often block views and become a dominant feature in a now enclosed landscape. Therefore, the floodwalls are characterized as only somewhat compatible because in many places they disrupt the current harmony with the coastal landform, causing the broad and open experience currently available to be lost. Therefore, the following environmental commitment being implemented for adverse impacts to cultural resources, would also be implemented for adverse impacts to visual and aesthetic resources: design input to further minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated as feasible, into the final design and construction of the floodwalls around the Ala Wai Canal.

During construction of the proposed project there would be potential significant adverse impacts to traffic and transportation due to the presence of construction vehicles. Specific impacts that could occur are: increased traffic congestion and/or reduce circulation when hauling trucks are present; increased degradation of existing pavement/condition of roadways from heavy construction vehicles and equipment; decreased driver safety because of reduced sight-distance or increased visual hazards associated with construction vehicles; temporary changes in access to businesses, residences, or public facilities; and temporary reduction in availability of public on-street parking. To reduce significant adverse impacts during construction to less than significant the following environmental commitment would be implemented: require the construction contractor to prepare and implement a Transportation Management Plan. For additional details on measures to be included in a Transportation Management Plan refer to Section 3.5.8.

Soil classes present in the project footprint range from soils least susceptible to seismic amplification (i.e.,least susceptible to liquefaction) to soils most susceptible to seismic amplification. (i.e., most susceptible to liquefaction). To minimize potential impacts to proposed project features, design of the proposed project would follow seismic design requirements which would provide structural stability and would further reduce potential adverse impacts.

All other resource categories not listed above would experience either no impacts, negligible, or minor adverse impacts that would not require the implementation of environmental commitments. Best management practices would be implemented, however, to minimize negligible and minor adverse impacts as feasible.

ES.9 Plan Implementation

The implementation plan is still being developed by the project delivery team. The non-Federal sponsor supports this project.

ES.10 Views of the Public, Agencies, Stakeholders, and Tribes

A significant number of stakeholder and agency meetings and other public involvement efforts have been conducted throughout the planning process to-date. In general, the timing and focus of these events has been determined in response to project-related needs and stakeholder interests and desires. A wide range of input has been provided as part of the various public and agency meetings held to date. In general, stakeholders have expressed support for the project and emphasized the need for near-term action to reduce the risk of flooding. Concerns have been raised relative to the non-federal sponsor's ability to fund and maintain the project, as well as potential impacts of the project (particularly those associated with visual, cultural and recreational resources), and acquisition of private property.

ES.11 Reviews

No documented reviews have been conducted. The first technical District Quality Control (DQC) review will begin on October 02, 2023.

ES.12 Areas of Known or Expected Controversy

NEPA requires identification of issues of known controversy that have been raised in the scoping process and throughout the development of the study. The following issues were identified as a result of public scoping, stakeholder engagement, and environmental review.

Impacts to Cultural and Aesthetic Resources: Waikiki is a scenic tourist destination with a high concentration of historic and cultural resources. The construction of six-to-nine-foot floodwalls would change views of the water from land and conversely of the cityscape from the water. The assessment of effects and potential mitigation measures will continue into the PED phase.

Opportunity for Nature Based Solutions: Public input and agency input has conveyed a preference for natural and nature-based features (NNBF) or green solutions to address flooding as opposed or in addition to traditional structural solutions. Some nature-based features were identified as feasible; however, none could be shown to reasonably reduce riverine flooding.

Property Acquisition: In some cases, permanent property acquisition would potentially be needed due to induced flooding from project features. Efforts have been made to minimize the need for acquisition. Temporary construction easements would be required for construction staging and equipment access. Temporary restrictions on access to private property may also be necessary. Flowage easements would also be required in some areas. Specific property

acquisition requirements have not been identified at this time.

Chapter 1: Introduction

5.6 Introduction

The Ala Wai Watershed is located on the southeastern side of the island of Oahu, Hawaii, and includes Makiki, Manoa, and Palolo streams, all of which drain to the Ala Wai Canal. The Canal is a 2-mile-long waterway constructed during the 1920s to drain extensive coastal wetlands, thus allowing development of the Waikiki District. A large portion of the watershed, including most of Waikiki, is highly susceptible to flooding.

This Draft General Reevaluation Report (GRR) with a Supplemental Environmental Impact Statement (SEIS), subsequently referred to as "Draft GRR/SEIS", has been prepared for the Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii. This current study is also referred to as the Ala Wai Canal General Reevaluation Study. It assesses the risk of flooding in the Ala Wai Watershed and describes a range of potential alternative plans formulated to reduce flood risk, with identification of a tentatively selected plan. This document constitutes both a Draft GRR, in accordance with the U.S. Army Corps of Engineers (USACE) planning process, and a Draft Supplemental Environmental Impact Statement (SEIS), as required to comply with both the National Environmental Policy Act (NEPA) and Hawaii Revised Statutes (HRS) Chapter 343. Following public and governmental agency review, the Draft GRR/EIS is finalized and submitted to Headquarters USACE, the Assistant Secretary of the Army for Civil Works (ASA(CW)), and the Office of Management and Budget (OMB) for review and approval. If approved, a Chief of Engineers Report would be sent to Congress recommending authorization of the recommended plan described in the Final GRR/SEIS.

This Draft GRR/SEIS was prepared by USACE in close coordination with the City and County of Honolulu—the non-federal sponsor for the Ala Wai Canal General Reevaluation Study. The Ala Wai Canal General Reevaluation Study represents a congressionally authorized opportunity to reevaluate the outcome of the Ala Wai Canal Flood Risk Management Study, O'ahu, Hawaii, which was completed in 2017. Additional information on the history of this effort is provided below in Section 1.5.

1.2 USACE Planning Process

In February (Walsh 2012a) and March (Walsh 2012b) 2012, two planning memoranda were issued that collectively revised USACE's approach to planning studies and emphasized risk-based decision-making and early vertical team, commonly known as leadership chain, engagement during the study. The new process is called Specific, Measurable, Attainable, Risk Informed, and Timely (SMART) Planning, and is derived from the Principles and Guidelines and the USACE Planning Guidance Notebook (Engineering Regulation (E.R.) 1105-2-200). With SMART Planning, a study still works progressively through the six-step planning process, including: 1- identification of the problems and opportunities related to flood risk management; 2- inventorying and forecasting existing and expected conditions; 3- formulating alternative flood risk management plans; 4- evaluating the effects of each alternative plan; 5- comparing the alternative plans to one another; and 6- identifying a tentatively selected plan. This Draft GRR/SEIS uses this six-step planning process as a roadmap for description of the overall study process.

1.3 Study Authority

The Ala Wai Canal General Reevaluation Study was authorized by Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970 (Public Law 91-611), as amended. Section 209 is a general study authority that authorizes surveys of harbors and rivers in Hawaii. The applicable portion of Section 209 states:

> "The Secretary of the Army is hereby authorized and directed to cause surveys for flood control and allied purposes including channel and major drainage improvements, and floods aggravated by or due to wind or tidal effects, to be made under the direction of the Chief of Engineers, in drainage areas of the United States and its territorial possessions, which include the following named localities: *Provided*, That after the regular or formal reports made on any survey are submitted to Congress, no supplemental or additional report or estimate shall be made unless authorized by law except that the Secretary of the Army may cause a review of any examination or survey to be made and a report submitted to Congress, if such review is required by the national defense or by changed physical or economic conditions: *Provided further*, That the Government shall not be deemed to have entered upon any project for the improvement of any waterway or harbor mentioned in this title until the project for the proposed work shall have been adopted by law: Harbors and rivers in Hawaii, with a view to determining the advisability of improvements in the interest of navigation, flood control, hydroelectric power development, water supply and other beneficial water uses, and related land resources."

This study was appropriated under the Supplemental Appropriations of the Bipartisan Budget Act of 2018 (Public Law 115-123), dated 9 February 2018, which funded initiation and/or completion of previously authorized flood and storm damage reduction studies.

1.4 Study Area

The Ala Wai Watershed is located on the southeastern side of the island of Oahu, Hawaii. The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Ko'olau Mountains to the nearshore waters of Mamala Bay (Figure 1). It includes the Makiki, Manoa, and Palolo streams, which flow to the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands. The construction and subsequent draining allowed the development of the Waikiki District.

The study area is the Ala Wai watershed, shown in Figure 1. The study area is comprised of 14 damage reaches, the delineation of each being informed by the hydrology and hydraulics of the watershed and intended to group structures appropriately for modeling and benefit evaluation. Figure 2 displays a map of the study area's 14 damage reaches.

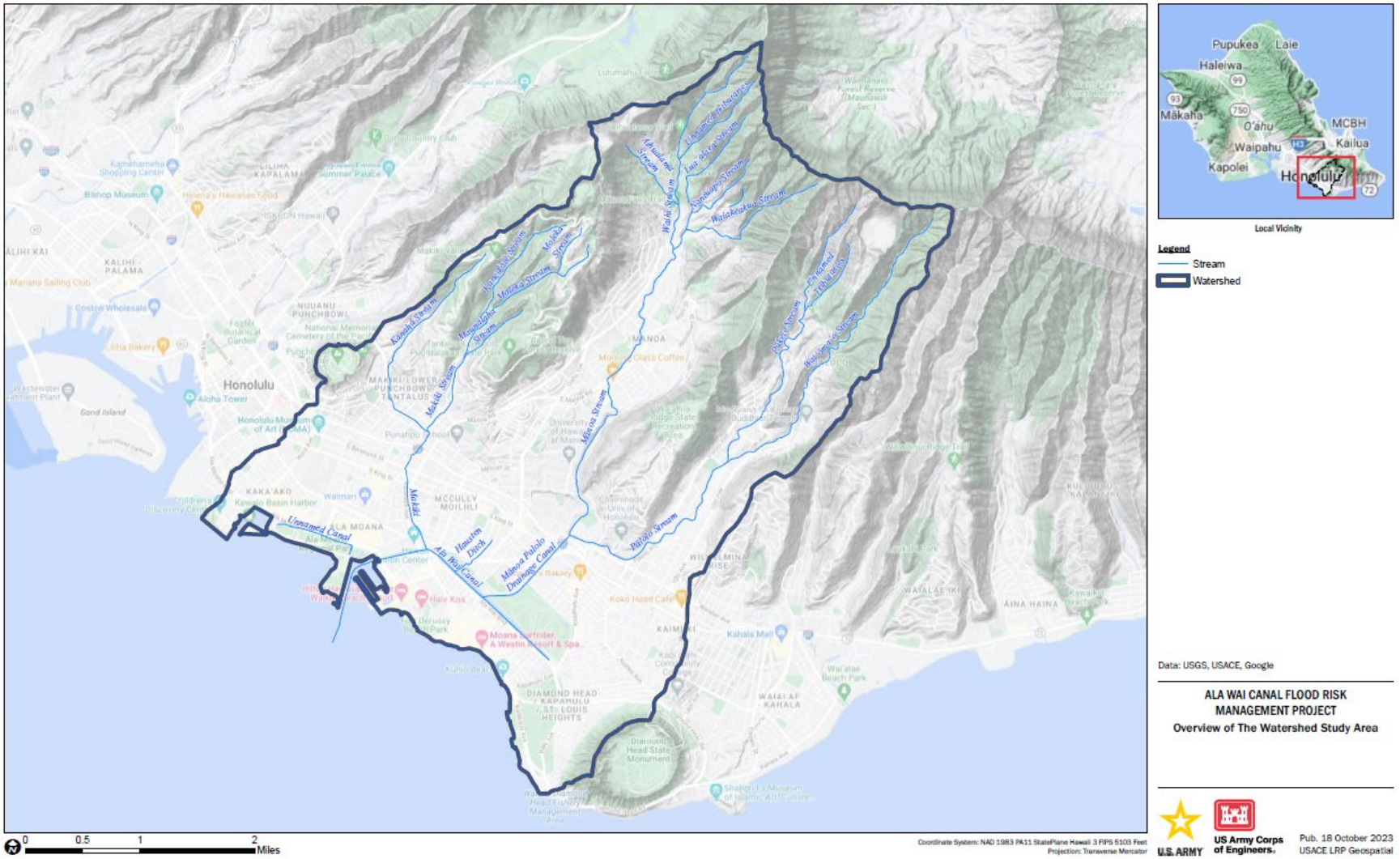

Figure 1: Ala Wai Watershed.

Figure 2: Damage Reach Map.

1.5 Background and History

The Ala Wai Canal General Reevaluation Study represents a congressionally authorized opportunity to reevaluate the outcome of the Ala Wai Canal Flood Risk Management Feasibility Study, O'ahu, Hawaii, which was initiated in April 1999 in response to a request from the Hawaii Department of Land and Natural Resources (DLNR). At that time, federal, state, and local agencies sought a comprehensive management and restoration plan to restore aquatic habitat and biological diversity in the Canal and upstream tributaries. An initial reconnaissance report was submitted in August 1999 recommending that USACE assist the State with restoration of the Canal. Approval by USACE for continuation into the feasibility phase was granted in September 1999.

Independently, a separate study referred to as the Ala Wai Flood Study was initiated in September 1998 under the Planning Assistance to States (PAS) Program (Section 22 of the Water Resources Development Act [WRDA] of 1974) to determine the potential flood risk to the Waikiki area, in response to a request by the DLNR Land Division. The Ala Wai Flood Study was completed in October 2001 and documented flood risks associated with potential

overtopping of the Ala Wai Canal. This study identified several mitigation measures and conceptual alternatives that could potentially minimize flood damages to Waikiki and surrounding areas. Subsequently, a flood risk management objective was added to the Ala Wai Canal Flood Risk Management Feasibility Study, expanding the project focus to both ecosystem restoration and flood risk management in the Canal area.

A Feasibility Cost Share Agreement (FCSA) for the Ala Wai Canal Flood Risk Management Feasibility Study was executed between USACE and the DLNR Engineering Division in 2001. In October 2004, during the initial phases of the Ala Wai Canal Flood Risk Management Feasibility Study, heavy rains caused Manoa Stream to overtop its banks, resulting in significant damages. In response, the USACE temporarily ceased work on the feasibility study, such that the project could be expanded to include the upstream portions of the Ala Wai Watershed. While the FCSA was being amended to address a more comprehensive scope, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) received federal funds to identify specific actions to address flooding in Manoa Valley. The USDA NRCS effort—referred to as the Manoa Watershed Project—was initiated in 2006 and resulted in detailed topographic mapping, hydrologic and hydraulic modeling, and identification of potential measures to address specific flood problems. Insufficient federal funding led to termination of the Manoa Watershed Project prior to implementation. However, information developed through the Manoa Watershed Project was subsequently incorporated into the Ala Wai Canal Flood Risk Management Feasibility Study, which was restarted in 2007. At this time, efforts were primarily focused on bringing the technical information for the entire watershed up to the same level of detail as produced for Manoa under the Manoa Watershed Project.

In October 2012, a charrette was held to re-scope the study as part of the USACE Civil Works Planning Modernization process. The purpose of the charrette was to bring together the Ala Wai Canal Flood Risk Management Feasibility Study team, USACE Pacific Ocean Division and Headquarters staff, the non-federal sponsor, and other cooperating agencies to determine a path forward for completing the feasibility study in compliance with current USACE planning requirements. Key outcomes of the charrette included consensus on the problems and opportunities, objectives and constraints, screening and decision criteria, the initial array of alternatives, and a framework for identification of the recommended plan. Based on the project review at the charrette, ecosystem restoration was eliminated as a study objective, as it was determined that the biological resources within the watershed do not have enough national significance to adequately justify ecosystem restoration as an objective. However, ecosystem-related information previously identified as part of the Ala Wai Canal Flood Risk Management Feasibility Study was incorporated where possible as part of environmentally sustainable design considerations, particularly as related to maintaining habitats and migratory pathways for native aquatic species.

The Ala Wai Canal Flood Risk Management Feasibility Study was completed in 2017, resulting in a Chief's Report recommending a project that was authorized and funded for design and construction in 2018. A 2020 Engineering Documentation Report provided the technical basis for modifications necessary to ensure the authorized project functioned as intended. However, the *Ala Wai Flood Risk Management Project, Honolulu, Hawaii* Validation Report, dated March 25, 2021, found that the modifications in the 2020 Engineering Documentation Report were not cost effective and lacked the economic justification necessary for continued federal involvement. The current Ala Wai Canal General Reevaluation Study allows the project team to reevaluate whether a federal project for managing flood risk within the Ala Wai Watershed is feasible.

1.6 Purpose and Need

A high level of flood risk exists within the Ala Wai Watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) and aging and undersized infrastructure result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Manoa, and Palolo valleys. The population density within the Ala Wai watershed, with approximately 200,000 residents. The watershed also contains the University of Hawaii and the Waikiki District—a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state.

Flooding has occurred within the watershed on multiple occasions, resulting in recorded property damages and health and safety risks. Overtopping of the Ala Wai Canal has previously flooded areas adjacent to the canal multiple times, including November 1965 and December 1967 storms and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by several recent events, including the October 2004 storm that flooded the Manoa Valley and the March 2006 storm that flooded Makiki. The October 2004 event was estimated to be a 4% annual exceedance probability (AEP) flood event—an event with a 4% chance of being equaled or exceeded in any given year— and caused more than $85M in damages. Analyses conducted in support of this project show that the 1% AEP flood event affects approximately 3,111 structures with an estimated $905,327,000 in structural damages alone (2023 price levels), not accounting for loss in business income or other similar economic losses. This Draft GRR/SEIS analyzes a series of preliminary alternatives designed to reduce the on-going flood risks throughout the Ala Wai watershed, including a no action plan, as well as various combinations of structural, non-structural, and natural and nature-based measures.

1.7 Problems and Opportunities

Two main problems that encompass numerous sub-problems were identified:

- Elevated life risk resulting from riverine flooding along Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal.
    - Elevated life risk to individuals living, working, and visiting areas within the floodplain.
    - Elevated life risk due to the flashy nature of flooding within the watershed and the resulting limited time for warning and evacuation.
    - Elevated life risk resulting from exposure to contaminated floodwaters.
    - Elevated life risk due to inundation of critical facilities.
    - Elevated life risk due to inundation of transportation infrastructure, including access and egress from the watershed, isolation of residents and/or communities, and inundation of occupied vehicles.
- Economic damages resulting from riverine flooding along Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal.
    - Damage to residential and commercial structures and public infrastructure.
    - Impacts to the local economy through disruption of commerce and tourism.
    - Economic damages associated with traffic delays and detours.

Opportunities identified during the charrette were broken down into federal and local opportunities as described below.

Federal opportunities
- Educate the public/stakeholders on current and future flood risks.
- Protect and preserve historical sites and cultural resources throughout the watershed.
- Increase resiliency of communities by managing current and future flood risks.
- Improved ecological conditions through actions that improve habitat and water quality.
- Potential to provide and/or improve recreational opportunities.
- Improved ecosystem services and community relationships with water.
- Reduced life risk throughout the watershed, particularly socially vulnerable populations.
- Reduced economic damages associated with disruptions to commerce and tourism.
- Reduced economic and life safety impacts due to inundation of transportation infrastructure.
- Opportunity to engage with broad stakeholder groups regarding flood risk management desires and opportunities.

Local opportunities
- Opportunity to learn needed climate resilience practices that can be applied in other watersheds and neighborhoods.
- Opportunity to set the stage for additional capital projects.
- Decreased flood insurance costs.

1.8 Objectives and Constraints

An initial scoping charrette held on July 27-30, 2021, that included members of the USACE study team and representatives from the local sponsor and other key stakeholders resulted in the development of the following problems, opportunities, objectives, and constraints.

The following study objectives were developed to provide a means of determining whether project alternatives can address identified problems while maximizing the potential to realize identified opportunities:
- Reduce risks to life and safety associated with direct inundation of structures (residential, non-residential, and critical facilities) and transportation infrastructure due to riverine flooding along Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal over the period of analysis.
- Reduce economic damages associated with direct inundation of structures (residential, non-residential, and critical facilities) & public infrastructure due to riverine flooding along Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal over the period of analysis.
- Reduce economic impacts associated with disruption of commerce and tourism due to riverine flooding along Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal over the period of analysis.

The following constraints (i.e., restrictions that limit the planning process) were identified:
- Inducing further development within the floodplain cannot be included as a goal of the project.

Additional considerations include:
- Presence of protected species and critical habitats throughout the watershed.
- The upper portion of the watershed is zoned as a Conservation District, which is intended to protect natural and cultural resources, including the island's aquifer.
- Real estate costs and limited availability of available real estate may limit feasibility of certain measures.

- Strong cultural ties to the environment and natural resources may affect the acceptability of certain management measures.
- Varied property ownership throughout the watershed (e.g., state or city/county owned but encumbered by a5omple or executive order).
- Private ownership of streambeds represents an important real estate consideration.
- Groundwater influence and high water table may affect applicability of certain measures.
- Potential seismic considerations may influence applicability of certain measures.
- Sea level rise and climate change will likely alter future flood risk.
- Dense development in the lower portions of the watershed may limit the implementability of certain measures.
- Large number of engaged stakeholder groups with potentially competing objectives and desires.
- Potential solutions could have significant impacts on local and regional economy.
- Per Engineer Regulation 1105-2-100, mitigation should be investigated and recommended to address induced flooding when economically justified or if there are overriding reasons of safety, economic or social concerns, or a determination of a real estate takings has been made.

1.9 Study Scope

The study will examine flood risk reduction measures related to inland riverine flooding in the Ala Wai Watershed. This study will not examine coastal storm risk management measures.

Chapter 2: Plan Formulation and Evaluation

2.1 Planning Framework

The USACE's planning process is based on the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* promulgated in 1983 (U.S. Water Resources Council 1983). The Principles and Guidelines provide for development of reasonable plans that are responsive to federal, state, and local concerns. Planning project benefits are quantified in this process as National Economic Development (NED) output, National Ecosystem Restoration (NER) output, or a combination of NED/NER output.

2.2 Assumptions

The following assumptions underpin the development, evaluation, and comparison of alternative flood risk management plans:

- Engineering and economics model outputs created as part of the 2017 engineering documentation report are sufficient to inform the initial development and assessment of flood risk management measures.
- A full interior drainage analysis will be completed during the PED phase. Thus, modifications to the recommended plan could be required during PED based on the outcome of those analyses.
- Efforts to address potential induced flooding were undertaken in accordance with USACE policy and guidance, which directs development of mitigation when economically justified, if there are overriding reasons of safety, economic, or social concerns, and/or if a determination of a real estate taking has been made. The study team acknowledges that recent case law regarding what level of induced flooding constitutes a takings may change how USACE interprets and implements policy regarding induced flooding and will include those potential risks in discussions and analyses moving forward.

2.3 Management Measures

A total of 224 management measures—or actions that can be taken to meet the planning objectives throughout the watershed—were identified by the USACE study team or brought forth by members of the public during public workshops held during the current Ala Wai Canal General Reevaluation Study or the previous feasibility study. The main management categories and associated descriptions, comprising the 224 management measures which were assessed, are provided in Table 1. Management measure types were categorized as follows:

- Structural (S) Measures: Measures that reduce or avoid damages by modifying the nature and/or extent of the flood hazard.
- Nonstructural (NS) Measures: Measures that reduce or avoid damages by modifying the consequences of the flood hazard.
- Natural and Nature-Based (NNB): Measures that alter, restore, use, or mimic natural landscape features or processes to manage flood risk.

The total number of management measures in each category are also provided in Table 1.

Table 1: Management Measure Categories.

Category	Description	Type	No.
Bridge Modification	Modify bridges identified as choke points on tributaries to increase capacity and reduce risk of adjacent inundation.	S	4

Category	Description	Type	No.
Bypass	Construction of a channel bypass to divert floodwaters away from a damage center or problem area, discharging back into the same drainage. Channel bypasses could be above or below ground, including large-scale tunnels or conduits.	S	44
Channel Modification	Widening, deepening, and/or lining of the channel to increase capacity and conveyance and prevent overtopping. Modification could occur along the tributaries, as well as the Ala Wai Canal.	S	20
Pumps	Construction of interior pumping stations to increase the rate at which floodwaters drain, reducing inundation extents and durations.	S	9
Debris Management	Measures designed to strategically capture debris during high-flow events to reduce downstream risks (e.g., direct damage and blockage/altered hydraulics).	S	11
Detention	Detention basins to store water either on (online) or off (offline) the stream network during high-flow events. Offline detention could be above ground within existing open space and/or underground.	S	58
Floodwall/Levee	Construction of a floodwall or levee along the Ala Wai Canal (i.e., construction of new floodwall or raising of existing canal walls) or its tributaries to reduce risk of inundation in adjacent areas. Floodwalls and levees could be integrated into more aesthetic, park-like features.	S	14
Gates	Control structures within or at the outlet of the Ala Wai Canal to permit lowering the water level and increasing storage and/or controlling tidal and storm surge influence. Also includes flap gates on existing drainage systems.	S	6
Grade Control Structure	Construction of grade control structures (e.g., weirs, stilling basin) to slow water velocities in the tributaries, reducing peak flows downstream and decreasing erosion and sediment.	S	6
Other	Structural measures that do not fit cleanly into more common management measure types.	S	3
Nonstructural	Physical (e.g., acquisition and relocation, floodproofing, and elevation) and nonphysical (e.g., flood warning system, risk communication, education, and planning) measures.	NS	10
Reforestation	Actions taken to protect, preserve, manage, and restore natural resources at the watershed scale (e.g., reforestation and restoring native vegetation) that restore natural process and reduce flood risk.	NNB	8
Water Quality	Measures, such as filter strips, that could be implemented in coordination with other flood risk management measures to improve water quality, as permitted by USACE policy.	NNB	4

Category	Description	Type	No.
Wetland/Floodplain	Creation or restoration of wetlands, riparian areas, and floodplains within available open space to store and dissipate flood waters.	NNB	11
Channel Naturalization	The process of restoring the geomorphic characteristics of natural stream channels, such as geometry, access to adjacent floodplains, and meanders, to increase the natural capacity of the river and reduce flood risk. This measure could also include restoring the natural stream bed and daylighting.	NNB	6
Impervious Surface Reduction	Reduce impervious surfaces and increase pervious surfaces (e.g., pervious pavement, green roofs) to reduce runoff and promote infiltration.	NNB	9
No Action	No measures would be implemented by the federal government to achieve the planning objectives.	NA	1

All 224 management measures were evaluated and either retained or screened from further consideration prior to alternative formulation. Management measure screening was conducted in two phases. Phase 1 involved a high-level assessment of engineering feasibility and policy compliance. Measures remaining after Phase 1 screening were then tiered to prioritize additional analyses and maximize analytical efficiency. Phase 2 screening criteria, descriptions, and metrics are provided below in Table 2. When possible, existing data were used for screening during Phase 2.

Table 2: Screening Criteria for Management Measures.

Criteria	Description	Metric(s)
Efficiency	Cost effectiveness—comparison of economic benefits and project costs.	Semi-quantitative – comparison of preliminary costs and expected benefits
Effectiveness (Damages Reduced)	Damages to buildings, related contents, and vehicles.	Semi-quantitative – expected benefits based on previous study iterations
Effectiveness (Life Safety)	Changes in life safety risk expected with alternative implementation.	Semi-quantitative – expected benefits based anticipated water surface elevation reductions.
Acceptability	The viability and appropriateness of an alternative from the perspective of the nation's general public and consistency with existing federal laws, authorities, and public policies.	Qualitative – Description
Environmental Effects	Effects to aquatic (stream, wetland) and terrestrial (riparian, upland) habitats, water quality, and threatened/endangered species	Qualitative – Low, medium, high based on footprint of each alternative.

Screening results for all measures are provided in the management measures tracking spreadsheet which can be found on the City & County of Honolulu's website (https://www.honolulu.gov/alawai/resources.html) and it is also provided in the Plan Formulation Appendix (Appendix A) for this report.

2.4 Arrays of Alternatives

The names and descriptions of the 30 management measures incorporated into the formulation of alternative plans is provided in Table 3.

A cornerstone approach, also known as the first added plan formulation approach, was used to formulate alternative flood risk management plans. The cornerstone approach utilizes a single measure as the starting point for formulating an alternative plan. Subsequently, additional measures are added which complement the cornerstone measure and the additional measures are intended to increase both the effectiveness and efficiency of the alternative plan. Formulation of the alternative plan stops once no further measures can be incorporated into the alternative plan which make it more effective and efficient. Table 3 provides the outcome of the initial plan formulation process, indicating whether each measure was included in each alternative (Y=yes) within the initial array and whether it was included as a cornerstone (C=cornerstone). The description and each measure type (S=structural; NS=nonstructural; NNB=natural and natures based; NA=not applicable) are also provided.

Table 3: Management Measures Used in Formulation of Alternative Plans

	Inclusion in at Least 1 Iteration of Plan Formulation										
Name	**0**	**1**	**2A**	**2B**	**2C**	**3**	**4**	**5**	**6**	**Description**	**Type**
Ala Wai Canal Floodwall		Y	Y	C	Y	Y	Y	C		Floodwall system along the Ala Wai Canal that may extend up the Manoa-Palolo Canal and Makiki.	S
Ala Wai Canal Tunnel (2nd Outlet)				Y						Eastern end of canal will be extended via subsurface tunnel as a second outlet to the ocean.	S
Ala Wai Golf Course Detention		C				Y	Y	Y		Design the Ala Wai Golf Course to include berm features for increased storage near the canal.	S
Daylight Ala Wai Canal (2nd Outlet)					C					Eastern end of canal will be extended via daylighting as a second outlet to the ocean.	S
Dredge Ala Wai Canal			Y	Y				Y		Ala Wai Canal will be dredged to its design depth or acceptable level of dredging, considering environmental impacts, stability, and structural integrity.	S
Dredge Manoa-Palolo Canal			Y	Y			Y			Dredge Manoa-Palolo Canal to increase storage and conveyance from Palolo and Manoa.	S
Kaimuki High School Berm / Floodwall		Y					Y			Extension of the Ala Wai Canal floodwall adjacent to/in the playing fields of the Kaimuki High School.	S
Kanaha Floodwall		Y	Y	C	Y		Y	Y		Floodwall on the Kanaha Stream where water jumps bank and flows towards Ala Moana.	S
Kapiolani Park Detention Basin		Y								Divert water to Kapiolani Park for additional flood storage.	S
Koali Road Floodwall		Y	Y	C	Y		Y	Y		Floodwall along the Manoa and Palolo Streams along Koali Rd, downstream of Kanewai Park.	S
Makiki District Park Detention		C		Y	Y		Y	Y		Makiki District Park multi-purpose detention pond.	S
Makiki Tunnel						C				Subsurface tunnel diverting water from the headwaters	S

	Inclusion in at Least 1 Iteration of Plan Formulation										
Name	**0**	**1**	**2A**	**2B**	**2C**	**3**	**4**	**5**	**6**	**Description**	**Type**
										of the Makiki Stream to the harbor/ocean.	
Manoa Valley District Park Detention		C	Y				Y	C		Manoa Valley District Park multi-purpose detention pond.	S
Waikiki Bypass			C	Y						Utilize existing storm sewer system or add bypasses from the Ala Wai Canal to the ocean.	S
Paki Ave Bypass			C							Utilize existing storm sewer system along Paki Ave as a bypass for Ala Wai Canal waters.	S
Palolo Channel Modification			Y				Y	Y		Deepen or widen channel to provide more within-bank storage.	S
Palolo Culverts			C							Bypass from Palolo Stream along Kapahulu Ave to Waikiki Wall outfall by upgrading existing storm sewer infrastructure.	S
Palolo Valley District Park Detention		Y					Y			Palolo Valley District Park multi-purpose detention pond.	S
Piikoi Street Bypass			C			Y	Y	Y		Bypass from Kanaha Stream down Piikoi Street to Ala Moana Park by upgrading/utilizing existing storm sewer infrastructure.	S
Pumps/other structures		Y	Y	Y	Y	Y	Y	Y		Pumps and other structures, such as flap gates, to mitigate interior drainage impacts of other measures.	S
SWIFT Tunnel (Manoa)						C				Subsurface tunnel diverting water from the headwaters of the Manoa Stream to the harbor/ocean.	S
SWIFT Tunnel (Palolo)						C				Subsurface tunnel diverting water from the headwaters of the Palolo Stream to the harbor/ocean.	S
Woodlawn Drive Floodwall		Y	Y	C	Y	Y	Y	Y		Floodwall along Manoa Stream at Woodlawn Drive bridge.	S

	Inclusion in at Least 1 Iteration of Plan Formulation										
Name	**0**	**1**	**2A**	**2B**	**2C**	**3**	**4**	**5**	**6**	**Description**	**Type**
Woodlawn Bridge Modification		Y								Modify the bridge at Woodlawn Drive to increase conveyance.	S
Woodlawn Channel Modification		Y			Y		Y	Y		Channel modification along Manoa Stream near Woodlawn Drive bridge.	S
Woodlawn Drive Bypass		Y	C	Y			Y	C		Bypass of Manoa Stream at Woodlawn Drive by constructing new inlet and upgrading/utilizing existing storm water infrastructure.	S
Nonstructural Measures		Y	Y	Y	Y	Y	Y	Y	Y	Physical (e.g., acquisition and relocation, floodproofing, and elevation) and nonphysical (e.g., flood warning system, risk communication, education, and planning) measures.	NS
Watershed Management							C			Removing invasive species and replanting with native species; controlling ungulates to reduce destruction of vegetation; and reducing impervious surfaces.	NNB
Daylight Makiki Stream		Y	Y				Y			Increasing conveyance and reducing restrictions along Makiki Stream by daylighting.	NNB
No Action	Y									No federal action.	NA

A summary of screening results for the final iteration of each alternative are provided in Table 4. A full description and evaluation of all iterations for each alternative is presented in the Plan Formulation Appendix.

Table 4: Evaluation Summary of the Initial Array of Alternatives.

Alt.	Effic.	Effect. (Damages)	Effect. (Lif. Saf.)	Effect. (Comm./Tour.	Accept.	Env.	Comp.
0	No	No	No	No	No	No	Positive
1	Positive	Positive	Positive	Positive	No	Positive	Positive
2A	Negative	Negative	Negative	Negative	No	No	Positive
2B	Positive	Positive	Positive	Positive	No	No	Positive
2C	Negative	No	No	Negative	No	Negative	Positive
3	Negative	No	No	No	No	Negative	Positive
4	Negative	Negative	Negative	Negative	Positive	Positive	Positive
5	Positive	Positive	Positive	Positive	No	No	Positive
6	Positive	Positive	No	Positive	No	Positive	Positive

The rationale for screening or retaining alternatives is provided below:

Alternative 0. No Action Plan. USACE planning policy (Engineering Regulation 1105-2-100) and NEPA require consideration of 'No Action'. The No Action alternative assumes no measures would be implemented by the federal government to achieve the planning objectives.

Alternative 1. Storage Cornerstone. Based on the benefits calculations provided by previous studies, the storage cornerstone is likely to have positive net benefits. It is also expected to be effective at providing flood risk reduction benefits associated with all 3 study objectives—damage reduction, life safety risk reduction, and reduced impacts to commerce and tourism—throughout the watershed. Alternative 1 would also have minimal impacts to aquatic and terrestrial habitats, as well as some benefit to water quality through increased infiltration. Benefits to socially vulnerable populations in the lower portion of the watershed would likely still experience risks due to flooding along the Ala Wai Canal. Alternative 1 would be compatible with laws, regulations, and policies; however, use of public parks as detention facilities could reduce acceptability by the public.

Alternative 2A. Conveyance (Existing Infrastructure) Cornerstone. Cornerstone measures included in Alternative 2A, including the Piikoi, Woodlawn Drive, Waikiki, and Paki Avenue Bypasses, and the Palolo Culverts, were found to be largely ineffective at reducing water surface elevations and were screened out during various iterations of the plan formulation process. As a result, Alternative 2A was screened from further consideration.

Alternative 2B. Conveyance (Floodwalls) Cornerstone. Based on the benefits calculations provided by previous studies, the storage cornerstone is likely to have positive net benefits. It is also expected to be effective at providing flood risk reduction benefits associated with all 3 study objectives—damage reduction, life safety risk reduction, and reduced impacts to commerce and tourism—throughout the watershed. Alternative 2B would have some impact to riparian and marine habitats, including increasing the rate at which contaminants reach the ocean. Alternative 2B would be compatible with laws, regulations, and policies; however, extensive floodwalls along the Ala Wai Canal could reduce acceptability by the public.

Alternative 2C. Conveyance (2nd Outlet) Cornerstone. Based on the benefits calculations provided by previous studies and preliminary costs, it was determined that the Ala Wai Canal 2nd Outlet would not have positive net benefits. Through coordination with partnering resource agencies, it was also determined that a 2nd canal outlet would also have significant environmental effects on marine resources and would also impact the tourism industry through

impacted water quality along Waikiki Beach. As a result, Alternative 2C was screened from further consideration.

Alternative 3. Tunnel Cornerstone. Modeling results and preliminary cost estimates indicate that the water surface elevation reductions and associated benefits would not be sufficient to offset the costs of tunnel construction. Through coordination with partnering resource agencies, it was also determined that a 2nd canal outlet would also have significant environmental effects on marine resources. As a result, Alternative 3 was screened from further consideration.

Alternative 4. Natural and Nature-Based Cornerstone. Sensitive analysis and modeling results quantifying the potential benefits associated with watershed management activities, including reforestation, invasive management, and reducing imperviousness, indicate that these activities would not be effective at modifying hydrology and hydraulics at events larger than the 50% AEP event. Thus, the cornerstone measures for Alternative 4 would be ineffective at reducing risk during the events that drive risk throughout the watershed. As a result, Alternative 4 was screened from further consideration.

Alternative 5. Hybrid Cornerstone. Based on the benefits calculations provided by previous studies and preliminary costs, Alternative 5 is likely to have positive net benefits. It is also expected to be effective at providing flood risk reduction benefits associated with all 3 study objectives—damage reduction, life safety risk reduction, and reduced impacts to commerce and tourism—throughout the watershed. Alternative 5 would have some impact to riparian and marine habitats, including increasing the rate at which contaminants reach the ocean; however, increasing storage and infiltration may work to reduce impacts to water quality. Alternative 5 would be compatible with laws, regulations, and policies; however, use of public parks as detention facilities and extensive floodwalls along the Ala Wai Canal could reduce acceptability by the public.

Alternative 6. Nonstructural Cornerstone. Based on the benefits calculations provided by previous studies and preliminary costs, it was determined that nonstructural measures would have positive net benefits in many portions of the watershed. It is also expected to be effective at providing flood risk reduction benefits associated with all 3 study objectives—damage reduction, life safety risk reduction, and reduced impacts to commerce and tourism—throughout the watershed. However, lower participation rates could render this alternative incomplete and impact overall efficiency. Alternative 6 would have minimal impact on environmental resources.

Final Array of Alternatives.
The final array consisted of 5 alternatives, as outlined below.

No Action (Future Without-Project)

As discussed above, USACE planning policy (Engineering Regulation 1105-2-100) and the NEPA require consideration of 'No Action'. The No Action alternative or the future without-project condition assumes no measures would be implemented by the federal government to achieve the planning objectives.

The future without-project condition is defined as the most likely condition expected to exist in the future in the absence of the project and serves as the benchmark against which other alternatives are evaluated. In general, future without-project forecasting should account for conditions such as climate variability, sea-level rise, subsidence, geomorphologic changes, and changes in development over the 50-year period of analysis. Based on an analysis of the anticipated future conditions within the watershed, the future without-project condition for the

study area was defined according to changes in sea-level, rainfall frequency, debris generation, and transport, and extent of impervious area. Substantial changes in land subsidence, seismic influences, and geomorphologic conditions are not expected over the period of analysis, so were not further evaluated. A detailed discussion of these conditions is provided in Chapter 3.

Under the No Action Alternative (future without project), a variety of flood-related effects would not be addressed, and the Honolulu community would remain vulnerable to the effects of flooding and storm damage. If no action is taken, it is anticipated that (1) vegetated areas within the floodplain would be subject to flooding; (2) recreational areas would continue to be subject to flooding; (3) roadways would continue to be at risk of flooding; (4) flood-related health and safety risks would not be addressed; and (5) critical infrastructure would not be removed from the floodplain. There would also be the risk of heavy metals and petroleum products being mobilized due to potential flood damage to residential and non-residential structures and vehicles and that such contaminants may present a risk to natural resources within the Ala Wai watershed. A large portion of the watershed, including approximately 52,000 residents (plus between 70,000 and 100,000 visitors daily), would remain within the 1% AEP flood event. In addition to threatening public health and safety, a large-scale flood event would be expected to result in significant structural damages associated with the 1% AEP flood, which are approximately $960 million. Emergency costs associated with responding to the flood event, impacts to critical infrastructure, and disruptions to local business would also be substantial.

Alternative 1 (Storage Cornerstone)

Alternative 1 primarily focuses on increasing storage throughout the Ala Wai watershed to reduce flood risk. Implementation of this alternative would include the construction of the following detention basins and floodwalls in strategic locations.

Makiki District Park Detention Basin–- At Makiki District Park, in Makiki Valley, a detention basin (i.e., Makiki District Park Detention Basin) would be constructed to temporarily store stormwater runoff. The detention basin would collect, and store stormwater which would then be released gradually back into Makiki Stream until the detention basin is completely drained. The detention basin would be constructed by excavating down approximately 6 to 10 ft and constructing a floodwall made of steel sheetpile and earthen slopes and 6 ft in height around the perimeter of the park (floodwall would be approximately 1,200 ft in length). The Makiki District Park Detention Basin would have a storage volume of approximately 22 acre-feet. An approximately 20 ft (H) x 4 ft (W) x 525 ft (L) concrete box culvert would be constructed at the upstream end of the detention basin as an inlet for stormwater from Makiki Stream. An approximately 1.75 ft (H) x 1.75 ft (W) X 1,205 ft (L) concrete box culvert would be constructed at the downstream end of the detention basin as an outlet for collected stormwater to slowly drain to Makiki Stream. Also, within Makiki Valley, a floodwall extending 6 ft above ground level (i.e., Kanaha Floodwall) would be constructed along the right descending bank of Makiki Stream. The floodwall would be approximately 2,200 ft long and would be constructed of macropiles with a concrete fascia. The Kanaha Floodwall would extend approximately from Mott Smith Drive downstream to Anapuni Street. Five road closure structures would be constructed to bridge the gap between the floodwall as it crosses (1) Liholiho Street, (2) private driveway, (3) Kewalo Street, (4) Ke'eaumoku Street, and (5) Makiki Street. The road closure structures would likely be constructed of aluminum stop logs that would be inserted in anticipation of a storm event to form a continuous line of protection with the floodwall; however, the actual design has not been determined yet. The purpose of the Makiki District Park Detention Basin is to work in conjunction with the Kanaha Floodwall to reduce the risk of flooding for adjacent residential communities located to the south of the floodwall.

Manoa Valley District Park Detention Basin–- At Manoa Valley District Park, in Manoa Valley, a

detention basin (i.e., Manoa Valley District Park Detention Basin) would be constructed. The detention basin would collect, and store stormwater which would then be released gradually back into Manoa Stream until the detention basin is completely drained. The detention basin would be constructed by excavating down approximately 6 to 8 ft and constructing a floodwall made of steel sheetpile and earthen slopes and 6 ft in height around the perimeter of the park (floodwall would be approximately 1,580 ft in length). The Manoa Valley District Park Detention Basin would have a storage volume of approximately 54 acre-feet. An approximately 15 ft (H) x 4.5 ft (W) x 445 ft (L) concrete box culvert would be constructed at the upstream end of the detention basin as an inlet for stormwaters from Manoa Stream. An approximately 2 ft (H) x 2 ft (W) channel would be excavated at the downstream end of the detention basin as an outlet for collected stormwater to slowly drain to Manoa Stream. The purpose of the Manoa Valley District Park Detention Basin is to reduce the risk of flooding to residential structures downstream of the park.

Woodlawn Drive Floodwall and Koali Road Floodwall–- Also within Manoa Valley, a floodwall extending 6 ft above ground level (i.e., Woodlawn Drive Floodwall) would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,270 ft in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,510 ft in length. Two concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two flap gates would be retrofitted on smaller stormwater culverts along this feature. Two road closure structures would be constructed — one at Koali Road and one at the pedestrian bridge crossing Palolo upstream (approximately 690 ft upstream of Koali Road Bridge) — to bridge the gap between the floodwall as it crosses these two throughways. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system.

Kaimuki High School Floodwall–- At Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending 6 ft above ground (i.e., Kaimuki High School Floodwall) would be constructed along the left descending bank of Manoa-Palolo Canal. The floodwall would be approximately 4,400 ft long and would be constructed of a combination of steel sheetpile (2,700 ft) and macropiles (1,700 ft) with concrete fascia. The Kaimuki High School floodwall would extend around the perimeter of Kaimuki High School's athletic fields. Two road closure structures would be constructed — one at Kapiolani Boulevard and one as South King Street along the left descending bank of the Manoa-Palolo Canal — to bridge the gap between the floodwall as it crosses these two throughways. The purpose of the floodwall would be to reduce the risk of flooding to residential structures east/southeast of Kaimuki High School.

Ala Wai Golf Course Detention Basin–- At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately 6 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 10,665 ft in length. The golf course detention basin would have a storage volume of approximately 314 acre-feet. A concrete in-stream weir diversion structure would be constructed approximately 50 feet downstream of the Date Street Bridge, along the left descending bank of

the Manoa-Palolo Canal, and at the downstream end of an existing drainage ditch running parallel to Date Street. The dimensions of the weir would be approximately 33 ft (W) x 147 ft (L) x 14.5 (H). The diversion weir would allow stormwater to enter the golf course detention basin starting at the 5% AEP—an event with a 5% chance of being equaled or exceeded in any given year— flood event. Three concrete drainage structures with flap gates would be constructed along the southwest side of the Ala Wai Golf Course to allow collected stormwater to slowly drain into the Ala Wai Canal. The three drainage structures would be approximately 3 ft (W) X 3 ft (H) and would be located at the downstream end of three existing natural drainages along the southwest side of the golf course (west of the Ala Wai Golf Course Clubhouse). Three road closure structures would be constructed – one at the entrance to the golf course maintenance facility (off Date Street), one at Date Street to connect the Kaimuki High School floodwall, and one at Ala Wai Golf Course Drive – to bridge the gap between the floodwall as it crosses these two roadways. The purpose of the Ala Wai Golf Course Detention Basin would be to reduce the risk of flooding within Waikiki.

Mitigation Measures – Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cubic feet/second (cfs). At the time of compiling this Draft Report, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed. If Alternative 1 moves forward, additional analysis would be conducted during the PED to determine the above and appropriate supplemental NEPA analysis and coordination would be conducted as necessary. In addition to considering pumps as potential mitigation for induced flooding within the watershed, nonstructural measures such as dry/wet floodproofing, elevation, and acquisition are also under consideration. Similar to the above, if Alternative 1 moves forward, additional analysis would be conducted during PED to determine the precise number and location of structures recommended for dry/wet floodproofing, elevation, or acquisition. Appropriate supplemental NEPA analysis and coordination would be conducted as necessary.

Alternative 2B (Conveyance Cornerstone)

In addition to the measures listed below, Alternative 2B also includes the Makiki District Park Detention Basin, Woodlawn Drive Floodwall, and Koali Road Floodwall all of which are described above under Alternative 1.

Kaimuki High School Floodwall– At Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending 6 ft above ground (i.e., Kaimuki High School Floodwall [extension of Ala Wai Canal Floodwall]) would be constructed along the left descending bank of Manoa Manoa-Palolo Canal. The floodwall would be approximately 3,360 ft long and would be constructed of a combination of macropiles (1,030 ft) and steel sheetpile (2,330 ft) with concrete fascia. The floodwall would extend around the perimeter of Kaimuki High School's athletic fields. This floodwall differs from the Kaimuki High School Floodwall described under Alternative 1 because th12ompleteall essentially stops near the Kaimuki High School's discus and shot put throwing area. Instead of running parallel to Date Street, the Kaimuki High School's floodwall would join up with the Ala Wai Canal Floodwall discussed below. The purpose of the floodwall would be to reduce the risk of flooding to residential structures east/southeast of Kaimuki High School.

Ala Wai Canal Floodwall– At Ala Wai Golf Course, Manoa-Palolo Canal, and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 24,745 ft long and constructed of a combination of macropiles (20,005 ft) and steel sheetpile (4,740 ft) with concrete fascia. The floodwall would extend along (1) the right descending bank of Manoa-Palolo Canal from approximately Interstate H-1

downstream to the Ala Wai Canal, (2) from Kaimuki High School Floodwall along Date Street to the southeast (adjacent to the Ala Wai Golf Course) and extending along the east/southeast side of the golf course that runs parallel to Kapahulu Avenue, and (3) along the left and right descending banks of the Ala Wai Canal downstream to Ala Moana Boulevard. Six existing stormwater sewers inletting into the Ala Wal Canal would be modified to include a flap gate which would permit the free flow of interior drainage into the Ala Wai Canal while preventing and sealing against backflow. One existing stormwater sewer inlet that would be modified runs parallel to Date Street, adjacent to the Ala Wai Golf Course. The remaining stormwater sewer inlets that would be modified are located along the right descending bank of the Ala Wai Canal within the area between Ala Wai Elementary School and Sunset Towers. Nine road closure structures would be constructed at (1) Kapiolani Boulevard, (2) Date Street (near the Date Street and Laau Street junction), (3) Date Street (near the vicinity of the Kaimuki High School's discus and shot put throwing area, (4) Ala Wai Golf Course Maintenance Facility driveway, (5) Ala Wai Golf Course Drive, (6) McCully Street (Ala Wai Canal right descending bank), (7) McCully Street (Ala Wai Canal left descending bank), (8) Kalakaua Avenue (Ala Wai Canal right descending bank), and (9) Kalakaua Avenue (Ala Wai Canal left descending bank). The purpose of the road closure structures would be to bridge the gap between the Ala Wai Canal Floodwall as it crosses these nine roadways. The purpose of the Ala Wai Canal Floodwall would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki.

Mitigation Measures – Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cfs. At the time of compiling this Draft Report, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed. If Alternative 2B moves forward, additional analysis would be conducted during the Preconstruction Engineering and Design (PED) phase to determine the above and appropriate supplemental NEPA analysis and coordination would be conducted as necessary. In addition to considering pumps as potential mitigation for induced flooding within the watershed, nonstructural measures such as dry/wet floodproofing, elevation, and acquisition are also under consideration. Similar to the above, if Alternative 2B moves forward, additional analysis would be conducted during PED to determine the precise number and location of structures recommended for dry/wet floodproofing, elevation, or acquisition. Appropriate supplemental NEPA analysis and coordination would be conducted as necessary.

Alternative 5.3 (Hybrid and Tentatively Selected Plan)

In addition to the measures listed below, Alternative 5.3 includes the Woodlawn Drive Floodwall and Koali Road Floodwall, both of which are described above under Alternative 1.

Kaimuki High School Floodwall– At the Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending 6 ft above ground (i.e., Kaimuki High School Floodwall [extension of Ala Wai Canal Floodwall]) would be constructed along the Kaimuki High School's track field and extending down to the vicinity of the Kaimuki High School's discus and shot-put throwing area. The floodwall would be approximately 3,260 ft long and would be constructed of a combination of steel sheetpile (1,460 ft) and macropiles (1,800 ft) with a concrete fascia. The Alternative 5.3 Kaimuki High School Floodwall would be shorter in length than the Kaimuki High School Floodwall described under Alternative 1 and Alternative 2B. Like Alternative 2B, though, the Kaimuki High School Floodwall would join up with the Ala Wai Canal Floodwall discussed below. The purpose of the floodwall would be to reduce the risk of flooding to residential structures east/southeast of Kaimuki High School.

Ala Wai Golf Course Detention Basin – At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately 6-9 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 8,315 ft in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. On the left descending bank of the Manoa-Palolo Canal, there is an overtopping spillway section, approximately 100 feet in length, that is reinforced with erosion protection. The levee along the Manoa-Palolo Canal is also lined with erosion protection on the canal-side. A portion of the existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be riprapped and used as an inlet location for overflow into the Ala Wai Golf Course Detention Basin. A small inlet channel would be excavated and lined with erosion control material to improve the flow onto the golf course. Three concrete drainage structures and three flap gates would be constructed along the levee alignment of the Ala Wai Golf Course to allow collected stormwater within the basin and from local runoff to slowly drain into Ala Wai Canal. The three drainage structures would be approximately 3 ft (W) x 3 ft (H) and would be located at the downstream end of three existing natural drainages along the southwest side of the golf course (west of the Ala Wai Golf Course Clubhouse). The detention basin also includes a floodwall along the golf course parking lot near the Ala Wai Canal, which is 9 ft in height. The floodwall has one concrete drainage structure and two flap gates. The drainage structure at this location serves to outlet flow from the Diamond Head neighborhood. The original outlet will be enclosed by concrete (instead of daylighted) and will need reconstruction of the vehicle and pedestrian access at this location. A small section of floodwall near the Kapahulu Avenue and Ala Wai Boulevard intersection at the Diamond Head end of the canal will tie-in to the golf course levee and Ala Wai Canal floodwall system. This section is 6 ft in height and includes one road closure structure and one drainage structure. Finally, there is one canoe access point in this location. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

Ala Wai Canal Floodwall–- At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 22,852 ft long and would be constructed of a combination of J-wall on macropiles (17,125 ft), L-wall on macropiles (4,069 ft), and tieback I-wall (1,658 ft) with a lava rock fascia. Existing stormwater sewers inletting into the Ala Wai Canal would be modified so that fourteen would be drainage structures and 59 would be retrofitted with flap gates. Eleven road closure structures would be constructed: (1) King Street (Manoa-Palolo Canal right descending bank), (2) King Street (Manoa-Palolo Canal left descending bank), (3) Kapiolani Boulevard (Manoa-Palolo Canal right descending bank), (4) Kapiolani Boulevard (Manoa-Palolo Canal left descending bank), (5) Date Street (near the Date Street and Laau Street junction), (6) Date Street (near the vicinity of the Kaimuki High School's discus and shot put throwing area, (7) Ala Wai Golf Course Maintenance Facility driveway, (8) Ala Wai Golf Course Drive, (9) McCully Street (Ala Wai Canal right descending bank), (10) McCully Street (Ala Wai Canal left descending bank), (11) Kalakaua Avenue (Ala Wai Canal right descending bank), and (12) Kalakaua Avenue (Ala Wai Canal left descending bank). The typical cross section of this feature varies along the alignment, but all are assumed to be 6 ft above ground. The floodwall along the Ala Wai Canal and the lower right descending bank of the Manoa-Palolo Canal will include an elevated walking path. On the left descending bank of the Manoa-Palolo Canal and near Kaimuki High School, there will be a floodwall on macropiles with no walking path. Where space is constricted, along the upper right descending bank of the Manoa-Palolo Canal, tieback I-walls will be constructed, with no walking path. The purpose of the Ala Wai Canal Floodwall system would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki.

Mitigation Measures – Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cfs. At the time of compiling this Draft Report, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed. If Alternative 5.3 moves forward, additional analysis would be conducted during the Preconstruction Engineering and Design (PED) phase to determine the above and appropriate supplemental NEPA analysis and coordination would be conducted as necessary. In addition to considering pumps as potential mitigation for induced flooding within the watershed, nonstructural measures such as dry/wet floodproofing, elevation, and acquisition are also under consideration. Similar to the above, if Alternative 5.3 moves forward, additional analysis would be conducted during PED to determine the precise number and location of structures recommended for dry/wet floodproofing, elevation, or acquisition. Appropriate supplemental NEPA analysis and coordination would be conducted as necessary.

Alternative 6 (Standalone Nonstructural Plan)

Alternative 6 consists of floodproofing and elevation of approximately 1,544 structures—43 to be elevated and 1501 with dry floodproofing—within three separate reaches with positive NED benefits. Structures within the 1% AEP floodplain in reaches AW1 (953) and AW2R (542) would be elevated or floodproofed to the 1% AEP flood stage (see Figure 3 for location of each reach). Structures within the 2% AEP floodplain in reach AW7R (49) would be elevated or floodproofed to the 2% AEP flood event. The target stage for all reaches is the 1% AEP flood event. Dry floodproofing involves sealing flood prone structures from water with door and window barriers, small scale rapid deployable floodwalls, or sealants. Dry floodproofing is generally feasible and effective up to a maximum height of three feet above ground level. Floodproofing is only recommended for non-residential structures, such as commercial buildings and critical infrastructure that cannot be elevated due to their large size. Elevation of structures is limited to residential structures, largely single-family homes. Whether a structure may be elevated depends on several factors including the foundation type, size of the structure, condition, etc. Elevating a home raises the finished floor elevation to a height where it is less likely that the structure and/or contents will be damaged by flooding. Residential structures can be raised up to 12 feet above ground level but cannot be raised beyond that height due to structural constraints and wind loading concerns.

Figure 3: Targeted Reaches for Alternative 6.

2.5 Plan Evaluation

2.5.1 Federal Objective

As specified in the USACE Planning Guidance Notebook (ER 1105-2-100), the federal objective of water and related land resources planning is to contribute to national economic development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable Executive orders (eOs), and other federal planning requirements. To demonstrate consistency with the federal objective, the effects of a project must be analyzed to demonstrate that the project benefits outweigh the costs within the context of the NED account. The NED account displays changes in the economic value of the national output of goods and services.

2.5.2 Contribution to Objectives and Avoidance of Constraints

Contributions to Objectives:

Objective 1. Reduce risks to life and safety associated with direct inundation of structures (residential, non-residential, and critical facilities) and transportation infrastructure due to riverine flooding along Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal over the period of analysis. Alternative 0 (No Action) would not result in a reduction to life safety risk. Alternative 1 and Alternative 2B are

expected to slightly induced life safety risk in the study area through induced flooding. Alternative 5 is expected to marginally decrease life safety risk. Alternative 6 is expected to have negligible effects on life safety risk.

Objective 2. Reduce economic damages associated with direct inundation of structures (residential, non-residential, and critical facilities) & public infrastructure due to riverine flooding along Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal over the period of analysis. Alternatives 1, 2B, 5, and 6 all reduce economic damages throughout the study area. Alternative 0 would not result in a reduction in economic damages, and damages could increase without federal action due to the effects of climate change and sea level rise on riverine flood risk.

Objective 3. Reduce economic impacts associated with disruption of commerce and tourism due to riverine flooding along Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal over the period of analysis. Alternatives 1, 2B, 5, and 6 are all expected to reduce impacts to commerce and tourism within the study area. Alternatives 1, 2B, and 5 are expected to reduce risk and economic impacts to commercial areas, including along Manoa Stream and along the Ala Wai Canal. Alternative 6 would include floodproofing of commercial facilities along the Manoa Stream and Ala Wai Canal. Alternative 0 would not result in a reduction in impacts to commerce and tourism, and impacts could increase without federal action due to the effects of climate change and sea level rise on riverine flood risk.

Avoidance of Constraints
The only study-specific constraint is that inducing further development within the floodplain cannot be included as a goal of the project. Alternatives 1, 2B, 5, and 6 all satisfy this constraint. Essentially all developable space within the floodplain has already been developed.

2.5.3 PR&G Criteria

Alternatives were also evaluated based on the four evaluation criteria outlined in the USACE Principles, Requirements, and Guidelines (PR&G) (USACE, 2013) and defined and described below:

Completeness: The extent to which the measure provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. Alternatives 0, 1, 2B, 5, and 6 represent complete alternatives in that they account for all necessary investments and actions (including potential mitigation measures described above) required to ensure realization of the planned effects. However, floodproofing and structure elevation are voluntary and participation rate could affect overall benefits accrued by each alternative.

Effectiveness: The extent to which each measure would alleviate the specified problems and achieves the specified opportunities. Alternatives 1, 2B, 5, and 6 are effective at addressing the identified problems and realizing the identified opportunities; albeit the extent to which each alternative is effective varies drastically. Alternatives 1, 2B, 5, and 6 reduce economic damages and provide $22.7M, $39M, $52.3M, and $32.4M in average annual benefits, respectively. These benefits are associated with residential, commercial/industrial facilities, and public facilities, thus, each alternative would benefit private residences, industry and commerce, and the local government. Alternative 5 is the only alternative which is expected to reduce life safety risk associated with direction inundation of occupied residential, commercial, industrial, and public structures. Alternatives 1 and 2B are expected to slightly induce life safety risk through induced flooding. Alternative 6 is expected to result in minor reductions in life safety due to

decreases in the number of structures experiencing first floor flooding and associated damages. Alternative 0 would have no effect on economic damages or life safety risk.

Efficiency: The extent to which each alternative is a cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment. Alternatives 1, 2B, 5, and 6 are all cost-effective, as assessed by having positive net economic benefits and a BCR that is higher than 1.0. Specifically, the net annual economic benefits for Alternatives 1, 2B, 5, and 6 are $13.6M, $18.7M, $30.6M, and $14M, respectively, and the BCRs for each alternative are 2.5, 1.9, 2.4, and 1.76, respectively. Alternative 0 would not result in any cost or associated benefits. None of the alternatives would have a significant impact on the Nation's environment. A detailed analysis of environmental effects is presented in Chapter 3 of this report.

Acceptability: The viability and appropriateness of an alternative from the perspective of the nation's general public and consistency with existing federal laws, authorities, and public policies. Alternatives 0, 1, 2B, 5, and 6 would be acceptable in that they are all compatible with existing laws, regulations, and policies. All alternatives have the potential to garner some level of public controversy.

Environmental Effects. Effects on aquatic (stream, wetland) and terrestrial (riparian, upland, critical) habitats, water quality, and threatened/endangered species. Environmental effects of each alternative are presented in detail in Chapter 3 of this report. Alternatives 0, 1, 2B, 5, and 6 do not have significant impacts to aquatic or terrestrial habitats, water quality, or threatened and endangered species. Any environmental impacts would be minor and temporary.

A summary of the evaluation of the final array of alternatives is presented below in Table 5.

Table 5: Summary of Evaluation Criteria for Final Array of Alternatives

Evaluation Criteria	Alt. 0 (No Action)	Alt. 1 (Storage Plan)	Alt. 2B (Conveyance Plan)	Alt 5. (Hybrid Plan)	Alt 6. (Nonstruct. Plan)
Efficiency	No effect	Positive effect	Positive effect	Positive effect	Positive effect
Effectiveness (Economic Damages)	No effect	Positive effect	Positive effect	Positive effect	Positive effect
Effectiveness (Life Safety)	No effect	Negative effect	Negative effect	Positive effect	Positive effect
Effectiveness (Comm./Tour.)	No effect	Positive effect	Positive effect	Positive effect	No effect
Acceptability	No effect	Positive effect	Positive effect	Positive effect	Positive effect
Completeness	Positive effect	Positive effect	Positive effect	Positive effect	Positive effect
Environmental Effects	No significant effect	No significant effect	No significant effect	No significant effect	No significant effect

2.5.4 System of Accounts

The USACE planning process incorporates four accounts to facilitate the display and comparison of the beneficial and adverse effects of each alternative plan. The mode of analysis,

commonly referred to as the "System of Accounts," displays the positive and negative effects of broad categories of impacts in a tabular format. The accounts include those that relate to contributions to NED, Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE). As previously described, the NED account displays changes in the economic value of the national output of goods and services. The EQ account displays the beneficial and adverse effects of the plans on ecological, cultural, and aesthetic resources. The RED account displays changes in the distribution of regional economic activity (e.g., income and employment). The OSE account displays plan effects on social aspects such as community impacts, health and safety, and recreational opportunities.

Table 6 outlines the definitions and analyses, along with the associated metrics, used to assess benefits across the four accounts described in PR&G (USACE, 2013).

Table 6: The Four Accounts.

Account	Definition	Analysis/Metrics
National Economic Development (NED)	The NED account represents the change in the economic value of the national output of goods and services that result from each alternative.	The NED account was assessed using the Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) software. Metrics include net annual economic benefits and BCR.
Regional Economic Development (RED)	The RED account characterizes changes in the distribution of regional economic activity that result from each alternative.	The USACE Regional Economic System (RECONS) was used to estimate regional economic impacts and contributions associated with the various alternatives. Metrics include increases in employment and labor income.
Other Social Effects (OSE)	The OSE account characterizes effects that are relevant to the planning process but not reflected in the other three accounts.	Qualitative assessment of effects on life safety risk. Qualitative assessment of benefits to resiliency, social vulnerability, and community cohesion within reaches identified as socially vulnerable using the Center for Disease Control's (CDC's) Social Vulnerability Index (SVI).
Environmental Quality (EQ)	The EQ account characterizes non-monetary effects (positive or negative) on significant natural and cultural resources that result from each alternative.	Qualitative analysis that considers benefits to aquatic and riparian habitats and downstream water quality.

A summary of how each alternative contributes to the four accounts is provided in the following sections and is summarized in Table 7.

NED. Alternatives 1, 2B, 5, and 6 would contribute to the National economy, having positive net economic benefits and positive BCRs. There would be no benefit to the National economy under Alternative 0.

RED. Alternatives 1, 2B, 5, and 6 would contribute to the regional economy by supporting both regional employment and labor income. There would be no benefit to the regional economy under Alternative 0.

EQ. Environmental effects of each alternative are presented in detail in Chapter 3 of this report. In general, none of the alternatives are expected to have significant impacts to aquatic or terrestrial habitats, water quality, or threatened and endangered species. Any impacts would be minor and temporary. Environmental resources would continue to be degraded due to flooding under Alternative 0.

OSE. Alternatives 5 is expected to reduce life safety risk associated with direct inundation of occupied residential, commercial, industrial, and public structures. Alternative 6 is also expected to result in minor reductions in life safety due to decreases in the number of structures experiencing first floor flooding and associated damages. Alternatives 1 and 2B are expected to marginally elevated life safety risk further by inducing flooding. Alternative 0 would have no effect on life risk throughout the study area.

Alternatives 1 and 5 are expected reduce economic damages and life safety risk within socially vulnerable communities (i.e., communities identified as socially vulnerable by the Environmental Protection Agencies Environmental Justice Screening Tool and/or the Council on Environmental Quality Climate & Economic Justice Screening Tool). Alternative 2B would induce flooding in communities identified as socially vulnerable. Alternative 6 is expected to have no significant impact of socially vulnerable communities. Alternative 0 would have no effect on communities identified as socially vulnerable.

Table 7: Summary Table Evaluation of Alternatives–- Four Accounts.

Account	Alt. 0 (No Action)	Alt. 1 (Storage Plan)	Alt. 2B (Conveyance Plan)	Alt 5. (Hybrid Plan)	Alt 6. (Nonstruct. Plan)
NED	No effect	Positive effect	Positive effect	Positive effect	Positive effect
RED	No effect	Positive effect	Positive effect	Positive effect	Positive effect
OSE	No effect	Negative effect	Negative effect	Positive effect	No significant effect
EQ	No effect	No significant effect	No significant effect	No significant effect	No significant effect

2.5.5 Risk and Uncertainty

Risk and uncertainty are fundamental to all water resource planning and communication, and each aspect of a flood risk assessment must account for risk and uncertainty. USACE risk assessment procedures were followed in this study to account for uncertainty in the information to the extent practicable. However, there is some project performance uncertainty in all studies, even with the risk assessment procedures. This study incorporated risk management framework principles and risk-informed planning into the plan formulation process. Specific examples include the following:

- Risk analysis and communication was conducted, consistent with ER 1105-2-101, Risk Analysis for Flood Damage Reduction Studies, and EM 1110-2-1619, Risk-Based Analysis for Flood Risk Management Studies.

- The PDT incorporated risk-informed decision making into the planning process. An internal document (referred to as the risk register) was developed and used to document and carry forward those risk management concepts. Risks that were identified included unknowns that will be addressed in more detail during future design efforts, for example field investigations of geotechnical information, cultural resources, and biological resources, and updated of available information about construction costs. Subsequent technical, agency, and public reviews aid in identifying and assessing the relative risks associated and identify ways to reduce them to acceptable levels. Opportunities for value engineering will be incorporated as well to reduce the risks of missed opportunities for identifying more effective, more cost-efficient project features, designs, and/or construction.

- Uncertainty will be captured through cost engineering's mandatory cost and schedule risk assessment (CSRA) process to establish cost contingencies. The economic analysis developed ranges of economic outputs with mid and mean number ranges to best capture uncertainties and identify risks in the risk register.

- Risk and uncertainty ranges were iteratively refined for costs and economics with each subsequent level of design. This analysis confirmed the conceptual numbers were still within the established ranges of uncertainty, validating assumptions and risk decisions.

Residual Risk

Residual risk represents existing, future, or historical risk that remains or might remain after an alternative has been implemented. Every alternative in the Final Array of Alternatives would have residual risk of inundation and associated residual life safety risk. Table 8 summarizes the residual risk of each alternative in the Final Array of Alternatives, should they be implemented. Residual economic risk is presented in Fiscal Year (FY) 2023 price levels and annualized values use an FY23 federal discount rate of 2.5%. Residual Life safety risk is presented as increases, decreases, or no change from the existing and future without-project conditions (FWOPC).

Table 8: Summary of Residual Risk for Final Array of Alternatives.

Residual Risk	Alt. 0 (No Effect)	Alt. 1 (Storage Plan)	Alt. 2B (Conveyance Plan)	Alt 5. (Hybrid Plan)	Alt 6. (Nonstruct. Plan)
Economic Risk (Residual Damages)	$70.0M	$67.5M	$50.9M	$42M	$68.4M
Life Safety Risk	No change	Marginal increase from without-project condition	Marginal increase from without-project condition	Marginal decrease from without-project condition	No significant change from without-project condition

Uncertainty

Identifying and managing risk is critical to making informed planning decisions in the face of uncertainty. However, some level of uncertainty will remain following any decision. Understanding and characterizing this remaining uncertainty is also critical as it can affect the

outcome of any decision. This section characterizes remaining uncertainty under each alternative.

Uncertainty remains regarding the necessary mitigation required for potential induced damages under Alternatives 1, 2B, and 5. Contested litigation surrounding the Ideker Farms, Inc. et al. vs. the United States of America has the potential to change mitigation requirements related to induced flooding; however, the case is still being adjudicated and a final ruling is pending.

Uncertainty also remains with respect to how Alternatives 1, 2B, and 5 may affect, or be affected by, interior drainage. A full interior drainage analysis was not conducted as part of the Ala Wai Canal General Reevaluation Study and will be conducted during preconstruction engineering and design. Modifications to management measures included in each alternative and/or additional features may need to be added to each alternative to address risk associated with interior drainage.

Alternative 6 has a large degree of uncertainty pertaining to the participation rate of the proposed nonstructural measures. This alternative consists entirely of management measures with voluntary participation. Participation rates could affect the overall benefits achieved by each alternative and the amount of residual risk following implementation. Alternatives 6 is based on visual surveys and existing data, including first floor elevations. Additional information and data obtained during subsequent projects phases could result in additional structures being incorporated or current structures being removed from each alternative.

Chapter 3: Existing, Future Without Project Conditions, and Environmental Effects & Consequences

This chapter provides the existing conditions (a baseline), as well as a forecast of the Future Without Project (FWOP) conditions. The existing conditions provide a description of the human environment, which is subdivided into the natural, physical, economic, and built environments. The 2017 Ala Wai Canal Flood Risk Management Feasibility Study with Integrated Environmental Impact Statement (IFR/EIS) (USACE, 2017) is a reference for detailed information on resource categories within the study area that are discussed in this Chapter. Therefore, the 2017 Ala Wai Canal Flood Risk Management IFR/EIS (USACE, 2017) is hereby incorporated by reference, as per 40 CFR 1502.21. The following resource category descriptions within this Chapter provide brief overviews of the existing condition of resources within the study area as well as any updates to information since 2017.

This chapter also includes environmental consequences of the proposed project upon the existing environment. The environmental impacts were assessed following the 1978 Council for Environmental Quality (CEQ) Regulations. USACE took into consideration context and intensity in determining potential impact significance, as defined in 40 CFR part 1508.27 (CEQ, 1978). The intensity of a potential impact is the impact's severity and includes consideration of beneficial and adverse effects, the level of controversy associated with a project's impacts on human health, whether the action establishes a precedent for future actions with significant effects, the level of uncertainty about project impacts and whether the action threatens to violate federal, state, or local laws established for the protection of the human and natural environment. The severity of an environmental impact is characterized as none/negligible, less than significant, significant, or beneficial. The impact may also be short-term or long-term in nature.

- **None/Negligible** – This effect would cause no discernible change in the environment as measured by the applicable significant criteria; therefore, no mitigation would be required.
- **Less than Significant** – This effect would cause no substantial adverse change in the environment as measured by the applicable significance criteria; in general, no mitigation would be required (but in some cases may be incorporated as a best practice or to meet other regulatory requirements).
- **Significant** – This effect would cause a substantial adverse change in the physical conditions of the environment or as otherwise defined based on the significance criteria. Effects determined to be significant fall into two categories: those for which there is feasible mitigation available that would avoid or reduce the environmental effects to less-than-significant levels, and those for which there is either no feasible mitigation available or for which, even with implementation of feasible mitigation measures, there would remain a significant adverse effect on the environment. Those effects that cannot be reduced to a less-than-significant level by mitigation are identified as significant and unavoidable.
- **Beneficial** – This effect would provide benefit to the environment as defined for that resource.
- **Direct** – An effect on a resource by an action at the same place and time.
- **Indirect** – An effect from an action that occurs later or possibly at a different place and often to a different resource but is still reasonably foreseeable.
- **Short-term** – Temporary in nature and does not result in permanent long-term beneficial or adverse effect to a resource. For example, temporary construction-related effects (such as, an increase in dust, noise, traffic congestion) that no longer occur once construction is complete. May be minor, significant, adverse, or beneficial in nature.

- **Long-term** – Permanent (or for most of the project life) beneficial or adverse effects to a resource. For example, permanent conversion of a wetland to a parking lot. May be minor, significant, adverse, or beneficial in nature.

The USACE used quantitative and qualitative analysis, as appropriate, to determine the level of potential impact from proposed alternatives. Based on the results of the analyses, this SEIS identifies whether a particular potential impact would be adverse or beneficial, and to what extent. CEQ Regulations (1978) also require that a proposed action's cumulative impact be addressed as part of a NEPA document. Cumulative impacts are discussed in Section 3.7.

Like the existing conditions, the 2017 Ala Wai Canal Flood Risk Management Study IFR/EIS (USACE, 2017) detailed the effects of proposed measures on the human environment that are included in the current effort. Table 9 shows the measures from the 2017 study that are still being considered for implementation as part of the current effort as well as measures that were not part of the 2017 study but are part of the current effort. The measures that are the same as the 2017 study have already been evaluated in the 2017 IFR/EIS will be analyzed in the impact analysis below.

Table 9: Comparison of Included Measures for the 2017 Recommended Plan and the 2023 GRR Alternatives.

Measures	2017 IFR/EIS Recommended Plan	2023 GRR Alternative 1	2023 GRR Alternative 2B	2023 GRR Alternative 5.3[1]	2023 GRR Alternative 6
Waihi Debris and Detention Basin	X	-	-	-	-
Waiakeakua Debris and Detention Basin	X	-	-	-	-
Woodlawn Ditch Detention Basin	X	-	-	-	-
Manoa In-stream Debris Catchment	X	-	-	-	-
Manoa District Park Detention Basin	-	X	-	-	-
Kanewai Field Multi-purpose Detention Basin	X	-	-	-	-
Waiomao Debris and Detention Basin	X	-	-	-	-
Pukele Debris and Detention Basin	X	-	-	-	-
Makiki Debris and Detention Basin	X	-	-	-	-
Makiki District Park Detention Basin	-	X	-	-	-
Manoa-Palolo Canal Floodwalls	-	-	X	X	-
Ala Wai Canal Floodwalls	X	-	X	X	-
Hausten Ditch Detention Basin	X	-	-	-	-
Ala Wai Golf Course Multi-Purpose Detention Basin	X	X	-	X	-
Floodwarning System	X	-	-	-	-
Dry Floodproofing	-	-	-	-	X
Elevating Structures	-	-	-	-	X

[1] Alternative 5.3 is the same as Alternative 5, but optimized. Because Alternative 5.3 is the Tentatively Selected Plan, the potential environmental impacts of the optimized alternative are analyzed in this Chapter 3.

3.1 Period of Analysis

The period of analysis is 50 years.

3.2 General Setting

The Ala Wai Watershed is located on the island of Oahu, which has undergone major land-use changes in the past 100 years. Since 1950 the resident population of the island has more than doubled (State of Hawaii, 2000). Honolulu, the capital city located on the island of Oahu, is now considered the most densely populated city in the Nation (Fulton et al., 2001). Urbanization on Oahu has been accompanied by substantial alterations to stream systems, including changes in water quality, instream habitat, riparian habitat, and the introduction of nonnative species. An extensive study conducted in the 1970s, showed that 57% of the streams on the island of Oahu had been channelized, 58% had water exported from them, and all had roads crossing over them (Timbol and Maciolek, 1978). Modifications of the stream ecosystems have been most severe at the lower elevations where urban growth is greatest (Timbol and Maciolek, 1978). Artificially straightened reaches with concrete-lined flat-bottomed channels and revetted (reinforced) banks are common in the urban areas of the study area. Such modifications are commonly accompanied by removal of riparian vegetative cover, and a reduction in substrate complexity (removal of large boulders).

3.3 Physical Environment

3.3.1 Climate and Climate Change

Regulatory Setting

No federal regulations regarding climate change apply to the study area. The U.S. Environmental Protection Agency (USEPA) has started the process of regulating large sources of greenhouse gas (GHG) emissions (e.g., power plants, cement manufacturing, etc.), but these proposed regulations are not applicable to the study area. Hawaii laws that address climate change include:

- Act 234 (State Legislature Hawaii [SLH] 2007)
- Act 286 (Hawaii Revised Statutes [HRS] § 226-109), *Climate Change Adaptation Priority Guidelines*
- Act 83 (HRS Chapter 225P), *Hawaii Climate Adaptation Initiative Act*

Existing Conditions

The climate of the study area is characterized by mild temperatures, which vary little between seasons. The small temperature difference between the warmest and coolest months is largely attributable to the influence of the surrounding ocean, the persistence of cool trade winds, and the small seasonal variation in solar radiation (Blumenstock and Price, 1967; Sanderson, 1993). Daylight hours also change little from season to season. The length of the longest day and the shortest day of the year vary only by a few hours. The rainy season occurs from October through April and a dry season occurs from May through September; however, high rains and storm flows can occur throughout any given year. During heavy storms, 24-hour rainfall can exceed 10 inches over coastal areas and 20 inches over mountainous areas (Giambelluca et al., 1984).

The Pacific region is subject to various patterns of climate variability (USGCRP, 2018). The effects of the El Niño-Southern Oscillation (ENSO) and other patterns of oceanic and atmospheric variability in the region are significant. They include large variations in sea surface temperatures, the strength and persistence of the trade winds, the position of jet streams and

storm tracks, and the location and intensity of rainfall. The ENSO-related extremes of El Niño and La Niña generally persist for 6 to 18 months and change phase roughly every 3 to 7 years. The Pacific Decadal Oscillation (PDO) and the Interdecadal Pacific Oscillation (IPO) are patterns that operate over even longer time horizons and include the weather and climate of the region. Even after accounting for these natural patterns, the waters around Hawaii have been warming since the 1950s, with temperatures from the surface to a depth of 660 feet rising by as much as 3.6°F. If emissions continue to increase, future sea surface temperatures are projected to increase 1.7°F by 2030, 2.3°F by 2055, and 4.7°F by 2090 (USGCRP, 2018).

The future trend for precipitation within Hawaii is uncertain currently (USGCRP, 2018). For nearly a century, the average precipitation, average stream discharge, and stream baseflow have been trending downward for Hawaii. However, there is high variability due to the cyclical patterns described above (i.e., ENSO, PDO, and IPO) and there is uncertainty as to whether this trend will continue. In addition, while rainfall in Hawaii generally has been decreasing, it is also becoming more extreme. Both extreme heavy rainfall events (causing increased runoff, erosion, and flooding) and droughts (causing water shortages) have become more common. The number of consecutive wet days and the number of consecutive dry days are both increasing in Hawaii (USGCRP, 2018).

Surface air temperatures within the region have increased and are expected to continue to rise over the entire region (USGCRP, 2018). In Hawaii, the rate of increase has been greater at high elevations. If emissions continue to increase, projected annual surface air temperature is expected to increase 3.5°F by 2055. On most islands, increased temperatures coupled with decreased rainfall and increased drought will reduce the amount of freshwater available (USGCRP, 2018).

Regarding sea level change, global mean sea level rose at a rate of 0.047 $\pm$ 0.008 inches (in) per year (yr) from 1993 to 2016, and that rate accelerated to 0.134 $\pm$ 0.016 in/yr (Nerem et al., 2010). The semi-diurnal tide range in Honolulu is about 1.903 feet and the rate of sea level rise is about 0.056 + 0.008 in/yr, based on Honolulu tide station from 1905-2015 (NOAA, 2017). Church et al. (2013) estimates that global mean sea level could rise to 3.215 feet by 2100. Others, such as Sweet et al. (2017) suggest that sea level could rise by 6.562 feet in the Hawaii region by 2100. Flooding from sea level rise is anticipated to increase in frequency and intensity in the coming decades and it is anticipated that Honolulu will encounter as many as 100 tidal floods per year (Thompson et al., 2019). It is suggested that coastal groundwater will play a significant role in contributing to flooding in Honolulu through marine inundation (Rotzoll and Fletcher, 2013). A byproduct of marine inundation will be the infiltration of marine waters backing up into sewer mains and storm drain systems (Habel, 2019). Onsite sewage disposal systems, a common form of sewage treatment in Hawaii, are at risk of discharging contaminated groundwater and pose a risk to public health (Whitter and El-Kadi, 2014; Balaraman, 2016).

All the climate change factors described above will have an impact on human communities in Hawaii (USGCRP, 2018). Because Hawaii is almost entirely dependent upon imported food, fuel, and material, the vulnerability of ports and airports to extreme events, sea level rise, and increasing wave heights is of great concern. Climate change is expected to have serious effects on human health and natural resources. In addition, sea level rise and flooding are expected to overwhelm sewer systems and threaten public sanitation (USGCRP, 2018).

Significance Criteria

The environmental consequences of the proposed project related to climate change are evaluated using the criteria listed below. An effect was considered significant if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing emissions of GHGs or addressing climate change.

Environmental Consequences

No Action

No Impact: Under the No Action Alternative, none of the flood risk management measures would be implemented, such that no construction equipment from implementation of the project would be used or generate GHG emissions that could have an effect on the environment. Construction of other projects (federal or non-federal), operations of other projects, and maintenance of other projects within the watershed would continue but are not expected to have a significant contribution of GHG emissions that could have an impact on the environment.

Alternative 1

Less than Significant Impact: Effects from Alternative 1 on climate change through GHG emissions produced during construction of the structural and mitigation measures and use of diesel backup generators for pump stations, if found to be necessary, would result in only slight increases in GHG emissions and be below thresholds under the present status of attainment for air quality. Therefore, the project would result in short-term less than significant adverse impacts to climate change while construction of the structural features and mitigation measures is occurring. The completed project would consist mainly of statis features that would not produce on-going GHG emissions. If pumps are implemented as a mitigation measure, the operation of those pumps during a storm event would result in only slight increases in GHG emissions. Similarly, the maintenance of the project would require functionality assessments and minor repairs as well as clean up and disposal of debris, especially within the Ala Wai Golf Course detention basin following a storm event. Maintenance activities would require the use of small construction equipment and maintenance vehicles. Therefore, the project would result in long-term less than significant adverse impacts to climate change primarily when operation of the pumps is occurring and/or maintenance activities are occurring. The consideration of GHG emissions focused on the use of heavy machinery, assumed to be fueled by diesel and/or gasoline.

Published USEPA data indicate that approximately 22 pounds of carbon dioxide are produced for every gallon of diesel fuel burned, and approximately 19 pounds are produced for every gallon of gasoline used (EPA, 2023). In 2018, the State of Hawaii used approximately 511 million gallons of fuel for ground-based transportation (HSEO, 2019), including all vehicles. The average passenger vehicle in Hawaii travels 9400 miles per year (HSEO, 2019); the island of Oahu has over 790,000 passenger vehicles registered (Honolulu Civil Beat, 2019). Construction equipment represents a relatively small fraction of petroleum use, however, compared to road vehicles such as passenger cars. The transportation industry (trucks and cars) uses approximately 77% of diesel fuel in the U.S., while the entire industrial sector (including all factories, commercial uses and construction equipment) uses approximately 13% (USEIA, 2022). In general, construction equipment emissions are a small fraction of GHG emissions.

Efforts are on-going for all equipment manufacturers to reduce emissions and increase the fuel efficiency of construction equipment. Best management practices (BMPs) can also be used to

decrease GHG emissions from diesel engines. Some BMPs that are commonly implemented on construction projects and that would be implemented on this project include:

- Minimize waiting times and idling times by staging equipment to be present and operating only when needed.
- Conduct operations in sequence and bundle work to minimize the time needed for any piece of equipment.
- Ensuring haul loads are full all legs of a round trip, instead of empty return trips.

Each individual measure in the alternative will likely be constructed as a discrete project, so that travel distances to staging areas and stockpiles can be minimized. Each individual feature would be a comparatively small and local project, without large area impacts beyond the feature footprint. Given the scale of the project, the total amount of emissions resulting from construction would be insignificant at a regional scale; further, the emission levels would be significantly under the federal reporting threshold (25,000 metric tons per year). Once constructed, the alternative would have a long-term negligible effect would have no long-term direct or indirect on-going emissions or fuel consumption. As such, Alternative 1 would be expected to have a short-term indirect less than significant effect on climate change due to GHG emissions during construction activities.

Construction of Alternative 1 and the long-term operation and maintenance associated with the alternative would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing emissions of GHGs or addressing climate change. The purpose of Act 286 HRS § 226-109, *Climate Change Adaptation Priority Guidelines*, is "to encourage collaboration and cooperation among county, state, and federal agencies, policy makers, businesses, and other community partners to plan for the impacts of climate change and avoid, minimize, or mitigate loss of life, land, and property of future generations." Alternative 1 would meet the purpose of Act 286 by constructing flood risk management features with the objective of minimizing potential flood induced damages to property and life safety due to climate change induced flooding. Therefore, Alternative 1 would have long-term direct and indirect beneficial effects for adaptation to climate change.

Alternative 2B

Less than Significant Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential climate and climate change impacts are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. Overall, Alternative 2B would be expected to have a short-term less than significant effect on climate change due to GHG emissions during construction activities. Similarly, Alternative 2B would have a long-term less than significant effect on climate change due to GHG emissions during pump operations and maintenance activities. Alternative 2B would also be expected to have long-term direct and indirect beneficial effects for adaptation to climate change.

Alternative 5.3

Less than Significant Impact: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternatives 1 and 2B, such that the nature and degree of potential climate and climate change impacts are generally expected to be similar. Therefore, refer to the analysis under Alternatives 1 and 2B for Alternative 5 project impacts. Overall, Alternative 5.3 would be expected to have a short-term less than significant effect on climate change due to GHG emissions during

construction activities. Similarly, Alternative 2B would have a long-term less than significant effect on climate change due to GHG emissions during pump operations and maintenance activities. Alternative 5.3 would also be expected to have long-term direct and indirect beneficial effects for adaptation to climate change.

Alternative 6

Less than Significant Impact: Alternative 6 involves temporary construction on existing structures, construction access, and/or acquisition of existing structures. GHG emissions resulting from implementation of Alternative 6 would occur from the use of construction equipment necessary to elevate or demolish existing structures, as determined necessary. The GHG emissions would have a short-term less than significant adverse effect on climate change. Long-term, there would be a negligible adverse effect on climate change due to minor maintenance activities that would be required to maintain the elevated or floodproofed structures. In addition, Alternative 6 would have long-term direct and indirect beneficial effects for adaptation to climate change, as this is the purpose of these nonstructural measures. Elevation and dry/wet floodproofing would both aid in adaptation of thousands of structures to potentially significant future flooding due to climate change.

Environmental Commitments

No additional environmental commitments other than the BMPs discussed below would be implemented to minimize impacts to climate or climate change.

Best Management Practices

The following BMPs are focused on minimizing potentially adverse impacts to air quality; however, many of these BMPs would also help reduce GHG emissions. Therefore, the following BMPs would be implemented by the contractor to further reduce GHG emissions attributable to the project.

- Improve fuel efficiency from construction equipment by minimizing idling time either by shutting equipment off when not in use or reducing the time of idling to no more than five minutes. Provide clear signage that posts this requirement for workers at all entrances to a construction site.
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.
- Use equipment with new technologies when feasible (e.g., repowered engines, electric drive trains, etc.).
- Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
- Encourage and provide carpools, shuttle vans, transit passes, and/or secure bicycle parking for construction worker commutes.

3.3.2 Geology, Seismicity, and Soils

Regulatory Setting

- Federal Soil Protection Act
- HRS, Title 12, Chapter 180 – *Soil and Water Conservation Districts*

Existing Conditions

The Island of Oahu is constructed from two shield volcanoes, Waianae and Koolau (Rowland and Garcia, 2004). Waianae is the older of the two volcanoes (subaerial flows are ~3.9 to ~2.8

million years old) and makes up the western part of Oahu, while Koolau is younger (subaerial flows are ~2.9 to 2.1~ million years old) and makes up the eastern part of the island (Rowland and Garcia, 2004). The Ala Wai watershed lies on the southern slope of the Koolau volcano. Erosional forces such as wind and precipitation have eroded sediment from the valleys cut into Koolau and transported these sediments oceanward where they were deposited along the south coast of Oahu. The Honolulu coastal plain, which generally extends from Pearl Harbor to Koko Head, is comprised of interlayered terrigenous and marine sediments and calcareous materials, as well as volcanic deposits produced by rejuvenated-stage volcanism (Stearns, 1935). Metropolitan Honolulu (including Waikiki) is built on these sediments. The sediments have very little bearing strength and high-rise buildings in Honolulu are therefore built on concrete piles driven through the soft sediment until they bottom out on either limestone or rejuvenation-stage lava layer.

The U.S. Department of Agriculture, Natural Resources Conservation Service's Web Soil Survey was queried for soil types present within the study area. Table 10 displays the soil types within the study area and their general characteristics.

Seismic activity around Oahu is related to tectonic activity along seafloor fractures and faults, such as the Diamond Head Fault, which extends along the seafloor northeast of Oahu (Furumoto et al., 1990). Oahu is considered relatively stable in terms of subsidence and rates of uplift have been less than 0.004 in/yr since the last interglacial period with an estimated mean of 0.002 in/yr over the last 200,000 years (Fletcher and Jones, 1996; Caccamise, 2003). Landslides have been documented within the Ala Wai watershed and involve the incremental movement of land that remains saturated over a relatively long period of time (Baum and Reid, 1992). In contrast, debris flows are the mass sliding of soil with the underlying bedrock and overtopping vegetation moving rapidly, typically down a drainage channel, potentially damaging homes and other structures located in the path.

Table 10: Characteristics of Soil Types in the Study Area (USDA-NRCS, 2022).

Soil Type	Soil Characteristics	Hydric Soil Rating	Depth to Water Table	Drainage Class	Frequency of Flooding	Farmland Classification
Ewa Silty Clay Loam, Moderately Shallo, 0 to 2 percent slopes	Found on moderately shallow footslopes	No	More than 80 inches	Well Drained	None	Prime farmland if irrigated
Fill Land, Mixed	Fill found on flats and toeslopes	No	More than 80 inches	Well Drained	Rare	Not prime farmland
Hanalei Silty Clay, 0 to 2 percent slopes	Alluvium derived from basalt and found on flood plains on valley floors	No	About 24 to 60 inches	Poorly Drained	Frequent	Not prime farmland
Kaena Very Stony Clay, 10 to 35 percent slopes	Formed in alluvium and colluvium and found on fans	No	About 24 to 60 inches	Poorly Drained	None	Not prime farmland
Kawaihapai Clay Loam, 0 to 2 percent slopes	Alluvium derived from basalt and found on drainageways on mountain slopes and drainage ways on alluvial fans	No	More than 80 inches	Well Drained	None, Occasional	Prime farmland if irrigated
Kawaihapai Stony Clay Loam, 2 to 6 percent slopes	Alluvium derived from basalt and found on drainageways on mountain slopes and drainageways on alluvial fans	No	More than 80 inches	Well Drained	Occasional	Prime farmland if irrigated
Makiki Clay Loam, 0 to 2 percent slopes	Alluvium found on alluvial fans	No	More than 80 inches	Well Drained	None	Prime farmland if irrigated
Makiki Stony Clay Loam, 0 to 3 percent slopes	Alluvium found on alluvial fans	No	More than 80 inches	Well Drained	None	Prime farmland if irrigated
Molokai Silty Clay Loam, 3 to 7 percent slopes	Residuum weathered from basalt found on hillslopes	No	More than 80 inches	Well Drained	None	Prime farmland if irrigated
Rock Land	Basalt found on pahoehoe lava flows	No	More than 80 inches	Well Drained	None	Not prime farmland
Tantalus Silty Clay Loam, 15 to 40 percent slopes	Volcanic ash found on backslopes	No	More than 80 inches	Well Drained	None	Not prime farmland

Significance Criteria

The proposed project would result in a potentially significant impact to geology, soils, and seismicity if it would:

- Cause potential substantial adverse effects, including risk of loss, injury, or death involving strong seismic ground shaking; seismic-related ground failure, including liquefaction; or landslides.
- Result in substantial soil erosion or the loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide or collapse.
- Destroy a unique geologic feature.

Environmental Consequences

No Action

No Impact: Under the No Action Alternative, none of the flood risk management measures would be implemented. As no features would be constructed, there would be no project-related activities that would affect geologic, seismic, or soil conditions. The physical conditions within each of the measure locations would be expected to be generally commensurate with the current onsite conditions.

Erosional processes, including debris flows and landslides, are expected to continue across the watershed, especially in areas of potential hazard including steep slopes and high annual rainfall, as noted by Ellen et al. (1993). Given the potential for more intense episodes of rainfall, these events could potentially occur on a more frequent basis. In addition, expansion of invasive tree species (particularly those that easily uproot because of shallow root systems [such as *Miconia calvescens*]) into the steep upper slopes of the watershed could further contribute to increased frequency of mass wasting events.

Alternative 1

Less than Significant Impact with Environmental Commitments Incorporated: In terms of seismicity, the alternative footprint is located approximately 9.5 miles from the nearest fault, the Diamond Head Fault which is located along the seafloor northeast of Oahu. The alternative footprint is the physical location of an alternative and all included measures, either individually or collectively, that will be impacted to facilitate construction associated with alternative. Although no project features would be constructed over or near a fault zone, project features, including mitigation measures for induced flooding, would be located on sites with potential to experience periodic shaking, possibly of considerable intensity. This is because thousands of earthquakes occur every year in Hawaii, but most have an epicenter on or around the Island of Hawaii. Since the Island of Oahu is located northwest of the Island of Hawaii, the alternative footprint would have the potential for periodic shaking of moderate intensity with slight damage possible. However, project features, including mitigation measures for induced flooding, would follow seismic design requirements which would provide structural stability. Also, the project is not expected to draw a substantial amount of people, either during project construction activities (less than 40 construction personnel would be on site during construction) or permanently (no structures intended for human occupancy would be built; however, mitigation measures would alter existing structures with human occupancy), and only a small number of personnel would be needed for maintenance and operation activities, which are expected to be minimal. Therefore, short-term construction and long-term operation and maintenance of the project is not expected to expose people or structures to significant adverse, impacts related to fault rupture.

Regarding liquefaction, the U.S. National Earthquake Hazard Reduction Program (NEHRP) soil classes were used to assess potential for seismic amplification which in turn could cause liquefaction of soils. Under the NEHRP heirarchy, locations designated as class A soils are least susceptible to seismic amplification (i.e., least susceptible to liquefaction), while class E soils are the most susceptible to seismic amplification (i.e., most susceptible to liquefaction). As shown in Figure 4, the alternative footprint is primarily underlain by NEHRP class D and B soils with a scattering of class C soils. NEHRP class D soils are primarily prevalent in the Waikiki District of the alternative footprint, which is understandable since places in Waikiki include deep fill that is more susceptible to liquefaction. Under this alternative, there are no features proposed within the Waikiki District. Therefore, while project features, including mitigation measures for induced flooding, could be susceptible to liquefaction, most features would be located on class B soils which are on the lower end of the scale in terms of susceptibility to liquefaction. Project features, including proposed mitigation measures for induced flooding, would also follow seismic design requirements which would provide structural stability and EC GSS-1 would further reduce potential adverse impacts by following conclusions and recommendations in the Geotechnical Investigation Appendix (Appendix D). Moverover, project features would not include structures intended for human occupany; although existing structures with human occupancy could be modified as part of proposed mitigation measures for induced flooding. Operation and maintenance activities are expected to be minimal with periodic checking of the floodwalls/earthen berms, debris clearing from detention basins post storm, minor repairs to floodwalls/earthen berms after a significant storm event, minor repairs/replacement of equipment related to potential pump stations, and minor repairs to elevated/floodproofed homes. Therefore, short-term construction and long-term operation and maintenance of the project is expected to expose people or structures to less than significant adverse impacts, with environmental commitments incorporated, related to seismic-related ground failure such as liquefaction.

According to Figure 5, a majority of the alternative footprint has little potential for landslides. The Waahila Ridge within the alternative footprint is the only area with a moderate susceptibility to landslides. Project features closest to the Waahila Ridge are the Manoa Valley District Park Detention Basin (approximately 0.41 mile north of Waahila Ridge) and the Koali Road Floodwall (approximately 0.45 mile south/southwest of Waahila Ridge). Due to the distance of these sites from Waahila Ridge, construction of the project as well as long-term operation and maintenance is not expected to contribute to landslide potential or increase the risk of people or structures being exposed to landslides.

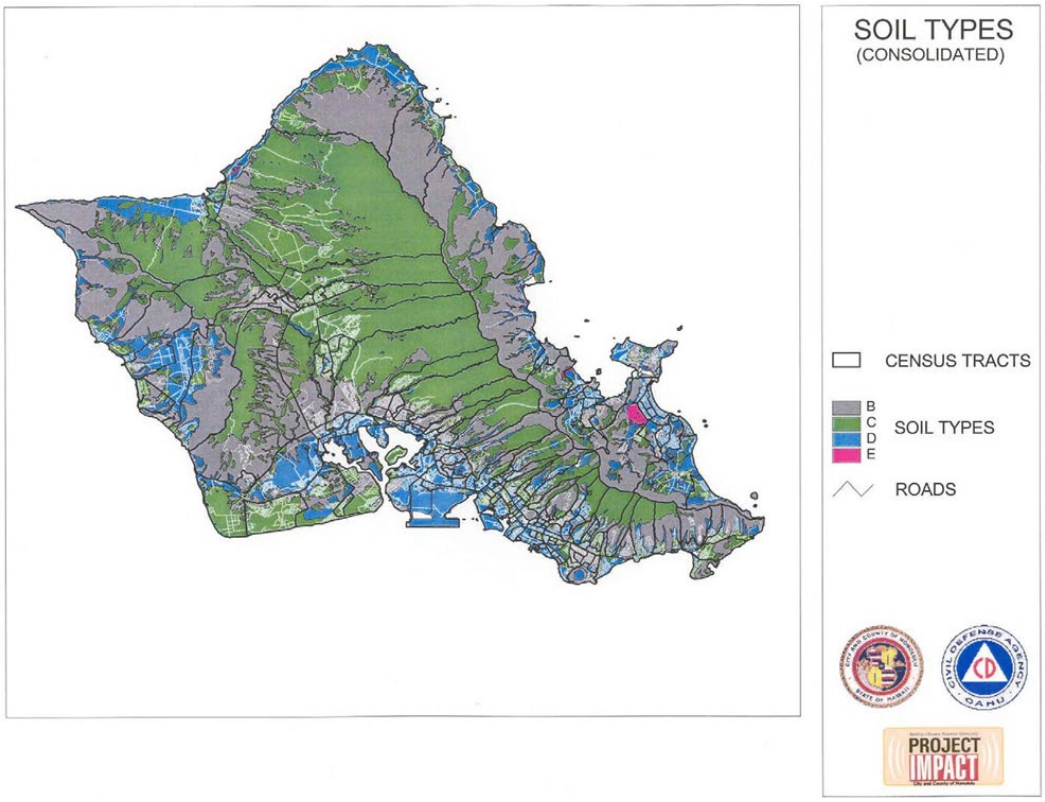

Figure 4: NEHRP Soil Types (Consolidated) within Oahu.

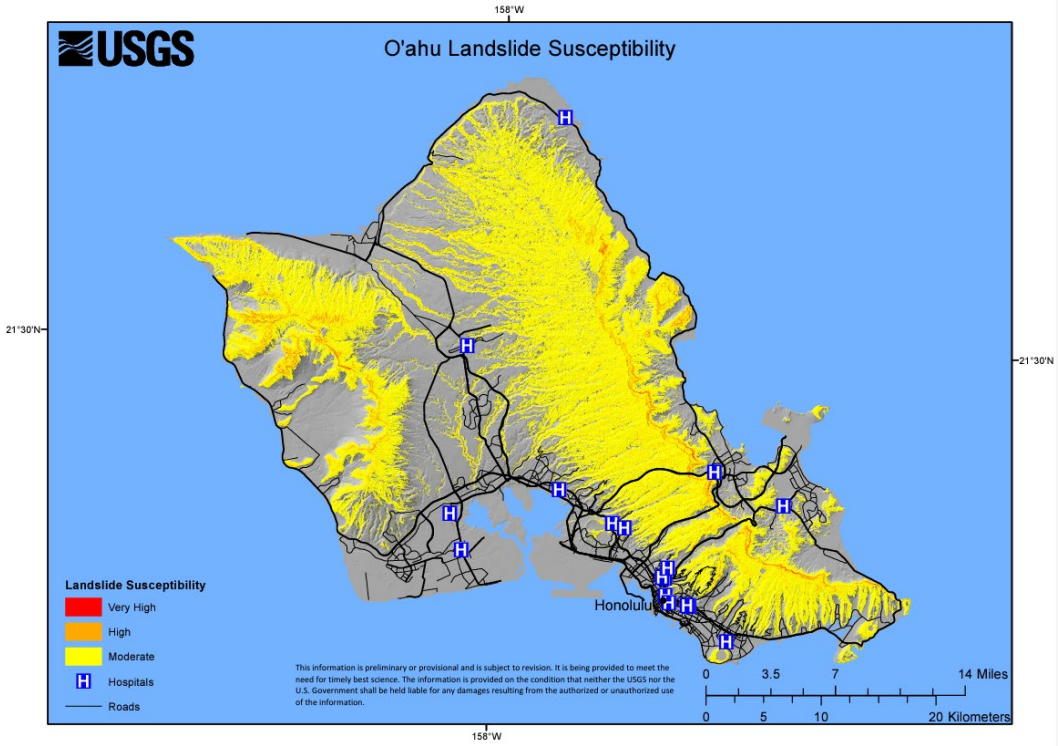

Figure 5: Potential Landslide Susceptibility for Oahu.

The project would involve excavation activities that would expose soils. The exposed soils could be subject to erosion impacts caused by water and wind. In addition, the construction of pump stations and the elevation of existing structures may involve embedment into the substrate. These potential effects on the subsurface geology would be permanent but considered to be minor based on other common residential or commercial construction projects in the area.

Alternative 1 also includes potential mitigation measures for induced flooding. Construction of pump stations and of elevating homes may involve embedment into the subsurface. These potential effects on the subsurface geology would be permanent but considered to be minor based on other common residential or commercial construction projects in the area. Overall, temporary minor adverse impacts would be expected for topography and soils, and negligible impacts on geology.

Additionally, construction equipment and vehicles could indirectly transport sediment to offsite locations. Construction projects which disturb one or more acres of soil are required to obtain coverage under a General Construction Permit. The project would disturb more than one acre and would be required to obtain a General Construction Permit. The General Construction Permit would require the filing of a Notice of Intent with the State of Hawaii, Department of Health, Clean Water Branch and the preparation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP would provide a list of BMPs to minimize potential soil erosion impacts. Additionally, after the project is completed, where feasible disturbed areas would be established and/or reestablished with vegetation to minimize long-term erosion impacts. Therefore, potential impacts associated with erosion would be less than significant with mandatory compliance with existing regulations and procedures outlined in the General Construction Permit and implementation of a SWPPP.

Unique geologic features within the vicinity of the alternative action area include Waikiki Beach, Diamond Head, Round Top, Sugar Loaf, Tantalus, and Punchbowl (H.T. Stearns, 1939). The alternative action area includes the alternative footprint and areas outside of the the alternative footprint where indirect impacts from construction or implementation of the alternative could occur as well as the marine aquatic habitat in the Ala Wai Small Boat Harbor and the marine aquatic habitat within 1,640 feet (500 meters) of the mouth of the Ala Wai Small Boat Harbor. The closest unique geologic feature to the alternative action area would be Waikiki Beach. However, although close, none of the project features are proposed to be constructed on the above unique geologic features. Because of the information above, no short-term or long-term impacts to a unique geologic feature would occur due to implementation of the project.

Alternative 2B

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 1 would have similar construction, operation, maintenance, and mitigation requirements as those in Alternative 2B, such that the nature and degree of impacts are generally expected to be similar. However, due to additional floodwall locations, there is the potential for a different degree of impacts specifically related to liquefaction and soil erosion. Therefore, the analysis for potential liquefaction and soil erosion impacts specific to Alternative 2B is below. Refer to the analysis under Alternative 1 for all other potential project impacts to geology, soils, and seismicity from Alternative 2B.

Regarding liquefaction, as shown in Figure 4, the alternative footprint is primarily underlain by NEHRP class D and B soils with a scattering of class C soils. NEHRP class D soils are primarily prevalent in the Waikiki District of the alternative footprint, which is understandable since places in Waikiki include deep fill that is more susceptible to liquefaction. Under this alternative, there

would be a floodwall constructed on the left and right descending banks of the Ala Wai Canal from Manoa-Palolo Canal downstream to Ala Moana Boulevard. Since the Ala Wai Canal floodwall could be constructed on top of NEHRP class D soils, the project feature is susceptible to liquefaction. However, it is important to distinguish that the construction of the floodwall would not be expected to cause liquefaction of soils. In addition, project features would follow seismic design requirements which would provide structural stability and EC GSS-1 would further reduce potential impacts by following conclusions and recommendations in the Geotechnical Investigation Appendix (Appendix D). For long-term operation and maintenance, there is the possibility that the floodwall could experience subsidence from earthquakes causing soils to liquefy in the Waikiki area. However, the floodwall does not include structures intended for human occupancy and the floodwall would follow seismic design requirements which would be provide structural stability. Therefore, short-term construction and long-term operation and maintenance of the project is expected to have a less than significant impact, with environmental commitments incorporated, regarding exposer of people or structures to significant impacts related to seismic-related ground failure such as liquefaction.

The project would involve excavation activities that would expose soils. In addition, the construction of pump stations and the elevation of existing structures may involve embedment into the substrate. These potential effects on the subsurface geology would be permanent but considered to be minor based on other common residential or commercial construction projects in the area.

Alternative 2B also includes potential mitigation measures for induced flooding. Construction of pump stations and elevation of homes may involve embedment into the subsurface. These potential effects on the subsurface geology would be permanent but considered to be minor based on other common residential or commercial construction projects in the area. Overall, temporary minor adverse impacts would be expected for topography and soils, and negligible impacts on geology.

Additionally, construction equipment and vehicles could indirectly transport sediment to offsite locations. Construction projects which disturb one or more acres of soil are required to obtain coverage under a General Construction Permit. The project would disturb more than one acre and would be required to obtain a General Construction Permit. The General Construction Permit would require the filing of a Notice of Intent with the State of Hawaii, Department of Health, Clean Water Branch, and the preparation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP would provide a list of BMPs to minimize potential soil erosion impacts. Additionally, after the project is completed, where feasible disturbed areas would be established and/or reestablished with vegetation to minimize long-term erosion impacts. Long-term, the operation of the project could increase erosion of stream banks within the Ala Wai watershed since Alternative 2B would increase conveyance of stormwaters through the system and out through the Ala Wai Small Boat Harbor. Long-term maintenance activities would include monitoring of the project features as well the stream banks for impacts. Any erosion of the stream banks caused by project features could be repaired. Therefore, potential impacts associated with erosion would be less than significant with mandatory compliance with existing regulations and procedures outlined in the General Construction Permit and implementation of a SWPPP.

Alternative 5.3

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as those in Alternative 1 and Alternative

2B, such that the nature and degree of impacts are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts.

Alternative 5.3 also includes potential mitigation measures for induced flooding. Construction of pump stations and of elevating homes may involve embedment into the subsurface. These potential effects on the subsurface geology would be permanent but considered to be minor based on other common residential or commercial construction projects in the area. Overall, temporary minor adverse impacts would be expected for topography and soils, and negligible impacts on geology.

Alternative 6

Less than Significant Impact: Alternative 6 involves temporary construction on existing structures, temporary construction access, and/or acquisition of existing structures. This would require the short-term use of heavy equipment, trucks, building materials such as lumber and jacks. There would be minor direct adverse effects to soils during construction; the preparation of a SWPPP would provide a list of BMPs to minimize potential soil erosion impacts. Long-term, there could be minor beneficial effects on soils since following construction disturbed areas would be reshaped if necessary for drainage and stabilization and seeded.

Environmental Commitments

Implementation of the environmental commitment listed below, would reduce to the extent feasible, impacts to geological resources and soils within the alternative footprint.

EC GSS-1: During construction activities, the project applicant shall incorporate the conclusions and recommendations included in the Geotechnical Investigation Appendix. Geotechnical conclusions and recommendations are in Appendix D and discuss geologic hazards such as slope stability, liquefaction, settlement potential, soil suitability, soil corrosivity, etc.

Best Management Practices

The following standard BMPs would be implemented by the contractor of by USACE to avoid or minimize any effects of potential erosion. Implementation of these BMPs would ensure that effects from erosion would remain at less than significant levels.

- Appropriate erosion control measures would be incorporated into the SWPPP to prevent sediment from entering waterways. The contractor would use a water truck or other appropriate measures to control fugitive dust on haul roads, construction areas, and stockpiles.
- Disturbed areas slated for revegetation would be planted in a timely manner to control erosion.

3.3.3 Air Quality

Regulatory Setting

Relevant federal and state laws/regulations include:

- Clean Air Act
- General Conformity Rule
- Department of Health, Public Health Regulations, Chapter 43, Air Pollution Control Regulations
- Department of Health, Title 11, Chapter 60, Air Pollution Control Regulations

- Department of Health, Title 11, Chapter 60.1, Air Pollution Control, Hawaii Administrative Rules
- Non-Road Diesel Fuel Rule
- Emissions Standards for On-Road Trucks
- Environmental Protection Agency Diesel Fuel Rule
- Off-Road Diesel Engine Rule

Existing Conditions

The federal Clean Air Act requires the U.S. Environmental Protection Agency (USEPA) to set national ambient air quality standards (NAAQS) for six criteria pollutants (i.e., carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur oxides) which are considered harmful to public health and the environment. Areas not meeting the NAAQS for one or more of the criteria pollutants are designated as "nonattainment" areas by the USEPA. According to the USEPA Green Book, the study area does not fall within or near any designated non-attainment areas for any criteria pollutants (USEPA, 2022a).

Significance Criteria

Effects to air quality would be considered significant if the proposed project would result in any of the following:

- Exceed federal or State air quality standards established for criteria pollutants.
- Substantially contribute to an existing exceedance of a federal or State air quality standard (for pollutants in non-attainment).
- Expose sensitive receptors to substantial pollutant concentrations.
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

Environmental Consequences

No Action

No Impact: Under the No Action Alternative, no federally funded flood risk management improvements would be implemented, such that no emissions of criteria pollutants would occur. The existing range of air pollution sources within the project area would not be expected to change substantially over the period of analysis. With continuing trade wind patterns, air quality levels are expected to remain relatively constant and would continue to be in compliance with federal and State standards.

Alternative 1

Less than Significant Impact: Construction of the project would involve a variety of ground disturbing activities, including site preparation, excavation, and grading. Use of heavy equipment and earthmoving operations conducted as part of these activities would generate internal combustion engine emissions and fugitive dust; potential air pollutants associated with these emissions include hydrocarbons; carbon monoxide; nitrogen; carbon; sulfur dioxide; and PM_{10} and $PM_{2.5}$. In general, these emissions would be temporary and localized in nature. In comparison to overall emissions in the region, the contribution by the project is relatively small; this contribution would only negligibly affect regional air quality and would not be expected to affect attainment of the federal or state ambient air quality standards. Furthermore, construction would be conducted in compliance with HAR Title 11 Chapter 60.1 (Air Pollution Control), which specifies that the best practical operation or treatment be implemented such that there is no discharge of visible fugitive dust beyond the property lot line.

Over the long-term operation and maintenance of the project, air emissions would occur from the use of vehicles for operations, maintenance activities, and operation of pump station(s) if needed as a mitigation measure for induced flooding. Other than emissions from maintenance equipment, vehicles, and potentially diesel engine(s) used to power the hydraulic pumps if electrical power is lost during a storm event, there would be no operational emissions from project features. Therefore, the emission levels from operation and maintenance would be negligible due to the infrequency of these activities occurring. Therefore, the proposed project would have short term minor adverse effects and long-term negligible adverse effects to air quality.

Alternative 2B

Less than Significant Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of impacts are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. Overall, short-term minor adverse effects and long-term negligible adverse effects would occur to air quality with Alternative 2B.

Alternative 5.3

Less than Significant Impact: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of impacts are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts. Overall, short-term minor adverse effects and long-term negligible adverse effects would occur to air quality with Alternative 5.3

Alternative 6

Less than Significant Impact: Short-term air quality impacts resulting from implementation of Alternative 6 would occur from the use of construction equipment necessary to elevate or demolish existing structures, as determined necessary. Impacts to air quality resulting from construction equipment emissions would be short-term minor adverse effects. There would be no long-term direct or indirect adverse effects on air quality.

Environmental Commitments

No additional environmental commitments other than the BMPs discussed below would be implemented to minimize impacts to air quality.

Best Management Practices

The following BMPs would be implemented during construction of the project:

Basic Construction Emission Control Practices

- Cover or maintain at least two feet of free board space on haul trucks transporting soil, rock, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways should be covered.
- Limit vehicle speeds on unpaved roads to 15 miles per hour (mph).
- Minimize idling either by shutting equipment off when not in use or reducing the time of idling to five minutes. Provide clear signage that posts this requirement for workers at the entrance to the construction site. Construction site includes the construction area, easements, access roads, and rights of way where construction occurs during the implementation of one or more measures.

- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.

Fugitive Dust Control Practices

- Limit vehicle speeds on unpaved roads to 15 mph.
- Install one or more of the following track-out prevention measures:
    - A gravel pad to clean the tires of existing vehicles,
    - A tire shaker;
    - A wheel wash system;
    - Pavement extending at least 50-ft from the intersection with the paved public road, or
    - Any other measure(s) as effective as the measures listed above.
- Suspend any excavation operations when wind speeds are high enough to result in emissions across the property line, despite application of other dust control practices.

Additional Air Quality BMPs

- Model year 2010 (MY2010) or newer haul trucks would typically be used for the duration of the project. Use of these trucks would provide the best available emissions controls for nOx and PM emissions. There would potentially be occasions when availability of MY2010 or newer haul trucks is limited, thereby forcing the need to use older trucks to meet construction schedule goals. Should a situation like this arise, the construction contractor would first be required to demonstrate that MY2010 or newer trucks are not available in the general project region before the use of older trucks is authorized by USACE.
- All off-road diesel-powered construction equipment greater than 50 hp would meet Tier-4-off-road emission standards (reference 40 CFR 1039), where available. If a certain tier engine is not available for any off-road equipment larger than 50 hp, that equipment would be equipped with the next lower tier engine (e.g., if Tier 3 is not available use Tier 2), or an engine that is equipped with retrofit controls to reduce exhaust emissions of nOx and diesel PM to no more than the next available tier, unless certified by engine manufacturers that the use of such devices is not practical for specific engine types. If the construction contractor proposed to use off-road diesel-powered construction equipment greater than 50 hp that does not meet Tier 4 off-road emissions standards, such usage would first have to be approved by USACE.
- Construction equipment would incorporate emissions-reducing technology such as specific fuel economy standards.

3.3.4 Groundwater Resources

Regulatory Setting

Relevant federal and state laws/regulations include:

- HRS Chapter 174C (State Water Code)

Existing Conditions

Groundwater generally occurs within basal unconfined flank aquifers within the study area. The basal aquifers located within the Ala Wai watershed are the Nuuanu, Palolo, and Waialae-West aquifer systems, which are part of the Honolulu aquifer sector. It is expected that, where present, high-level dike-impounded and perched groundwater in the upper portions of the watershed contribute to the recharge of the underlying basal aquifers. The State of Hawaii Commission on Water Resource Management (CWRM) is responsible for determining the sustainable yield for each aquifer; the total estimated sustainable yield for the island of Oahu is

407 million gallons per day (mgd) (CWRM, 2008a). The estimated sustainable yield for the Honolulu aquifer sector is 50 mgd. Of this total, the Nuuanu, Palolo, and Waialae-West aquifer systems have estimated yields of 5, 14, and 4 mgd, respectively (CWRM, 2008b). Because of concerns for diminishing reserves of developable groundwater and threats to water quality at developed sources, protection of the Honolulu aquifer sector as a groundwater management area was instituted in 1981, resulting in a requirement for water use permits (CWRM, 1990).

Significance Criteria

Effects on groundwater resources would be considered significant if implementation of an alternative plan would result in any of the following:

- Substantially increase contaminant levels in groundwater.
- Substantially deplete groundwater supplies.
- Interfere substantially with groundwater recharge.

Environmental Consequences

No Action

No Impact: Under the No Action Alternative, none of the flood risk management measures would be implemented. The potential future without project condition assumptions are the same as those discussed in the 2017 Ala Wai Canal Study (USACE, 2017); therefore, that discussion is incorporated by reference.

Alternative 1

Less than Significant Impact: Construction of the project does not require the substantial conversion of pervious surfaces to impervious. The floodwalls constructed of steel sheetpile, concrete, and micro-piles as well as drainage structures would result in the conversion of approximately 2.44 acres of pervious surface area to impervious (Table 11). Conversely, the construction of detention basins and earthen levees would retain pervious surfaces that would continue to be permeable. During construction, storage and use of some hazardous materials would occur. If handled inappropriately, these materials could accidentally spill or inadvertently discharge to groundwater. Construction activities would involve the use of heavy equipment, cranes, compactors, and other construction equipment that use petroleum products such as fuels, lubricants, hydraulic fluids, and coolants, all of which are detrimental to groundwater quality. BMPs listed below would be implemented to minimize the risk of inadvertent spills. Construction activities may also require the use of water trucks to minimize potential fugitive dust during construction. The amount of water required during construction, though, would not substantially decrease groundwater supplies.

Table 11: The Area of Impervious Surface Created by Alternative 1 Project Features.

Feature	Length (ft)	Width (ft)	Area (ft^2)	Area (acres)	Impervious Surface (acres)
Makiki District Park Detention Basin Berm	1,200	48	57,600	1.322	N/A
Drainage Structure 1	525	4	2,100	0.048	0.048
Drainage Structure 2	1,205	1.75	2,109	0.048	0.048
Kanaha Floodwall (I-Wall)	2,200	6	13,200	0.303	0.303
Road Closure Structure 1	40	6	240	0.006	0.006
Road Closure Structure 2	40	6	240	0.006	0.006
Road Closure Structure 3	60	6	360	0.008	0.008

Feature	Length (ft)	Width (ft)	Area (ft^2)	Area (acres)	Impervious Surface (acres)
Road Closure Structure 4	60	6	360	0.008	0.008
Road Closure Structure 5	60	6	360	0.008	0.008
Manoa Valley District Park Detention Basin Berm	1,580	48	75,840	1.741	N/A
Drainage Structure 1	445	4.5	2,003	0.046	0.046
Drainage Structure 2	2	120	240	0.006	0.006
Woodlawn Drive Floodwall (L-Wall)	1,270	12	15,240	0.350	0.350
Road Closure Structure 1	60	6	360	0.008	0.008
Koali Road Floodwall (L-Wall on Macropiles)	2,026	12	24,312	0.558	0.558
Drainage Structure 1	50	2	100	0.002	0.002
Drainage Structure 2	50	2	100	0.002	0.002
Road Closure Structure 1	40	6	240	0.006	0.006
Road Closure Structure 2	20	6	120	0.003	0.003
Kaimuki High School Floodwall (I-Wall)	2,700	6	16,200	0.372	0.372
Kaimuki High School Floodwall (L-Wall on Macropiles)	1,700	12	20,400	0.468	0.468
Road Closure Structure 1	180	6	1,080	0.025	0.025
Road Closure Structure 2	90	6	540	0.012	0.012
Ala Wai Golf Course Berm	10,665	48	511,920	3.917	N/A
Drainage Structure 1	147	33	4,851	0.111	0.111
Drainage Structure 2	50	4	200	0.005	0.005
Drainage Structure 3	50	4	200	0.005	0.005
Drainage Structure 4	50	4	200	0.005	0.005
Drainage Structure 5	50	4	200	0.005	0.005
Road Closure Structure 1	40	6	240	0.006	0.006
Road Closure Structure 2	80	6	480	0.011	0.011
				TOTAL	**2.44**
N/A = Not Applicable – would not convert pervious surface to impervious					

Long-term, the operation and maintenance of the project is not expected to result in any additional conversion of pervious surfaces to impervious; therefore, O&M would not interfere substantially with groundwater recharge. Similar to construction, heavy equipment may be needed during future maintenance activities for repairs or debris removal. Equipment used would need petroleum products which are detrimental to groundwater quality. BMPs listed below would be implemented during maintenance activities to minimize the risk of inadvertent spills. No heavy equipment is needed for operation of project features. O&M activities do not require the use of water; therefore, the project would not decrease groundwater supplies long-term. Alternative 1 also includes a broad range of mitigation measures that may be needed to minimize induced flooding. None of the proposed mitigation measures would involve extraction or withdrawals of groundwater. Dewatering may be required during construction of pump station(s) if found to be necessary to minimize induced flooding, however, any adverse effect to groundwater would be short-term and negligible. Overall, with the implementation of BMPs, the

project is expected to have a short-term less than significant adverse effect and a long-term negligible adverse effect on groundwater supplies, contaminant levels, or recharge.

Alternative 2B

Less than Significant Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to groundwater are generally expected to be similar. The primary difference between the alternatives is some of the project features and therefore the amount of impervious area created. Alternative 2B would convert approximately 8.67 acres of pervious surface to impervious surface (Table 12). Even though the amount of impervious surface created is greater in Alternative 2B than Alternative, the nature and degree of potential impacts to groundwater are generally expected to still be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. Overall, with the implementation of BMPs, the project is expected to have a short-term less than significant adverse effect and a long-term negligible adverse effect on groundwater supplies, contaminant levels, or recharge.

Table 12: The Area of Impervious Surface Created by Alternative 2B Project Features.

Feature	Length (ft)	Width (ft)	Area (ft^2)	Area (acres)	Impervious Surface (acres)
Makiki District Park Detention Basin Berm	1,200	48	57,600	1.322	N/A
Drainage Structure 1	525	4	2,100	0.048	0.048
Drainage Structure 2	1,205	1.75	2,109	0.048	0.048
Kanaha Floodwall (I-Wall)	2,200	12	26,400	0.606	0.606
Road Closure Structure 1	40	6	240	0.006	0.006
Road Closure Structure 2	40	6	240	0.006	0.006
Road Closure Structure 3	60	6	360	0.008	0.008
Road Closure Structure 4	60	6	360	0.008	0.008
Road Closure Structure 5	60	6	360	0.008	0.008
Woodlawn Drive Floodwall (L-Wall on Macropiles)	1,270	12	15,240	0.350	0.350
Road Closure Structure 1	60	6	360	0.008	0.008
Koali Road Floodwall (L-Wall on Macropiles)	2,026	12	24,312	0.558	0.558
Drainage Structure 1	50	2	100	0.002	0.002
Drainage Structure 2	50	2	100	0.002	0.002
Road Closure Structure 1	40	6	240	0.006	0.006
Road Closure Structure 2	20	6	120	0.003	0.003
Ala Wai Canal Floodwall (I-Wall)	4,740	6	28,440	0.653	0.653
Ala Wai Canal Floodwall (J-Wall on Macropiles)	20,005	12	240,060	5.511	5.511
Kaimuki High School Floodwall (I-Wall)	2,630	6	15,780	0.362	0.362
Kaimuki High School Floodwall (L-Wall on Macropiles)	1,030	12	12,360	0.284	0.284
Drainage Structure 1	50	2	100	0.002	0.002

Feature	Length (ft)	Width (ft)	Area (ft^2)	Area (acres)	Impervious Surface (acres)
Drainage Structure 2	50	3	150	0.003	0.003
Drainage Structure 3	50	2	100	0.002	0.002
Drainage Structure 4	50	4	200	0.005	0.005
Drainage Structure 5	50	2	100	0.002	0.002
Drainage Structure 6	50	4	200	0.005	0.005
Road Closure Structure 1	80	6	480	0.011	0.011
Road Closure Structure 2	80	6	480	0.011	0.011
Road Closure Structure 3	110	6	660	0.015	0.015
Road Closure Structure 4	230	6	1,380	0.032	0.032
Road Closure Structure 5	100	6	600	0.014	0.014
Road Closure Structure 6	40	6	240	0.006	0.006
Road Closure Structure 7	80	6	480	0.011	0.011
Road Closure Structure 8	80	6	480	0.011	0.011
Road Closure Structure 9	180	6	1,080	0.025	0.025
Canoe Access Structure 1	30	6	180	0.004	0.004
Canoe Access Structure 2	180	6	1,080	0.025	0.025
Canoe Access Structure 3	90	6	540	0.012	0.012
				TOTAL	**8.67**
N/A = Not Applicable – would not convert pervious surface to impervious					

Alternative 5.3

Less than Significant Impact: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to groundwater are generally expected to be similar. The primary difference between the alternatives is some of the project features and therefore the amount of impervious area created. Alternative 5.3 would convert approximately 8.03 acres of pervious surface to impervious surface (Table 13). Therefore, the amount of pervious surface being created under Alternative 5.3 is less than Alternative 2B but greater than Alternative 1. Even though the amount of pervious surface is different than Alternative 1 or 2B, the nature and degree of potential impacts to groundwater are generally expected to still be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for project impacts. Overall, with the implementation of BMPs, the project is expected to have a short-term less than significant adverse effect and a long-term negligible adverse effect on groundwater supplies, contaminant levels, or recharge.

Table 13: The Area of Impervious Surface Created by Alternative 5 Project Features.

Feature	Length (ft)	Width (ft)	Area (ft^2)	Area (acres)	Impervious Surface (acres)
Woodlawn Drive Floodwall (L-Wall on Macropiles)	1,270	12	15,240	0.350	0.350
Road Closure Structure 1	60	6	360	0.008	0.008
Koali Road Floodwall (L-Wall on Macropiles)	2,510	12	30,120	0.692	0.692
Drainage Structure 1	50	2	100	0.002	0.002
Drainage Structure 2	50	2	100	0.002	0.002

Feature	Length (ft)	Width (ft)	Area (ft^2)	Area (acres)	Impervious Surface (acres)
Road Closure Structure 1	40	6	240	0.006	0.006
Road Closure Structure 2	20	6	120	0.003	0.003
Ala Wai Canal Floodwall (J-Wall on Macropiles)	17,125	12	205,500	4.718	4.718
Ala Wai Canal Floodwall (L-Wall on Macropiles)	4,069	12	48,828	1.121	1.121
Ala Wai Canal Floodwall (Tieback I-Wall)	1,658	3	4,974	0.114	0.114
Drainage Structure 1	50	4	200	0.005	0.005
Drainage Structure 2	50	2	100	0.002	0.002
Drainage Structure 3	50	4	200	0.005	0.005
Drainage Structure 4	50	3	150	0.003	0.003
Drainage Structure 5	50	2	100	0.002	0.002
Drainage Structure 6	50	4	200	0.005	0.005
Drainage Structure 7	50	4	200	0.005	0.005
Drainage Structure 8	50	2	100	0.002	0.002
Drainage Structure 9	50	2	100	0.002	0.002
Drainage Structure 10	50	2	100	0.002	0.002
Drainage Structure 11	50	4	200	0.005	0.005
Drainage Structure 12	50	5	250	0.006	0.006
Drainage Structure 13	50	4	200	0.005	0.005
Drainage Structure 14	50	4	200	0.005	0.005
Road Closure Structure 1	80	6	480	0.011	0.011
Road Closure Structure 2	80	6	480	0.011	0.011
Road Closure Structure 3	110	6	660	0.015	0.015
Road Closure Structure 4	230	6	1,380	0.032	0.032
Road Closure Structure 5	60	6	360	0.008	0.008
Road Closure Structure 6	60	6	360	0.008	0.008
Road Closure Structure 7	40	6	240	0.006	0.006
Road Closure Structure 8	180	6	1,080	0.025	0.025
Road Closure Structure 9	180	6	1,080	0.025	0.025
Road Closure Structure 10	90	6	540	0.012	0.012
Road Closure Structure 11	90	6	540	0.012	0.012
Canoe Access Structure 1	30	6	180	0.004	0.004
Canoe Access Structure 2	180	6	1,080	0.025	0.025
Canoe Access Structure 3	90	6	540	0.012	0.012
Ala Wai Golf Course Berm	8,315	66	548,790	12.600	N/A
Ala Wai Golf Course Floodwall (L-Wall on Macropiles)	1,861	13	24,193	0.555	0.555
Road Closure Structure 1	40	6	240	0.006	0.006
Drainage Structure 1	147	33	4,851	0.111	0.111
Drainage Structure 2	50	4	200	0.005	0.005
Drainage Structure 3	50	4	200	0.005	0.005
Drainage Structure 4	50	4	200	0.005	0.005
Drainage Structure 5	50	4	200	0.005	0.005

Feature	Length (ft)	Width (ft)	Area (ft^2)	Area (acres)	Impervious Surface (acres)
Canoe Access Structure 1	420	6	2,520	0.058	0.058
				TOTAL	**8.03**
N/A = Not Applicable – would not convert pervious surface to impervious					

Alternative 6

No Impact: No short-term direct or indirect groundwater impacts would occur because of implementation of Alternative 6 because land disturbance for this alternative would be limited to modification of existing buildings. Implementation of alternative 6 would require construction access to all structures to be treated; this would be expected to be from existing roads. Similarly, localized maintenance such as repairs will be needed over time. Overall, no direct or indirect long-term adverse effects to groundwater would occur because of this alternative. Appropriate erosion and sediment control measures would be utilized during construction.

Environmental Commitments

No additional environmental commitments other than the BMPs discussed below would be implemented to minimize impacts to groundwater.

Best Management Practices

Implementation of the following BMPs would help ensure that effects on groundwater quality would remain at less than significant levels. Standard BMPs include:

- A fuel spill management plan would be developed for the project by the construction contractor and would be implemented by the contractor.
- Construction equipment and vehicles would be fueled and maintained in specific staging areas only, which would be designed to capture potential spills.
- Fuels and hazardous materials would not be stored on site. Any spills of hazardous material would be cleaned up immediately by the construction contractor.
- Construction vehicles and equipment would be inspected frequently and appropriately maintained by the construction contractor to help prevent dripping of oil, lubricants, or any other fluids.

3.3.5 Surface Water Resources

Regulatory Setting

Relevant federal and state laws/regulations include:

- Clean Water Act, Section 401, and Section 404
- Rivers and Harbors Act, Section 10
- HRS Chapter 174C (State Water Code)

Existing Conditions

The Ala Wai watershed is in urban Honolulu and has a drainage area of approximately 19 square miles. Communities within the drainage area include Manoa, Palolo, Makiki, McCully, Moiliili, and Waikiki. The watershed consists of three main tributaries, the Manoa, Palolo, and Makiki streams.

Makiki Stream is a relatively small stream originating near 1,850 feet on the southwestern flank of Mt. Tantalus in the Koolau Mountains and flows southwestwards for approximately 3.5 miles

to its terminus in the Ala Wai Canal. The stream has three major branches, these being from west to east the Kanaha, Kanealole, and Moleka streams, the latter two of which join prior to their confluence with the Kanaha. The upper half of the Makiki catchment lies in steep, forested terrain on the slopes of Mt. Tantalus and Round Top, an area that receives up to 134 inches of rain annually (Giambelluca et al., 2013). The stream in this section flows in natural, unmodified channels, heavily shaded by a forest, and is fed by two major springs, the Makiki Spring on the Kanealole branch, and the Herring Spring on the Moleka branch. At approximately 150 feet elevation, just downstream from Makiki Street, the stream channel is artificially confined within a concrete box culvert, which runs under the streets and neighborhoods of Honolulu before re-emerging at sea level near the intersection of Philip Street and Kalakaua Avenue. From this point the stream runs in an open concrete channel for another 0.4 miles to the Ala Wai Canal. There are no historic or active ditch diversions in the Makiki Stream catchment.

Manoa Stream is a large stream in a bowl-like catchment, originating near 2,800 feet on the southwestern flank of Konahuanui peak and adjacent ridgelines in the Koolau Mountains, and flows southwestwards for approximately 5.75 miles to its terminus in the Ala Wai Canal. The stream has two major branches, these being the Waihi on the west side of the basin, and the Waiakeakua on the east. The upper half of the Manoa catchment lies in steep, forested terrain on the slopes of the Koolau Mountains, in a very wet area that receives up to 151 inches of rain annually at the headwaters of the Waiakeakua branch (Giambelluca et al., 2013). The stream in its upper reaches flows in natural unmodified channels for approximately 2.25 miles, being heavily shaded by forest. Below Paradise Park, the stream passes through suburban neighborhoods in a partially modified channel for about 1.0 mile. At the Mano District Park, near 150 feet elevation the stream becomes confined within an artificial concrete channel, which continues downstream to the East Manoa Road bridge. Downstream from this bridge the stream flows in a re-aligned but partially natural channel mostly following the base of the steep eastern wall of Manoa Valley. Downstream from Kanewai Park, at approximately 30 feet elevation, the stream channel has been straightened, but not concrete-lined, and continues in this fashion for 1.4 miles, passing below the H-1 Freeway and then continuing to its confluence with the Ala Wai Canal.

Palolo Stream is another large stream in a somewhat more tightly confined catchment than adjacent Manoa Stream and originates near 2,665 feet on the southwestern flank of Mt. Olympus and adjacent ridgelines in the Koolau Mountains and flows southwestwards for approximately 4.4 miles before joining with Manoa Stream just upslope of the H-1 Freeway. The stream has two major branches, these being the Pukele on the west side of the basin, and the Waiomao on the east. The upper third of the Palolo catchment lies in steep, forested terrain on the slopes of the Koolau Mountains, in a wet area that receives up to 120 inches of rain annually at the headwaters of the Pukele branch, and 104 inches annually at the headwaters of the Waiomao branch (Giambelluca et al., 2013). The stream headwaters in these upper reaches traverse unmodified channels for approximately 2.0 miles, being shaded by a forest. At approximately 530 feet elevation both stream branches begin to traverse the suburban neighborhoods of Palolo Valley, with their channels becoming progressively more straightened and modified. Pukele Stream appears to be intermittent in its upper reaches but receives significant spring inflow just upstream of the 10th Avenue Bridge. Not far downstream of this bridge, at 250 feet elevation, the stream becomes confined within a concrete channel, and retains this artificial character for the remaining 0.30 mile of its length, until its confluence with Waiomao Stream at 225 feet elevation. The Waiomao Stream exhibits higher volume in its headwaters, receiving perennial inflow from the outlet of a perched wetland in Kaau Crater. This branch also retains a more natural character to its channel until just before its confluence with the Pukele Stream, at which point it is confined within an artificial concrete channel, which then

continues for the remaining 2.0 miles length of the stream until its confluence with Manoa Stream just downslope of Kanewai Park.

The Ala Wai Canal was man-made in the 1920s and is about 2 miles long, originally built to drain the wetlands and formed Waikiki. The width of the Canal ranges between 150 and 250 feet. The original depths of the Ala Wai Canal were approximately 10 to 20 feet below mean sea level (msl) behind Waikiki, 10 to 13 feet below msl between the confluence with Makiki Stream and Ala Moana Boulevard Bridge, and 25 feet below msl beyond the Ala Moana Boulevard Bridge (Noda, 1992). However, sedimentation has decreased the depths over time. Portions of the Ala Wai Canal have been dredged a total of four times: in 1967, 1978-1979, 2002-2003, and 2019-2021. The Canal intercepts flows from Manoa and Palolo stream (via the Manoa-Palolo Drainage Canal) and Makiki Stream (as well as numerous storm drain outfalls), and empties into the Ala Wai Boat Harbor. The boat harbor connects to Mamala Bay via a channel that was dredged through the reef platform when the harbor was built in 1935. Mamala Bay encompasses the ocean area offshore of southern Oahu from Diamond Head Crater to Barbers Point (Kalaeola) Deep Draft Harbor.

The upper reaches of the basin area very steep and rock and incised into the Koolau Volcano, between 40-feet and 2,400 feet elevation. The Makiki and Manoa basins typically receive more than 160 inches of rain annually, while Palolo valley receives less. The lower portion of the basin is much less steep and is urbanized. Significant portions of the lower watershed are hardened, impervious surfaces with sewer system drainage actively directing most of the runoff in less intense events. The Ala Wai Canal and Waikiki basin receive about 30 inches of precipitation, annually. High-intensity rainfall events in the mountains usually produce flashy flood events in the small drainage basin. Time to peak is usually one hour and even for large intense storms, the rise and recessions of the flood hydrography usually occurs within 6 hours (USACE, 2020).

The U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) Database was used to query wetlands that have been identified within the study area (Figure 6 and Figure 7). It is important to note that the NWI Database provides only reconnaissance level information on the location, type, and size of wetland resources. Certain wetland habitats are excluded from the NWI because of limitations of aerial imagery as the primary data source used to detect wetlands. Wetland habitats that are excluded from the NWI include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (e.g., coral or tuberficid worm reefs) have also been excluded from the database.

Manoa Stream is shown as having 24.07 acres of freshwater forested/shrub wetland (USFWS, 2022). The 24.07 acres of freshwater forested/shrub wetland include the headwater tributaries of Manoa and the Manoa mainstem down to its confluence with Palolo Stream. Additionally, riverine habitat is found within approximately 0.83 acres of Waihi Stream, 0.15 acres of Aihualama Stream, 0.56 acres of Waaloa Stream, and 1.2 acres of Mano Stream. The NWI Database also shows a single freshwater emergent wetland of approximately 0.19 acres located near Waihi Stream, about 0.15 miles upstream of the confluence of Waihi Stream with Waiakeakua Stream.

Makiki Stream is shown as having 12.28 acres of freshwater forested/shrub wetland, which is primarily located within the headwater tributaries (i.e., Kanealoloe Stream, Moleka Stream, and Kanaha Stream). The mainstem of Makiki Stream is comprised of approximately 4.03 acres of riverine habitat.

Palolo Stream has approximately 16.73 acres of freshwater forested/shrub wetland, which is mainly located within the headwater tributaries (i.e., Waiomao Stream and Pukele Stream). The Pukele Stream tributary also has 0.09 acre of freshwater emergent wetland and 0.78 acre of freshwater pond. The Waiomao tributary also has 20.74 acres of freshwater emergent wetland and an additional 15.66 acres of freshwater forested/shrub wetland. The Palolo Stream mainstem is primarily comprised of 4.75 acres of riverine habitat, extending from the convergence of its tributaries to the confluence of Palolo and Manoa streams.

The NWI Database shows 59.31 acres of the Ala Wai Canal as riverine habitat. The Ala Wai Boat Harbor is comprised of 58.86 acres of estuarine and marine deepwater habitat. Estuarine and marine wetlands extend along the nearshore areas of Aina Moana (Magic Island) Park, Kahanamoku Beach, Fort DeRussy Beach Park, and Waikiki Beach (approximately 8.85 acres).

Other nearby wetlands according to the NWI Database include 3.65 acres of freshwater forested/shrub wetland and 0.97 acres of freshwater pond at the Ala Wai Golf Course. The Kahanamoku Lagoon includes approximately 3.88 acres of estuarine and marine deepwater habitat and 0.73 acres of estuarine and marine wetland. The Aina Moana (Magic Island) Park includes approximately 5.09 acres of estuarine and marine deepwater habitat and 1.25 acres of estuarine and marine wetland (USFWS, 2022).

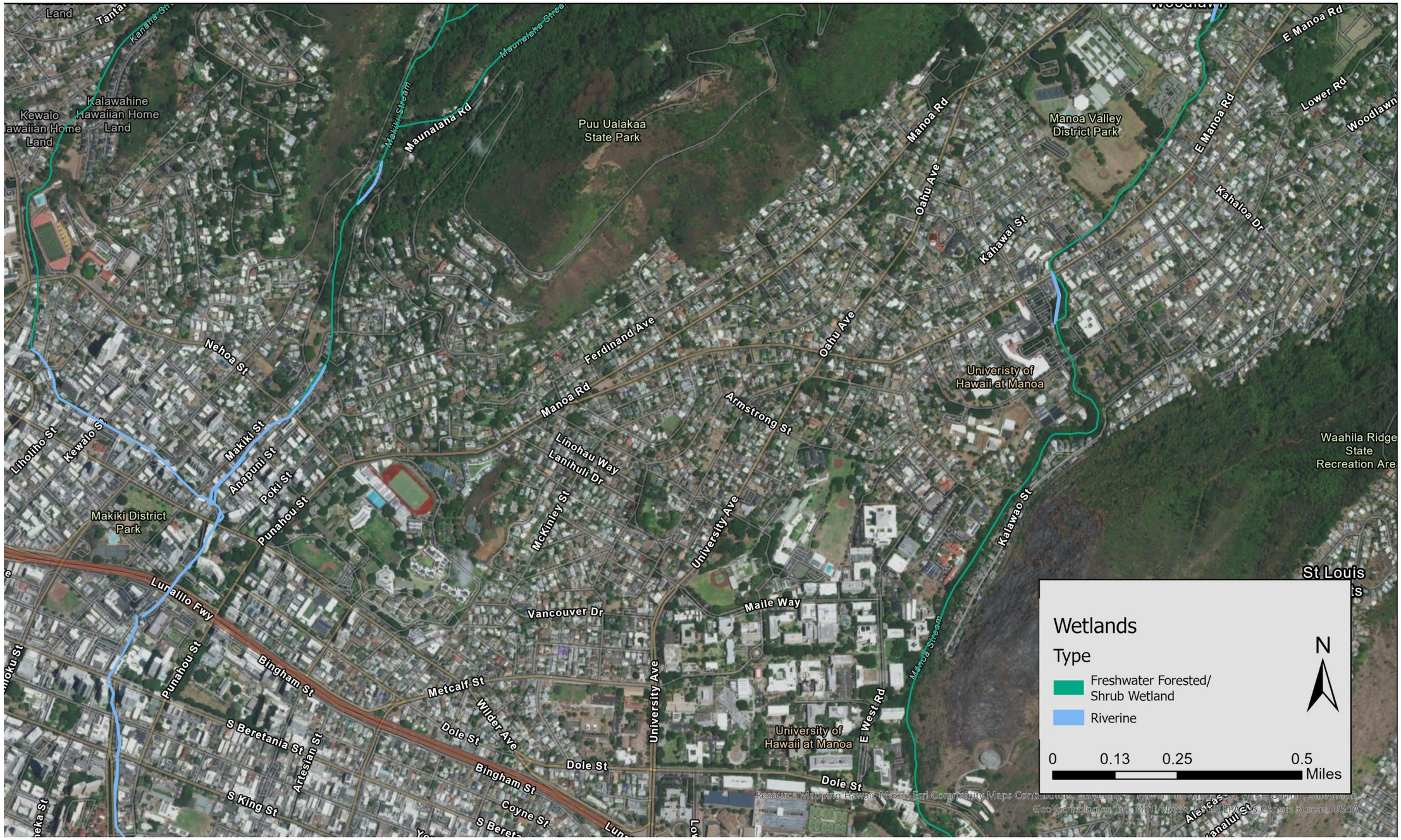

Figure 6: Location of National Wetland Inventory Wetlands Within the Lower Watershed of the Study Area.

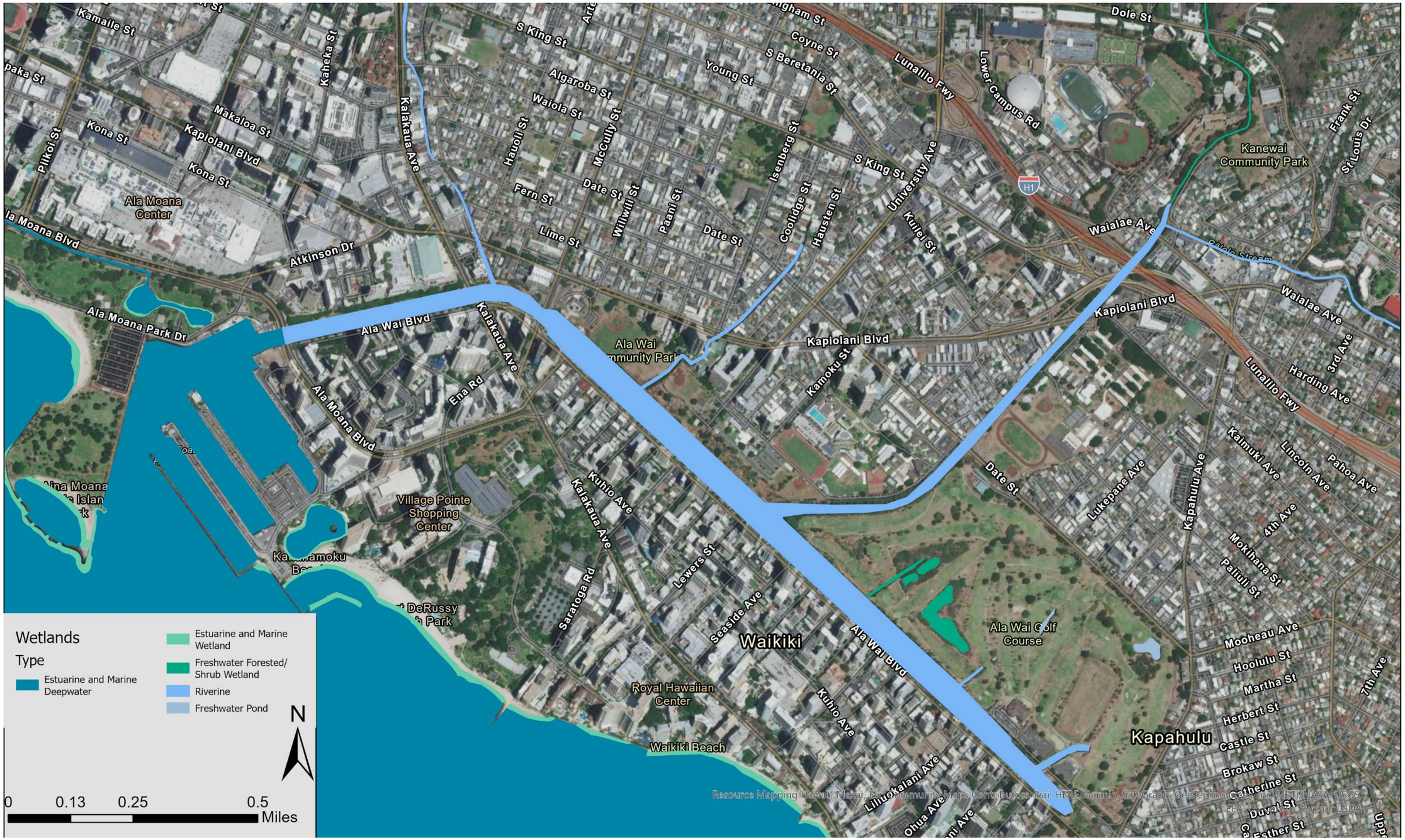

Figure 7: Location of National Wetland Inventory Wetlands Within the Lower Watershed of the Study Area.

Significance Criteria

Effects to surface water resources would be considered significant if the proposed project would result in any of the following:

- Obstruct or otherwise change the course of a stream or canal.
- Remove, fill, or substantially disturb a jurisdictional wetland or other Waters of the U.S.
- Substantially modify or otherwise adversely affect a floodplain.
- Significantly increase channel and/or bank erosion or reduce channel stability.
- Substantially affect sediment transport dynamics.

Environmental Consequences

No Action

No Impact: Under the No Action Alternative, none of the flood risk management measures would be implemented, such that no modifications to surface water features would occur. The potential future without project condition assumptions are the same as those discussed in the 2017 Ala Wai Canal Study (USACE, 2017); therefore, that discussion is incorporated by reference.

Alternative 1

Less than Significant Impact: Construction of Alternative 1 includes the Woodlawn Drive Floodwall, Koali Road Floodwall, Kaimuki High School Floodwall, and road closure structures which would not involve work within a stream or canal. The Makiki District Park Detention Basin (including the Kanaha Floodwall), Manoa Valley Park, and Ala Wai Golf Course detention basins are not instream detention basins like those analyzed in the 2017 Ala Wai Study (USACE, 2017). Instead, the detention basins are built on land adjacent to the streams within the Ala Wai watershed; therefore, the berms/floodwalls associated with these features would not involve work within a stream or canal. However, the construction of inlet and outlet structures for the detention basins would involve work within a stream or canal. None of these measures would permanently obstruct or change the course of a waterway, or substantially modify the existing floodplain. However, they would involve the placement of fill material within the channels, which are Waters of the U.S. Specifically, the construction of drainage structures for the detention basins would require the placement of materials including compacted fill and concrete. It is important to note that a formal jurisdictional determination of Waters of the U.S. have not yet been completed for the proposed project action area; however, all the streams and canals in the watershed are assumed to be Waters of the U.S. (AECOS, 2014). Jurisdictional wetlands are not expected to be present outside the defined channel limits. This information will be verified during the next phase of the project through a formal jurisdictional determination in accordance with the new Clean Water Rule: Definition of “Waters of the United States” (33 C.F.R. Part 328). The only wetland habitat, according to the NWI Database (Figure 7), that would be impacted by the project is located on the Ala Wai Golf Course. Approximately 0.005 acre of freshwater forested/shrub wetland would be permanently filled with a concrete weir that would act as one of the outlet drainage structures for the Ala Wai Golf Course detention basin.

Construction of the Makiki Park District and Manoa Valley Park District detention basins would also involve excavation to provide adequate detention capacity, but this excavation activity would not involve work within a stream or canal. Long-term, the inlet and outlet drainage structures would require periodic removal of debris and potentially sediment. The detention basins would also require periodic debris removal but this maintenance activity for the detention basins would not involve work within a stream or canal. All debris removed from the inlet and outlet structures and detention basins would be disposed of in an approved offsite location. The

estimated volume of fill material that would be placed within Waters of the U.S. is summarized in Table 14.

In addition to the above, implementation of Alternative 1 would likely include mitigation measures to minimize induced flooding within the watershed. Mitigation measures currently under consideration include nonstructural measures such as dry/wet floodproofing, elevation, and buy outs. For an analysis of nonstructural measures refer to Alternative 6 below. A structural mitigation measure under consideration is a pump station(s). If a pump station is found to be necessary additional design and analysis would occur. In general, the pump station would be constructed upland and adjacent to the stream, but not within the stream. Therefore, construction of the pump station if necessary is not expected have any short-term adverse effects to surface water by obstructing or otherwise changing the course of a stream; remove, fill or substantially disturb a jurisdictional wetland or other Waters of the U.S.; adversely affect a floodplain; increase channel and/or bank erosion or reduce channel stability; or substantially affect sediment transport dynamics.

Table 14: Estimated Excavation and Discharge of Fill Within Waters of the U.S. for Alternative 1.

Measure	Length of Stream to be Disturbed (linear feet)	Length of Stream in Permanent Footprint (linear feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Makiki District Park Detention Basin Berm	0	0	0	0	0	0
Makiki District Park Detention Basin Drainage Structure 1	50	10	22	13	0	0
Makiki District Park Detention Basin Drainage Structure 2	50	8	2	1	0	0
Kanaha Floodwall	0	0	0	0	0	0
Manoa Valley District Park Detention Basin Berm	0	0	0	0	0	0
Manoa Valley District Park Detention Basin Drainage Structure 1	50	11	18	10	0	0
Manoa Valley District Park Detention Basin Drainage Structure 2	50	8	2	1	0	0
Woodlawn Drive Floodwall	0	0	0	0	0	0
Koali Road Floodwall	0	0	0	0	0	0
Koali Road Floodwall Drainage Structure 1	50	8	38	19	0	0
Koali Road Floodwall Drainage Structure 2	50	8	38	19	0	0
Kaimuki High School Floodwall	0	0	0	0	0	0
Ala Wai Golf Course Berm	0	0	0	0	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 1	50	39	629	575	0	0

Measure	Length of Stream to be Disturbed (linear feet)	Length of Stream in Permanent Footprint (linear feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Ala Wai Golf Course Detention Basin Drainage Structure 2	50	10	3	2	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 3	50	10	3	2	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 4	50	10	3	2	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 5	505	505	1179	571	0	0
TOTAL	**550**	**627**	**1,937**	**1,215**	**0**	**0**

Long-term operation and maintenance of Alternative 1 is not anticipated to increase channel and/or bank erosion. Overall, the detention basins are designed to reduce peak flows, which in turn could reduce erosion rates and provide some degree of benefit to channel stability. As discussed above, debris that accumulative within the inlet/outlet structures and the detention basins would be removed as part of routine O&M activities and disposed of at an approved, offsite location. However, this is expected to occur on an infrequent basis. The minimal discharge of fill material for the inlet/outlet structures is expected to result in a less than significant impact. Similarly, the operation and maintenance of a pump station, if found to be necessary, is not expected to have a long-term adverse effect to surface water. The pump station would only be trigged to begin operating in the event of a storm event; therefore, much of the time the pump station would not be in operation. BMPs listed below would be implemented during construction to ensure potential impacts remain less than significant to surface waters.

Alternative 2B

Less than Significant Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to surface water resources are generally expected to be similar. It is important to note that Alternative 2B also includes a floodwall around the Ala Wai Canal which would require interior drainage structures. It is important to note that a formal jurisdictional determination of Waters of the U.S. have not yet been completed for the proposed project action area; however, all the streams and canals in the watershed are assumed to be Waters of the U.S. (AECOS, 2014). Jurisdictional wetlands are not expected to be present outside the defined channel limits. This information will be verified during the next phase of the project through a formal jurisdictional determination in accordance with the new Clean Water Rule: Definition of “Waters of the United States” (33 C.F.R. Part 328). Refer to Table 15 for the estimated volume of fill that would be placed into Waters of the U.S.

Table 15: Estimated Excavation and Discharge of Fill Within Waters of the U.S. for Alternative 2B.

Measure	Length of Stream to be Disturbed (feet)	Length of Stream in Permanent Footprint (feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Makiki District Park Detention Basin Levee	0	0	0	0	0	0
Makiki District Park Detention Basin Drainage Structure 1	50	10	22	13	0	0
Makiki District Park Detention Basin Drainage Structure 2	50	8	2	1	0	0
Kanaha Floodwall	0	0	0	0	0	0
Woodlawn Drive Floodwall	0	0	0	0	0	0
Koali Road Floodwall	0	0	0	0	0	0
Koali Road Floodwall Drainage Structure 1	50	8	38	19	0	0
Koali Road Floodwall Drainage Structure 2	50	8	38	19	0	0
Ala Wai Canal Floodwall (Including Ala Wai Golf Course, Manoa-Palolo Canal, and Kaimuki High School)	0	0	0	0	0	0
Ala Wai Canal Drainage Structure 1	50	10	4	3	0	0
Ala Wai Canal Floodwall Drainage Structure 2	50	8	2	1	0	0
Ala Wai Canal Floodwall Drainage Structure 3	50	10	4	3	0	0

Measure	Length of Stream to be Disturbed (feet)	Length of Stream in Permanent Footprint (feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Ala Wai Canal Floodwall Drainage Structure 4	50	9	3	2	0	0
Ala Wai Canal Floodwall Drainage Structure 5	50	8	2	1	0	0
Ala Wai Canal Floodwall Drainage Structure 6	50	10	4	3	0	0
TOTAL	**500**	**89**	**119**	**65**	**0**	**0**

Although Alternative 2B has additional features that are not included in Alternative 1 (e.g., Ala Wai Canal Floodwall), Alternative 2B also doesn't include all the features that Alternative 1 has (e.g., Manoa Valley District Park Detention Basin). Overall, Alternative 2B would disturb slightly less linear feet of stream than Alternative 1, but construction fill placed into waters of the U.S., primarily due to backfilling around the inlet/outlet/drainage structures, would be less than that required for Alternative 1. Alternative 2B would require approximately 65 cy^3 of fill into waters of the U.S. whereas Alternative60omplld require approximately 1,215 cy^3 of fill into waters of the U.S. Although Alternative 2B would require less fill into waters of the U.S., the general impacts to surface water resources during construction and post construction would be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts.

Alternative 5.3

Less than Significant Impact: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to surface water resources are generally expected to be similar. It is important to note that Alternative 5.3 also includes a floodwall around the Ala Wai Canal. Since the floodwall is slightly different in length when compared to Alternative 2B, additional drainage structures are required for interior drainage. It is important to note that a formal jurisdictional determination of Waters of the U.S. have not yet been completed for the proposed project action area; however, all the streams and canals in the watershed are assumed to be Waters of the U.S. (AECOS, 2014). Jurisdictional wetlands are not expected to be present outside the defined channel limits. This information will be verified during the next phase of the project through a formal jurisdictional determination in accordance with the new Clean Water Rule: Definition of "Waters of the United States" (33 C.F.R. Part 328). The only wetland habitat, according to the NWI Database (Figure 7), that would be impacted by the project is located on the Ala Wai Golf Course. Approximately 0.005 acre of freshwater forested/shrub wetland would be permanently filled with a concrete weir that would act as one of the outlet drainage structures for the Ala Wai Golf Course detention basin. Refer to Table 16 for the estimated volume of fill that would be placed into Waters of the U.S.

Table 16: Estimated Excavation and Discharge of Fill Within Waters of the U.S. for Alternative 5.

Measure	Length of Stream to be Disturbed (feet)	Length of Stream in Permanent Footprint (feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Woodlawn Drive Floodwall	0	0	0	0	0	0
Koali Road Floodwall	0	0	0	0	0	0
Koali Road Floodwall Drainage Structure 1	50	8	38	19	0	0
Koali Road Floodwall Drainage Structure 2	50	8	38	19	0	0
Ala Wai Golf Course Berm	0	0	0	0	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 1	50	39	170	83	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 2	50	10	3	2	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 3	50	10	3	2	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 4	50	10	3	2	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 5	505	505	1179	571	0	0
Ala Wai Canal Floodwall (includes Kaimuki High School extension)	0	0	0	0	0	0
Ala Wai Canal Drainage Structure 1	50	10	4	3	0	0

Measure	Length of Stream to be Disturbed (feet)	Length of Stream in Permanent Footprint (feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Ala Wai Canal Floodwall Drainage Structure 2	50	8	2	1	0	0
Ala Wai Canal Floodwall Drainage Structure 3	50	10	4	3	0	0
Ala Wai Canal Floodwall Drainage Structure 4	50	9	3	2	0	0
Ala Wai Canal Floodwall Drainage Structure 5	50	8	2	1	0	0
Ala Wai Canal Floodwall Drainage Structure 6	50	10	4	3	0	0
Ala Wai Canal Floodwall Drainage Structure 7	50	10	4	3	0	0
Ala Wai Canal Floodwall Drainage Structure 8	50	8	2	1	0	0
Ala Wai Canal Floodwall Drainage Structure 9	50	8	2	1	0	0
Ala Wai Canal Floodwall Drainage Structure 10	50	8	2	1	0	0
Ala Wai Canal Floodwall Drainage Structure 11	50	10	4	3	0	0
Ala Wai Canal Floodwall Drainage Structure 12	50	11	31	17	0	0

Measure	Length of Stream to be Disturbed (feet)	Length of Stream in Permanent Footprint (feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Ala Wai Canal Floodwall Drainage Structure 13	50	10	6	3	0	0
Ala Wai Canal Floodwall Drainage Structure 14	50	10	6	3	0	0
TOTAL	**1,505**	**720**	**1,510**	**743**	**0**	**0**

Although Alternative 5.3 has fewer measures than both Alternative 1 and Alternative 2B it has the greatest impact to surface water resources in terms of linear feet of stream impacted and fill discharged into waters of the U.S. Although Alternative 5.3 does have a greater impact to surface waters, the impact is still considered less than significant since the linear feet of stream being permanently impacted is minimal. Alternative 5.3 would disturb approximately 1,505 linear feet during construction, but only 720 linear feet of stream would be permanently impacted. In addition, Alternative 5.3 includes the excavation of approximately 1,510 cy^3 of material from channel banks with 743 cy^3 of fill material discharged into waters of the U.S., primarily due to backfilling around drainage structures. No long-term excavation or fill material placement is anticipated to occur. Even though Alternative 5.3 would require more fill into waters of the U.S., the general impacts to surface water resources during construction and post construction would be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts.

Alternative 6

No Impact: No short-term direct or indirect surface water impacts would occur as a result of implementation of Alternative 6 because land disturbance for this alternative would be limited to modification of existing buildings located upland. Implementation of Alternative 6 would require temporary construction access to all structures to be treated which would be expected to occur from existing roads. Similarly, localized maintenance such as repairs will be needed over time. Overall, no long-term direct or indirect adverse effects to surface waters would occur as a result of this alternative. Appropriate erosion and sediment control measures would be utilized during construction.

Environmental Commitments

No specific environmental commitments for surface waters apply.

Best Management Practices

No specific BMPS associated with impacts to surface waters apply. Refer to BMPs for water quality that would also be applicable to surface waters.

3.3.6 Hydrology and Hydraulics

Regulatory Setting

Relevant federal and state laws/regulations include:

- CCH Drainage Standards (2000)

Existing Conditions

The Ala Wai watershed is located on the leeward side of Oahu Island, Hawaii, on the southern slope of the extinct Koolau volcano between Punchbowl Crater and Diamond Head Crater. The watershed is about 19 square miles, bounded to the north by the Koolau Mountains (with ridge crest elevations about 2,400 feet), and by Mamala Bay, to the south. The Ala Wai watershed is comprised of three major drainages that include the Makiki drainage (1,687 acres), Manoa and Palolo drainage (6,247 acres) and storm water drainage from Kapahulu, Moiliili, Ala Moana, and Waikki areas (4,099 acres), all of which drain into the Ala Wai Canal. Makiki Stream, Manoa Stream, and Palolo Stream are considered perennial streams, supporting surface flows in all or part of each stream segment throughout the year. The drainage area encompassing Ala Wai Canal and Waikiki receives about 30 inches of annual rainfall. High-intensity rainfall on steep slopes of the small drainage basin can produce very flashy flood events in the lower basin. Time to peak is usually less than 1 hour and even for large intense storms, the rise and recession of the flood hydrograph usually occurs within 6 hours.

Several heavy rainfall events have occurred that have caused flooding within the study area (NOAA, 2022a):

- November 29 – December 8, 2003: Several rain gauges on Oahu recorded nearly 13 inches of rain, most of which fell in about 6 hours.
- August 2-4, 2004: Hurricane Darby remnants caused thunderstorms that affected the entire island of Oahu and dumped several inches of rain in a few hours. A few streams overflowed their banks and minor landslides occurred. Significant ponding occurred on roads.
- October 30, 2004: Heavy showers and thunderstorms led to significant rainfall amounts (at times over 5 inches per hour). The focus of the heaviest rain occurred over the southern portion of the Koolau Mountains on Oahu, resulting in Manoa Stream overflowing its banks and causing significant flooding in Mano Valley, including the University of Hawaii campus.
- February 19-21, 2006: Heavy rains on Oahu caused urban flooding near the Middle Street ramp on the H-1 freeway and in the low-lying Mapunapuna business district.
- March 1-3, 2006: Moderate to heavy rain experienced. Severe flooding occurred over the east-facing slopes of the Koolaus with significant damage in the Kaaawa, Hauula, and Punaluu areas.
- March 19, 2006: Strong thunderstorms dumped three to five inches of rain, mosly in a 6-hour period. Several properties were inundated in wets Oahu and, once again, along the north- and east-facing slopes of the Koolaus.
- March 23, 2006: Fast-moving thunderstorms swept over Honolulu and east Oahu during the evening of March 23 and caused considerable ponding in low lying areas such as Waikiki and another round of landslides in Tantalus.
- March 24, 2006: Strong, fast-moving thunderstorms hit Honolulu during the evening with 1- to 2-inch per hour rains producing more Tantalus landslides and causing the overflow of Makiki Stream near Fern Street and Moku Place.
- March 26, 2006: Heavy rains and flash flooding occurred on Oahu.
- March 31-April 2, 2006: Strong thunderstorms moved over the eastern half of the island during the late morning of March 31. The heavy rains coupled with very saturated ground produced severe runoff and flooding in several locations. Makiki Stream once again overflowed near Moku Place and inundated several blocks near Fern Street and Kalakaua Avenue. Manoa Stream overflowed at Woodlawn Drive.
- October 31, 2006 – November 2, 2006: Heavy rainfall occurred across much of Hawaii with rainfall amounts in some locations totaling over 15 inches. The excessive rains produced flooding over portions of windward Kauai and Oahu and triggered a significant landslide that closed Oahu's Pali Highway.
- December 10-14, 2008: Several rounds of rainfall occurred causing significant flooding. Several Oahu rain gauges recorded 10 to 13 inches in a 12-hour period.
- June 4, 2011: Strong thunderstorms produced intense rainfall and record-breaking stream flow over the windward slopes of Oahu. Flash floods from 5 to 10 inches of rain in a 3-hour period inundated roads and homes and severely damaged agricultural properties from Punaluu to Kailua. Emergency managers also report several rescues of people from stranded vehicles, but no deaths or serious injuries reported.
- April 13-15, 2018: Thunderstorms resulted in torrential rainfall and severe flooding over portions of Oahu.
- December 5-7, 2021: A kona low produced widespread heavy rainfall leading to flash flooding. Thunderstorms with heavy rainfall moved over Oahu from the south, causing flooding in numerous locations across the south side of the island and especially from Pearl City to Kahala. One notable impact was flooding damage to the Iwilei power substation which cut electrical service to Downtown Honolulu businesses and residents. Also, a section

of the H-1 Freeway westbound through Honolulu was closed due to waist-deep water near the Vineyard off ramp. On December 6, Mayor Rick Blangiardi of the City and County of Honolulu signed an Emergency Proclamation and Governor David Ige signed the "Heavy Rains and Flooding Proclamation for the State of Hawaii" due to the ongoing severe weather damaging public and private property. Based on both a precipitation frequency analysis and flow frequency analysis of gages within the basin, the storm event was characterized as approximately a 20% AEP—an event with a 20% chance of being equaled or exceeded in any given year—event.

Hydrologic and hydraulic modeling studies were conducted to estimate peak stream flow discharges and associated water surface elevations that could occur in the Ala Wai watershed because of a range of potential storm events, like those above. These models built upon previous modeling work and incorporated up-to-date topographic and hydro-meteorological data. More detailed information regarding the modeling assumptions, techniques, methodologies, results, and uncertainties can be found in Appendix B.

Hydrology

Hydrologic modeling was conducted to calculate peak flow discharges at key locations throughout the watershed. Discharge estimates for the 99%, 50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% AEP flood events were determined based on the results of various hydrologic methods that were used, depending on the location in the watershed and the availability of data. The main method used was the USACE HEC-HMS Version 4.3 hydrologic model. HEC-HMS Version 4.3 model results were compared with results from other regional methods, including the U.S. Geological Survey (USGS) regional peak-discharge regression equations, the CCH Drainage Standards Plate 6 curve, existing peak flow values from the FEMA Flood Insurance Study, and site-specific frequency analysis at USGWS gage locations using the USACE Hydrologic Engineering Center-Statistics Software Package (HEC-SSP). Regional methods are primarily dependent on drainage area and do not account for other physical or meteorological factors in the watershed, which can be accounted for in a HEC-HMS Version 4.3 model.

The resulting values for selected locations are shown in Table 17. As shown, the flow at the mouth of the Ala Wai Canal based on the 1% AEP flood event was computed to be 19,500 cubic feet per second (ft^3/s). Previous estimates of the 1% AEP peak flow value in this location ranged from 22,900 ft^3/s (Noda, 1994) to 28,200 ft^3/s (FEMA, 2004) and were based on regional methods. The current value is lower than previous estimates because of detailed modeling methods and accounting for channel and canal storage, which reduces the peak flow in the canal.

Table 17: Hydrologic Model Results for Peak Flow Discharge (ft^3/s) at Select Locations Within the Watershed at various percent probability events.

		Peak Flow Discharge (cfs)							
Watershed	**Location**	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
		50%	20%	10%	5%	2%	1%	0.50%	0.20%
Manoa Watershed	Confluence of Waihi and Waiakeakua Streams	1,200	2,000	2,800	3,600	4,600	5,500	6,200	7,400
	Confluence of Manoa Stream and Woodlawn Ditch	1,700	3,200	4,600	5,700	7,150	8,200	9,000	10,500
	Lowrey Ave. Bridge	1,900	3,500	4,800	6,000	7,400	8,350	9,300	11,000
	Woodlawn Drive Bridge	2,000	3,700	5,000	6,300	7,700	8,800	9,900	11,700
	Manoa Stream near Noelani Elementary School	2,100	3,8000	5,200	6,700	8,200	9,400	10,600	12,400
	Dole Street Bridge	2,300	4,100	5,700	7,200	9,000	10,200	11,800	13,600
	Kanewai Field Gage	2,500	4,300	6,000	7,600	9,500	10,700	12,100	14,500
	Just Upstream of the Confluence of Manoa and Palolo Streams	2,600	4,450	6,150	7,800	9,700	11,200	12,500	15,300
Ala Wai Watershed	Confluence of Makiki and Kanaha Streams	650	1,300	1,900	2,550	3,400	4,200	4,800	6,400
	USGS Stream Gage near King Street	700	1,400	2,000	2,700	3,500	4,500	5,600	6,700
	Confluence of Makiki Stream and the Ala Wai Canal	900	1,700	2,600	3,300	4,500	5,700	6,800	8,000
	USGS Pukele Gage 16244000	440	820	1,200	1,600	2,100	2,700	3,000	3,900
	Confluence of Pukele and Waiomao Streams	1,000	2,000	2,900	3,900	5,100	6,100	7,600	9,200
	USGS Palolo Gage 16247000	1,200	2,200	3,100	4,100	5,500	6,600	8,000	10,000
	Just Upstream of the Confluence of Manoa and Palolo Streams	1,300	2,600	3,500	4,800	6,300	7,600	9,400	12,000

	Confluence of Manoa and Palolo Streams	3,400	6,200	8,400	11,000	14,200	16,700	20,500	22,900
	USGS Stream Gage 16247100	3,600	6,400	8,600	11,200	14,500	17,000	20,900	23,200
	Confluence of Manoa-Palolo and Ala Wai Canals	4,000	6,700	9,000	11,700	15,000	17,500	21,500	24,000
	Mouth of Ala Wai Canal	8,000	11,500	13,500	16,000	18,000	19,500	20,500	22,000

Hydraulics

Hydraulic modeling was conducted to estimate peak storm flow discharge as well as water surface elevations from peak discharge data and evaluate sensitivity to stage-discharge relationships in the Ala Wai watershed. Peak storm flow discharges (Table 18) and water surface elevations (Table 19) were estimated for the 50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% AEP flood events. The modeling was conducted using HEC-RAS and GIS software utilizing the best available data, using a one-dimensional, steady state flow model with sub-critical flow step-backwater computations. A detailed discussion on the methodology and assumptions used in the modeling effort is presented in Appendix B.

Table 18: Peak Storm Flow Discharge for Various Modeled Events under the Existing Condition.

Location			Storm Event/Peak Discharge Flow[1]							
River	**Reach**	**River Station**	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
Ala Wai	Upper	10082	176	312	397	465	649	684	945	676
Ala Wai	Upper	7405	551	994	1427	1713	1732	1990	2419	2771
Ala Wai	Upper	6095	751	1454	1899	2084	2323	2715	3326	3916
Ala Wai	Middle	5770	5,499	8706	10418	12150	13958	14568	15111	14734
Ala Wai	Middle	5195	5,543	8695	10441	12101	13974	14620	15529	16094
Ala Wai	Middle	3282	5,740	8769	10308	11700	13238	13833	14393	14760
Ala Wai	Middle	2961	5,770	8788	10274	11570	12988	13596	14203	14933
Ala Wai	Lower	67	4,763	2292	2541	2831	3177	3475	3724	3924
Kanaha	Ditch	4372	93	199	287	394	567	711	866	1038
Kanaha	Ditch	943	210	326	344	351	365	381	384	396
Kanaha	Ditch	2	236	357	372	379	386	363	308	317
Makiki	Upper	9543	238	485	705	960	1342	1608	1901	2386
Makiki	Upper	7672	294	588	669	721	757	771	783	803
Makiki	Lower	5940.67	627	1143	1334	1516	1782	2030	1992	2037
Makiki	Lower	4709.50	629	1150	1345	1518	1798	2040	2060	2062
Makiki	Lower	1897	743	1047	1098	1121	1139	1149	1158	1163
Makiki	Lower	76	634	879	957	969	1001	1028	1055	1000
Manoa	Main	16506	1,499	2723	3657	4623	5934	6834	7583	8413
Manoa	Main	10968	2,468	3993	5048	6113	7311	8294	9150	9971
Manoa	Main	10496	2,692	3796	4257	4516	4736	4889	5004	5112
Manoa	Main	8117	2,921	3427	3394	3325	3379	3890	4252	4746
Manoa	Main	8016	2,930	3224	2900	2549	2308	2702	2998	3414
Manoa	Main	7839	2,952	5013	5379	5498	5694	6173	6546	6942
Manoa	Main	3042	3,069	5562	7159	8407	9536	10708	11700	11491
Manoa	Main	2891	3,069	5561	7151	8389	9533	10672	11660	11634
Manoa	Main	1457	3,495	6370	8509	10019	11664	13135	14505	16361
Manoa	Main	1378	3,495	6370	8504	10019	11672	13179	14608	16577
Manoa	Main	1107	3,585	5494	6496	6977	7453	7759	8098	8503
Manoa	Main	84	3,541	5276	6081	6613	7235	5789	7426	8942
Palolo	Main	11542	1,806	3125	3971	4701	5576	6212	6696	7275
Palolo	Main	10074	1,891	2800	3205	3587	4054	4397	4708	5086

Location			Storm Event/Peak Discharge Flow[1]							
River	**Reach**	**River Station**	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
Palolo	Main	6282	2,041	3506	4720	5799	7188	8075	9404	10942
Palolo	Lower	4810	5,435	9138	12422	15088	19224	20521	21025	23203
Palolo	Lower	4653	5,435	9137	12418	15082	19218	19584	20999	19854
Palolo	Lower	4557	5,435	9136	12414	15117	18788	19325	20780	20316
Palolo	Lower	2609	5,499	9265	12146	13585	14779	14992	15470	15581
Palolo	Lower	305	5,062	7857	8599	10215	11171	11418	11520	11436
Pukele	Tributary	5958	654	1242	1722	2231	1947	3418	3935	4730
Waiomao	Tributary	4900	638	1135	1537	1973	2573	3070	3625	4307

[1] Numbers shown are in cubic feet per second

Table 19: Water Surface Elevation during Peak Storm Flow Discharge for Various Modeled Events under the Existing Condition.

Location			Storm Event/Water Surface Elevation[1]							
River	**Reach**	**River Station**	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
Ala Wai	Upper	10082	4.20	5.27	5.91	6.50	7.18	7.52	7.92	8.37
Ala Wai	Upper	7405	4.20	5.27	5.90	6.49	7.16	7.52	7.91	8.36
Ala Wai	Upper	6095	4.19	5.26	5.89	6.48	7.15	7.52	7.91	8.37
Ala Wai	Middle	5770	4.19	5.26	5.89	6.48	7.15	7.52	7.91	8.37
Ala Wai	Middle	5195	4.15	5.19	5.81	6.39	7.04	7.40	7.80	8.26
Ala Wai	Middle	3282	4.05	5.02	5.61	6.17	6.82	7.18	7.58	8.04
Ala Wai	Middle	2961	4.01	4.93	5.50	6.05	6.68	7.04	7.43	7.89
Ala Wai	Lower	67	3.23	3.22	3.23	3.23	3.23	3.23	3.23	3.23
Kanaha	Ditch	4372	126.72	127.30	127.68	128.07	128.61	129.02	129.40	129.78
Kanaha	Ditch	943	65.75	68.03	68.48	68.87	69.54	70.05	70.69	71.21
Kanaha	Ditch	2	59.29	60.27	60.52	60.76	61.12	64.20	66.62	67.26
Makiki	Upper	9543	170.63	171.28	171.80	172.26	172.91	173.30	173.71	174.29
Makiki	Upper	7672	102.96	106.23	107.02	107.51	107.85	107.98	108.08	108.27
Makiki	Lower	5940.67	47.35	49.56	50.38	51.21	54.03	63.12	62.47	62.45
Makiki	Lower	4709.50	30.33	36.46	38.83	40.40	42.57	44.25	44.96	45.47
Makiki	Lower	1897	9.53	10.91	11.45	11.80	12.23	12.52	12.83	13.18
Makiki	Lower	76	3.79	4.52	4.98	5.44	5.98	6.30	6.64	7.01

Location			Storm Event/Water Surface Elevation[1]							
River	**Reach**	**River Station**	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
Manoa	Main	16506	275.69	277.47	278.58	279.57	280.75	281.49	282.07	282.67
Manoa	Main	10968	178.55	181.63	182.64	183.44	184.27	184.87	185.27	185.71
Manoa	Main	10496	172.93	178.23	178.84	179.39	179.88	180.16	180.35	180.51
Manoa	Main	8117	148.71	150.94	152.01	152.76	153.48	153.92	154.21	154.50
Manoa	Main	8016	147.55	150.57	152.08	153.00	153.82	154.31	154.64	154.97
Manoa	Main	7839	145.85	149.58	150.97	151.79	152.50	152.87	153.16	153.44
Manoa	Main	3042	62.63	65.17	66.69	67.79	68.85	69.85	70.80	71.87
Manoa	Main	2891	60.51	63.54	65.38	66.74	68.05	69.23	70.30	71.50
Manoa	Main	1457	39.77	42.16	43.53	44.36	44.98	45.49	45.93	46.46
Manoa	Main	1378	39.54	41.75	42.83	43.37	43.84	44.21	44.52	44.91
Manoa	Main	1107	36.83	38.38	38.87	39.23	39.53	39.81	40.04	40.33
Manoa	Main	84	19.85	22.69	25.21	26.85	30.94	32.72	32.83	33.24
Palolo	Main	11542	133.87	135.25	135.99	136.59	137.25	137.69	138.03	138.42
Palolo	Main	10074	110.61	112.38	113.10	113.75	114.51	115.06	115.54	116.11
Palolo	Main	6282	32.20	33.55	34.67	35.66	36.91	38.44	39.84	40.62
Palolo	Lower	4810	18.39	21.27	24.09	25.72	27.79	28.34	28.84	29.61
Palolo	Lower	4653	16.24	19.00	22.54	23.92	25.36	25.61	26.46	26.43
Palolo	Lower	4557	16.19	19.15	22.91	24.28	25.82	26.18	26.92	26.71
Palolo	Lower	2609	7.86	10.20	11.64	12.26	12.81	12.95	13.28	13.45
Palolo	Lower	305	3.99	4.90	5.50	6.08	6.76	7.15	7.58	8.20
Pukele	Tributary	5958	518.92	520.19	520.98	521.73	522.68	523.26	523.85	524.69
Waiomao	Tributary	4900	395.73	397.38	398.49	399.51	400.66	401.49	402.32	403.23

[1] Numbers shown are in cubic feet per second

Floodplain inundation maps were created for the 5% AEP (Figure 8), 2% AEP (Figure 9), and 1% AEP (Figure 10) flood events under the existing condition. Because of the relatively flat terrain around the Ala Wai Canal, the floodplain extents are similar for many of higher frequency storm events, with differences only in the depth of flooding. As further discussed in Appendix B, it is important to note that floodplain extent maps are a tool which help characterize the flood hazard but are not exact because of inherent limitations in the modeling process.

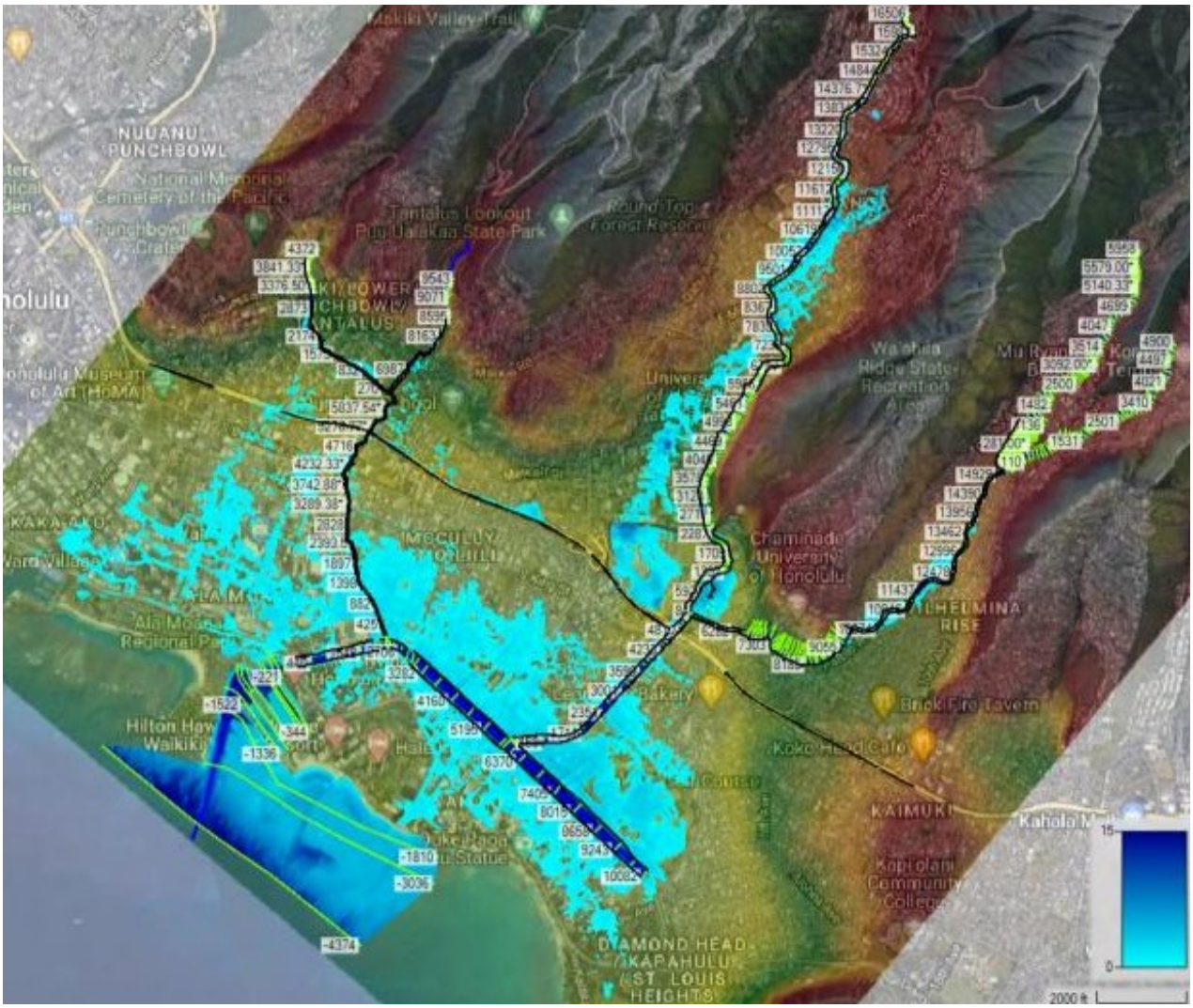

Figure 8: Existing Floodplain Inundation Map for the 5% AEP Flood Event.

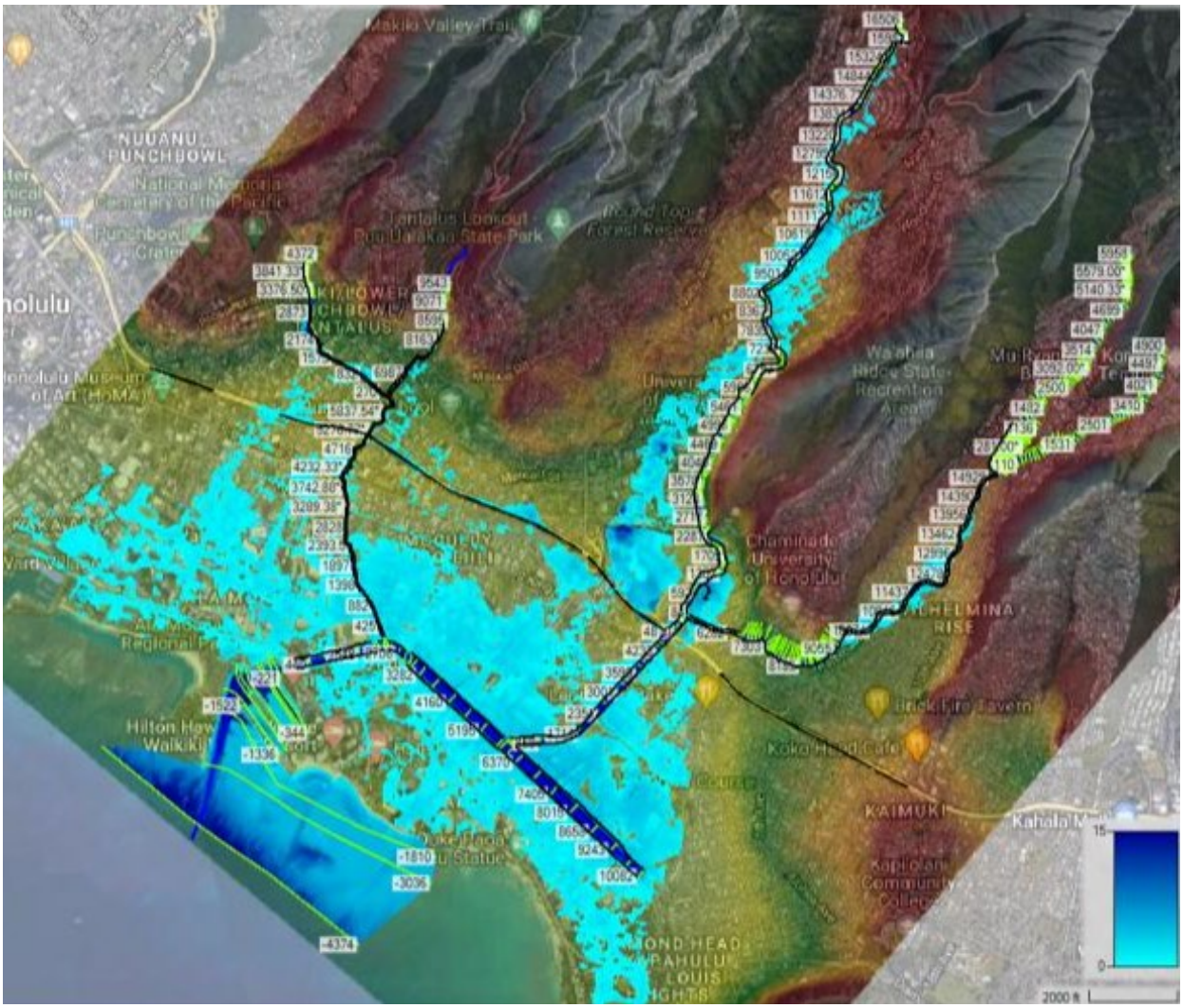

Figure 9: Existing Floodplain Inundation Map for the 2% AEP Flood Event.

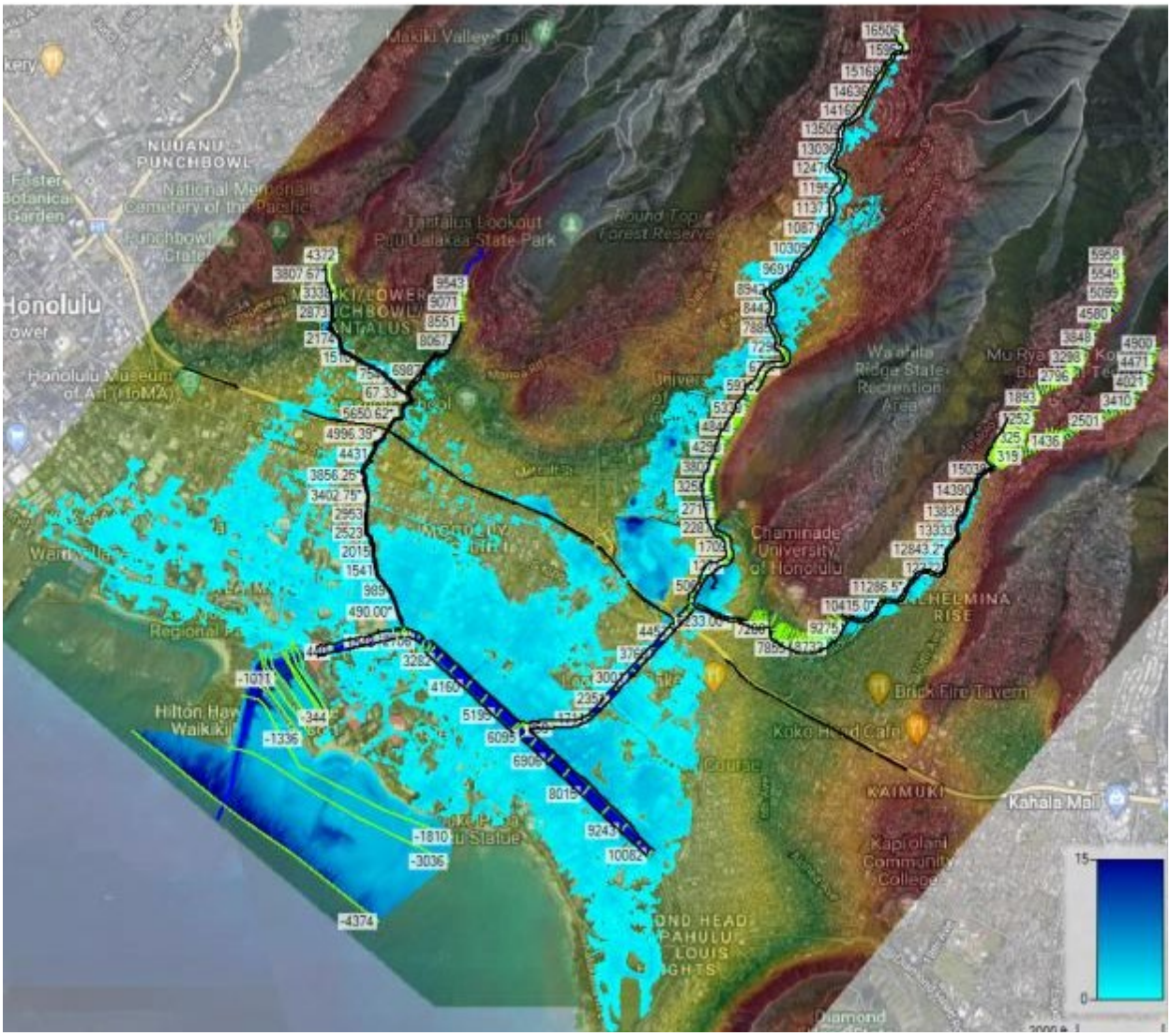

Figure 10: Existing Floodplain Inundation Map for the 1% AEP Flood Event.

Based on the 1% AEP flood event, a flow of approximately 3,475 ft^3/s leaves the system and flows into the ocean through Waikiki. Accounting for the effects of floodplain storage and the backwater along Makiki Stream, the peak flow at the mouth of the Canal is reduced from its upstream peak of 14,620 ft^3/s. This results in a greatly reduced flood inundation area between Kalakaua Avenue and Ala Moana Boulevard. Based on the peak flow values computed for this study, the Ala Wai Canal has about a 20% AEP flood capacity before overtopping the banks. This is less than the 10% AEP flood capacity documented by E.K. Noda (1994), even with the dredging completed in 2008. The reduced capacity may be because of the use of mean higher high water (MHHW) as a downstream boundary condition for all flood recurrence intervals and the use of a steady flow HEC-RAS model (which tends to be more conservative than the in-house model used by E.K. Noda [1994]). The McCully Street Bridge is the main reason for high water-surface elevations in the upstream sections of the Canal. The model results also indicate other key limitations in channel capacity, including the following:

- Makiki Stream has the lowest channel capacity of all the streams in the watershed. Flooding primarily occurs because high water surface elevations in the Ala Wai Canal cause water to back up into Makiki Stream and overtop the channel. Most of the flooding along Makiki

Stream occurs between King Stret and Kapiolani Boulevard. The elevations along Kapiolani Boulevard are slightly higher than the surrounding ground, and as a result, this feature acts as a weir preventing most of the flow from flooding the downstream area. A small area in the vicinity of Kaheka Street allows water to flow over Kapiolani Boulevard and eventually into the lower area of the parking facility of the Ala Moana Center.

- The confluence of Kanaha Ditch and Makiki Stream causes a backwater effect, which does not allow Kanaha Ditch to drain. Water overtops the channel, flows down slope across Wilder Street and floods the area approximately bounded by Kewalo Street and Keeaumoku Street. Flows are stopped at the H-1 Freeway where they would presumably drain into the stormwater drainage system.
- The model includes a detailed analysis of Palolo Stream which has not been previously available or documented on the FIRM. Results of the detailed modeling indicate a channel capacity capable of containing a 2% AEP flood event, with the section between Palolo Avenue Bridge to Kalua Road Bridge having a lower capacity (between 5% and 2% AEP flood event).
- Consistent with previous documentation (USACE, 2006; Oceanit, 2008), the modeling results indicate Manoa Stream has channel capacity limitations between Kahaloa Drive Bridge and Woodlawn Drive Bridge, which creates a flooding hazard for the nearby residences and the UH campus.

Flood depths for the 1% AEP flood event around the Ala Wai Canal, Manoa-Palolo Drainage Canal, and lower Makiki Stream are about 1.5 to 3 feet deep, on average, for the out of channel floodplain areas. Flood depths are about 2 to 3 feet deep, on average, for the split flow reaches of Kanaha and University overland flow areas. In upper Makiki, Manoa, and Palolo streams, flood depths may be up to 5 feet, depending on location.

Significance Criteria

Effects to hydrology and hydraulics would be considered significant if the proposed project would result in any of the following:

- Substantially alter the existing drainage pattern of the site or area.
- Substantially change drainage patterns within the watershed.
- Substantially increase the extent, frequency, or duration of flooding.
- Create or contribute to runoff that would exceed the capacity of existing or planned stormwater drainage systems.

Environmental Consequences

No Action

Significant Impact: Under the No Action Alternative, none of the flood risk management measures would be implemented, such that the existing flood-related threats would remain. In addition, future climate changes are expected to contribute to increased water surface elevations due to sea-level rise.

Extensive urban development throughout the Ala Wai watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) would continue to result in an elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Manoa, and Palolo valleys without implementation of flood risk management measures. Past flooding that has occurred within the watershed has resulted in property damages and health and safety risks. These risks are expected to remain under the No Action alternative. The potential impact

of flooding could be significant. Analyses conducted in support of this study show that the 1% AEP flood event—an event with a 1% chance of being equaled or exceeded in any given year—could affect approximately 3,111 structures with an estimated $905,327,000 in structural damages alone (2023 price levels). This figure does not account for loss in business income or other similar economic losses. Safety risks in the event of flooding would also remain under the No Action alternative. The Ala Wai watershed has approximately 200,000 residents that would remain under threat of flooding. The watershed also contains the University of Hawaii and the Waikiki District—a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state. Overall, under the No Action alternative, local flooding issues would continue in the manner as they currently occur. Under existing conditions, the 20%, 10%, 4%, 2%, 1%, 0.5%, and 0.2% AEP events cause flooding in the overbanks including comingling flooding between the channel systems. Widespread flooding begins at approximately the 10% AEP flood event throughout the study area and is caused by overtopping of the channels. Widespread overtopping of the channels would still occur between the 10% and 0.2% AEP events within the Ala Wai watershed, thereby leaving homes and businesses at risk to impacts from flooding.

Current water quality issues associated with storm water and with flood events would remain unchanged under the No Action Alternative. No new water quality issues would be introduced, and no water quality issues would be addressed.

Consistent with the USACE EC 1165-2-212 and ECB 2013-27, three scenarios (low, intermediate, and high) were modeled to define the future without-project hydrologic and hydraulic conditions, with each scenario defined based on the corresponding rate of change in the input conditions. Low is considered the best-case scenario (with a continuation in the current trends for sea-level rise and rainfall intensity), intermediate is the most probable scenario, and high is considered the worst-case scenario. The modeling inputs for these three scenarios are summarized in Table 20. Refer to Appendix H for a detailed discussion sea level change.

Table 20: Future Without-Project Scenario for Sea Level Change by 2080.

Component	Low	Intermediate (Most Probable)	High
Sea Level Rise	+ 0.43 ft	+ 1.12 ft	+ 3.31 ft

Alternative 1

Less than Significant Impact with Mitigation Incorporated: The overall objective of the project is to reduce the risk of riverine flooding. Therefore, Alternative 1 has been designed to detain floodwaters and/or improve conveyance to minimize the risk of flooding within the watershed. Construction of the project is primarily on land with work near/in water required just for drainage structures. Where in water work may need to occur a coffer dam or similar type structure would be constructed, but the sizes of these structures would be small and would not be expected to substantially alter the existing drainage pattern of a site or area not substantially change drainage pattern within the watershed. The long-term operation and maintenance of the project, including maintenance of pump station(s) if determined to be necessary, would have a similar effect as the short-term effects on drainage patterns in the area. Overall, short-term, and long-term negligible adverse effects to drainage patterns in the area and/or watershed would occur. The 5%, 2%, and 1% AEP floodplain inundation maps for Alternative 1 are shown in Figure 11, Figure 12, and Figure 13. Anticipated peak flow discharges and surface water elevations for the 5%, 2%, and 1% AEP floodplains are shown in Table 21. Model results for other APE probabilities are presented in Appendix B.

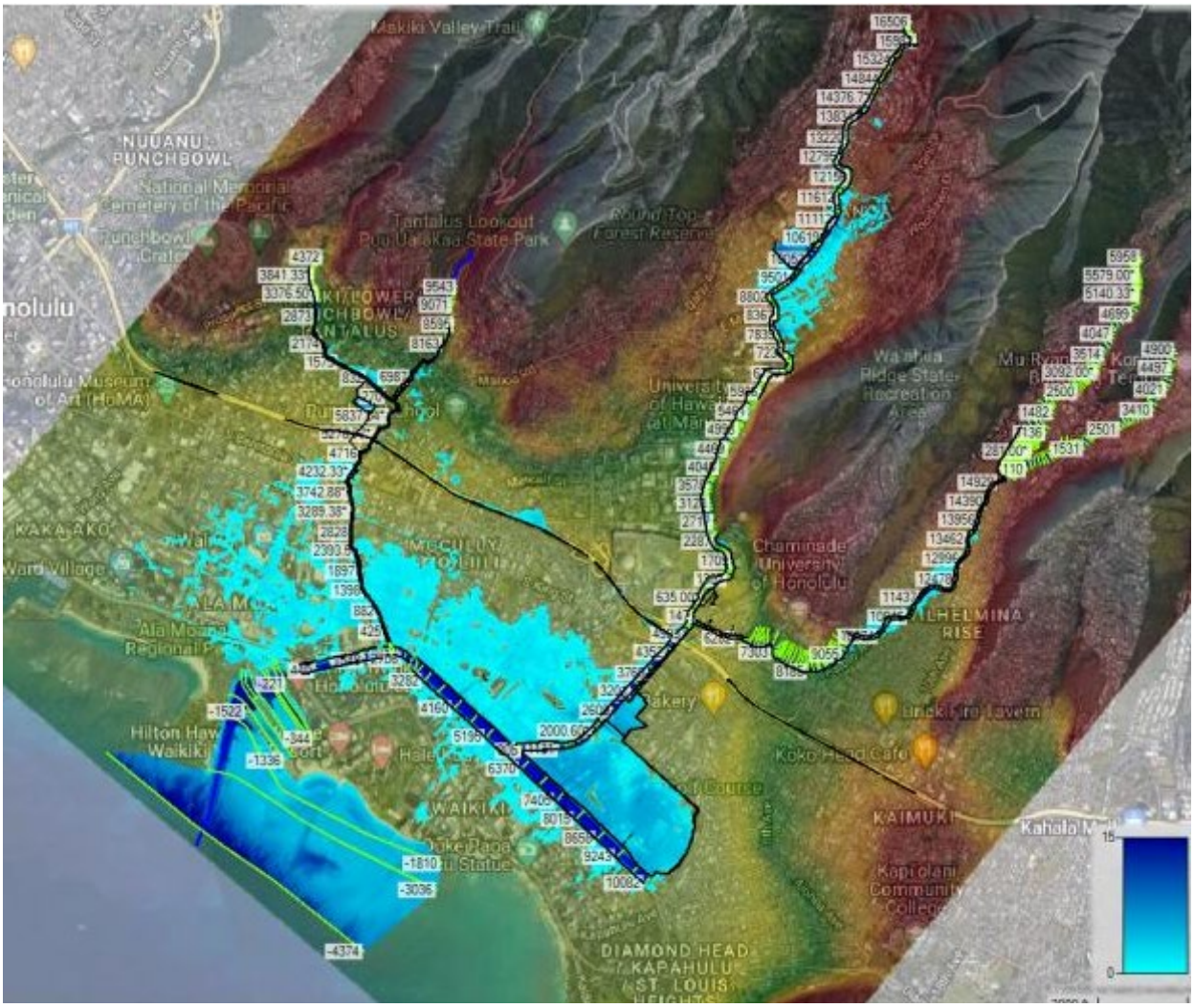

Figure 11: Alternative 1 Floodplain Inundation Map for the 5% AEP Flood Event.

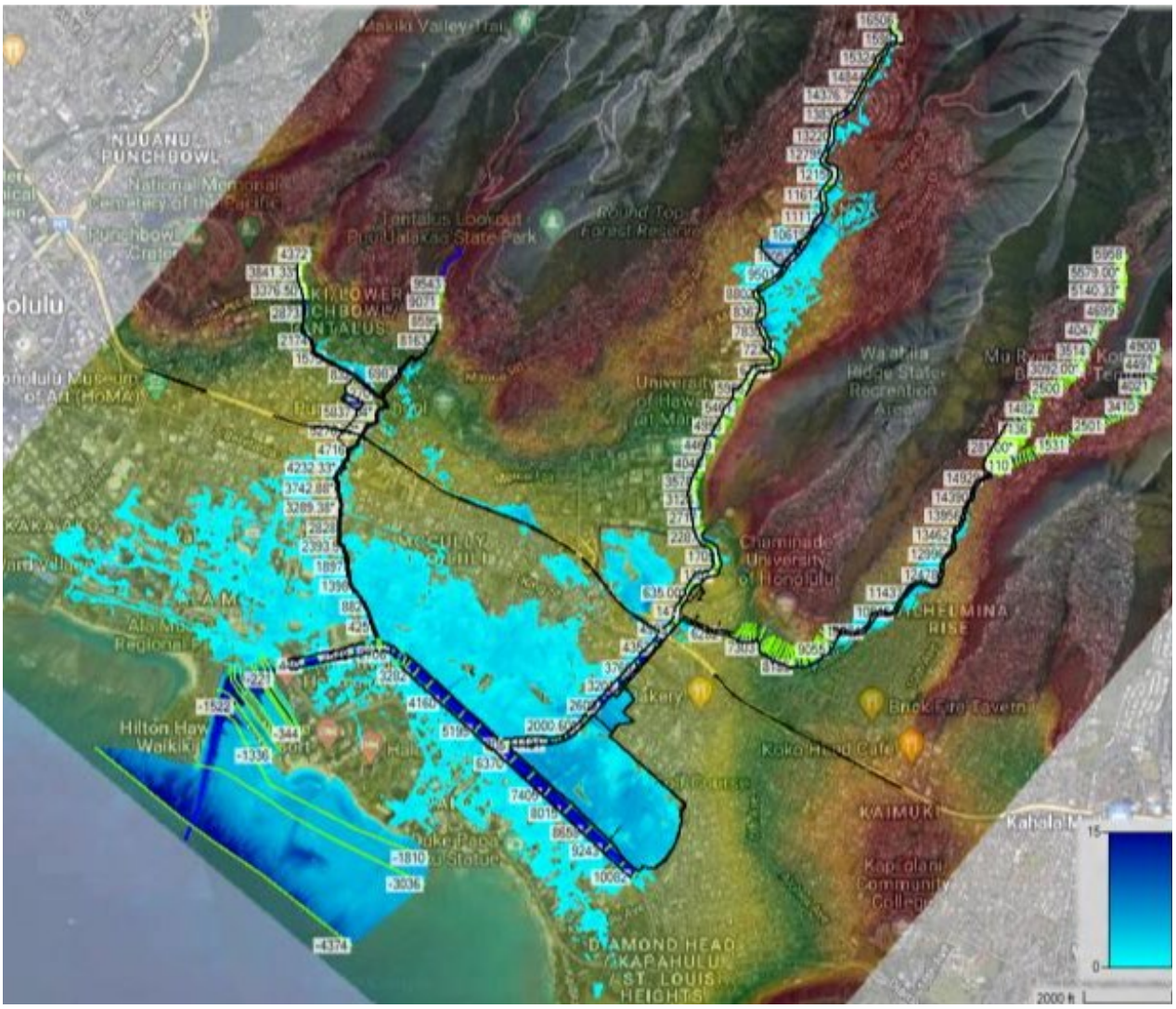

Figure 12: Alternative 1 Floodplain Inundation Map for the 2% AEP Flood Event.

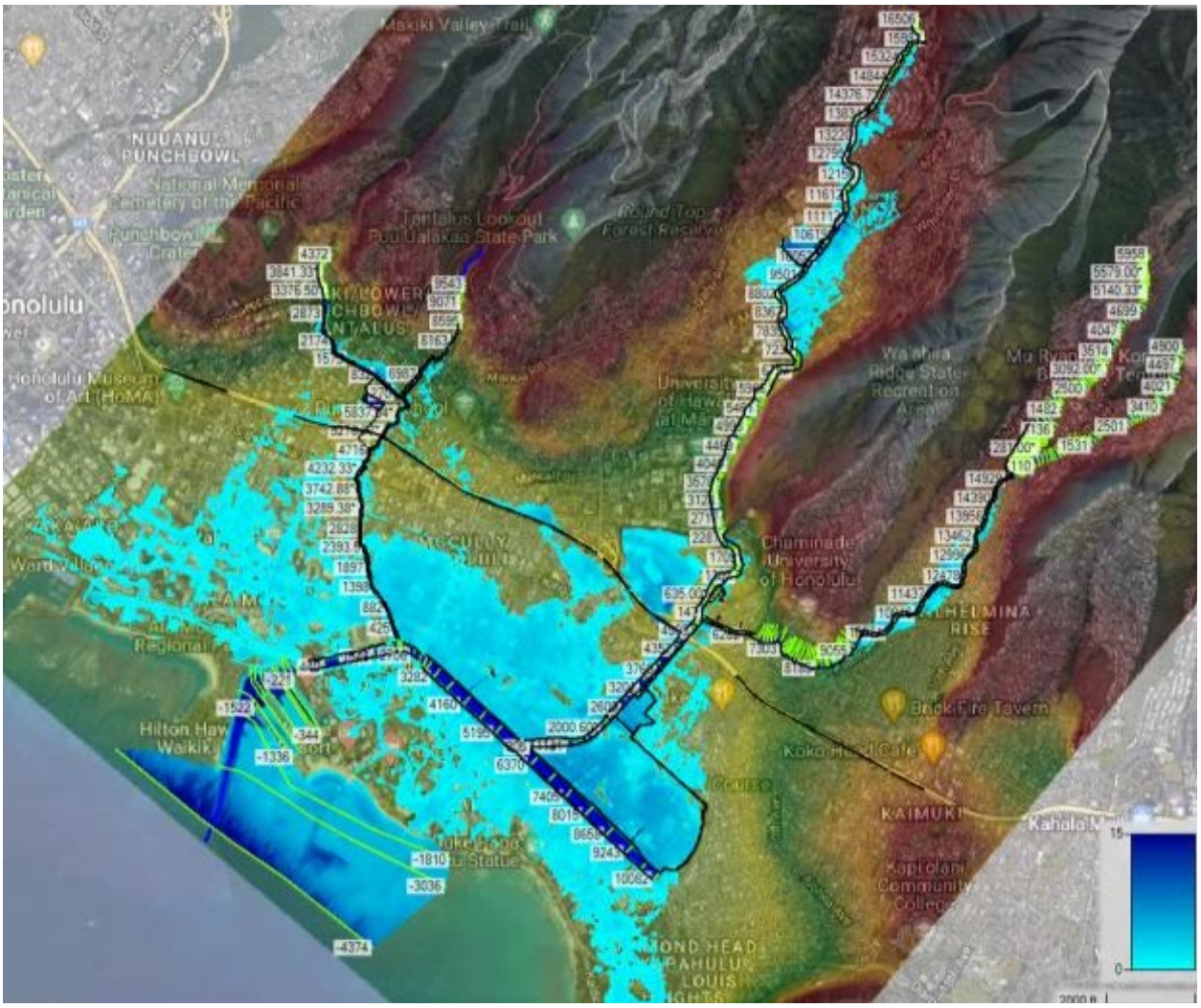

Figure 13: Alternative 1 Floodplain Inundation Map for the 1% AEP Flood Event.

Table 21: Peak Storm Flow Discharge and Water Surface Elevations for the 5%, 2%, and 1% AEP Flood Event With Implementation of Alternative 1.

Location			Storm Event/Peak Flow Discharge[1]			Storm Event/Water Surface Elevation[1]		
River	**Reach**	**River Station**	**5%**	**2%**	**1%**	**5%**	**2%**	**1%**
Ala Wai	Upper	10082	2168	2972	3598	5.81	6.44	7.41
Ala Wai	Upper	7405	2082	2854	3457	5.81	6.44	7.40
Ala Wai	Upper	6095	1585	2240	2761	5.81	6.44	7.40
Ala Wai	Middle	5770	9313	9789	11841	5.81	6.44	7.40
Ala Wai	Middle	5195	9425	9999	12014	5.74	6.37	7.31
Ala Wai	Middle	3282	9934	11055	13053	5.53	6.14	7.06
Ala Wai	Middle	2961	9982	11295	13287	5.43	6.01	6.90
Ala Wai	Lower	67	11261	12789	14958	3.23	3.23	3.23
Kanaha	Ditch	4372	394	567.82	711	128.07	128.61	129.02
Kanaha	Ditch	943	599.35	768	906	69.59	70.93	71.96
Kanaha	Ditch	2	403	461	498	61.32	66.16	68.99
Makiki	Upper	9543	960	1342	1608	172.26	172.91	173.30
Makiki	Upper	7672	718	757	771	107.49	107.85	107.98
Makiki	Lower	5940.67	1731	2086	2164	53.12	62.85	65.12
Makiki	Lower	4709.50	1741	2102	2181	42.36	45.25	46.00
Makiki	Lower	1897	1124	1143	1154	11.80	12.23	12.54
Makiki	Lower	76	1302	1384	1442	4.92	5.41	6.17
Manoa	Main	16506	4623	5934	6834	279.58	280.77	281.52
Manoa	Main	10968	6087	7455	8526	183.59	184.57	185.10
Manoa	Main	10496	4782	5352	5745	179.98	180.89	181.50
Manoa	Main	8117	3976	5366	6216	153.10	154.15	154.78
Manoa	Main	8016	3484	4456	5164	153.25	154.38	155.06
Manoa	Main	7839	5139	5970	6616	152.60	153.84	154.58
Manoa	Main	3042	9019	11649	12447	68.20	70.24	71.79
Manoa	Main	2891	9011	11633	12816	67.19	69.57	71.22
Manoa	Main	1457	10580	13589	15816	45.02	46.59	47.61
Manoa	Main	1378	10587	13611	15975	44.33	45.66	46.70
Manoa	Main	1107	10920	14133	16556	41.52	42.90	44.05
Manoa	Main	84	10869	12398	15894	29.83	32.55	33.54

Location			Storm Event/Peak Flow Discharge[1]			Storm Event/Water Surface Elevation[1]		
River	**Reach**	**River Station**	**5%**	**2%**	**1%**	**5%**	**2%**	**1%**
Palolo	Main	11542	4776	5612	6142	136.65	137.28	137.65
Palolo	Main	10074	3440	3858	4214	113.50	114.19	114.77
Palolo	Main	6282	6366	8229	9857	35.94	37.73	40.23
Palolo	Lower	4810	16847	22628	25256	26.77	29.32	30.62
Palolo	Lower	4653	16811	22148	25084	24.89	26.49	26.52
Palolo	Lower	4557	16653	17227	17758	25.30	26.92	27.30
Palolo	Lower	2609	16832	18802	20137	15.06	15.41	15.68
Palolo	Lower	305	7968	8132	9512	5.54	6.26	7.25
Pukele	Tributary	5958	2229	2947	3418	521.73	522.68	523.26
Waiomao	Tributary	4900	1973	2573	3069	399.51	400.66	401.49

[1] Numbers shown for peak flow discharge are in cfs while water numbers shown for water surface elevation are in feet.

The outlets draining the detention basins proposed under Alternative 1 are generally designed to pass all flows under 10% to 20% AEP; in other words, 80% to 90% of all expected flow events will pass without increase to inundation beyond existing conditions. However, less frequent events such as the 0.2% AEP increase the extent of flooding beyond the extent that currently occurs under existing condition. Since the proposed project would cause induced flooding where it does not always occur under the existing condition, mitigation measures would need to be implemented to minimize the impacts of induced flooding. Nonstructural mitigation measures currently under consideration but not yet fully developed include dry/wet floodproofing (EC HH-2), elevation (EC HH-3), and buy outs (EC HH-4). For a discussion of the potential impacts to hydrology and hydraulics refer to Alternative 6 which includes similar nonstructural measures. The only structural measure currently under consideration, but unlikely to be implementable, is the construction of a pump station(s) located along Makiki Stream where most induced flooding is occurring (EC HH-1). The pumping station would mitigate for interior flooding that could be induced by the floodwalls during a storm event. The number and precise location of a permanent pump station(s) is unknown at this time; however, the pumping capacity that would be needed ranges between 500 and 20,000 cubic feet/second (cfs), which would be a large pump station(s). A permanent pump station(s) would likely consist of a wet well installed in a low-lying area where water naturally flows. The wet well would consist of a concrete inlet box with mesh screens for debris and wildlife protection, hinged lid for pump removal for maintenance, etc. The outlet from the wet well would be routed to the floodwall and would either pass over the wall or through it with a check valve to prevent inflow from the river side. The wet well would connect to a pump house. The pump house would be elevated and would hold the electrical infrastructure and other operating equipment, and a backup generator to minimize pump failure in the event of power disruption. The pumps (if necessary) would be designed to mitigate for induced flooding; however, pumps alone would not fully mitigate for induced flooding. The precise size and location of a pump station(s), if found to be necessary, and design would be analyzed during the Preconstruction Engineering and Design (PED) phase. Therefore, implementation of Alternative 1 would have long-term significant adverse effects to surface water by increasing the extent of flooding in some areas during less frequent storm events. Conversely, there would also be long-term beneficial effects to hydrology and hydraulics with the implementation of Alternative 1 which would also minimize the extent of flooding in some areas as well as potentially remove flooding potential for some areas in the watershed. Even though there could be a benefit for some areas in the watershed, the mitigation measures discussed above (i.e., nonstructural and pump station(s)) would need to be implemented to offset significant adverse impacts to those areas that would experience induced flooding.

The proposed project is designed to detain in-stream flows and/or improve conveyance within the stream channels, such that it is not expected to affect the quantity of stormwater runoff or the capacity of the stormwater drainage system. By reducing the floodplain, the proposed project would reduce the extent of the stormwater drainage system that is subject to inundation. Overall, the implementation of Alternative 1 would have short-term negligible adverse effects to hydrology and hydraulics. Long-term beneficial effects to hydrology and hydraulics are expected by minimizing the extent of flooding in some locations. However, long-term significant adverse effects to hydrology and hydraulics are also expected due to less frequent storm events causing flooding where it does not occur under the existing condition (i.e., induced flooding). The implementation of mitigation measures EC HH-1 through EC HH-4, which are still being explored, are anticipated to reduce this significant adverse impact to a less than significant adverse impact.

Alternative 2B

Less than Significant Impact with Mitigation Incorporated: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to hydrology and hydraulics are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 5.3 project impacts. Differences in the reduction of flood risk between Alternative 2B and Alternative 1 are discussed below.

Like Alternatives 1, Alternative 2B would minimize the occurrence of flooding within various areas of the watershed for frequent storm events. The minimization of flooding under Alternative 2B is less than that provided with Alternative 1. Also, like Alternative 1, the proposed project would induce flooding within the watershed in various areas that currently do not experience flooding. Induced flooding would be greater than that experienced under Alternative 1 and would be anticipated to occur only during large storm events that occur less frequently. The 5%, 2%, and 1% AEP floodplain inundation maps for Alternative 2B are shown in Figure 14, Figure 15, and Figure 16. Anticipated peak flow discharges and surface water elevations for the 5%, 2%, and 1% AEP floodplains are shown in Table 22. Model results for other APE probabilities are presented in Appendix B.

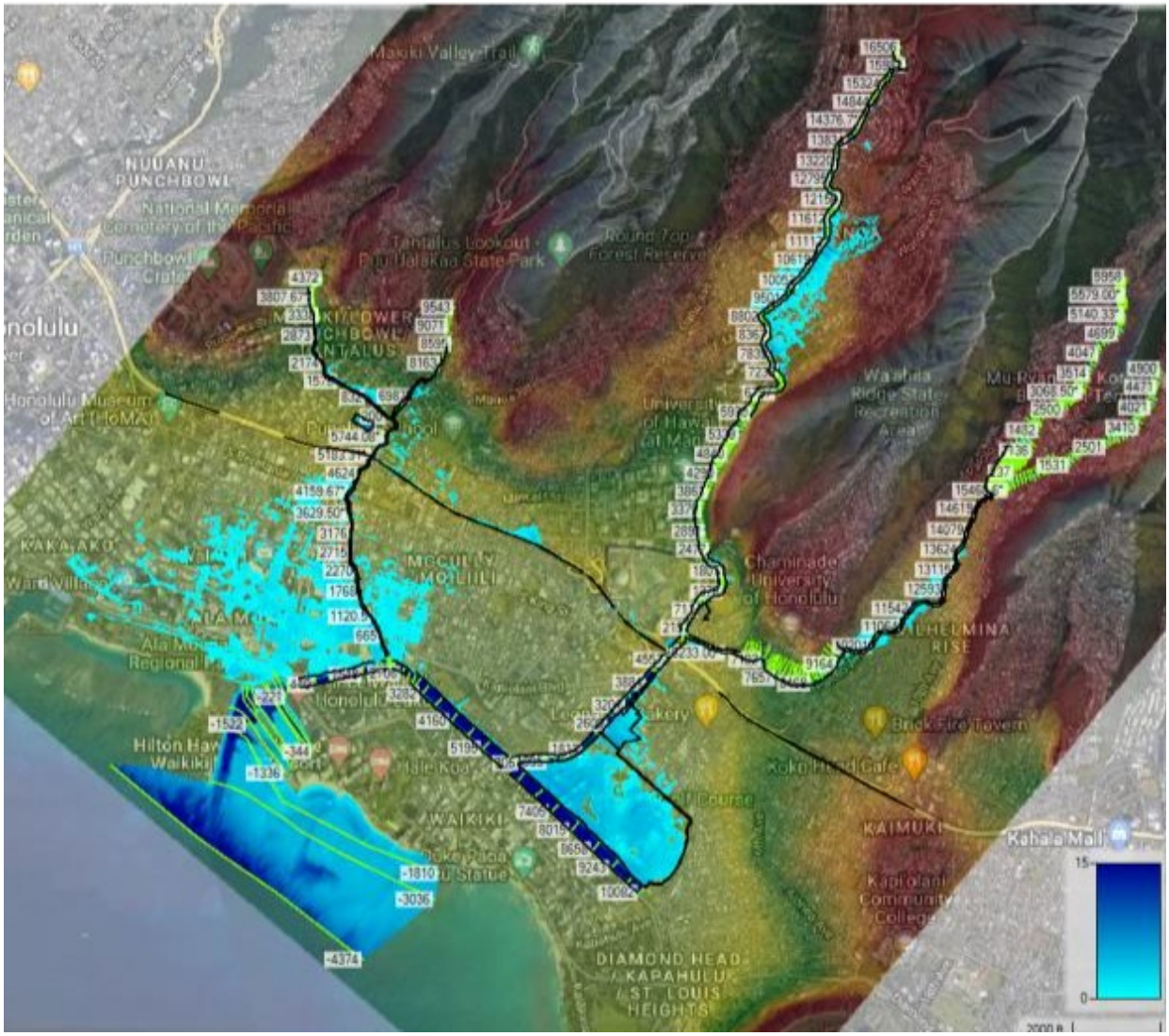

Figure 14: Alternative 2B Floodplain Inundation Map for the 5% AEP Flood Event.

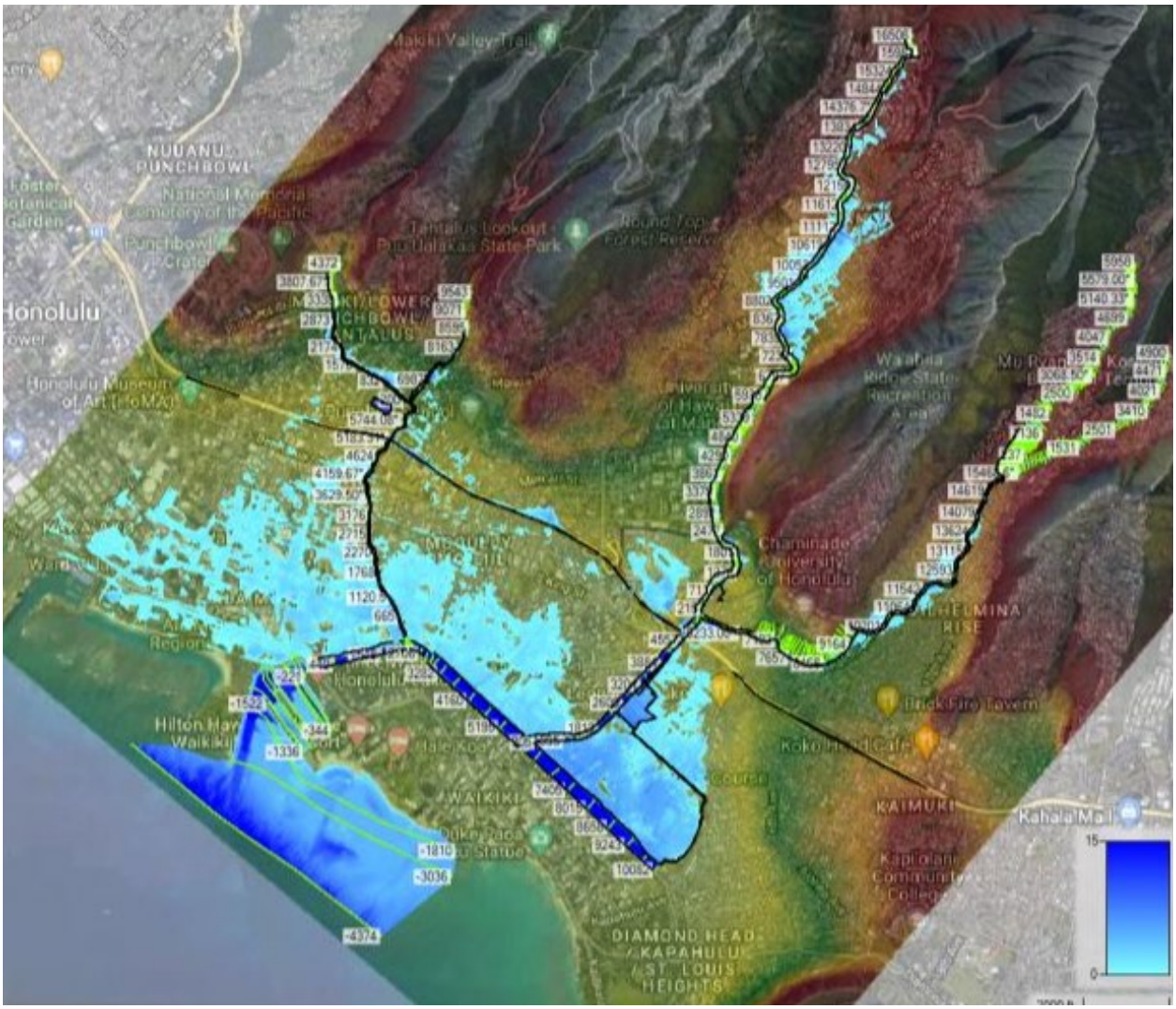

Figure 15: Alternative 2B Floodplain Inundation Map for the 2% AEP Flood Event.

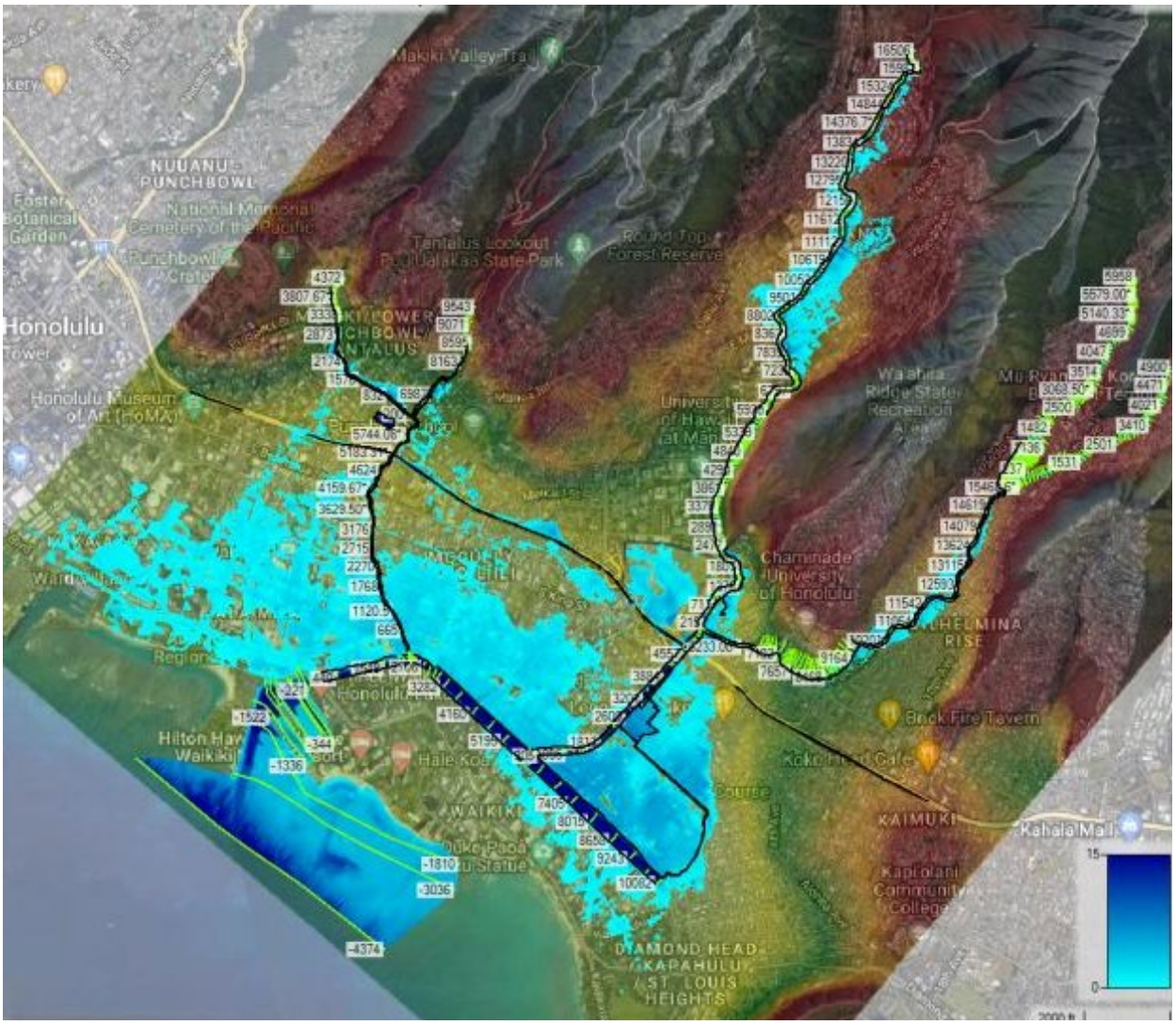

Figure 16: Alternative 2B Floodplain Inundation Map for the 1% AEP Flood Event.

The overall potential for flood damage reduction associated with Alternative 2B is not expected to be as great as that associated with Alternative 1. However, Alternative 2B is still expected to provide a significant beneficial impact relative to reduced potential for flooding in the watershed, especially for less frequent events.

Overall, the implementation of Alternative 2B would have short-term negligible adverse effects to hydrology and hydraulics. Long-term beneficial effects to hydrology and hydraulics are expected by minimizing the extent of flooding in some locations. However, long-term significant adverse effects to hydrology and hydraulics are also expected due to less frequent storm events causing flooding where it does not occur under the existing condition (i.e., induced flooding). The implementation of mitigation measures EC HH-1 through EC HH-4, which are still being explored, are anticipated to reduce this significant adverse impact to a less than significant adverse impact.

Table 22: Peak Storm Flow Discharge and Water Surface Elevations for the 5%, 2%, and 1% AEP Flood Event With Implementation of Alternative 2B.

Location			Storm Event/Peak Flow Discharge[1]			Storm Event/Water Surface Elevation[1]		
River	**Reach**	**River Station**	**5%**	**2%**	**1%**	**5%**	**2%**	**1%**
Ala Wai	Upper	10082	411	587	846	7.97	9.00	9.26
Ala Wai	Upper	7405	3163	3356	3685	7.94	8.98	9.23
Ala Wai	Upper	6095	3968	4195	5132	7.92	8.95	9.19
Ala Wai	Middle	5770	13806	18757	20387	7.92	8.95	9.19
Ala Wai	Middle	5195	13986	18206	19551	7.81	8.82	9.06
Ala Wai	Middle	3282	14550	16736	17142	7.55	8.62	8.90
Ala Wai	Middle	2961	14600	16781	17168	7.37	8.46	8.75
Ala Wai	Lower	67	15715	17667	18261	3.23	3.24	3.28
Kanaha	Ditch	4372	394	567	711	128.07	128.61	129.02
Kanaha	Ditch	943	596	684	748	69.59	70.45	70.96
Kanaha	Ditch	2	398	436	459	60.84	61.35	63.97
Makiki	Upper	9543	960	1342	1608	172.26	172.91	173.30
Makiki	Upper	7672	718	755	771	107.49	107.83	107.97
Makiki	Lower	5940.67	1568	1906	2270	51.35	53.22	62.73
Makiki	Lower	4709.50	1582	1924	2281	39.00	39.89	40.52
Makiki	Lower	1897	1111	1142	1160	9.63	9.72	9.78
Makiki	Lower	76	1177	1378	1476	6.56	7.44	7.71
Manoa	Main	16506	4623	5934	6834	279.57	280.75	281.49
Manoa	Main	10968	6058	7276	8267	183.46	184.31	184.85
Manoa	Main	10496	4423	4664	4812	179.21	179.71	180.03
Manoa	Main	8117	4348	5642	6458	153.48	154.36	154.98
Manoa	Main	8016	3596	4658	5328	153.67	154.63	155.27
Manoa	Main	7839	5319	6200	6848	153.08	154.09	154.77
Manoa	Main	3042	9712	12199	12306	68.67	70.54	72.01
Manoa	Main	2891	9708	12183	14045	67.71	69.85	71.34
Manoa	Main	1457	11226	13926	16006	45.38	46.74	47.63
Manoa	Main	1378	11245	13980	16204	44.60	45.81	46.69
Manoa	Main	1107	11571	14462	16445	41.80	43.05	44.04
Manoa	Main	84	11471	14430	16556	30.64	32.56	33.54

Location			Storm Event/Peak Flow Discharge[1]			Storm Event/Water Surface Elevation[1]		
River	**Reach**	**River Station**	**5%**	**2%**	**1%**	**5%**	**2%**	**1%**
Palolo	Main	11542	4776	5612	6142	136.65	137.28	137.65
Palolo	Main	10074	3440	3858	4214	113.50	114.19	114.77
Palolo	Main	6282	6388	8227	9836	36.00	37.71	39.69
Palolo	Lower	4810	17335	21386	22903	27.53	29.72	30.63
Palolo	Lower	4653	17335	21110	22903	25.99	28.01	28.88
Palolo	Lower	4557	17335	20988	22452	26.38	28.51	29.40
Palolo	Lower	2609	15025	17937	19491	14.44	16.91	17.26
Palolo	Lower	305	11417	14069	14674	7.49	8.43	8.65
Pukele	Tributary	5958	2229	2947	3418	521.73	522.68	523.26
Waiomao	Tributary	4900	1973	2573	3070	399.51	400.66	401.49

[1] Numbers shown for peak flow discharge are in cfs while water numbers shown for water surface elevation are in feet.

Alternative 5.3

Less than Significant Impact with Mitigation Incorporated: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to hydrology and hydraulics are generally expected to be similar. Therefore, refer to the analysis under Alternatives 1 and 2B for Alternative 5.3 project impacts. Differences in the reduction of flood risk between Alternative 5.3 and Alternatives 1 and 2B are discussed below.

Like Alternatives 1 and 2B, Alternative 5.3 would minimize the occurrence of flooding within various areas of the watershed for frequent storm events. The minimization of flooding under Alternative 5.3 is greater than under Alternatives 1 or 2B. However, like Alternatives 1 and 2B, the proposed project would also induce flooding within the watershed in various areas that currently do not experience flooding. Induced flooding would be less than that experienced under Alternatives 1 and 2B and would be anticipated to occur only during large storm events that occur less frequently. The 5%, 2%, and 1% AEP floodplain inundation maps for Alternative 2B are shown in Figure 17, Figure 18, and Figure 19. Anticipated peak flow discharges and surface water elevations for the 5%, 2%, and 1% AEP floodplains are shown in Table 23. Model results for other APE probabilities are presented in Appendix B.

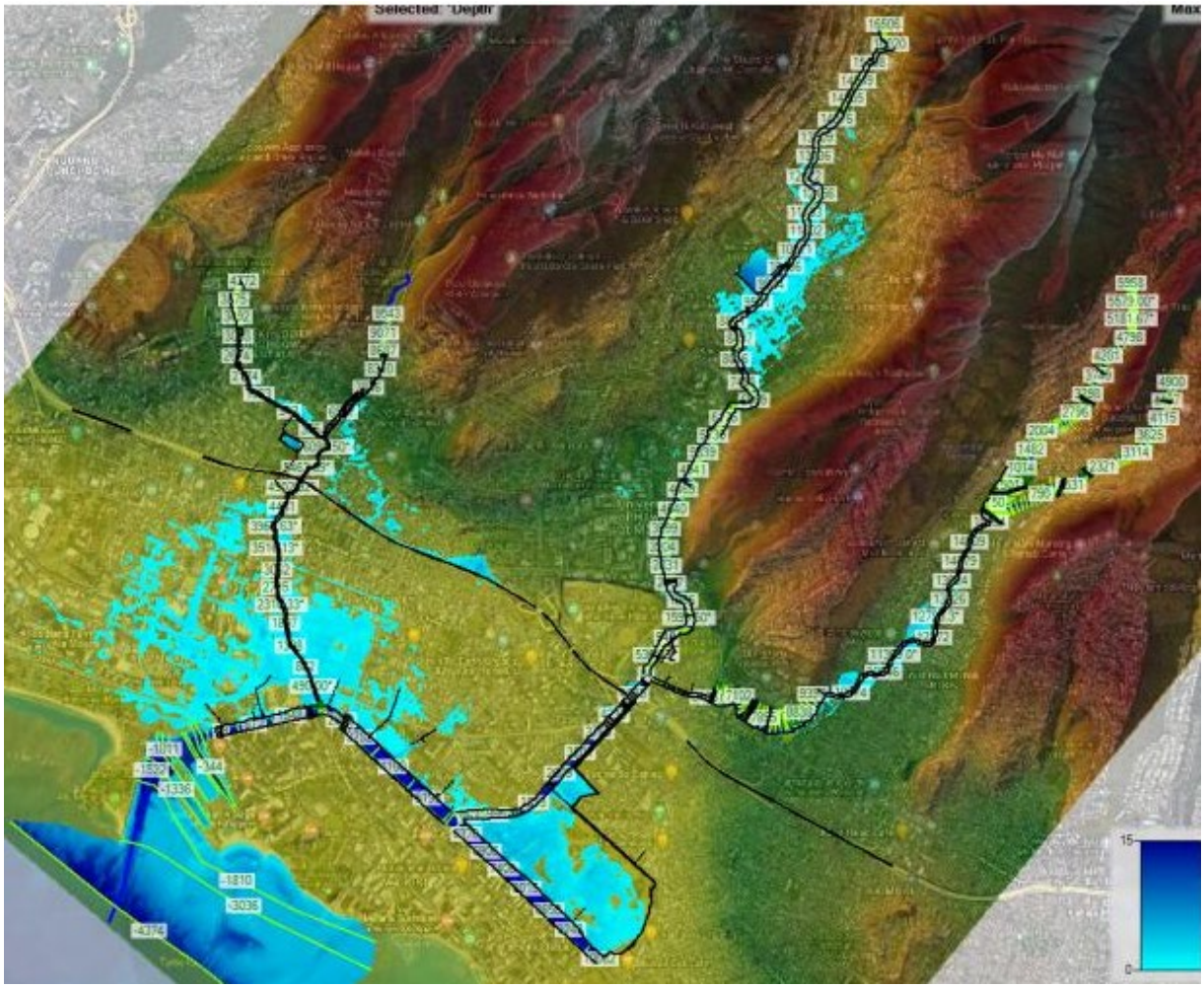

Figure 17: Alternative 5.3 Floodplain Inundation Map for the 5% AEP Flood Event.

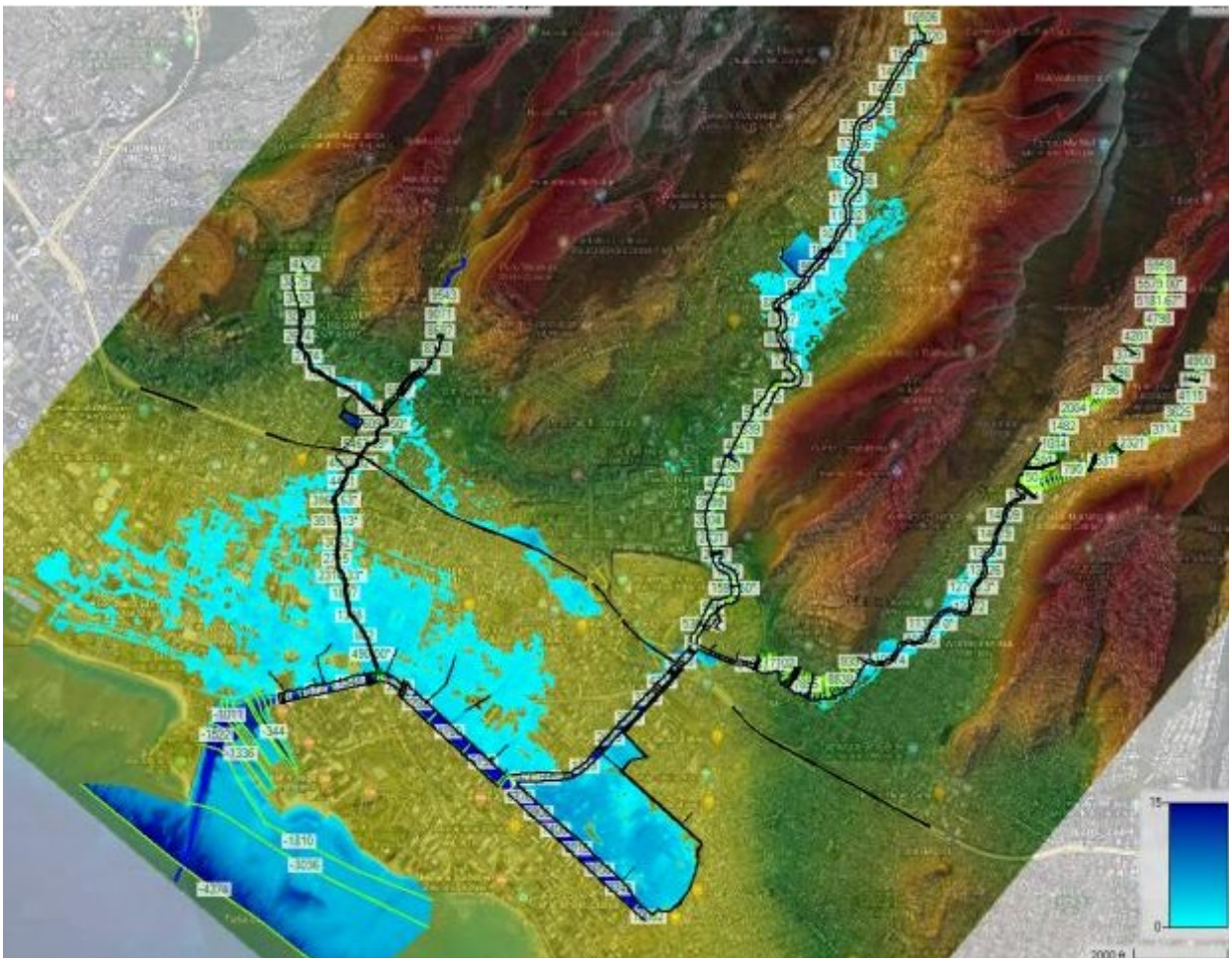

Figure 18: Alternative 5.3 Floodplain Inundation Map for the 2% AEP Flood Event.

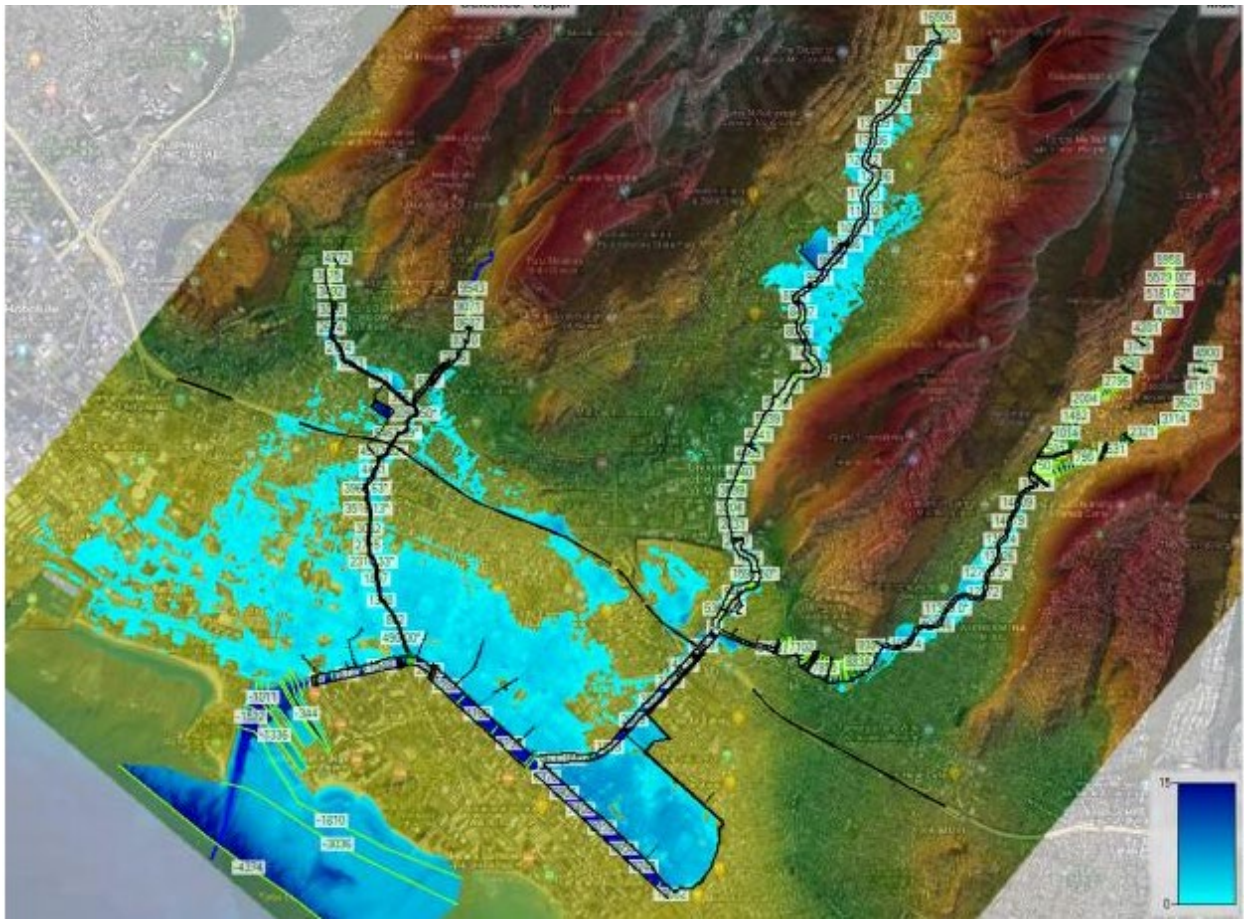

Figure 19: Alternative 5.3 Floodplain Inundation Map for the 1% AEP Flood Event.

Table 23: Peak Storm Flow Discharge and Water Surface Elevations for the 5%, 2%, and 1% AEP Flood Event with Implementation of Alternative 5.3.

Location			Storm Event/Peak Flow Discharge[1]			Storm Event/Water Surface Elevation[1]		
River	**Reach**	**River Station**	**5%**	**2%**	**1%**	**5%**	**2%**	**1%**
Ala Wai	Upper	10082	557	569	833	7.91	8.87	9.54
Ala Wai	Upper	7405	1336	3045	4543	7.91	8.85	9.49
Ala Wai	Upper	6095	1790	4240	6665	7.91	8.83	9.44
Ala Wai	Middle	5770	13325	16959	22295	7.91	8.83	9.44
Ala Wai	Middle	5195	13589	17039	21797	7.80	8.69	9.26
Ala Wai	Middle	3282	14429	16688	18922	7.53	8.43	9.08
Ala Wai	Middle	2961	14499	16313	17732	7.35	8.30	8.98
Ala Wai	Lower	67	15687	17387	18622	3.23	3.23	3.32
Kanaha	Ditch	4372	394	567	711	128.07	128.61	129.02
Kanaha	Ditch	943	603	756	906	69.61	70.86	71.74
Kanaha	Ditch	2	399	454	494	60.90	64.17	68.09
Makiki	Upper	9543	960	1342	1608	172.26	172.91	173.30
Makiki	Upper	7672	719	757	772	107.49	107.85	107.99
Makiki	Lower	5940.67	1562	2013	2123	51.52	63.11	64.22
Makiki	Lower	4709.50	1571	2029	2128	41.22	44.79	45.74
Makiki	Lower	1897	1121	1139	1149	11.82	12.25	12.55
Makiki	Lower	76	1255	1300	1316	6.55	7.31	7.92
Manoa	Main	16506	4623	5934	6834	279.58	280.77	281.52
Manoa	Main	10968	6087	7461	8531	183.59	184.56	185.10
Manoa	Main	10496	4791	5354	5751	180.00	180.90	181.51
Manoa	Main	8117	3986	5342	6200	153.08	154.13	154.76
Manoa	Main	8016	3316	4432	5156	153.24	154.37	155.04
Manoa	Main	7839	5146	5949	6608	152.58	153.82	154.55
Manoa	Main	3042	9006	11601	12397	68.19	70.22	71.79
Manoa	Main	2891	8997	11584	15801	67.18	69.55	71.22
Manoa	Main	1457	10565	13583	15851	45.00	46.57	47.60
Manoa	Main	1378	10565	13621	16050	44.32	45.64	46.68
Manoa	Main	1107	10896	14091	16548	41.51	42.89	44.05
Manoa	Main	84	10879	11498	15556	29.67	32.60	33.69

Location			Storm Event/Peak Flow Discharge[1]			Storm Event/Water Surface Elevation[1]		
River	**Reach**	**River Station**	**5%**	**2%**	**1%**	**5%**	**2%**	**1%**
Palolo	Main	11542	4701	5576	6211	136.59	137.25	137.69
Palolo	Main	10074	3587	4053	4397	113.75	114.51	115.06
Palolo	Main	6282	6226	8003	9546	35.83	37.57	39.97
Palolo	Lower	4810	16622	22294	24968	26.91	29.99	31.34
Palolo	Lower	4653	16622	22289	24946	25.26	28.07	29.15
Palolo	Lower	4557	16605	21907	23918	25.66	28.63	29.84
Palolo	Lower	2609	14973	18102	19708	13.12	14.36	14.80
Palolo	Lower	305	13268	13220	15497	7.28	8.26	8.79
Pukele	Tributary	5958	2230	2947	3418	521.73	522.68	523.26
Waiomao	Tributary	4900	1973	2573	3070	399.51	400.66	401.49

[1] Numbers shown for peak flow discharge are in cfs while water numbers shown for water surface elevation are in feet.

Overall, the implementation of Alternative 5.3 would have short-term negligible adverse effects to hydrology and hydraulics. Long-term beneficial effects to hydrology and hydraulics are expected by minimizing the extent of flooding in some locations. However, long-term significant adverse effects to hydrology and hydraulics are also expected due to less frequent storm events causing flooding where it does not occur under the existing condition (i.e., induced flooding). The implementation of mitigation measures EC HH-1 through EC HH-4, which are still being explored, are anticipated to reduce this significant adverse impact to a less than significant adverse impact.

Alternative 6

No Impact: Implementation of Alternative 6 would not have any short-term or long-term direct or indirect impacts on hydrology or hydraulics because construction would be occurring to existing structures and nothing within a waterway or nearshore.

Environmental Commitments

The following environmental commitments could potentially be implemented minimize induced flooding under Alternatives 1, 2B, and 5.3.

EC HH-1: Potential pump station(s) located within the vicinity of Makiki Stream to minimize induced flooding. The location, size, and number of pumps that may be required will be analyzed and detailed during PED. Generally, due to the cost of this mitigation measure it is highly unlikely that this proposed mitigation measure would be implemented.

EC HH-2: Dry and/or wet floodproofing commercial structures in areas where induced flooding occurs. The number of structures and the location of structures that would need to be dry and/or wet floodproofed will be analyzed and detailed during PED.

EC HH-3: Elevating residential structures in areas where induced flooding occurs. The number of structures and the location of structures that would need to be elevated will be analyzed and detailed during PED.

EC HH-4: Acquisition of commercial and/or residential structures in areas where induced flooding occurs. The number of structures and the location of structures that would need to be acquired will be analyzed and detailed during PED.

Best Management Practices

No specific BMPS associated with impacts to hydrology and hydraulics apply. Refer to BMPs for water quality that would also be applicable to hydrology and hydraulics.

3.3.7 Water Quality

Regulatory Setting

Relevant federal and state laws/regulations include:

- Clean Water Act, Sections 401 and 402
- HAR Chapter 11-54 (Water Quality Standards)
- Chapter 11-55 (Water Pollution Control)

Existing Conditions

Under Section 303(d) of the Clean Water Act, states, territories, and authorized tribes are required to develop and update every two years, lists of waters – rivers, lakes, coastal waters, and estuaries – that are impaired (or threatened) by one or more pollutants. Total Maximum Daily Loads (TMDL's) must then be prepared for all waters on the 303(d) List. Figure 20 and Table 24 show the pollutants for which Makiki, Palolo, Manoa, Ala Wai Canal and Harbor have been placed on the 303(d) List of Water Quality Limited Segments. Manoa stream (State Waterbody ID: HI3-3-07.01) is listed as impaired for aquatic life and other due to murky water, nitrogen and/or phosphorous, and pesticides (USEPA, 2022b). Makiki stream (State Waterbody ID: HIALWS06) is listed as impaired for aquatic life due to nitrogen and/or phosphorus. Palolo stream (State Waterbody ID: HI3-3-07.01.1) is listed as impaired for aquatic life due to trash. Ala Wai Canal and Harbor (Palolo Stream Fork) (State Waterbody ID: HIW00034) is listed as impaired for aquatic life, swimming and boating, and other due to bacteria and other microbes, murky water, and nitrogen and/or phosphorus. Ala Wai Canal and Boat Harbor (State Waterbody ID: HIW00050) is listed as impaired for aquatic life, swimming and boating, and other due to bacteria and other microbes, metals, murky water, nitrogen and/or phosphorus, pesticides, and other unknown causes. The following three TMDL's have been developed to protect and restore water quality within the Ala Wai Canal: Ala Wai Canal Phosphorus (January 1, 2002 – addresses algal growth and nutrient impairments), Ala Wai Canal Suspended Solids (February 21, 1986 – addresses suspended solids impairment), and Ala Wai Canal Toxic Pollutants (February 21, 1986 – addresses unlisted impairments). Kahanamoku Lagoon (State Waterbody ID: HIW00003) is listed as impaired for swimming and boating due to bacteria and other microbes. Kahanamoku Beach (State Waterbody ID: HI366432) is listed as impaired for aquatic life due to algae and murky water. Royal-Moana Beach (State Waterbody ID: HI898947) is listed as impaired for aquatic life due to algae, ammonia, murky water, and nitrogen and/or phosphorus. Waikiki Beach Center (State Waterbody ID: HI244505) is listed as impaired for aquatic life due to murky water (USEPA, 2022b).

Figure 20: Location of 303(d) Listed Water Quality Limited Segments within the Ala Wai Canal Watershed.

Table 24: Ala Wai Canal Watershed 303(d) Listed Pollutants for Water Quality Limited Segments.

Area (miles[a] or square miles[a])	Impairment	Total Maximum Daily Load (TMDL) Developed	Probable Sources Contributing to Impairment from 2020
Manoa Stream (11.3 miles)	Chlordane	No	Unknown
Manoa Stream (11.3 miles)	Dieldrin	No	Unknown
Manoa Stream (11.3 miles)	Nitrate/Nitrite	No	Unknown
Manoa Stream (11.3 miles)	Total Nitrogen	No	Unknown
Manoa Stream (11.3 miles)	Total Phosphorus	No	Unknown
Manoa Stream (11.3 miles)	Turbidity	No	Unknown
Makiki (7.4 miles)	Total Nitrogen	No	Unknown
Makiki (7.4 miles)	Total Phosphorus	No	Unknown
Palolo Stream (8.7 miles)	Trash	No	Unknown
Ala Wai Canal and Harbor (Palolo Stream Fork) (0.003 square miles)	Turbidity	No	Unknown
Ala Wai Canal and Harbor (Palolo Stream Fork) (0.003 square miles)	Total Nitrogen	No	Unknown
Ala Wai Canal and Harbor (Palolo Stream Fork) (0.003 square miles)	Fecal Coliform	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Cause Unknown	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Lead	Yes	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Nitrate/Nitrite	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Total Nitrogen	No	Unknown

Area (miles[a] or square miles[a])	**Impairment**	**Total Maximum Daily Load (TMDL) Developed**	**Probable Sources Contributing to Impairment from 2020**
Ala Wai Canal and Boat Harbor (0 square miles)	Nutrients	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Total Phosphorus	Yes	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Total Suspended Solids	Yes	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Turbidity	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Pesticides	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Enterococcus	No	Unknown
Kahanamoku Lagoon (0.25 square miles)	Enterococcus	No	Unknown
Kahanamoku Beach (0.3 miles)	Chlorophyll a	No	Unknown
Kahanamoku Beach (0.3 miles)	Turbidity	No	Unknown
Royal-Moana Beach (0.4 miles)	Ammonia-Nitrogen	No	Unknown
Royal-Moana Beach (0.4 miles)	Chlorophyll a	No	Unknown
Royal-Moana Beach (0.4 miles)	Nitrate/Nitrite	No	Unknown
Royal-Moana Beach (0.4 miles)	Turbidity	No	Unknown
Waikiki Beach Center (0.05 miles)	Turbidity	No	Unknown

[a] refers to the miles or square miles assessed

The City and County of Honolulu National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. HI S000002 was issued by the State of Hawaii, Department of Health (DOH) and became effective on September 1, 2020 (City and County of Honolulu, 2021). The permit will expire on August 31, 2025. Pursuant to Part F.1(a) of the Permit, a monitoring program must be designed and implemented. The overarching goal for the monitoring program required under the MS4 is related to both managing and assessing the effectiveness of the Storm Water Management Program (SWMP). The primary objective of the SWMP is to reduce to the maximum extent practicable, pollutants discharged from the City and County of Honolulu's MS4 to State waters, and to evaluate monitoring data (City and County of Honolulu, 2021).

Significance Criteria

Effects to water quality would be considered significant if the proposed project would result in any of the following:

- Substantially degrade surface water quality such that it would violate water quality standards, contribute to exceedance of aquatic life guidelines, or otherwise impair beneficial uses.
- Substantially increase contaminant levels in the groundwater.

Environmental Consequences

No Action

No Impact: Under the No Action Alternative, none of the flood risk management measures would be implemented. The potential future without project condition assumptions are the same as those discussed in the 2017 Ala Wai Canal Study (USACE, 2017); therefore, that discussion is incorporated by reference.

Alternative 1

Less than Significant Impact: Construction of Alternative 1 features, primarily the inlet and outlet structures associated with the detention basins, could increase the delivery of sediment (i.e., from construction-related erosion) and associated pollutants via stormwater runoff, which could temporarily affect water quality in the streams and downstream receiving waters. Although sediment-bound pollutants are known to occur throughout the watershed (particularly in the urbanized areas), none of the soils that would be exposed by construction are expected to contain excessive levels of contamination. In general, construction of the flood risk measures would involve placement of imported materials, with only minimal amounts of excavation. All materials used to construct the measures would be from approved sources and would be clean and free of contaminants. Areas requiring excavation (e.g., Makiki District Park Detention Basin, Manoa Valley District Park Detention Basin, and the inlet and outlet structures associated with these detention basins and the Ala Wai Golf Course Detention Basin) are located in open space areas, which are not subject to significant inputs of roadways sediments or other anthropogenic contaminants, such that a significant increase in pollutant delivery to the receiving streams would be expected as a result of construction.

During construction, storage and use of some hazardous materials would occur. If handled inappropriately, these materials could accidentally spill or inadvertently discharge to adjacent waterways or groundwater. Construction activities would involve the use of heavy equipment, cranes, compactors, and other construction equipment that use petroleum products such as fuels, lubricants, hydraulic fluids, and coolants, all of which are detrimental to water quality. BMPs listed below would be implemented to minimize the risk of inadvertent spills.

Construction would disturb more than 1 acre of land; therefore, the project would be regulated under the State's NPDES stormwater program, which requires the preparation of a SWPPP to obtain permit coverage. The objective of a SWPPP is to describe the measures that would be implemented to prevent sedimentation, erosion, and stormwater contamination, in compliance with the requirements of the NPDES program. BMPs that would be implemented to minimize impacts associated with potential pollutants are listed below. Preparation and implementation of the SWPPP, as well as adherence to other requirements of the NPDES program, would reduce the potential construction-related water quality impacts to less than significant and no mitigation would be required.

The operation and maintenance of Alternative 1 is not expected to contribute pollutants to the waterways or otherwise measurably effect water quality. The inlet structures to the detention basins are designed to divert water into the detention basins starting at the 5% AEP flood event. Diverted water would be held in the detention basins until stormwater flows begin to dissipate, at which time detained water would be slowly released back into the receiving streams. During the detention of water within the basins, sediments within the water column would likely settle out, meaning water leaving the detention basins could contain less sediment than water that entered the detention basins. However, the degree to which sediments would settle out and the reduction of sediments within detained water flowing back into the stream is unknown. It's important to note that the detention basins are generally located within areas that are already subject to flooding under the existing without project condition, such that the implementation of Alternative 1 is not expected to substantially increase delivery of contaminants to the streams beyond that which already occurs or otherwise alter the location or degree of water quality contaminants.

Maintenance activities could involve the use of machinery to remove debris from the inlet/outlet structures and the detention basins as well as to potentially repair any erosion that might occur near the inlet/outlet structures. Like construction, heavy equipment which requires the use of petroleum products that are detrimental to water quality, may be needed for maintenance activities. BMPs implemented during construction would also be implemented during maintenance activities to minimize the risk of inadvertent spills. Therefore, with the implementation of BMPs, the project is expected to have a less than significant impact on water quality.

Alternative 1 also includes the implementation of mitigation measures for induced flooding. Nonstructural measures like dry/wet floodproofing, elevation, and acquisition would have similar impacts to water quality as the Nonstructural Alternative that was analyzed. Therefore, refer to the discussion under Alternative 6 for the potential effects to water quality these potential mitigation measures would cause. The only structural mitigation measure being considered is permanent pump station(s), although due to cost the construction of pump station as a mitigation measure is highly unlikely. If constructed, though, a pump station would only operate during a storm event. The primary purpose of the pump station would be to minimize induced flooding on structures located outside the floodwalls where modeling has found induced flooding to be probable. If necessary, permanent pump stations are intended to collect rainfall and stormwater runoff that is not collected by the subsurface drainage system as it naturally flows to low-lying areas. The runoff would be pumped over/through the floodwall before water levels elevate to a level of inducing flooding to nearby structures. The pumps would not redirect runoff; they would move it where it would have drained without the floodwall. When operating, the pump station(s) would serve as a long-term point source of stormwater discharge. The potential pump station(s) would be expected to be compliant with state water quality standards. In addition, a small, manufactured treatment device or sediment settling basin would be installed

as part of the pump station(s). Therefore, long-term the hydraulic pumps could influence the quality of stormwater runoff, but it would be temporary, minor, and not significant.

Alternative 2B

Less than Significant Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to water quality are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. Overall, Alternative 2B would have a short-term less than significant adverse effect to water quality. Alternative 2B would also have a long-term less than significant adverse effect to water quality.

Alternative 5.3

Less than Significant Impact: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to water quality are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts. Overall, Alternative 5.3 would have a short-term less than significant adverse effect to water quality. Alternative 5.3 would also have a long-term less than significant adverse effect to water quality in addition to a long-term beneficial effect to water quality.

Alternative 6

No Impact: No short-term direct or indirect water quality impacts would occur as a result of implementation of Alternative 6 because land disturbance for this alternative would be limited to modification of existing buildings. Implementation of Alternative 6 would require temporary construction access to all structures to be treated, but this is expected to occur from existing roads. Similarly, localized maintenance such as repairs would be needed over time. Overall, no direct or indirect long-term adverse effects to water quality would occur as a result of this alternative. Appropriate erosion and sediment control measures would be utilized during construction.

Environmental Commitments

No specific environmental commitments associated with impacts to water quality apply.

Best Management Practices

Implementation of the following BMPs would help ensure that effects on water quality and WOTUS would remain at less than significant levels. Standard BMPs include:

- Appropriate erosion control measures would be incorporated into the SWPPP by the construction contractor to prevent sediment from entering waterways and to minimize temporary turbidity impacts. Examples include, but are not limited to, strawbales/wattles, erosion blankets, silt fencing, silt curtains, mulching, revegetation, and temporary covers. Sediment and erosion control measures would always be maintained by the contractor during construction. Control measures would be inspected periodically by the construction contractor, particularly during and after significant rain events.
- A fuel spill management plant would be developed for the project by the construction contractor and would be implemented by the contractor.
- Construction equipment and vehicles would be fueled and maintained in specific staging areas only, which would be designed to capture potential spills. These areas cannot be

near any ditch, stream, or other body of water or feature that may convey water to a nearby body of water.
- Any spills of hazardous material would be cleaned up immediately by the construction contractor.
- Construction vehicles and equipment would be inspected frequently and appropriately maintained by the construction contractor to help prevent dripping of oil, lubricants, or any other fluids.
- Implementation and adherence to any additional requirements as mandated by the Construction General Permit and the Section 401 Water Quality Certification. The construction contractor would obtain the Construction General Permit while USACE would obtain the Section 401 Water Quality Control Certification. The contractor would be responsible for implementing requirements set forth in these two permits.

3.3.8 Sediment Quality

Regulatory Setting
Relevant federal and state laws/regulations include:
- Clean Water Act, Section 401, Section 402, and Section 404

Existing Conditions
No systematic studies of sediment quality have been completed for the Ala Wai watershed; however, a few studies have been conducted in conjunction with water quality and environmental condition assessments. Sediment quality within the Ala Wai watershed, most notably in the Manoa watershed, has been negatively impacted by intensive historical use of herbicides in Hawaii, year-round cultivation practices, prevalence of subterranean termites, and proximity of agricultural and residential lands to streams (Spengler et al., 2019). In general, the sediment quality correlates with urban land uses. Elevated levels of organochlorine pesticides (e.g., dieldrin, chlordane, and dichloro-dephenyl-trichloroethane [DDT]), polychlorinated biphenyls (PCBs) and semivolatile organic compounds and polycyclic aromatic hydrocarbons (PAHs) have all been detected in the stream sediments of the Manoa watershed at concentrations exceeding the aquatic-life guidelines (USGS, 2004). Concentrations of barium, cadmium, lead, tin and zinc were also found to be higher in urban areas than in the undeveloped forested basins, which suggests human sources of these elements (USGS, 2004).

Significance Criteria
Effects to sediment quality would be considered significant if the proposed project would result in any of the following:
- Substantially increase contaminant concentrations within the watershed by mobilizing buried contaminants.

Environmental Consequences

No Action
No Impact: Under the No Action Alternative, none of the flood risk management measures would be implemented. During heavy rainfall events, the rapid rise in stream volumes would be expected to continue mobilizing contaminated streambed sediments and re-suspending the sediments within the water column, consistent with current conditions.

Alternative 1

Less than Significant Impact: The construction of Alternative 1 features, especially the inlet and outlet structures associated with the detention basins, could disturb contaminated streambed sediments where the features connect to the receiving stream. Although sediment-bound pollutants are known to occur throughout the watershed (particularly in the downstream urbanized areas), sediment that must be removed for the installation of inlet and outlet structures would be disposed of upland (not placed in channel). The stream channel and banks near inlet and outlet structures would be stabilized by the use of riprap, vegetation, or similar means. Typically, less than 0.02 acre of streambed sediments would have the potential of being disturbed and potentially mobilized with the construction of the inlet/outlet structures. Other features that are part of Alternative 1 like floodwalls and road closure structures, would not include construction within a stream channel. Therefore, construction of these features would have no potential for disturbing potentially contaminated streambed sediments.

Long-term, the operation and maintenance of the detention basins are not expected to substantially increase contaminant concentrations within the watershed by mobilizing buried contaminants. The inlet structures to the detention basins are designed to divert water into the detention basins starting at the 5% AEP flood event. Diverted water would be held in the detention basins until stormwater flows begin to dissipate, at which time the detained water would be slowly released back into the receiving streams. During the detention of water within the basins, streambed sediments that were mobilized due to high stream volumes during a heavy rainfall event, would be expected to have time to settle out within the detention basins. This means water leaving the detention basins could contain less sediment and potentially contaminated sediments, than the water that was entrained in the basins. However, the degree to which sediments would settle out and the reduction of sediments within the entrained water flowing back into the stream is unknown.

Maintenance activities could include debris removal from the inlet and outlet structures and removal of sediment and debris from the detention basins. The removal of debris from the inlet and outlet structures could potentially disturb streambed sediments, although the area potentially disturbed during debris removal would be less than the acreage disturbed during the construction of the inlet/outlet structures. Any debris and sediment removed from the inlet/outlet structures and detention basins would be disposed of at an approved upland facility.

Alternative 1 also includes the implementation of mitigation measures to minimize induced flooding caused by the proposed project. Nonstructural measures like dry/wet floodproofing, elevation, and acquisition would have similar impacts to water quality as the Nonstructural Alternative that was analyzed. Therefore, refer to the discussion under Alternative 6 for the potential effects to sediment quality these potential mitigation measures would cause. The only structural mitigation measure being considered is a permanent pump station(s), although due to the cost of construction of a pump station(s) where one may be beneficial would make the implementation of this mitigation measure highly unlikely. If constructed, though, a pump station(s) would only operate during a storm event. The primary purpose of the pump station would be to minimize induced flooding on structures located outside the floodwalls where modeling has found induced flooding to be probable. If necessary, a permanent pump station(s) would collect rainfall and stormwater runoff that is not collected by the subsurface drainage system as it naturally flows to low-lying areas. The runoff would be pumped over/through the floodwall before water levels elevate to a level of inducing flooding to nearby structures. The construction of a pump station(s) would occur adjacent to a stream channel, but not within the stream channel. Therefore, the construction of a pump station(s) would not be expected to disturb or mobilize streambed sediments. Long-term, maintenance activities associated with a

pump station(s) typically include frequent inspections to assure normal functioning of pump station equipment and to identify potential problems early. Routine preventive maintenance would also occur to prevent unnecessary equipment wear and downtime. The above maintenance activities would have no impact on sediment quality. Long-term operation of a pump station(s) is automated and only occurs during a storm event. However, during a storm event, the operation of the pump station would collect rainfall and stormwater runoff and the runoff would be pumped over/through the floodwall. The stormwater runoff that is collected could contain contaminated sediments that would then be pumped into a stream/canal. Although the presence of a pump would likely increase the rate at which the stormwater runoff enters the stream/canal, the pump would not cause an increase in contaminant concentrations within the watershed. The stormwater runoff potentially containing contaminated sediments would have entered the watershed under the existing condition, but the rate at which it would have entered the watershed would have been slower than the rate at which it would enter the watershed with a pump station(s) in operation. In addition, where the water enters the stream/canal from the pump station(s), the velocity of the water entering the stream/canal could mobilize buried contaminants within the receiving stream/canal. BMPs would be implemented to minimize the velocity of the water from the pump station entering the stream/canal so that the mobilization of sediments would be less than significant. Therefore, the implementation of the above mitigation measures is expected to have no short-term adverse effect on sediment quality, but a less than significant long-term adverse effect on sediment quality.

Overall, construction, operation, maintenance, and potential mitigation measures associated with Alternative 1 is expected to have a less than significant adverse effect on sediment quality within the watershed.

Alternative 2B

Less than Significant Impact: The construction of Alternative 2B features, includes only one detention basin. However, floodwalls that would be constructed under Alternative 2B often have outlet structures associated with them. The detention basin included in Alternative 2B would have the same short-term and long-term impacts to sediment quality; therefore, refer to the discussion of those potential impacts under Alternative 1.

Alternative 2B includes the construction of more floodwalls than Alternative 1. The construction of floodwalls and road closure structures would avoid construction within a stream channel except for the segment of floodwall along the Manoa-Palolo Canal (part of the Ala Wai Canal floodwall) and a portion of floodwall along Makiki Stream. Construction of upland floodwalls would have no potential for disturbing potentially contaminated streambed sediments. For floodwall along the Manoa-Palolo Canal, it appears that it would be necessary to construct a temporary rock bench within the stream channel for equipment access during floodwall construction. This construction would require the use of BMPs to minimize impacts to the stream. Once constructed, the temporary bench would be removed, and the floodwalls would not impact the sediment conditions. The Koali Road and Ala Wai Canal floodwalls include outlet structures that would collect interior drainage behind a floodwall during a storm event and carry those waters to the receiving waterway on the downside of the floodwall. The outlet structures for the Ala Wai Canal floodwall are already existing stormwater drainage outlets that would be modified with a flap gate. The addition of the flap gate is not anticipated to disturb potentially contaminated streambed sediments. The Koali Road floodwall includes two outlet structures. Where these features connect to the receiving stream, construction activities could disturb streambed sediments. Although sediment-bound pollutants are known to occur throughout the watershed (particularly in the urbanized areas), none of the sediments that would be exposed by construction are expected to contain excessive levels of contamination. In addition, typically

less than 0.02 acre of streambed sediments would have the potential of being disturbed and potentially mobilized with the construction of the outlet structures.

Long-term, the operation and maintenance of the floodwalls is not expected to substantially increase contaminant concentrations within the watershed by remobilizing buried contaminants. Maintenance activities such as potential repairs and ensuring flap gates are working properly are not expected to require the disturbance of streambed sediments. The operation of the floodwalls, unlike the detention basin, would not allow streambed sediments that are mobilized due to increasing storm volumes during heavy rainfall to settle out of the water column. Instead, the floodwalls would likely increase stream volumes above existing conditions during heavy rainfall, as stormwater that is currently overflowing the channel banks of a stream would be contained within the floodwalls and shunted downstream. Due to the likely increase in stream volumes above existing conditions, increased mobilization of contaminated stream sediments could occur. The increase in mobilization of contaminated stream sediments is not expected to be significantly greater, though, since the stormwater from the upper watershed would be anticipated to slow down once it reaches the Kaimuki High School and Ala Wai Canal floodwalls which provide more surface area for the stormwater to spread out than a confined channel.

Alternative 2B also includes potential mitigation measures to address induced flooding. Refer to the effects analysis under Alternative 1 for the potential mitigation measures.

Overall, the construction, operation, maintenance, and potential mitigation measures associated with Alternative 2B are expected to have a less than significant adverse effect on sediment quality within the watershed.

Alternative 5.3

Less than Significant Impact: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, although the extent of the work for the tentatively selected plan includes only one off-line detention basin and fewer floodwalls. As with Alternative 2B, some floodwall work may occur within the stream channels. Alternative 5.3 would also include potential mitigation measures for induced flooding. Due to the similarity in work required for Alternative 5.3, it is expected that the nature and degree of potential impacts to sediment quality are generally expected to be similar to those detailed above for Alternatives and 2B. Therefore, refer to the analysis under Alternatives 1 and 2B for Alternative 5.3 project effects. Overall, the construction, operation, maintenance, and potential mitigation measures associated with Alternative 5.3 are expected to have a less than significant adverse effect on sediment quality within the watershed.

In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternatives 1 and 2B, such that the nature and degree of potential impacts to noise levels within the alternative action area are generally expected to be similar.

Alternative 6

No Impact: No short-term direct or indirect sediment quality impacts would occur as a result of implementation of Alternative 6 because land disturbance for this alternative would be limited to modification of existing buildings located upland. Implementation of Alternative 6 would require construction access to all structures to be treated, but this is expected to occur from existing roads. Similarly, localized maintenance such as repairs would be needed over time. Overall, no direct or indirect long-term adverse effects to sediment quality would occur as a result of this

alternative. Appropriate erosion and sediment control measures would be utilized during construction.

Environmental Commitments
No specific environmental commitments associated with impacts to sediment quality apply.

Best Management Practices
BMPs for sediment apply for any work within the channel, including inlet/outlet construction, temporary access for construction, or any features which would protrude into the canal or would potentially disturb the sediment:

- Sediment that must be excavated for installation of inlet and outlet structures would be disposed of upland in an appropriate facility. Disturbed areas would be stabilized with riprap and/or vegetation at the end of construction.
- A Section 401 Water Quality Certification would be obtained for any filling or dredging in the canal.
- If needed, soft sediment within the canal and along the area of bench construction or other disturbance would be dredged to remove sediment that would be easily disturbed. Dredged sediment would be dewatered, with the water likely being treated and/or discharged to the sanitary sewer system (under a discharge permit). Sediment is assumed to be of poor quality and would be treated/dried as needed and taken to a landfill.
- Silt (turbidity) curtains would be installed as needed, to minimize the release of turbidity downstream.
- A cofferdam would be installed as needed, to physically isolate the construction area. The area inside the cofferdam would be enclosed such that any sediment disturbed, or water impacts within the area would be isolated and not released downstream.
- Only clean stone, free of fines, would be used for constructing a temporary work bench within the canal. Stone would be placed using a crane (not dumped) to minimize the footprint and sediment disturbance. Stone would be removed at the end of construction. The channel bank would be restored with native vegetation.
- Sediment quality within the footprint of the work would be determined beforehand, so that appropriate provisions for construction and for sediment handling can be determined.
- The canal area would be surveyed for sensitive wildlife and habitat that requires protection. Environmental windows would be established as needed to prevent disturbance to nesting species, etc. Sensitive areas to avoid would be established.

3.3.9 Noise

Regulatory Setting
Relevant federal and state laws/regulations include:

- Noise Control Act
- HRS Chapter 342F (Noise Pollution)
- Chapter 11-46, Hawaii Administrative Rules

Existing Conditions
In general, ambient noise levels vary with land use throughout the study area. In the forested portions of the upper watershed, ambient noise levels are relatively low, with most sounds

associated with environmental factors such as wind, rain, and animals (particularly birds). In locations that interfere with low density development (i.e., residential areas and recreational facilities), sounds associated with human activity generally increase ambient noise levels. Within the urban areas of the study area, ambient noise levels range from relatively quiet residential neighborhoods to commercial and industrial areas, which typically generate higher levels of noise. Sources of noise include commercial and industrial operations, construction activities, intermittent aircraft flybys, and traffic, especially along the major arterial roads and freeways. Table 25 shows average decibel levels for common noises that may be encountered within the study area.

Table 25: Noise Levels for Common Sounds.

Noise	Average Decibels (dB)
Library	40
Large Office	50
Normal Conversation	60
Freeway Traffic	70
Handsaw	85a
Factory Machinery	100
Power Saw	110
Ambulance Siren	120
Jackhammer	130
Airplane Taking Off	140
Rocket Launch	180

[a] Sounds above 85 dB are considered harmful depending on how long and how often someone is exposed to them and whether hearing protection is being used.

Significance Criteria

Effects of noise and vibration would be considered significant if the proposed project would result in any of the following:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local noise ordinance, or applicable standards of other agencies.
- Cause long-term exposure of noise-sensitive receptor(s) to a substantial increase in noise levels over the ambient condition.
- Generation of excessive groundborne vibration or groundborne noise levels.

Environmental Consequences

Methodology: Construction of an alternative would require the use of heavy equipment that would temporarily increase noise and/or groundborne vibration levels at properties near the work sites. Construction equipment required for each project feature and construction site preparation was identified and the typical noise level (i.e., dBA) at 50 feet for that construction equipment was compiled using the U.S. Department of Transportation Construction Noise Handbook (USDOT, 2006). For each design feature and site preparation, the loudest piece of equipment was used to estimate construction noise impact on nearby sensitive receptors. It is important to note, that although the loudest piece of equipment was used in the analysis, construction activities would be intermittent. Therefore, actual noise levels could be somewhat lower than estimated values. Noise from construction activity generally attenuates (decreases) at a rate of 6.0 to 7.5 dBA per doubling of distance from the source. Any shielding effects that may result from local barriers such as topography, fences, vegetation, etc. are not incorporated, so the calculated noise levels represent a conservative or “worse case” scenario. The Federal Highway Administration (FHWA) has determined that an 80 dBA L_{eq} daytime construction noise

level at nearby residences would constitute a significant construction noise impact (FHWA, 2006).

Like noise, vibration attenuates with increasing distance, as a complex function of energy transfer into the ground and the soil conditions through which the vibration is transmitted. Calculations of vibration attenuation follow standard FTA methods (FTA, 2006). Short- and long-term vibration impacts would be considered significant if the project construction would expose sensitive receptors to or would generate vibration levels that exceed 0.2 in/sec peak particle velocity (PPV).

No Action

No Impact: Under the No Action Alternative, the flood risk management project would not be implemented, such that no increase in ambient noise levels would occur. Land uses under the future without-project condition are expected to be reasonably consistent with the existing land uses. Given that the types of noise and maximum permissible noise levels are linked to the various land use districts, the general range of ambient noise levels across the watershed is not expected to measurable change over the period of analysis.

Alternative 1

Less than Significant Impact with Environmental Commitments Incorporated: Construction of Alternative 1 would require the use of multiple pieces of construction equipment. The overall construction could take approximately 3 years. All construction activities would occur between 7:00 a.m. and 6:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturday to comply with the City of Honolulu noise ordinance established by the State of Hawaii Department of Health (Noise Section). In addition, an approved community noise permit is required for construction projects exceeding 78 dBA. The use of certain construction equipment, such as pile drivers, hydraulic hammers, jackhammers, etc., is limited to use Monday through Friday between 9:00 a.m. and 5:30 p.m.

Typical construction equipment noise emissions for each piece of construction equipment for site preparation and each project feature are found in Table 26 through Table 28.

Table 26: Construction Equipment Required for Site Preparation (i.e., Clearing & Grubbing) (FTA, 2006).

Equipment Type	Typical Sound Level at 50 ft (dBA)
Brush Chipper	85
Chain Saw	85
Crawler Dozer	85
Dump Truck	88
Excavator	85
Flatbed Truck	88
Front End Loader	80
Skid Steer	80
Water Truck	88

Table 27: Construction Equipment Required for Detention Basins, Including Inlet and Outlet Structures, and Associated Levees/Floodwalls (FTA, 2006).

Equipment Type	Typical Sound Level at 50 ft (dBA)
Concrete Mixer	85
Concrete Pump	82

Concrete Vibrator	80
Crane	83
Crawler Dozer	85
Dump Truck	84
Excavator	85
Front End Loader	80
Generator	82
Pile Driver	101
Water Pump	76
Water Truck	88
Welder	73

Table 28: Construction Equipment Required for Floodwalls (including inlet structures) and Road Closure Structures (FTA, 2006).

Equipment Type	Typical Sound Level at 50 ft (dBA)
Asphalt Paver	89
Bull Dozer	85
Concrete Mixer	85
Concrete Pump	82
Concrete Saw	90
Concrete Vibrator	80
Crane	83
Crawler Dozer	85
Dump Truck	84
Excavator	85
Flatbed Truck	88
Front End Loader	80
Generator	82
Pile Driver	101
Roller	74
Water Pump	76
Water Truck	88
Welder	73

The loudest piece of construction equipment for site preparation is 88 dBA at 50-ft. The loudest piece of construction equipment for detention basins (including inlet and outlet structures and associated levees/floodwalls) is 101 dBA at 50-ft. The loudest piece of construction equipment for floodwalls (including inlet structures) and road closure structures is 101 dBA at 50-ft. The FHWA has determined that an 80 dBA Leq daytime construction noise level at nearby residences would constitute a significant construction noise impact (FHWA, 2006). Therefore, certain features would require construction equipment that would exceed the FHWA daytime construction noise standard of 80 dBA Leq. In addition, some construction equipment used would also exceed 78 dBA, the threshold for which an approved community noise permit is required for construction projects by the City of Honolulu noise ordinance. This construction equipment is anticipated to surpass both above thresholds since residences in some places are within 20 feet of where construction work would be occurring. Since construction of certain features of the project would exceed the FHWA daytime construction noise standard, environmental commitments EC NV-1 through EC NV-6 (refer to environmental commitments section for additional details) would be implemented during construction to reduce potentially

significant noise impacts to nearby residences to less than significant. Therefore, with mitigation, Alternative 1 is expected to have a less than significant impact regarding the generation of a substantial temporary increase in ambient noise levels in the vicinity of the project in excess of standards established in the local noise ordinance, or applicable standards of other agencies.

Like noise, the FHWA has compiled vibration level data regarding vibration generating characteristics of several types of construction equipment that are shown in Table 29.

Table 29: Vibration Source Levels for General Construction Equipment (FHWA, 2006).

Equipment Type	Peak Particle Velocity at 25 feet (in/sec.)
Pile Driver	0.644
Vibratory Roller	0.21
Hoe Ram	0.089
Large Bulldozer	0.089
Caisson Drill	0.089
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozer	0.003

As shown in Table 29 a pile driver would be the type of equipment anticipated to be used during construction activities that would create the highest vibration level of 0.644 in/sec PPV at 25-ft. Based on typical vibration propagation rates, the vibration level at some of the nearest residences to construction work (i.e., 20-ft) could actually exceed 0.644 in/sec and be as high as 0.900 in/sec (Caltrans, 2004). At this vibration level, potential structural damage could occur to extremely fragile historic buildings, ruins, ancient monuments; fragile buildings; historic and some old buildings; older residential structures; newer residential structures; and modern industrial/commercial buildings. The potential for structural damage to the least susceptible structure/structure condition (i.e., modern industrial/commercial buildings) would dissipate at approximately 30 feet from the vibration source. The potential for structural damage to the most susceptible structure/structure condition (i.e., extremely fragile historic buildings, ruins, ancient monuments) would dissipate at approximately 100 feet from the vibration source (Caltrans 2004).

In addition, at the 0.900 in/sec vibration level (i.e., 20 feet from the vibration source), the pile driver which is considered a continuous/frequent intermittent vibration source would rise to “severe” in terms of human annoyance level (Caltrans, 2004). At approximately 70 feet from the vibration source, the human annoyance level would drop to “strongly perceptible; at approximately 150 feet the human annoyance level would drop to “distinctly perceptible”; and lastly at approximately 300 feet the human annoyance level would drop to “barely perceptible” (Caltrans, 2004). Since construction of certain features would require construction equipment that at certain distances from the source would have the potential to cause structural damage and “severe” human annoyance, environmental commitments EC NV-1 through EC NV-6 (refer to environmental commitments section for additional details) would be implemented during construction to reduce potentially significant vibration impacts to nearby residences to less than significant. Therefore, with mitigation, Alternative 1 is expected to have a less than significant impact regarding the short-term generation of excessive groundborne vibration or groundborne noise levels.

Some locations are considered more sensitive to adverse effects from noise and groundborne vibrations. These locations are termed sensitive receptors and generally include schools, hospitals, senior living facilities, libraries, places of worship, cemeteries, parks/preserves, and residences. As discussed above, there are some residences within 20 feet of where construction activities would be occurring. In addition to residences, this analysis identified other sensitive receptors within 0.25 mile (i.e., 1,320 feet) of construction activities were identified. Any sensitive receptors located outside 0.25 mile would not be expected to have significant impacts as noise and vibrations from construction equipment would be expected to dissipate to ambient levels at this distance. Table 30 shows the sensitive receptors, excluding residences, and distance from the construction site for each project feature.

Table 30: List of Sensitive Receptors Within 0.25 Mile of Project Features.

Project Feature	Sensitive Receptor	Distance of Sensitive Receptor from Project Feature (miles)
Makiki District Park Detention Basin	1) Makiki District Park 2) Scottish Rite Cathedral 3) Christ United Methodist Church 4) St. Clement's School	≤ 0.10
Makiki District Park Detention Basin	1) Jodo Mission of Hawaii 2) Playmate Kindergarten, Day Care 3) Arcadia Retirement Residence 4) First Church of Christ Scientist 5) Hawaiian Mission Academy Ka Lama Iki 6) Punahou Square Park 7) Maryknoll High School 8) Shriners Children's Hospital 9) Honolulu Church of Christ 10) Cartwright Neighborhood Park	0.11-0.19
Makiki District Park Detention Basin	1) Lutheran Church of Honolulu 2) Kapiolani Medical Center for Women & Children	0.20-0.25
Kanaha Floodwall1) Christ United Methodist Church	≤ 0.10	
Kanaha Floodwall	1) Montessori Community School 2) Honolulu Church of Christ	0.11-0.19
Kanaha Floodwall	1) Robert Louis Stevenson Middle School	0.20-0.25

Project Feature	Sensitive Receptor	Distance of Sensitive Receptor from Project Feature (miles)
	2) President Theodore Roosevelt High School 3) Catholic Charities Hawaii 4) Lutheran Church of Honolulu 5) Arcadia Retirement Residence	
Manoa Valley District Park Detention Basin	1) Manoa Valley District Park 2) Manoa Community Garden	≤ 0.10
Manoa Valley District Park Detention Basin	1) Manoa Elementary School 2) Manoa Elderly Housing 3) St. Pius X Parish	0.11-0.19
Manoa Valley District Park Detention Basin	1) Manoa Senior Living	0.20-0.25
Woodlawn Drive Floodwall	1) St. Pius X Parish 2) Noelani Elementary School 3) Youth with a Mission	0.11-0.19
Koali Road Floodwall	1) Kanewai Community Park	≤ 0.10
Koali Road Floodwall	1) Hale Aloha Ilima	0.11-0.19
Koali Road Floodwall	1) Chaminade University of Hawaii	0.20-0.25
Kaimuki High School Floodwall	1) Kaimuki High School 2) Ala Wai Golf Course	≤ 0.10
Kaimuki High School Floodwall	1) Moiliili Japanese Cemetery 2) Iolani Lower School 3) St. Alban's Chapel 4) Lukepane Community Garden	0.11-0.19
Kaimuki High School Floodwall	1) Prince Jonah Kuhio Elementary School	0.20-0.25
Ala Wai Golf Course Berm	1) Ala Wai Golf Course 2) Kaimuki High School 3) Lukepane Community Garden	≤ 0.10
Ala Wai Golf Course Berm	1) Iolani School 2) President Thomas Jefferson Elementary 3) Hawaii School for the Deaf and the Blind 4) St. Alban's Chapel	0.11-0.19
Ala Wai Golf Course Berm	1) Paki Community Park	0.20-0.25

The loudest piece of construction equipment for site preparation is 88 dBA at 50-ft. The loudest piece of construction equipment for detention basins (including inlet and outlet structures and associated levees/floodwalls) is 101 dBA at 50-ft. The loudest piece of construction equipment

for floodwalls (including inlet structures) and road closure structures is 101 dBA at 50-ft. For site preparation, the loudest piece of construction equipment (i.e., dump truck at 88 dBA) would dissipate below 80 dBA Leq threshold for sensitive receptors located approximately 100-150 feet away from the noise source. In addition, the loudest piece of construction equipment for site preparation would dissipate below 78 dBA Leq threshold for sensitive receptors located approximately 150 feet from the noise source. The loudest piece of construction equipment for detention basin and floodwall construction is a pile driver (i.e., 101 dBA) for which the noise level would dissipate below the 80 dBA Leq threshold for sensitive receptors located approximately 200 to 250 feet from the noise source. In addition, the loudest piece of construction equipment would dissipate below the 78 dBA Leq threshold for sensitive receptors located approximately 250 feet from the noise source. Therefore, sensitive receptors located approximately 0.11 to 0.25 miles from the construction sites are not expected to have temporary increases in ambient noise levels due to construction of Alternative 1. Similarly, except for the construction sites themselves, which are often sensitive receptor locations (i.e., Kaimuki High School, Manoa Valley District Park, etc.), sensitive receptors located less than 0.10 mile from the construction sites are not expected to have temporary increases in ambient noise levels due to construction as most of these sensitive receptors are located at least 500 feet from the noise sources. However, as stated above, this doesn't consider the residences which are located within at least 20 feet of some construction sites. Therefore, as stated above, since the noise level at residences would exceed the FHWA daytime construction noise standard of 80 dBA Leq and the 78 dBA threshold set by the City of Honolulu noise ordinance; environmental commitments EC NV-1 through EC NV-6 (refer to environmental commitments section for additional details) would be implemented during construction to reduce potentially significant noise impacts to nearby residences and other sensitive receptors to less than significant. Therefore, with mitigation, Alternative 1 is expected to have a less than significant impact with regard to causing short-term exposure of noise-sensitive receptors to a substantial increase in noise levels over the ambient condition.

Long-term, the operation and maintenance of the project is not expected to generate consistent noise levels that would exceed current condition ambient noise levels. The operation of the project is passive in that no generators, pump stations, etc. that would generate noise on an intermittent basis would be needed. Maintenance activities would generally require the use of passenger vehicles to check floodwalls, detention basins, and road closure structures. If repairs or debris clearing is needed, then equipment such as that shown in Table 28 would be expected to be used. Therefore, the long-term operation and maintenance of Alternative 1 is expected to have a less than significant impact regarding the generation of a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local noise ordinance, or applicable standards of other agencies.

Long-term, the operation and maintenance of the project is not expected to generate consistent vibration levels that would potentially cause structural damage or reach a human annoyance level for vibration. The operation of the project is passive in that no equipment would be required to operate any of the flood risk management features. Therefore, there would be no equipment to generate ground vibrations consistently. Maintenance activities would generally require the use of passenger vehicles to check floodwalls, detention basins, and road closure structures. If repairs or debris clearing is needed, then equipment such as that shown in Table would be expected to be used. The crawler dozer could have a PPV like that of a small bulldozer as listed in Table 29. At a distance of 20 feet, the crawler dozer would have a PPV of 0.004 in/sec which wouldn't even rise to the level of potentially causing structural damage to extremely fragile historic buildings, ruins, or ancient monuments. Similarly, a PPV of 0.004 in/sec would be under the maximum vibration level for a continuous/frequent intermittent source

to be “barely perceptible” in terms of human annoyance level. Therefore, the long-term operation and maintenance of Alternative 1 is expected to have a less than significant impact regarding the long-term generation of excessive groundborne vibration or groundborne noise levels.

Alternative 1 would also include potential mitigation measures to address induced flooding. Nonstructural mitigation measures under consideration include dry/wet floodproofing, elevation, and acquisition. The potential effects of the nonstructural mitigation measures under consideration would have similar effects to those discussed under Alternative 6; therefore, refer to the effects analysis for Alternative 6 regarding these mitigation measures. The only structural mitigation measure for induced flooding under consideration is a pump station(s). The precise location of the pump station(s) and size is unknown at this time. It is also highly unlikely that a pump station(s) will be included as a mitigation measure for induced flooding. However, if a pump station(s) remains as a mitigation measure under consideration the following provides a broad overview of the effects on noise. During construction, equipment required would be similar to that listed in Table 27. Although the location and distance from sensitive receptors for a pump station(s) is unknown at this time, due to the urban nature of the area it is a conservative assumption that construction equipment could be within 0.25 mile (i.e., 1,320 feet) of residences and other sensitive receptors—even within 20 feet of residences and other sensitive receptors. With the implementation of environmental commitments EC NV-1 through EC NV-6 (refer to environmental commitments section for additional details) during construction activities, potentially significant adverse noise effects to nearby residences and other sensitive receptors would be minimized to less than significant adverse effects. Regarding short-term vibrations during construction, the construction activities are not expected to require a pile driver. Therefore, the piece of equipment with the highest potential for generating ground borne vibration is likely a caisson drill with a PPV of 0.089 at 25 feet. Therefore, if residences or other sensitive receptors are located within 20 feet of the pump station, as a conservative assumption, the PPV would be 0.124 at 25 feet. At this PPV for a continuous/frequent intermittent source, extremely fragile historic buildings, ruins, ancient monuments, and fragile buildings could potentially be at risk for structural damage during construction. Regarding sensitive receptors, 0.124 PPV at 20 feet would be “strongly perceptible” in terms of human annoyance level. Therefore, ground-borne vibrations from construction activities could cause a significant adverse impact, but with the implementation of EC NV-1 through EC NV-6 (refer to environmental commitments section for additional details) during construction activities, these potentially significant adverse effects would be reduced to less than significant adverse effects.

Long-term, operation and maintenance of the pump station(s) could generate noise and ground-borne vibration levels above ambient levels when the pump station(s) is operating. During operation, the pump motor would be a temporary source of noise and vibration which may negatively impact nearby residences and sensitive receptors. To minimize potential noise and vibration effects the following measures would be considered during the design of the pump station(s) if found to be necessary as a mitigation measure: 1) use of submersible pumps; 2) use of electrically driven motors where submersible pumps are not practical; 3) provision of appropriate mufflers if engines are used; and 4) use of concrete or masonry for the building of the pump house. Sound insultation of the pump house walls may be an option; however, the effectiveness of such a measure may be reduced by necessary station ventilation. Maintenance of a pump station could potentially be frequent, but equipment used would be primarily hand tools to make sure parts of the pump station remain in good working condition and replacement of pump parts when necessary. Therefore, the long-term operation and maintenance of a pump station(s) would have an adverse effect on nearby residences and sensitive receptors; however, due to the operation of the pump being only during a storm event and the design of the pump

station including potential noise mitigation measures as described above, a pump station(s) would be expected to have a less than significant adverse effect on noise and vibration levels.

Overall, Alternative 1 would have a short-term significant adverse effect and a long-term less than significant adverse effect on noise and vibration levels in the watershed. The short-term significant adverse effect would be reduced to less than significant with the implementation of mitigation measures EC NV-1 through EC NV-6 (refer to environmental commitments section for additional details).

Alternative 2B

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to noise levels within the alternative action area are generally expected to be similar. It is important to note that Alternative 2B includes a floodwall around the Ala Wai Canal and doesn't include the Manoa Valley District Park Detention Basin. In addition, Alternative 2B would take approximately 3.5 years for construction. Therefore, refer to Table 31 for the sensitive receptors located within 0.25 mile of construction sites specific to Alternative 2B.

Overall, Alternative 2B would have a short-term significant adverse effect and a long-term less than significant adverse effect on noise and vibration levels in the watershed. The short-term significant adverse effect would be reduced to less than significant with the implementation of mitigation measures EC NV-1 through EC NV-6 (refer to environmental commitments section for additional details).

Table 31: List of Sensitive Receptors Within 0.25 Mile of Project Features.

Project Feature	Sensitive Receptor	Distance of Sensitive Receptor from Project Feature (miles)
Makiki District Park Detention Basin	1) Makiki District Park 2) Scottish Rite Cathedral 3) Christ United Methodist Church 4) St. Clement's School	≤ 0.10
Makiki District Park Detention Basin	1) Jodo Mission of Hawaii 2) Playmate Kindergarten, Day Care 3) Arcadia Retirement Residence 4) First Church of Christ Scientist 5) Hawaiian Mission Academy Ka Lama Iki 6) Punahou Square Park 7) Maryknoll High School 8) Shriners Children's Hospital 9) Honolulu Church of Christ 10) Cartwright Neighborhood Park	0.11-0.19
Makiki District Park Detention Basin	1) Lutheran Church of Honolulu 2) Kapiolani Medical Center for Women & Children	0.20-0.25
Kanaha Floodwall	1) Christ United Methodist Church	≤ 0.10
Kanaha Floodwall	1) Montessori Community School 2) Honolulu Church of Christ	0.11-0.19
Kanaha Floodwall	1) Robert Louis Stevenson Middle School 2) President Theodore Roosevelt High School 3) Catholic Charities Hawaii 4) Lutheran Church of Honolulu 5) Arcadia Retirement Residence	0.20-0.25
Woodlawn Drive Floodwall	1) St. Pius X Parish 2) Noelani Elementary School 3) Youth with a Mission	0.11-0.19
Koali Road Floodwall	1) Kanewai Community Park	≤ 0.10
Koali Road Floodwall	1) Hale Aloha Ilima	0.11-0.19

Project Feature	**Sensitive Receptor**	**Distance of Sensitive Receptor from Project Feature (miles)**
Koali Road Floodwall	1) Chaminade University of Hawaii	0.20-0.25
Kaimuki High School Floodwall	1) Kaimuki High School 2) Ala Wai Golf Course	≤ 0.10
Kaimuki High School Floodwall	1) Moiliili Japanese Cemetery 2) Iolani Lower School 3) St. Alban's Chapel 4) Lukepane Community Garden	0.11-0.19
Kaimuki High School Floodwall	1) Prince Jonah Kuhio Elementary School	0.20-0.25
Ala Wai Golf Course Berm	1) Ala Wai Golf Course 2) Kaimuki High School 3) Lukepane Community Garden	≤ 0.10
Ala Wai Golf Course Berm	1) Iolani School 2) President Thomas Jefferson Elementary 3) Hawaii School for the Deaf and the Blind 4) St. Alban's Chapel	0.11-0.19
Ala Wai Golf Course Berm	1) Paki Community Park	0.20-0.25
Ala Wai Canal Floodwall	1) Ala Wai Golf Course 2) Kaimuki High School 3) Iolani School 4) Ala Wai Elementary School 5) Ala Wai Community Park 6) EF International Language Campus	≤ 0.10
Ala Wai Canal Floodwall	1) Prince Jonah Kuhio Elementary School 2) Moiliili Japanese Cemetery 3) President Thomas Jefferson Elementary School 4) Ala Moana Regional Park 5) St. Alban's Chapel	0.11-0.19
Ala Wai Canal Floodwall	1) Paki Community Park 2) Hawaii School for the Deaf and Blind 3) King William C. Lunalio Elementary School	0.20-0.25

Alternative 5.3

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to noise levels within the alternative action area are generally expected to be similar. It is important to note that Alternative 5.3 includes a floodwall around the Ala Wai Canal and the Ala Wai Golf Course detention basin. In addition, the construction of Alternative 5.3 would take approximately 4 years. Refer to Table 32 for the sensitive receptors located within 0.25 mile of construction sites specific to Alternative 5.3.

Overall, Alternative 5.3 would have a short-term significant adverse effect and a long-term less than significant adverse effect on noise and vibration levels in the watershed. The short-term significant adverse effect would be reduced to less than significant with the implementation of mitigation measures EC NV-1 through EC NV-6 (refer to environmental commitments section for additional details).

Table 32: List of Sensitive Receptors Within 0.25 Mile of Project Features.

Project Feature	Sensitive Receptor	Distance of Sensitive Receptor from Project Feature (miles)
Woodlawn Drive Floodwall	1) St. Pius X Parish 2) Noelani Elementary School 3) Youth with a Mission	0.11-0.19
Koali Road Floodwall	1) Kanewai Community Park	≤ 0.10
Koali Road Floodwall	1) Hale Aloha Ilima	0.11-0.19
Koali Road Floodwall	1) Chaminade University of Hawaii	0.20-0.25
Kaimuki High School Floodwall	1) Kaimuki High School 2) Ala Wai Golf Course	≤ 0.10
Kaimuki High School Floodwall	1) Moiliili Japanese Cemetery 2) Iolani Lower School 3) St. Alban's Chapel 4) Lukepane Community Garden	0.11-0.19
Kaimuki High School Floodwall	1) Prince Jonah Kuhio Elementary School	0.20-0.25
Ala Wai Golf Course Berm	1) Ala Wai Golf Course 2) Kaimuki High School 3) Lukepane Community Garden	≤ 0.10
Ala Wai Golf Course Berm	1) Iolani School 2) President Thomas Jefferson Elementary 3) Hawaii School for the Deaf and the Blind 4) St. Alban's Chapel	0.11-0.19
Ala Wai Golf Course Berm	1) Paki Community Park	0.20-0.25
Ala Wai Canal Floodwall	1) Ala Wai Golf Course 2) Kaimuki High School 3) Iolani School 4) Ala Wai Elementary School 5) Ala Wai Community Park 6) EF International Language Campus	≤ 0.10

Project Feature	**Sensitive Receptor**	**Distance of Sensitive Receptor from Project Feature (miles)**
Ala Wai Canal Floodwall	1) Prince Jonah Kuhio Elementary School 2) Moiliili Japanese Cemetery 3) President Thomas Jefferson Elementary School 4) Ala Moana Regional Park 5) St. Alban's Chapel	0.11-0.19
Ala Wai Canal Floodwall	1) Paki Community Park 2) Hawaii School for the Deaf and Blind 3) King William C. Lunalio Elementary School	0.20-0.25

Alternative 6

Less than Significant Impact: The implementation of Alternative 6 would have no long-term direct or indirect adverse noise effects. However, minor short-term adverse noise effects are expected to result from implementation of Alternative 6, because construction for this alternative would take place in populated areas throughout Honolulu and would include modification of existing buildings. These impacts will be similar to that of the structural alternatives, except that less equipment and a shorter time at each location will be needed to raise a structure. Noise due to construction could be ten dBA higher than ambient noise up to 400 feet away from the construction site. Non-physical actions will not affect noise levels. Overall, this Alternative will have a short-term, minor adverse effects, during construction only. The duration of time to complete all of the work for this alternative is not known at this time. As an example of potential construction time required, if five structures were floodproofed/elevated per week it would take approximately 7.5 years to complete. However, just as for the structural alternatives, noise levels would be subject to local noise ordinance requirements. Construction would be expected to occur only during daylight hours and not occur at night, early mornings, or on Sundays.

Environmental Commitments

The following specific environmental commitments would be implemented by the contractor during construction activities to further reduce any potential noise effects.

EC NV-1: Obtain a community noise permit from the City of Honolulu.

EC NV-2: Appropriate level of sound attenuation would be used during construction to meet local ordinances. Potential sound attenuation measures that could be considered include, but are not limited to, temporary sound barriers between the sources of construction noise and noise-sensitive receptors, as appropriate.

EC NV-3: Residents and businesses near the construction sites would be provided with advance notice of project activities, schedule, anticipated traffic, and potential noise issues. The advance notice would describe the potential noise disruption and the steps that would be taken to minimize the noise.

EC NV-4: Haul trucks operating near sensitive receptor sites would be spaced apart to avoid noise effects from simultaneous operation.

EC NV-5: Engineer brake (jake brake) use within city limits would be prohibited. Many noise complaints arise from heavy truck use of engine brakes to slow the truck down. Use of this type of braking can be avoided by proper speed control.

EC NV-6: The contractor would properly maintain and tune engines of all equipment and maintain properly functioning mufflers on all internal combustion engines to minimize noise levels.

Best Management Practices

No BMPS associated with impacts due to noise apply.

3.4 Natural Environment

Regulatory Setting

Regulations and policies that protect the natural environment include the following:

- Endangered Species Act (ESA)
- Migratory Bird Treaty Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Marine Mammal Protection Act
- Clean Water Act, Section 404
- HRS Chapter 195D (Conservation of Aquatic Life, Wildlife, and Land Plants)
- HRS Chapter 174C (State Water Code)
- EO 11990 – Protection of Wetlands
- EO 13112 – Invasive Species

In addition to the above regulations, the Fish and Wildlife Coordination Act (FWCA) required federal agencies to coordinate with the USFWS and State wildlife agencies during project planning to provide for adequate consideration of wildlife resource conservation, including minimization of adverse effects and compensation for wildlife resource losses. Coordination with USFWS and DLNR (including both DOFAW and DAR) has been conducted throughout the planning process. Input received to date has been integrated into the planning process, as summarized in this report: no high-risk issues or concerns have been raised to date. Compliance with ESA Section 7 is discussed in Section 3.4.4. Supporting documentation is contained in Appendix K; this content is also being used for compliance with HRS Chapter 195D.

Existing Conditions

3.4.1 Plant Communities

In general, plant communities within the lower reaches of Manoa and Palolo streams and all of Makiki stream are completely dominated by non-native and invasive plant species, with little to no remaining native plant species cover. To describe the plant communities within the study area, the Ala Wai Watershed can be divided into two separate land uses: Forest Reserve and Urban (Figure 21).

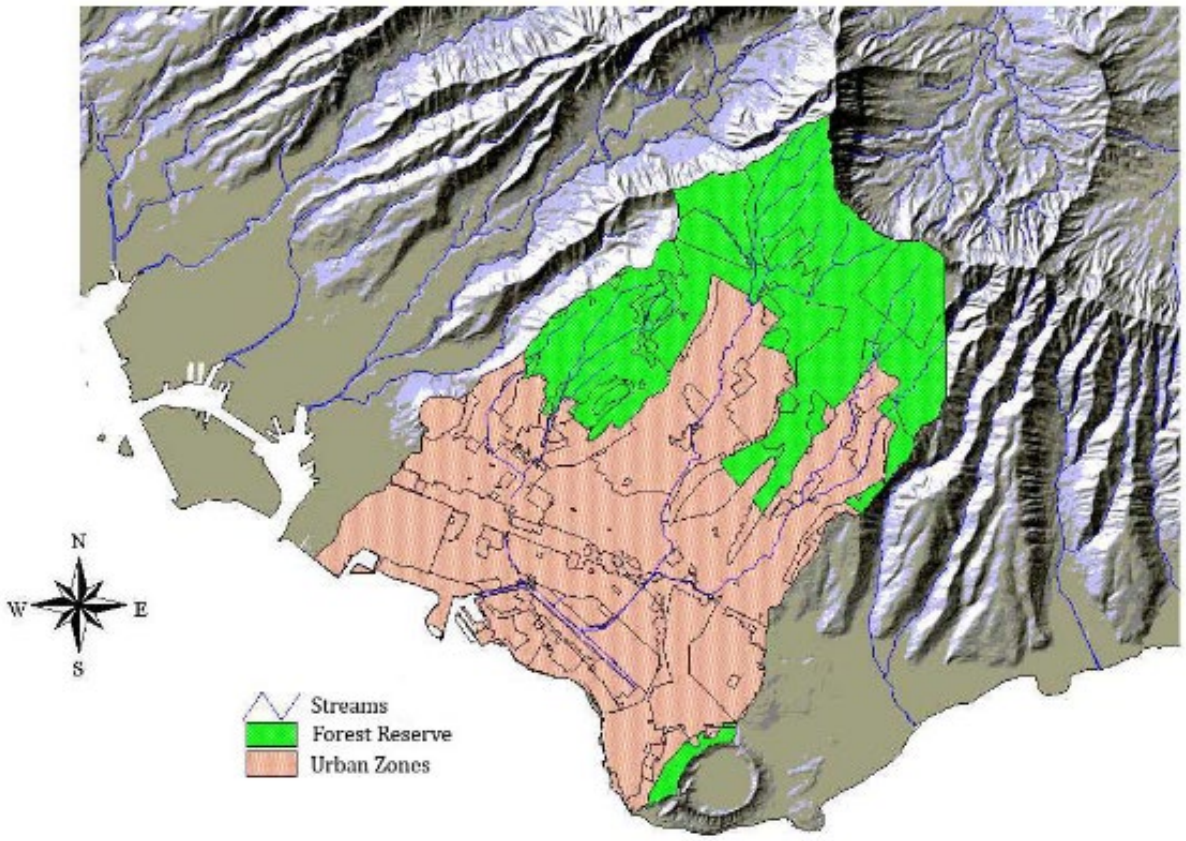

Figure 21: Ala Wai Watershed Study Area Depicting Forest Reserve Land Use Versus Urban Land Use (Oceanit, 2004)

As seen in Figure 21, the upper reaches of the study area above the urban land use areas are part of the Honolulu Watershed Forest Reserve. Plant communities within the steeper areas of the Honolulu Watershed Forest Reserve (i.e., slopes at and below the Koolau ridgeline to roughly about the 1500-feet contour) are relatively undisturbed and mostly dominated by native vegetation (AECOS, 2010). The habitat has been classified as mixed fern shrubland comprised of native plant species such as *'ōhi'a* (*Metrosideros polymorpha*), *uluhe* fern (*Dicranopterus linearis*), *'ama'u* ferns (*Sadleria cyatheoides* and *S. pallida*), *uluhe lau nui* (*Diplopterygium pinnatum*), *loulu hiwa* palm (*Pritchardia martii*), *pūkiawe* (*Leptecophylla tameiameia*), *'ōhelo* (*Vaccinum calycinum*), and *'ape'ape* (*Gunnera petaloïdea*). Below the mixed fern shrubland plant community is wet forest which grades into mesic forest at yet lower elevations just above the urban areas. Introduced species predominate these plant communities, particularly trees and shrubs such as Moluccan albizia (*Falcateria moluccana*), eucalyptus (*Eucalyptus globulus* and *E. robusta*), Chinese banyan (*Ficus macrocarpa*), guava (*Psidium cattleianum* and *P. guajava*), Christmas berry (*Schinus terebinthefolius*), mango (*Mangifera indica*), and shoebutton ardisia (*Ardisia elliptica*). Within the urban areas, the vegetation community is comprised primarily of planted and tended ornamental species. Regarding the riparian vegetation community there is very little within the urban areas due to flood risk management features and residences abutting the stream channels. The lower, concrete lined Palolo Stream completely lacks riparian vegetation in most places. Much of the middles reach of Makiki Stream is contained within an underground box culvert and therefore also lacks riparian plant species. The tributary streams above the urban areas are sometimes shaded by large, non-native plant species such as Chinese banyan (*Ficus macrocarpa*), mango (*Mangifera indica*), and gum

(*Eucalyptus sp.*). Mangrove trees (*Rhizophora mangal*) dominate some areas in the lower estuarine reaches of the Manoa-Palolo Drainage Canal and Ala Wai Canal, although concrete walls and concrete rubble masonry (CRM) walls constructed as banks have eliminated much of the riparian vegetation community (AECOS, 2010). Overall, approximately 238 plant species have been identified within the study area with the majority being non-native, naturalized plants. Only 11 are indigenous (native to the Hawaiian Islands and other Pacific Islands), one is a possible endemic (uniquely native to the Hawaiian Islands), and eight are early Polynesian introductions to the islands.

3.4.2 Wildlife Communities

The wildlife community within the study area includes native species such as the *Oahu amakihi* (*Hemignathus chloris*), Apapane (*Himatione sanguinea*), and the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*). Many non-native and invasive species are commonly observed within all areas of the watershed and include species such as Indian Mongoose (*Herpestes a. aruopunctatus*), feral cats (*Felis catus*), Black Rat (*Rattus rattus*), Norway Rat (*Rattus norvegicus*), and the Polynesian Rat (*Rattus exulans*). Feral pigs (*Sus scrofa*) are another common non-native and invasive species that has been introduced to the Hawaiian Islands and may be found in the study area. Feral pig can cause extensive damage to the understory of forest and riparian habitat by uprooting plants and small trees, by contributing to soil erosion with their massive consumption of understory vegetation, and cause soil compaction (Stone and Scott, 1985; Tep and Gaines, 2003). The impact by feral pigs on forests and understory vegetation can contribute to increased flooding and erosion within a watershed.

According to the Cornell Lab of Ornithology's eBird website, approximately 90 bird species have been observed across eight birding hotspots within the study area (i.e., Lyon Arboretum, Mānoa Cliffs Trail, Waahila Ridge State Recreation Area, Ala Moana Park and State Recreation Area, Fort DeRussy Beach Park, Kuhio Beach Park, Honolulu Zoo, and Kapiolani Park) (Cornell Lab of Ornithology, 2022). Common species with the greatest number of observations in the study area (i.e., over 100 observations) are Cattle Egret (*Bubulcus ibis*), Common Myna (*Acridotheres tristis*), Common Waxbill (*Estrilda astrild*), House Finch (*Haemorhous mexicanus*), House Sparrow (*Passer domesticus*), Java Sparrow (*Lonchura oryzivora*), Pacific Golden-Plover (*Pluvialis fulva*), Red-crested Cardinal (*Paroaria coronate*), Rock Pigeon (*Columbia livia*), Rose-ringed Parakeet (*Psittacula krameria)*, Spotted Dove (*Spilopelia chinensis*), Wedge-Tailed Shearwater (*Puffinus pacificus*), White Tern (*Gygis alba*), Yellow-fronted Canary (*Serinus mozambicus*), and Zebra Dove (*Geopelia striata*) (Cornell Lab of Ornithology, 2022). Indigenous seabirds that may be observed flying over the watershed include the Great Frigatebird (*Fregata minor*), White-tailed Tropicbird (*Phaethon lepturus*), White Tern (*Gygis alba*), and the Brown Booby (*Sula leucogaster*) (KMWP, 2002). Migratory shorebird species with the potential to occur within the study area include the Pacific Golden-Plover, Wandering Tattler (*Tringa incana*), and the Ruddy Turnstone (*Arenaria interpres*). Non-native bird species that have introduced disease, displaced native bird species, and have been observed within the study area include the Japanese Bush Warbler (*Horornis diphone*), Warbling White-Eye (*Zosterops japonicus*), Red-vented Bulbul (*Pycnonotus cafer*), and Zebra Dove (*Geopelia striata*) (KMWP, 2002).

3.4.3 Aquatic Communities

Like vegetation communities within the study area, aquatic communities within the Ala Wai Watershed are primarily dominated by non-native and invasive species. Native freshwater fish in Hawaii are limited to five gobioid species (*'o'opu*), including one indigenous *'o'opu nākea* (*Awaous guamensis*) and three endemic *o'opu alamo'o* (*Lentipes concolor*), *'o'opu nōpili* (*Sicyopterus stimpsoni*), and *'o'opu naniha* (*Stenogobius hawaiiensis*) gobies, and one endemic eleotrid *'o'opu akupa* (*Eleotris sandwicensis*) (Kinzie, 1990). The native stream aquatic

community also includes several shrimp species of *'opae kala'ole* and *'opae 'oeha'a* (*Atyoida sp.* and *Macrobrachium sp.*), and mollusk species *Neritina126ompletenea* and *Neritina granosa*. All these native species have been recently documented in the Ala Wai Watershed except for *o'opu alamo'o* and *hihiwai* (Parham et al., 2015; Parham et al., 2008; Kido, 2008). However, observations of native aquatic species within the watershed are limited due to the abundance of introduced fish and invertebrate species such as smallmouth bass (*Micropterus dolomieu)*, tilapia (*Sarotherodon melanotheron*), Chinese catfish (*Clarias fuscus*), Tahitian prawn (*Macrobrachium lar*), and leeches (*Myzobdella lugubris*) which outcompete native species for forage, shelter, and reproductive habitat. The following paragraphs provide brief overviews of the aquatic communities specific to Palolo Stream, Manoa Stream, Makiki Stream, Ala Wai Canal and Manoa-Palolo Drainage Canal, and Waikiki Beach.

The Palolo Stream aquatic community is dominated by the bristle-mouth armored catfish (*Ancistrus* cf. *temminckii.*) and the suckermouth armored catfish (*Hypostomus* cf. *watwata group*), which was found to be abundant at the Manoa-Palolo stream confluence (AECOS, 2010). Also found within large numbers, especially in the upper Palolo Stream reaches, is the non-native atyid shrimp (i.e., Taiwan blue shrimp or *Neocaridina126ompletenesa sinensis*). No native Hawaiian aquatic fauna was noted in the valley of the lower Palolo valley stream reaches. Regarding algae, the overall taxonomic diversity is relatively low (i.e., only seven species were collected), although algal densities were high. Conversely, aquatic invertebrate (e.g., small aquatic insects, crustaceans, and mollusks) diversity was found to be low.

Within Manoa Stream, the aquatic community is dominated by non-native top-minnows, tilapia, and armored catfishes. In somewhat lesser abundance are guppies (*Poecilia reticulata*), swordtails (*Xiphophorus helleri*), and mosquitofish (*Gambusia affinis*). Native fish species found within Manoa Stream include *'o'opu nōpili*, *'o'opu nākea*, and *'o'opu 'akupa*. Also present in Manoa Stream is the endemic *hapawai* (a snail, *Neritina126ompletenea*). Non-native aquatic invertebrates prevalent in Manoa Stream include the Asiatic clam (*Corbicula fluminea*), *Neocaridina126ompletenesa* (a snail), and *Melanoides126ompletenesa* (a worm).

The Makiki Stream aquatic community includes native species such as mullet (*Mugil cephalus*), barracuda (*Sphyraena barracuda*), and native gobies (i.e., *Awaous sp.* and *Stenogobius sp.*). The native invertebrate *Macrobranchium grandimanus* (a crustacean) is also found in Makiki Stream. The most abundant non-native species within Makiki Stream is tilapia. For additional details on the freshwater aquatic environment refer to the 2017 FEIS and its associated Final Fish and Wildlife Coordination Act Report.

The Ala Wai Canal and the Manoa-Palolo Drainage Canal are considered entirely estuarine. Tidal influence for the Manoa-Palolo Drainage Canal extends from the canal's intersection with the Ala Wai Canal upstream about 300 feet, roughly midway along Kaimuki High School. Mangroves dominate in the lower estuary on both banks. A relatively large percentage of native fish species have been observed in the Ala Wai Canal and Manoa-Palolo Drainage Canal including barracuda, mullet, and *aholehole* (*Kuhlia sandvicensis*). There is also an abundance of Tilapia and Armored catfishes that likely compete with the two native goby species.

Fish species caught within the Ala Wai Boat Harbor include Great Barracuda (*Sphyraena barracuda*), Wedge-tail Triggerfish (*Rhinecanthus rectangulus*), Crevalle Jack (*Caranx hippos*), Hawaiian Ladyfish (*Elops hawaiensis*), Doublespotted Queenfish (*Scomberoides lysan*), Skipjack Tuna (*Katsuwonus pelamis*), West Atlantic Bonefish (*Abula vulpes*), Giant Trevally (*Caranx ignobilis*), Southern Puffer (*Sphoeroides nephelus*), Smallmouth Bass, Pacific Barracuda (*Sphryaena argentea*), Bluefin Trevally (*Caranx melampygus*), Eyestripe Surgeonfish

(*Acanthurus dussumieri*), Blackchin Tilapia (*Sarotherodon melanotheron*), Stocky Hawkfish (*Cirrhitus pinnulatus*), Manybar Goatfish (*Parupeneus multifasciatus*), Blue Tilapia (*Oreochromis aureus*), Wahoo (*Acanthocybium solandri*), Black Seabass (*Centropristis striata*), Common Dolphinfish (*Coryphaena hippurus*), Orange Goatfish (*Mulloidichthys flavolineatus*), Red Grouper (*Epinephelus morio*), Inshore Lizardfish (*Synodus foetens*), and Leopard Moray Eel (*Enchelycore pardalis*).

Marine aquatic habitat within 1,640 feet of the mouth of the Ala Wai Harbor was surveyed by the USFWS (USFWS, 2023). The surveyed area primarily included Shoreline Intertidal, Harbor, Reef Flat, and Reef Crest zones seaward of Ala Wai Harbor and Waikiki Beach seaward of Ft. DeRussy. The observed area included modified intertidal beach and a mix of natural reef flat and reef flat areas that have been modified to provide access to small dug out harbors at Waikiki Beach. Visual surveys indicated that the survey area was relatively typical of historically modified urban beaches, harbors, and coral reef environment. Coral abundance was generally low (< 10% cover) throughout. Small (< 19.7 inches) to large (19.7 – 78.7 inches) lobate corals were most common on the reef flats, followed by small medium-branching, encrusting, and microatoll growth forms. The most common coral species observed included *Porites rus*, *P. compressa*, *P. lobata*, and potentially other species of massive Porites, branching *Pocillopora spp.*, and encrusting *Montiposa spp*. Zoanthids were sparsely disturbed on reed flats. Frondose algae, CCA, and turf algae were common but not dominant throughout the surveyed area. Invasive algal species observed included *Gracilaria127ompletenea*, *Acanthophera spicifera*, and *Avrainvillea sp*. Filamentous algae or cyanobacteria were present, particularly seaward of Waikiki beaches but did not dominate the habitat. Spiny urchins were common, and rock boring urchins were dominant throughout the surveyed area. Sea cucumbers were observed throughout the surveyed area and occurred in clusters in certain reef flat areas. Molluscs were observed sparsely throughout the surveys. Sponges were observed in clusters, primarily seaward of Ala Wai Harbor. Tunicates were observed primarily in areas directly adjacent to channels and harbor areas. Green sea turtles were observed swimming at 16 locations within the surveyed area. No marine mammals were observed (USFWS, 2023). For additional details on the marine aquatic habitat refer to the Draft Fish and Wildlife Coordination Act Report (USFWS, 2023) found in Appendix K.

3.4.4 Federal Listed Species and Species of Special Concern

Several of the wildlife species within the study area are listed as threatened or endangered under the federal Endangered Species Act (ESA) and/or State law (HRS Chapter 195D [Conservation of Aquatic Life, Wildlife, and Land Plants]). Regarding federal listed species with the potential to occur within the study area, official species lists were obtained from the USFWS iPaC website (Project Codes: 2023-0048409; 2023-0048319; 2023-0048348; 2023-0048352; 2023-0048400). The following twenty-six federally listed species have the potential of occurring within the vicinity of the study area (Table 33):

Table 33: Federally Listed Species with the Potential of Occurring within the Study Area.

Species	Federal Status	Potential to Occur
Mammals		
Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)	Endangered	**Moderately Likely to Occur**; Minimal low-quality habitat present within project footprint.
Hawaiian Monk Seal (*Monachus schauinslandi*)	Endangered	**Moderately Likely to Occur;** Minimal low-quality foraging

Species	Federal Status	Potential to Occur
		habitat present adjacent to the project footprint.
Birds		
Band-rumped Storm-petrel – Hawaii Distinct Population Segment (DPS) (*Oceanodroma castro*)	Endangered	**Moderately Likely to Occur**; Nesting habitat is not present within action area; Potential for foraging and flying over action area to Pacific Ocean.
Hawaii Akepa (*Loxops coccineus*)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Hawaiian Duck (*Anas wyvilliana*)	Endangered	**Moderately Likely to Occur**; Minimal low-quality habitat present within action area.
Hawaiian Common Gallinule (*Gallinula galeata sandvicensis*)	Endangered	**Moderately Likely to Occur**; Minimal low-quality habitat present within action area.
Hawaiian Coot (*Fulica americana alai*)	Endangered	**Moderately Likely to Occur**; Minimal low-quality habitat present within action area.
Hawaiian Petrel (*Pterodroma sandwichensis*)	Endangered	**Moderately Likely to Occur**; Nesting habitat is not present within project footprint; Potential for flying over action area to foraging grounds (Pacific Ocean).
Hawaiian Stilt (*Himantopus mexicanus knudseni*)	Endangered	**Likely to Occur**; Minimal low-quality habitat present within action area.
Newell's Townsend's Shearwater (*Puffinus auricularis newell*i)	Threatened	**Moderately Likely to Occur**; Nesting habitat is not present within project footprint; Potential for foraging and flying over action area to Pacific Ocean.
Short-tailed Albatross (Phoebastria albatrus)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Reptiles		
Green Sea Turtle (Chelonia mydas)	Threatened	**Likely to Occur;** Suitable foraging habitat present within action area.
Hawksbill Sea Turtle	Endangered	**Moderately Likely to Occur**; Suitable foraging habitat present within action area.
Flowering Plants		
ʻaiea (*Nothocestrum latifolium*)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.

Species	Federal Status	Potential to Occur
‘akoko (*Euphorbia celastroides var. kaenana*)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
‘ena’ena (*Pseudognaphalium sandwicensium var. molokaiense*)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Carter’s Panicgrass (Panicum fauriei var. carteri)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Ewa Plains ‘akoko (Euphorbia skottsbergii var. skottsbergii)		**Not Likely to Occur**; Suitable habitat is not present within action area.
Ihi (Portulaca villosa)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Kamanomano (*Cenchrus agrimonioides*)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Lobelia monostachya	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Polyscias lydgatei	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Popolo (Solanum nelsonii)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Pu’uka’a	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Ohai (Sesbania tomentosa)	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Vigna o-wahuensis	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Ferns and Allies		
Ihi’ihi	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.
Microlepia129ompletea var. mauiensis	Endangered	**Not Likely to Occur**; Suitable habitat is not present within action area.

Critical habitat has been designated within the action area for the Hawaiian monk seal. In addition, critical habitat has been proposed within the action area for the green sea turtle.

Due to the action area being generally comprised of either low density vegetated non-native riparian/forest habitat (such as that associated with floodwalls along the middle watershed), turf

grass (such as that associated with the detention basins), or developed areas (such as that associated with the floodwalls along the lower watershed), federally endangered or threatened plant species that have the potential to occur in the action area are not expected to occur due to the lack of suitable habitat. Because of the lack of suitable habitat present for these species within the action area, a project is expected to have no effect on these species, or their designated critical habitat and they are not discussed further.

Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)

The Hawaiian hoary bat is a listed federally endangered species.

Current Species Status

The hoary bat is the most widely distributed bat in North America. In Hawaii, the Hawaiian hoary bat (opeapea) has been reported from all the main Hawaiian Islands, except for Niihau, although the specimen records only exist for Kauai, Oahu, Maui, Molokai, and Hawaii Island. On Oahu, the species is thought to be widely distributed however, the highest concentrations of acoustic detections for Hawaiian hoary bat are from northern Koolau and Waianae Mountain ranges (USFWS, 2021g). Additional acoustic detections for the species have been documented on lands in Waikiki, Ford Island, the north shore of Oahu, and the National Wildlife Refuge complex that includes the James Campbell NWR, the Kalaeloa Unit of the Pearl Harbor NWR, and the Oahu Forest NWR (USFWS, 2021g).

Biology and Ecology of Species – Reproduction and Forage Requirements

Hawaiian hoary bats roost alone or with dependent young in native and nonnative trees, typically more than 15 feet tall (USFWS, 2021g). Hoary bats begin foraging before or after sunset depending on the time of year, feed on a variety of native and non-native night-flying insects, including moths, beetles, crickets, mosquitoes, and termites; and similar to other insectivorous bats, prey is located using echolocation (USFWS, 1998). Water courses and edges (e.g., coastlines and forest/pasture boundaries) appear to be important foraging areas; the species also is attracted to insects that congregate near lights. Breeding has only been documented on the islands of Hawaii and Kauai. Mating most likely occurs between September and December, and females give birth to twins during May or June. Mother bats likely stay with their pups until they are six to seven weeks old (USFWS, 1998).

Factors Affecting Species Activity and Survival

Threats to hoary bats include habitat loss, pesticides, predation and roost disturbance. A reduction in tree cover might be the primary reason for the species decline in Hawaii and pesticides may have reduced populations (USFWS, 1998).

Potential to Occur in the Action Area

Little is known about the species' occurrence across the island of Oahu, including the Ala Wai watershed. However, based on the habitat preferences, it is possible that it could occur within the action area. Specifically, the Manoa Valley Park District detention basin, Woodlawn Drive Bridge floodwall, and Koali Road floodwall include forested habitat with tall trees that may be used for roosting. The Makiki Park District detention basin (including the Kanaha floodwall), Kaimuki High School floodwall, Ala Wai Golf Course detention basin, and portions of the Ala Wai Canal floodwall (especially in the vicinity of the Manoa-Palolo Canal) may also provide suitable foraging habitat; however, the habitat value of these sites is likely diminished by the extensive urbanization in the surrounding areas.

Hawaiian Monk Seal (*Monachus schauinslandi*)

The Hawaiian monk seal is a listed federally endangered species. Critical habitat has been designated for Hawaiian monk seal. Specific to Oahu, designated marine critical habitat includes the seafloor and all subsurface waters within 33 feet (10 meters) of the seafloor, out to the 656-foot (200 meter) depth contour line. At specific points around Oahu, critical habitat for Hawaiian monk seal extends inland through the water's edge 16 feet (five meters) into the terrestrial environment from the shoreline. However, no terrestrial critical habitat is designated within the vicinity of the action area.

Current Species Status

Hawaiian monk seals are found in the Hawaiian archipelago which includes both the main and Northwestern Hawaiian Islands and rarely at Johnston Atoll which lies nearly 1,000 miles southwest of Hawaii (NOAA, 2023a). The monk seals are endemic to these islands, occurring nowhere else in the world. The Hawaiian monk seal population is estimated to be around 1,570 seals—nearly 1,200 seals in the northwestern Hawaiian Islands and 400 monk seals in the main Hawaiian Islands. In general, the Hawaiian monk seal population has been declining overall for six decades and current numbers, though increasing, are only about one-third of historic population levels (NOAA, 2023a).

Biology and Ecology of Species – Reproduction and Forage Requirements

Hawaiian monk seals are "generalist" feeders, which means they eat a wide variety of foods depending on what's available (NOAA, 2023a). They eat many types of common fishes, squids, octopuses, eels, and crustaceans (crabs, shrimps, and lobsters). Diet studies indicate that they forage at or near the seafloor and prefer prey that hide in the sand or under rocks. Hawaiian monk seals are mostly solitary and don't live in colonies like sea lions or other seals. But they do sometimes lie near each other—usually not close enough to make physical contacts—in small groups. They usually sleep on beaches, sometimes for days at a time. They also occasionally sleep in small underwater caves. Monk seals do not migrate seasonally, but some seals have traveled hundreds of miles in the open ocean. Individual seals often frequent the same beaches over and over, but they do not defend territories. When on land, monk seals haul-out to rest, molt, give birth and nurse on sand, coral rubble, and volcanic rock shorelines. They generally prefer sandy, protected beaches surrounded by shallow waters for pupping. When not on land, Hawaiian monk seals use waters surrounding atolls and islands and areas further offshore on reefs and submerged banks; they also use deepwater coral beds as foraging habitat (NOAA, 2023a).

Mating occurs during the spring and summer months at sea (76 FR 32026, June 2, 2011). Most females mate once a year. Females and males typically reach sexual maturity between the ages of 5 to 6 years of age in the main Hawaiian Islands and age 7 to 10 in the Northwestern Hawaiian Islands (NOAA, 2023a). The youngest documented female to give birth was 4 years old. Gestation is about 11 months with most pup births occurring between February and August. Nursing lasts for about 6 weeks and pups and moms stay on shore until a pup is weaned (76 FR 32026, June 2, 2011).

Factors Affecting Species Activity and Survival

Historically, humans and disturbance from government installations in the Northwestern Hawaiian Islands threatened Hawaiian monk seal. Today, Hawaiian monk seal are negatively affected by food limitation, shark predation, marine debris entanglement, male seal aggression, habitat loss, fishery interactions (i.e., commercial longline fishing including hook and nets), disease (e.g., canine distemper, Leptospirosis, and Brucellosis) and contaminants, human-seal interactions, and intentional killing (NOAA, 2023a).

Potential to Occur in the Action Area

The Hawaiian monk seal is unlikely to occur within the action area; however, a Hawaiian monk seal was observed swimming in the Ala Wai Canal on March 6, 2023 (Moore, 2023). It is believed that the presence of the Hawaiian monk seal in the canal is potentially related to recent dredging of canal sediments by the Hawaii DLNR and Genki balls that have been thrown into the canal as part of the Genki Ala Wai Project. In addition, a Hawaiian monk seal known as RK96 (also known as Kaiwi) has pupped on Kaimana beach in Waikiki twice (i.e., 2021 and 2023) (NOAA, 2023b). Therefore, there is the potential for Hawaiian monk seals to occur within the action area. It is important to note that the proposed action is focused on stream-related flood risk reduction and does not include any direct impacts to marine or coastal habitat. The proposed action does not extend into the marine critical habitat for the Hawaiian monk seal, and no terrestrial critical habitat is designated within the vicinity of the action area. Overall, there is the potential for Hawaiian monk seal to occur within the action area.

Band-rumped Storm Petrel (*Oceanodroma castro*)

The Hawaii DPS of band-rumped storm-petrel is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status

Historically, band-rumped storm-petrels were abundant and occurred throughout the main Hawaiian Islands (USFWS, 2021h). There is thought to be one single population that breeds within the Hawaiian Islands across several colonies. Currently, band-rumped storm-petrels are confirmed or likely breeding on Lehua Islet, Kauai, Lanai, and the island of Hawaii. The species may potentially breed on Maui, but no nesting sites have been confirmed. Population estimates for Hawaii DPS of band-rumped storm-petrel are unknown, but a study estimated between 171 and 221 nesting pairs on Kauai in 2002 (USFWS, 2021h).

Biology and Ecology of Species – Reproduction and Forage Requirements

Band-rumped storm-petrels are ground nesting seabirds, which predominantly nest in cliffs or rocky lava fields (USFWS, 2021h). Eggs are laid in May through June and chicks fledge around October. Band-rumped storm-petrels typically do not begin to breed until between ages three to seven years old. The species can live up to 20 years old. Band-rumped storm-petrels feed while sitting on the water or by dipping prey while flapping just above the surface of the ocean. It is suspected that their diet consists of small fish, squid, and perhaps some crustaceans.

Factors Affecting Species Activity and Survival

Threats to band-rumped storm-petrels include introduced predators such as pigs, rats, feral cats, and mongoose, goats, and sheep degrade nesting habitat (USFWS, 2021h). Artificial lighting may cause fall-out, causing collisions and injuries to individuals that make them vulnerable to predators. Also vulnerable to collisions with towers and utility lines while in flight (USFWS, 2021h).

Potential to Occur in the Action Area

Nesting habitat for the band-rumped storm-petrel is not present within the proposed action footprint, nor is the species known to breed on Oahu. The species could be present foraging or flying over the island as fallout of band-rumped storm-petrels has been recorded on Oahu (USFWS, 2021h).

Hawaii Akepa (*Loxops coccineus*)

Hawaii akepa is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status

The historical range of the Hawaii akepa once included much of the island of Hawaii (USFWS, 2010a). At the most recent 5-year review of the species, Hawaii akepa occurred as five disjunct populations in the north and central windward Hawaii, Kau, Kona, and Hualalai regions on Hawaii (USFWS, 2020b). In 1977, the total population of Hawaii akepa was estimated to be 13,892 birds. In 2016, the total population was estimated to be 16,248 birds. Hawaii akepa is known for distributional anomalies across apparently suitable habitat particularly between open canopy montane woodland and old-growth closed-canopy *Metrosideros polymorpha* (ohia) forest, likely due to differences in nest-site and food availability. Overall, recent surveys and population estimates suggest that the Hawaii akepa population is stable and possibly increasing especially in Hakalau Forest National Wildlife Refuge (USFWS, 2020b).

Biology and Ecology of Species – Reproduction and Forage Requirements

The Hawaii akepa is a small, sexually dichromatic Hawaiian honeycreeper endemic to Hawaii island (USFWS, 2010a). Hawaii akepas form monogamous pairs during July and August and bonds last several years. The breeding period of akepas begins in March and ends by September. Females typically lay one to two eggs which are incubated for 14 to 16 days. Females brood the hatchlings for up to 8 days. Juveniles develop plumage by day 12 and young akepas leave the nest around 16 to 20 days after hatching. They remain dependent on their parents for up to 10 weeks post hatching (USFWS, 2010a).

Hawaii akepa are birds of old growth ohia or ohia/koa forest (USFWS, 2010a). Their density depends in part on the density of large trees because only large trees provide the cavities required for nesting. The average size of trees used for nesting is three feet in diameter at breast height. Large ohia trees provide cavities for nest-sites and the preferred foraging substrate for Hawaii akepa. Large koa trees provide mainly cavities for nest sites but not preferred foraging substrate. Hawaii akepa are not typically found below 4,300 feet elevation (USFWS, 2010a).

Hawaii akepa feed on insects and spiders, though their main diet consists of caterpillars. They have been observed feeding on nectar to a lesser extent (USFWS, 2010a).

Factors Affecting Species Activity and Survival

Threats to the survival of this species primarily include modification and loss of habitat and avian disease (USFWS, 2010a). Predation by introduced mammals may also play a role in this species survival. The species is especially sensitive to the loss of old growth forest due to their dependence on large trees with cavities for nesting (USFWS, 2010a).

Potential to Occur in the Action Area

The action area is generally comprised of either low density vegetated non-native riparian/forest habitat (such as that associated with the floodwalls along the middle watershed), turf grass (such as that associated with the detention basins) or developed areas (such as that associated with the floodwalls along the lower watershed). No portion of the action area supports old growth ohia or ohia/koa forest. As such, suitable habitat is not present, and this species is expected to not have the potential to occur within the action area.

Hawaiian Duck (*Anas wyvilliana*)

Hawaiian duck is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status

The Hawaiian duck historically occurred throughout the main Hawaiian Islands except the island of Lanai and Kahoolawe (USFWS, 2021d). Today, these birds are only found on Kauai and Niihau and were reintroduced on Oahu, Hawaii, and Maui. During the most recent 5-year review of the species, genomic research indicated that duck populations on the islands of Oahu, Maui, Molokai, and Hawaii are Hawaiian duck-mallard hybrids due to genetic intermixing with feral mallards. However, ducks sampled on Kauai appear to be pure or nearly pure. There are believed to be fewer than 2,000 pure Hawaiian duck remaining statewide, with most of these occurring on Kauai (USFWS, 2021d).

Biology and Ecology of Species – Reproduction and Forage Requirements

Hawaiian ducks are found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, sewage treatment ponds, montane streams, and marshlands (USFWS, 2011). This species is visible from sea level up to 10,827 feet (3,300 meters) of elevation (USFWS, 2021d). The Hawaiian duck was found to occupy wetlands greater than 1,969 feet (600 meters) more likely from a house in areas of low building densities and are more likely to occupy medium to large wetlands (greater than 10,764 square feet [1,000 square meters]) in areas of high wetland densities (USFWS, 2009).

Hawaiian ducks are serially monogamous (USFWS, 2021d). Some pairs nest year-round, but the main breeding season takes place from December to May. The female lays 2 to 10 eggs and incubation lasts about 4 weeks. Ducklings are precocial and can take to the water soon after hatching but cannot fly until about 9 weeks of age. They become reproductively mature enough to reproduce after a year of age (USFWS, 2021d).

Hawaiian ducks are omnivorous birds (USFWS, 2021d). Their diet consists of freshwater vegetation, mollusks, insects, and other aquatic invertebrates (USFWS, 2021d).

Factors Affecting Species Activity and Survival

Major threats affecting the survival of this species include hybridization with feral mallards (*Anas platyrhynchos*); loss and degradation of wetland habitat including alteration of hydrology, and invasion of habitat by nonnative plants; predation and avian disease; and environmental contaminants (USFWS, 2009).

Potential to Occur in the Action Area

The only suitable habitat that could support this species within the action area are very small pockets of wetland habitat; these are limited to isolated features within the Ala Wai golf course, and possibly Hausten Ditch and the upper reaches of the Ala Wai Canal. However, these areas are in high building densities and are small, and therefore are expected to provide very minimal habitat value in comparison to other nearby wetland areas (e.g., Pearl Harbor National Wildlife Refuge). Overall, these areas are not expected to provide suitable nesting habitat but could be used for resting habitat by Hawaiian ducks. As such, it is possible (though unlikely), that Hawaiian ducks could occur in the action area.

Hawaiian Common Gallinule (*Gallinula galeata sandvicensis*)

Hawaiian common gallinule is a listed federally endangered species. Critical habitat has not been designated for this species.

Current Species Status

Hawaiian gallinule (Alae ula) occurs in wetland habitats below 410 feet elevation on the islands of Kauai and Oahu, although there have been reports from Keanae Peninsula on Maui and from the island of Hawaii (USFWS, 2010b). On Oahu, the species is widely distributed with most birds found between Haleiwa and Waimanalo; small numbers occur at Pearl Harbor and the leeward coast at Lualualei Valley. Island-wide population, based on semi-annual waterbird counts conducted by DOFAW, suggests that the population is increasing, but count numbers are variable, about 300 individuals. Currently, the Hawaiian gallinule occurs only on the islands of Kauai and Oahu having been extirpated from Molokai sometime after the 1940s, from Maui after the late 1940s, and from the island of Hawaii in 1887 (USFWS, 2021a). As of the most recent 5-year review for the species, it was estimated that the minimum population is approximately 927 individuals (USFWS, 2021a).

Biology and Ecology of Species – Reproduction and Forage Requirements
Hawaiian gallinules are found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, and sewage treatment ponds (USFWS, 2011e).

Nesting occurs year-round, but most activity occurs between March and August (USFWS, 2010b). Platform nests are constructed in dense vegetation over water. Five to six eggs are laid and hatch after 22 days. Chicks can swim shortly after hatching and are dependent on their parents for several weeks (USFWS, 2010b).

Hawaiian gallinules are thought to be opportunistic feeders, so their diet may vary with the particular habitat (USFWS, 2010b). They generally forage in dense emergent vegetation and along the edges of habitat (USFWS, 2010b).

Factors Affecting Species Activity and Survival
Threats to survival for this species include loss and degradation of wetland habitat; predation by introduced animals; modification of hydrology; alteration of habitat structure and vegetation composition by invasive nonnative plants; loss of riparian vegetation; and water quality degradation due to grazing, disease, and possibly environmental contaminants (USFWS, 2011e).

Potential to Occur in the Action Area
The only suitable habitat that could support this species within the action area are very small pockets of wetland habitat; these are limited to isolated features within the Ala Wai golf course, and possibly Hausten Ditch and the upper reaches of the Ala Wai Canal. However, these areas lack some of the key habitat features, and therefore are expected to provide very minimal habitat value in comparison to other nearby areas (e.g., Pearl Harbor National Wildlife Refuge); these areas are not expected to provide suitable nesting habitat but could be used for resting habitat. As such, it is possible (though unlikely), that Hawaiian gallinule could occur in the action area.

Hawaiian Coot (*Fulica americana alai*)
Hawaiian coot is a listed federally endangered species. Critical habitat has not been designated for this species.

Current Species Status
Hawaiian coot (ala keokeo) occurs statewide, although Kauai, Oahu, and Maui collectively support 80% of birds detected during the annual waterbird surveys (USFWS, 2021b). On Oahu, coots are observed at Lake Wilson and Nuuanu Reservoir, Kahuku Point and along the

windward shore. The most recent minimum population estimate of Hawaiian coot is 1,815 individuals (USFWS, 2021b).

Biology and Ecology of Species – Reproduction and Forage Requirements

Hawaiian coots are found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, and sewage treatment ponds (USFWS, 2011e). Hawaiian coot are omnivores, feeding on seeds and leaves, snails, crustaceans, insects, tadpoles, and small fish. The species will travel long distances, including between islands, when local food sources are depleted. Nesting habitat includes freshwater and brackish ponds, irrigation ditches, and taro fields. Floating nests are constructed of aquatic vegetation and found in open water or anchored to emergent vegetation. Open water nests are usually composed of mats of water hyssop and Hilo grass. Nests in emergent vegetation are typically platforms constructed from buoyant stems of species such as bulrush. Nesting occurs year-round, but most activity occurs between March and September. Clutch size ranges from three to ten eggs, and chicks may hatch after a 25-day incubation period (USFWS, 2011e).

Factors Affecting Species Activity and Survival

Threats to survival for this species include loss and degradation of wetland habitat; predation by introduced animals; modification of hydrology; alteration of habitat structure and vegetation composition by invasive nonnative plants; loss of riparian vegetation; and water quality degradation due to grazing, disease, and possibly environmental contaminants (USFWS, 2011e).

Potential to Occur in the Action Area

The only suitable habitat that could support this species within the action area are very small pockets of wetland habitat; these are limited to isolated features within the Ala Wai golf course and possibly along the upper edges of the Ala Wai Canal. However, these areas are very small and provide very minimal habitat value in comparison to other nearby areas (e.g., Pearl Harbor National Wildlife Refuge); they are not expected to provide suitable nesting habitat but could be used for resting habitat. As such, it is possible (though unlikely), that Hawaiian coots could occur in the action area.

Hawaiian Petrel (*Pterodroma sandwichensis*)

Hawaiian petrel is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status

Historically, the Hawaiian petrel was believed to have had well established breeding populations on all the major Hawaiian Islands (USFWS, 1983). Currently, the Hawaiian petrel (Uau) breeds on several main Hawaiian Islands, including Maui, Hawaii Island, and Kauai and possibly on Molokai, Lanai, the sea stacks off Kahoolawe and Lehua Island (USFWS, 2011c). However, approximately 85% of the known population of Hawaiian petrel nests on Maui (USFWS, 2011c). Since the last 5-year review in 2017, Pacific Rim Conservation continues to conduct surveys and burrow searching in the northern Koolau Mountains and near the summit of Mount Kaala on Oahu (USFWS, 2022a). No burrows have been located yet, but Hawaiian petrel calls continue to be detected on acoustic monitors at both sites (USFWS, 2022a). An analysis of at-sea surveys conducted between 1998 and 2011 estimated the Hawaiian petrel population to be 52,186 individuals including juveniles and subadults (USFWS, 2022a).

Biology and Ecology of Species – Reproduction and Forage Requirements

Hawaiian petrels currently are known to nest only at elevations above 7,200 feet (USFWS, 1983). Vegetation in nesting areas is often sparse and consists predominantly of grass and bracken fern. Adults form nests by excavating burrows or crevices that are generally three to six feet deep and reaching a length up to 15 feet or more. Nesting burrows are commonly located among large rock outcrops, talus slopes, or along edges of lava flows with suitable underlying soil for the excavation of tunnels. Hawaiian petrels form long-term pair bonds and return to the same nest site each year during breeding season. Eggs are laid in May through June and chicks generally fledge by December. Both parents incubate, brood, and feed a single chick. Hawaiian petrels begin breeding at about age 5 or 6 (USFWS, 1983).

Hawaiian petrels may feed hundreds of miles (thousands of kilometers) from their colonies, preying upon marine organisms, such as squid, goatfish, lantern fish and in some cases, crustaceans. Petrels feed by capturing prey with their beaks while sitting on the water or flapping just above the surface.

Factors Affecting Species Activity and Survival
Threats to the survival of Hawaiian petrels include historic hunting and introduced predators, such as dogs, pigs, rats, feral cats, and mongoose (USFWS, 1983).

Potential to Occur in the Action Area
Nesting habitat for the Hawaiian petrel is not present within the proposed action footprint. Therefore, no direct impacts to Hawaiian petrel or their nesting/foraging habitat is expected to occur. The species could be present foraging or flying over the action area.

Hawaiian Stilt (*Himantopus mexicanus knudseni*)
Hawaiian stilt is a listed federally endangered species. Critical habitat has not been designated for this species.

Current Species Status
Hawaiian stilts were historically known from all of the major islands except Lanai and Kahoolawe (USFWS, 2011e). Currently, Hawaiian stilts are found on all the main Hawaiian Islands except Kahoolawe. Regarding Oahu, large concentrations of Hawaiian stilts can be found at the James Campbell National Wildlife Refuge, the Kahuku aquiculture ponds, the Honouliuli and Waiawa units of the Pearl Harbor National Wildlife Refuge, and on Nuupia Ponds in Kaneohe. Populations also exist at the Chevron Refinery, the fishponds at Kualoa Beach Park, at Salt Lake District Park, and at scattered locations along the northern and eastern coasts. From 2006 to 2011, Oahu accounted for 35 to 50% of the State's Hawaiian stilt population (USFWS, 2011e). The most recent winter and summer surveys for Hawaiian stilt show a fluctuating population, which generally increased from 1985 to 2004 and since then has been roughly stable at 1,500 to 2,000 individuals (USFWS, 2020c).

Biology and Ecology of Species – Reproduction and Forage Requirements
Hawaiian stilts are found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, and sewage treatment ponds (USFWS, 2011e). Foraging habitat consists of ephemeral fresh, brackish, or saltwater habitats. Hawaiian stilts prefer sites with a water depth of less than nine inches, limited and low growing vegetation, or exposed tidal flats and opportunistically prey upon polychaete worms, small crabs, insects, and small fish. Hawaiian stilt frequently moves among wetland habitats in search of food (USFWS, 2011e).

Breeding habitat differs from foraging habitat and individuals move between the two habitats daily (USFWS, 2011e). Nesting occurs on freshly exposed mudflats and some low growing vegetation, also will nest on islands in fresh and brackish ponds or artificial floating nest structures. Nesting occurs between March and August and peaks in May and June. Three to four eggs are typically laid, and chicks hatch approximately 24 days later. Both parents incubate eggs and brood young, and fledglings remain with their parents for several months (USFWS, 2011e).

Factors Affecting Species Activity and Survival

Threats to survival for this species include loss and degradation of wetland habitat; predation by introduced animals; modification of hydrology; alteration of habitat structure and vegetation composition by invasive nonnative plants; loss of riparian vegetation; and water quality degradation due to grazing, disease, and possibly environmental contaminants (USFWS, 2011e).

Potential to Occur in the Action Area

A small amount of potentially suitable habitat occurs within the action area; these areas include the aquatic features within the Ala Wai golf course, Hausten Ditch, and possibly the upper reaches of the Ala Wai Canal. However, these areas are limited in size and provide very minimal habitat value in comparison to other nearby areas (e.g., Pearly Harbor National Wildlife Refuge); they are not expected to provide suitable nesting habitat but could be used for resting habitat. As such, it is possible (though relatively unlikely), that Hawaiian stilts could occur in the action area.

Newell's Townsend's Shearwater (*Puffinis auricularis newelli*)

The Newell's shearwater is a listed federally threatened species.

Current Species Status

Newell's shearwater's historical range is thought to include Hawaii, Maui, Molokai, Oahu, and Kauai. Young et al., (2019) have identified sites on the leeward slopes of Mount Kaala in the Waianae Mountains and at Poamoho, Koolau Mountains, that may serve as breeding sites on Oahu. Since the publication of the 5-year review in 2011, results from analysis of at-sea surveys conducted between 1998 and 2011 estimated the Newell's shearwater population to be about 27,011 (95% confidence interval [CI] 18,254 – 37,125) individuals, including juveniles and subadults. The previous at-sea population estimate from surveys conducted between 1980 and 1994 estimated 84,000 (95% CI 57,000 – 115,000) birds, including subadults and juveniles.

Biology and Ecology of Species – Reproduction and Forage Requirements

Newell's shearwaters are colonial and nesting habitat is typically within steep mountainous terrain between 500 and 2,300 feet in elevation (USFWS, 1983). The species appears to have an affinity for dense fern habitat with moderate to light tree cover. To take flight, the species requires an open downhill flight path through which it can become airborne; therefore, the species favors ridge crests or embankments for its nesting burrows. Females typically lay a single egg in cavities and burrows, often located at the base of a tree. Breeding is highly synchronous, and eggs are laid in early June, and most young fledge by November. Both parents incubate the egg, and brood and feed the nestling. Parents forage tens of miles (hundreds of kilometers) offshore and return to colon at night to feed chick. No post-fledging care is provided. Age at first breeding is between 6 and 7 years old (USFWS, 1983).

Newell's shearwater often forages in large, mixed species flocks associated with schools of large, predatory fishes, which drive prey to the surface (USFWS, 1983). The species feeds

mainly by pursuit-plunging; individuals dive into water and swim using their partly folded wings for propulsion. Diet may consist of fish and squid (USFWS, 1983).

Factors Affecting Species Activity and Survival

Threats to Newell's shearwater include historical hunting, introduced predators such as dogs, pigs, rats, barn owls, feral cats, and mongoose. Habitat loss and degradation has resulted in the loss of 75% of forest habitat over the last 150 years, with much of the remaining forest degraded by invasive plants. Artificial lighting disorients fledglings, causing "fallout" and collision with vertical structures. When grounded, fledglings become susceptible to predators. Overfishing and catastrophes, such as hurricanes, may result in injury and mortality to individuals.

Potential to Occur in the Action Area

Nesting habitat for Newell's shearwater is not present within the proposed action area. Therefore, no direct impacts to Newell's shearwater or their nesting/foraging habitat is expected to occur. The species could be present foraging or flying over the action area.

Short-tailed Albatross (*Phobastria (=Diomedea) albatrus*)

The short-tailed albatross is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status

Historically, the short-tailed albatross is believed to have once nested on Midway Atoll at the northwestern end of the Hawaiian Archipelago (USFWS, 2008). Since 1938, approximately 50 observations of about 17 different short-tailed albatrosses have been noted in the vicinity of the Northwestern Hawaiian Islands, typically between November and April (USFWS, 2008). During the most recent 5-year review it was noted that in the Northwestern Hawaiian Islands, a short-tailed albatross pair was present on Eastern Island at Midway Atoll from 2008 to 2015 and successfully fledged chicks in 2011, 2012, and 2014 (USFWS, 2020d). During 2016, a new pair formed on Sand Island, Midway Atoll. During the 2018-2019 breeding season, the same pair returned and successfully raised their own chick to fledge. A suspected female-female pair has been attempting to breed at Kure Atoll, Hawaii, since 2010 (USFWS, 2020d). The most recent 5-year review of the species estimated the population at 7,365 birds.

Biology and Ecology of Species – Reproduction and Forage Requirements

Breeding habitat for the species is isolated, windswept, offshore islands, with restricted human access (USFWS, 2008). Nest sites may be flat or slopes, with sparse or full vegetation. The short-tailed albatross is a colonial, annual breeding species; each breeding cycle lasts about eight months. Nests consist of a divot on the ground lined with sand and vegetation. Birds may breed at 5 years of age, but first year of breeding is more commonly six. A single egg is laid in late October to late November with hatching occurring from late December through January. Chicks begin to fledge in late May into June (USFWS, 2008).

Non-breeding habitat is the North Pacific marine environment which is most heavily used by short-tailed albatross (USFWS, 2008). The area is characterized by regions of upwelling and high productivity along the northern edge of the Gulf of Alaska, along the Aleutian Chain, and along the Bering Sea shelfbreak from the Alaska Peninsula out towards St. Matthew Island (USFWS, 2008).

The diet of short-tailed albatross during breeding is not well-known, but observations of food brought to nestlings and of regurgitated material indicate that the diet includes squid, shrimp, fish, flying fish eggs, and other crustaceans (USFWS, 2008).

Factors Affecting Species Activity and Survival

Major threats to short-tailed albatross include habitat alteration and loss due to catastrophic events; climate change; commercial fishing; contaminants; disease and parasites; predation; natural competition; invasive species; air strikes; and other human activities (USFWS, 2008).

Potential to Occur in the Action Area

The action area is generally comprised of either low density vegetated non-native riparian/forest habitat (such as that associated with the floodwalls along the middle watershed), turf grass (such as that associated with the detention basins) or developed areas (such as that associated with the floodwalls along the lower watershed). No portion of the action area supports suitable breeding habitat for short-tailed albatross. As such, suitable habitat is not present, and this species is expected to not have the potential to occur within the action area.

Green Sea Turtle (*Chelonia mydas*)

The green sea turtle, Central North Pacific Distinct Population Segment is a listed federally threatened species. The National Marine Fisheries Service (NMFS) has proposed to designate specific areas in the marine environment as critical habitat for six distinct population segments (DPSs) of the green sea turtle, including the Central North Pacific DPS, under the Endangered Species Act of 1973, as amended. Proposed critical habitat includes nearshore areas from the mean high-water line to 66-foot (20 meters) depth located along the coasts of Florida, North Carolina, Texas, Puerto Rico, U.S. Virgin Islands, California (which also includes nearshore areas from the mean high-water line to 6 miles [10 kilometers] offshore), Hawaii, American Samoa, Guam, and the Commonwealth of Northern Marian Islands. It also includes Sargassum habitat, from 33-foot (10 meters) depth to the outer boundary of the U.S. Exclusive Economic Zone, in the Gulf of Mexico and Atlantic Ocean (NOAA-NMFS-2023-0087). The proposed designated critical habitat includes the mouth of the Ala Wai Canal, the Ala Wai Canal Boat Harbor, and the nearshore marine environment within the vicinity of Waikiki which could experience indirect impacts from the proposed action.

Current Species Status

The green sea turtle occurs throughout the Hawaiian Islands and are most conspicuous at French Frigate Shoals (NMFS and USFWS, 1998). Green sea turtles also inhabit the nearshore waters around the main Hawaiian Islands, including Oahu. The Hawaiian green turtle population (i.e., the Central North Pacific DPS) has been increasing at a rate of 5% per year over the past two decades (NMFS and USFWS, 1998).

Biology and Ecology of Species – Reproduction and Forage Requirements

Adult green sea turtles reside in nearshore benthic environments and have a nearly exclusive herbivorous diet consisting of macroalgae and sea grasses (NMFS and USFWS, 1998). Green sea turtles are commonly observed to forage for sea grass (*Halophila decipiens*) at Ala Moana Beach Park, Oahu Island. Adult male and female green sea turtles have been observed to haul out and bask on the shoreline at French Frigate shoals. About 90% of the nesting occurs on French Frigate Shoals of the Northwestern Hawaiian Islands. Between 200 and 700 females nest at French Frigate Shoals annually with a modest amount of nesting at Laysan Island, Lisianski Atoll, and Peal and Hermes Reef. Green sea turtles in Hawaii may lay up to six

clutches of eggs per season and each clutch may consist of about 100 eggs (NMFS and USFWS, 1998).

Factors Affecting Species Activity and Survival
Threats to the survival of GST include the loss of foraging habitat to nearshore development in the main Hawaiian Islands (e.g., marina construction, artificial beach development, siltation from agricultural runoff, contamination of forage areas from toxic spills, resort development, and increased vessel traffic), entanglement and ingestion of marine debris, incidental take during fisheries, poaching, and disease (e.g., fibropapillomas) (NMFS and USFWS, 1998).

Potential to Occur in the Action Area
The green sea turtle is likely to occur within the action area, specifically the Ala Wai Canal and potentially as far upstream as the Manoa-Palolo Canal. Green sea turtle has been observed as recently as 2021 in the Ala Wai Canal.

Hawksbill Sea Turtle (*Eretmochelys imbricata*)
The hawksbill sea turtle is a listed federally endangered species. Critical habitat has been designated in the waters surrounding Mona and Monito Islands, Puerto Rico. No critical habitat is present within the action area.

Current Species Status
Hawksbill sea turtles may occur throughout the main Hawaiian Islands but are considered rare except for common observations of individuals around West Maui. Approximately 60 female adults have been documented within Hawaiian waters with no estimate of population size.

Biology and Ecology of Species – Reproduction and Forage Requirements
Adult hawksbill sea turtles forage on sponges and certain species of algae. They are observed in shallow reefs and bays. Nesting has been documented along Halawa River Valley of east Molokai Island, Kamehameha Beach, Hawaii Island, and various beaches around Maui Island. Hawskbill turtles display slow growth rates with an average annual growth rate of approximately 0.39 to 1.97 inches (two to five centimeters) per year for juveniles that slows to almost no somatic growth in adults.

Factors Affecting Species Activity and Survival
Threats to hawksbill sea turtle include the loss of nesting beaches due to construction and human presence, beach erosion, artificial lighting, nest predation, exotic vegetation, marine debris, incidental take during from fisheries, poaching, and disease (e.g., fibropapillomas).

Potential to Occur in the Action Area
The hawksbill sea turtle is less likely to occur within the action area when compared to the green sea turtle; however, the possibility exists that the species could be present in the Ala Wai Canal and potentially as far upstream as the Manoa-Palolo Canal.

3.4.5 Essential Fish Habitat
Essential Fish Habitat (EFH) in the marine waters surrounding the Hawaiian Islands is described in two fishery ecosystem plans (FEPs) prepared by the Western Pacific Regional Fishery Management Council (WPRFMC). The FEP for the Hawaiian Archipelago (2009; Amendment 4, 2016; Amendment 5, 2019) specifically manages demersal resources and habitats associated with the extended Hawaiian Islands. Fisheries may comprise a group or complex of species. These fishery species are collectively referred to as management unit species (MUS).

The adjacent marine waters of Ala Wai Small Boat Harbor and the nearshore marine waters of Honolulu (Figure 22) are within the Hawaii Archipelago Fishery Ecosystem Plan (FEP) boundaries and has been identified as EFH by the WPRFMC. MUS are those "caught in quantities sufficient to warrant management or specific monitoring by NMFS and the WPRFMC," are listed in Table 34. The EFH for MUS of the Western Pacific Region (Table 35 and Table 36) are bounded by the shoreline and seaward boundary of the exclusive economic zone (EEZ), unless otherwise indicated.

Figure 22: EFH (Yellow Highlight) within the Vicinity of the Study Area.

Table 34: Hawaii Archipelago Management Unit Species (MUS).

Scientific Name	Common Name	Local Name
Bottomfish		
Aphareus rutilans	silverjaw jobfish	lehi
Aprion virescens	gray jobfish	uku
Hyporthodus quernus	sea bass142ompu'upu'u	
Etelis carbunculus	red snapper	ehu
Etelis coruscans	longtail snapper	onaga or 'ula'ula'loa'e
Pristipomoides filamentosus	pink snapper	'ōpakapaka
Pristipomoides sieboldii	Von Siebold's snapper	kalekale
Pristipomoides zonatus	snapper	gindai
Seamount Groundfish		

Scientific Name	Common Name	Local Name
Beryx splendens	alfonsin	NA
Hyperoglyphe japonica	raftfish	NA
Pentaceros wheeleri	armorhead	NA
Crustaceans		
Heterocarpus spp.	Deepwater shrimp	NA
Ramina ranina	Kona crab	pap"l kua loa

(NA) Not applicable

Table 35: Bottomfish and Seamount Groundfish EFH Designations for Each Life Stage of Species Assemblages.

Species Assemblage	EFH				Overlaps with Action Area?
	Eggs	Post-hatch Pelagic	Post-settlement	Sub-adult/adult	
Bottomfish Shallow Stocks	• Water column from 0-240 m (0-787 ft) • Shoreline to EEZ outer boundary				Yes
Bottomfish Intermediate Stocks	• Water column from 0-320 m (0-1,050 ft) • Shoreline to EEZ outer boundary		• Water column from 40-320 m (131-1,050 ft) • Between the 40 and 320 m (131 and 1,050 ft) isobaths		• Yes – Eggs & Post-hatch pelagic • No – Post-settlement & sub-adult/adults
Bottomfish Deep Stocks	• Water column from 0-400 m (0-1,312 ft) • Shoreline to EEZ outer boundary		• Water column from 80-400 m (262-1,312 ft) • Shoreline to 1,312 ft (400 m) isobath		
Seamount Groundfish	• Pelagic waters 0-600 m (0-1,968 ft) • Within EEZ north of 28° N & west of 180° W		• Benthic or benthopelagic waters from 120-600 m (394-1,968 ft) • Within EEZ north of 28° N & west of 180° W	• Benthic or benthopelagic waters from 120-600 m (394-1,968 ft) • Within EEZ north of 28° N & west of 180° W	

Table 36: Pelagic and Crustacean EFH Designations for Each Life Stage of Species Assemblages.

Species Assemblage	EFH Designations		Overlaps with Action Area?
	Eggs & Larvae	Juveniles & Adults	
Crustaceans	**Kona crab:** • Water column down to 150 m • Shoreline out to EEZ boundary	**Kona crab:** • Bottom from shoreline down to 100 m	Yes
	Deepwater shrimp:	**Deepwater shrimp:**	No

	• Outer reef slopes between 550 and 700 m	• Outer reef slopes between 300 and 700 m	
Pelagic	• Water column down to 200 m • Shoreline to EEZ boundary	• Water column down to 1,000 m • Shoreline to EEZ boundary	Yes

While pelagic MUS can be found within the Hawaii Archipelago FEP boundary, they are managed under a separate Pelagic FEP, which encompasses all areas of pelagic fishing operations in the EEZ or on the high seas, for any domestic vessels that: fish for, possess, or transship Pacific Pelagic MUS (Table 37) within the EEZ waters of the Western Pacific Region or land Pacific Pelagic MUS within the states, territories, commonwealths, or unincorporated U.S. island possessions of the Western Pacific Region.

Table 37: Pacific Pelagic Management Unit Species (PMUS).

Scientific Name	Common Name
Thunnus alalunga	albacore tuna
Thunnus obesus	bigeye tuna
Thunnus albacares	yellowfin tuna
Thunnus thynnus	northern bluefin tuna
Katsuwonus pelamis	skipjack tuna
Euthynnus affinis	kawakawa
Auxis spp.	other tuna relatives
Scomber spp.	other tuna relatives
Allothunus spp.	other tuna relatives
Tetrapturus audax	striped marlin
Tetrapturus angustirostris	shortbill spearfish
Xiphias gladius	swordfish
Istiophorus platypterus	sailfish
Makaira mazara	blue marlin
Makaira indica	black marlin
Alopias pelagicus	pelagic thresher shark
Alopias superciliousus	bigeye thresher shark
Alopias vulpinus	common thresher shark
Carcharhinus falciformis	silky shark
Carcharhinus longimanus	oceanic whitetip shark
Prionace glauca	blue shark
Isurus oxyrinchus	shortfin mako shark
Isurus paucus	longfin mako shark
Lamna ditropis	salmon shark
Coryphaena spp.	mahimahi (dolphinfish)
Lampris spp.	moonfish
Acanthocybium solandri	wahoo
Gempylidae	oilfish family
Bramidae	pomfret family
Ommastrephes bartamii	neon flying squid
Thysanoteuthis rhombus	diamondback squid
Sthenoteuthis oualaniensis	purple flying squid

Based on the depth and distances from shore, EFH for the fisheries listed above is designated, at least in part, in the study area. There is no designated Habitat Area of Particular Concern in or near the study area for any of the federally managed fishery species. Based on the National Oceanic and Atmospheric Administration Office of Coast Survey reported Maritime Limits and Boundaries, the approximate area of cumulative EFH designations for the Hawaii Archipelago and Pelagic Fishery, from the shoreline to the EEZ, measures over 16 million acres of the Pacific Ocean.

3.4.7 Conservation Plans

Habitat Conservation Plans (HCPs) are designed to conserve and protect federally listed and unlisted species while allowing for changes or alterations to wildlife habitats. They are developed by any non-federal landowner in cooperation with the USFWS when certain project activities may result in the take of a listed species. While there are five approved HCPs in place within Oahu, none of the HCPs fall within the study area (DLNR-DOFAW, 2022).

Significance Criteria

Effects on natural environment resource categories would be considered significant if the proposed project would result in any of the following:

- Have a substantial adverse effect on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the Hawaii DLNR or USFWS.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the Hawaii DLNR or USFWS.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting environmental resources.
- Conflict with the provisions of an adopted HCP or other approved local, regional, or state habitat conservation plan.

Environmental Consequences

No Action Alternative

Under the No Action Alternative, no flood risk management measures would be implemented and as such, project-related impacts to biological resources would not occur. In the absence of flood reduction measures, it is anticipated that areas adjacent to streams within the Ala Wai Watershed would be subject to periodic flooding.

In general, future climate changes are expected to result in habitat loss and degradation, decreased biodiversity (including extinction of endangered species and migration and loss of native species), and spread of invasive species. However, these conditions are already prolific within the watershed; therefore, it is expected that the future without-project conditions would be commensurate with existing conditions. Specifically, it is expected that the measure sites would continue to be characterized by a suite of non-native (including invasive) species that typically occur in disturbed urban environments. While there may be some slight changes in localized conditions, the overall species composition and habitat structure is not expected to change dramatically over the period of analysis.

Based on the extent of existing urbanization and development within the Ala Wai Watershed, and more specifically along the streams, it is expected that further development would be minimal. Some degree of redevelopment may occur in the neighborhoods throughout the watershed, however, this is not expected to substantially affect biological resources. With respect to instream habitat, it is assumed that there would be no significant changes in the extent and degree of channel hardening or modifications.

Alternative 1

Less than Significant Impact with Environmental Commitments Incorporated:

Plant Communities

Construction of Alternative 1 would involve clearing and trimming of vegetation within the construction limits (including any associated staging and access roads) at each of the structural measure sites. Of this area, vegetation would be permanently displaced with the construction of the Kanaha floodwall, Woodlawn Drive floodwall, Koali Road floodwall, and Kaimuki High School floodwall. Vegetation would also be permanently displaced with the construction of the road closure structures associated with the floodwalls and inlets/outlets. Vegetation within the Makiki District Park detention basin, Manoa Valley District Park detention basin, and Ala Wai Golf Course detention basin would be temporarily displaced during construction. Excavation of the two park district detention basins would temporarily impact turf grass. Construction of the earthen berms around the two park district detention basins and the golf course would also temporarily impact turf grass. Once construction is completed, the earthen berms would be reseeded with native grass species (where practicable). The long-term operation and maintenance of the structural features would need to be maintained in accordance with Corps of Engineers Engineering Pamphlet (EP) 1110-2-18. EP 1110-2-18 requires that a minimum 15-feet down slope of a floodwall, including earthen berms, needs to be a vegetation free zone (VFZ). The VFZ applies to all vegetation except for grasses for the purpose of erosion control.

The approximate areas that would be impacted are summarized in Table 38.

Table 38: Summary of Disturbance Acres for Alternative 1 Measures.

Structural Feature	Total Construction Area (acres)	Permanent Footprint (acres)	Vegetation Management Area for O&M (acres)	Inundation Area During Flood (acres)
Makiki District Park Detention Basin	8.46	6.77	6.77	2.26
Manoa Valley District Park Detention Basin	18.87	29.04	29.04	13.08
Ala Wai Golf Course Detention Basin	28.67	175.33	175.33	156.03
Kanaha Floodwall	3.64	2.03	2.03	NA
Woodlawn Drive Floodwall	2.40	1.27	1.27	NA
Koali Road Floodwall	4.20	2.01	2.00	NA
Kaimuki High School Floodwall	8.28	17.35	17.35	12.59

TOTAL	**74.52**	**233.80**	**233.79**	**183.96**

The vegetation that would be impacted is predominantly comprised of non-native species, many of which are considered invasive. Native species present within the measure sites are commonly occurring throughout Hawaii, no federally listed plant species are expected to be present.

In general, impact to non-native vegetation is not considered to be significant. However, some of this vegetation may provide habitat for aquatic and other wildlife species within the watershed, such that impacts to the vegetation could affect the wildlife species. Specifically, riparian vegetation, even if non-native and/or invasive, still provides shade and cover that contributes to habitat quality for native stream species. Similarly, non-native tree species may still provide habitat for native birds or bats.

Although impacts to vegetation are generally expected to be less than significant, construction of the project could affect a few concentrations of native species. Specifically, this includes a series of niu and milo trees planted along the Ala Wai Canal. To the extent, these trees would be avoided during construction. Where impacts cannot be avoided, the individual trees would either be replaced in-kind following construction or relocated to a suitable location near the alternative footprint. The exact location and total numbers of trees to be affected and replaced/relocated would be determined as part of pre-construction surveys.

Following construction, long-term operation and maintenance of the project would require ongoing vegetation management, including clearing and trimming in select locations. Specifically, a 15-foot-wide buffer around the perimeter of the detention structures and floodwalls would be revegetated with a suitable grass species; vegetation management would involve mowing the grass and removing any woody vegetation. Vegetation along the access roads would also be periodically trimmed, as needed to maintain adequate clearance for access. The estimated area in which vegetation will be maintained is provided in Table 39. As the areas to be maintained are within the construction limits, they will have been previously disturbed as part of the construction (and revegetated, as appropriate); no sensitive species are expected to colonize these areas. Therefore, maintenance of these areas is not expected to result in more than minimal vegetation-related impacts.

During flood conditions, the detention basins (i.e., Makiki District Park, Manoa Valley District Park, and Ala Wai Golf Course) would occasionally be used to store flood waters, and vegetation within the inundation zone could be temporarily impacts by the floodwaters. The approximate extent of vegetated areas that would be inundated (based on the 20-year event) is summarized in Table 38. The inundation period would be relatively short (in general, about 24 hours for the Makiki and Manoa Valley District Park detention basins; and about 48 hours for the Ala Wai Golf Course detention basin). Given the short duration of inundation, coupled with the lack of sensitive vegetation resources in these areas, operation of the detention basins is not expected to significantly affect vegetation resources.

Invasive plants, such as Java plum, strawberry guava, swamp mahogany, and albizia, are widespread within the alternative action area. Given the prevalence of these species, implementation of the project is not expected to result in a significant increase in the distribution or spread of invasive plant species within the sites. However, construction of the project could potentially result in the introduction of new invasive plant species within the site. However, construction of the project could potentially result in the introduction of new invasive species to

the construction site. To minimize this potential impact, the following BMPs would be implemented:

- All construction equipment, materials, and vehicles arriving from outside of the island of Oahu would be washed and/or visually inspected (as appropriate) for excessive debris, plant materials, and invasive or harmful non-native species before transportation to the construction site; import of materials that are known or likely to contain seeds or propagules of invasive species that would be prohibited.
- Offsite sources of vegetation materials (such as seed mixes) would be certified as weed-free or inspected before transport to the alternative footprint.
- All areas that are hydroseeded would be monitored for six months after hydroseeding to identify invasive plants that establish from seeds inadvertently introduced as part of the seed mix; all invasive plants identified within the hydroseed areas would be removed.
- At the end of the construction period, areas impacted by construction of the project would be surveyed to confirm that no problematic and/or invasive species has been introduced and become established. Appropriate remedial actions would be undertaken to facilitate containment or eradication of the target species as soon as reasonably possible.

Based on the prevalence of non-native species and lack of sensitive vegetation resources, coupled with the environmental commitments and BMPs to replace/relocate native species and minimize the introduction of invasive species, impacts to vegetative resources are expected to be less than significant.

Wildlife Communities

Wildlife resources that occur (or could potentially occur) within the watershed include a suite of native aquatic and terrestrial species, some of which are federally and state listed as endangered. Impacts to these resources are specifically addressed in the subsections below. In general, other wildlife is comprised of non-native and/or invasive species, although a limited number of non-listed native species could occur (e.g., native birds). Potential effects to non-listed native terrestrial species could include both direct impacts (e.g., disturbance, collision with project vehicles, etc.) and indirect impacts associated with habitat loss. However, non-listed native terrestrial species that occur in the alternative action area are generally common and widespread on Oahu, such that direct impacts would not significantly reduce the local population. The proposed project would reduce the amount of habitat available for these species, which could result in the displacement of some individuals. However, the amount of affected habitat represents a very small part of the total range available to each species. Consequently, impacts to non-listed terrestrial species are not considered significant.

Potential impacts to non-native wildlife species are not considered significant. Many of the potentially impacted species have been identified as invasive, which are species that are considered likely to cause economic or environmental harm or harm to human health (EO 13112). For example, feral pigs are generally considered to be a threat to ecosystems as they often consume or trample native flora and fauna, accelerate erosion, alter soil properties, and promote the invasion of non-native plants (Stone et al., 1992; Courchamp et al., 2003). Invasive bird species aggressively chase and outcompete native species for food and space; they also spread the seeds of invasive plant species. As such, adverse impacts to invasive species could be considered a positive effect, although given the scale of the project, any change in local populations is likely to be so low as to be insignificant.

Aquatic Communities

Most aquatic species in the watershed are non-native species, many of which are considered invasive. Like non-native terrestrial species, potential impacts to non-native aquatic species are not considered significant. As many of the potentially impacted species have been identified as invasive (meaning they are considered likely to cause economic or environmental harm or harm to human health), adverse impacts could be considered a benefit. However, given the scale of the project, any actual change in local populations is likely to be so low as to be insignificant.

Although not abundant, native aquatic species have been documented in all of the streams and canals in the watershed (including four gobiid species [o'opu nakea (*Awaous stamineus*), o'opu nopili (*Sicyopterus stimpsoni*), o'opu naniha (*Stenogobius hawaiiensis*), and o'opu akupa (*Eleotris sandwicensis*)], two shrimp species ['opae kala'ole (*Atyoida149ompletena*) and 'opae 'oeha'a (*Macrobrachium grandimanus*)] and a mollusk species [hapawai (*Neritina149ompletenea*)]. Construction of the project features would primarily not occur within the streams but would be adjacent to streams. Construction of the floodwall along the right descending bank of the Manoa-Palolo canal would require the placement of a rock bench within the Manoa-Palolo canal adjacent to the stream bank. The rock bench would be approximately 15 feet in width and would run parallel to the channel bank. Equipment and personnel needed to construct the floodwall would be staged on the rock bench which would be completely removed once construction of the floodwall is complete. In addition to the above floodwall, the construction of inlet and outlet structures associated with the Ala Wai Golf Course Detention Basin and the Ala Wai Canal floodwall could potentially require work within the streams/canal. Work is anticipated to occur mostly from shore, but for outlets below the water line a cofferdam would need to be installed to block of the construction area from the surrounding aquatic environment. The cofferdam would be the minimum size needed to access the area and complete the construction activities. The cofferdam would be completely removed once construction is complete. The placement of the rock bench and cofferdams, though, could have potential impacts to aquatic species such as injury, death, or possible entrainment. To minimize potential impacts to species, each inlet/outlet structure requiring a cofferdam would be dewatered prior to construction, with proper fish exclusion protocols and other standard BMPs implemented, such that construction-related impacts to native aquatic species are expected to be less than significant. Recommended protocols and BMPs are expected to include the following:

- The extent and duration of instream work would be minimized to the extent possible.
- Construction activities within the stream channels would be limited to low-flow conditions. In addition to minimizing the extent of dewatering required, this would also serve to minimize the potential to disrupt migration of native species.
- Proper dewatering techniques would be implemented, as needed. For example, sandbags or a cofferdam would be used to isolate the work area. If needed, a pump would be used to dewater the construction area within the cofferdam. The pump would be properly screened to preclude entrapment of fish, and the area would be adequately inspected to ensure no fish are stranded.

As part of the long-term project operation, O&M activities would be required to keep the flood risk management structures in proper working order; in-stream O&M activities would include periodic sediment/debris removal from inlet and outlet structures. This above-listed BMPs would be implemented (as appropriate), such that impacts are expected to be less than significant.

In addition to the direct impacts to aquatic fauna, the project would also impact aquatic habitat, which could indirectly affect native aquatic species. The primary direct impact to aquatic habitat

is during construction of the project. Construction of the Makiki Park Detention Basin, Manoa Valley Park Detention Basin, Koali Road Floodwall, and the Ala Wai Golf Course Detention Basin include inlet and outlet structures. The inlet structures intercept water and divert it either into a detention basin for storage or discharge interior drainage into a waterway on the other side of a floodwall. The outlet structures discharge stored water from a detention basin back into a waterway. Where these structures connect to the waterway, aquatic habitat could be impacted while construction is occurring. The project would incorporate BMPs to minimize erosion and turbidity into adjacent waterways while the inlet and outlet structures are being constructed. The design of the inlet and outlet structures would minimize the potential for scouring and erosion around the structures long-term. In addition, water discharged from the detention basin outlet structures has the potential to be less turbid as some sediment may fall out during storage. Therefore, less than significant impacts to aquatic habitat are anticipated.

Federal Listed Species and Species of Special Concern
Several ESA-listed species have the potential to be affected by the project; these are Hawaiian hoary bat, seabirds (i.e., band-rumped storm-petrel and Newell's Townsend's shearwater), and Hawaiian waterbirds (i.e., Hawaiian duck, Hawaiian gallinule, Hawaiian coot, Hawaiian petrel, and Hawaiian stilt). Potential impacts to these species are summarized below, with further detail provided in the Biological Assessment (Appendix K). The alternative action area does not contain critical habitat. ESA compliance is discussed in Section 6.1.

Hawaiian hoary bat (ESA status – Endangered): Should they occur, Hawaiian hoary bats could be directly or indirectly impacted by the project. Direct effects could include mortality or other forms of take (e.g., harm or harassment) to individual bats as a result of heavy equipment used for clearing and grubbing of the construction sites and construction of the flood risk management structures. The use of heavy equipment would also generate noise, which could disrupt bats that are present within the alternative action area. To avoid and minimize the potential for these impacts, vegetation clearing for the project would be performed during times of the year when Hawaiian hoary bats are not expected to be breeding to avoid potential for harm or disruption of juvenile bats that are unable to fly; specifically trees greater than 15 feet in height would not be cleared between June 1 and September 15. In addition, all construction activities would be scheduled to occur during daytime hours, thus avoiding potential bat foraging activities, which typically occur in the evening hours.

Other effects could include permanent loss or temporary impacts to habitat. However, given the amount of habitat available through the upper Ala Wai watershed, tree clearing within the alternative action area is not expected to measurable decrease the amount of forest available to the local population of bats for roosting. In addition, on Oahu roost trees are plentiful and are not expected to be a limiting factor for the species. The forest habitat in the upper portions of the Ala Wai watershed is homogenous and does not vary significantly in composition or structure between adjacent patches. For these reasons, it is expected that any bats displaced by the clearing would readily find alternate roost sites in surrounding undisturbed forest.

With the implementation of seasonal restrictions for tree trimming/clearing and enforcement of construction hours, impacts to the Hawaiian hoary bat are expected to be insignificant, such that the project may affect, but is not likely to adversely affect the species.

Seabirds (i.e., band-rumped storm petrel [ESA status – Endangered], Hawaiian petrel [ESA status – Endangered], and Newell's Townsend's shearwater [ESA status – Endangered]): No direct effects due to implementation of the project are expected to sea bird species since the proposed alternative action area does not provide suitable nesting habitat.

Therefore, there would be no direct impacts to sea bird nesting habitat. During construction of the proposed project, artificial lighting could be used during pre-dawn and pre-dusk hours within staging areas. Seabirds show a strong attraction to light sources, including artificial lights. Artificial lights can act as an attractant causing disorientation, confusion, and eventual grounding. The effects of artificial lights lead to a condition known as fallout, where fledgling young and adults are grounded and unable to regain flight, making them vulnerable to depredation or dehydration. Avoidance and minimization measures regarding artificial lighting would be implemented to reduce potential indirect impacts to seabirds that may be flying over the proposed alternative footprint. Given the above, coupled with the nature of activities proposed in the alternative footprint, impacts to seabirds are expected to be insignificant, such that the project may affect, but is not likely to adversely affect seabird species.

Hawaiian Waterbirds (i.e., Hawaiian duck (ESA status – Endangered), Hawaiian common gallinule [ESA status – Endangered], Hawaiian coot [ESA status – Endangered], and Hawaiian stilt [ESA status – Endangered]): The extent and quality of potentially suitable habitat within the proposed alternative footprint is very limited and is likely to only be used as resting habitat for Hawaiian waterbird species. In the unlikely event that Hawaiian waterbird species are present within the proposed alternative footprint, it is expected that they would readily disperse to nearby areas with higher quality habitat (e.g., Pearl Harbor National Wildlife Refuge) in response to disturbance; as such, the potential effects of the proposed project are expected to be limited to temporary construction-related disturbance (e.g., noise). Injury or mortality of Hawaiian waterbird species (or their nests) is not expected.

Areas of potentially suitable wetland habitat may be temporarily unavailable during construction (due to increased levels of disturbance), but sufficient habitat is expected to be available in nearby areas (e.g., Pearl Harbor National Wildlife Refuge). Following construction, the extent and quality of habitat is expected to be the same as the existing condition. During large-scale flood events, the detention basins would be inundated for short periods of time (i.e., about 1 day for Manoa Valley and Makiki Park District detention basins and about 2 days for the Ala Wai Golf Course detention basin), which could temporarily increase the extent of potential habitat. Although increased habitat may be viewed as a benefit, in heavily urbanized areas (such as the Ala Wai watershed), it can also create an attractive nuisance for waterbird species. Specifically, areas of increased habitat may attract waterbirds, which are then vulnerable to predator species that are prevalent in an urban environment (e.g., feral cats, mongoose). However, given the low probability of species occurrence and the infrequent recurrence and short-term duration of flooding, these conditions are not expected to significantly affect Hawaiian waterbirds. Based on the minimal extent and quality of suitable habitat, there is a low probability of species occurrence in the proposed alternative footprint. Given the above, coupled with the nature of activities proposed, impacts to Hawaiian waterbirds are expected to be insignificant, such that the proposed project may affect, but is not likely to adversely affect Hawaiian waterbird species.

Essential Fish Habitat

Pursuant to the Magnuson-Stevens Act, an adverse effect is defined as any impact that reduces quality and/or quantity of EFH; this includes direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to species and their habitat, and other ecosystem components.

As described in Section 3.4.5, no portion of the proposed alternative footprint has been designated as EFH, such that the proposed project is not expected to directly affect the quality and/or quantity of EFH. The nearshore waters downstream from the Ala Wai Canal (i.e., Ala Wai Small Boat Harbor, Mamala Bay, etc.) include EFH for various lifestages of bottomfish,

seamount groundfish, pelagics, and crustaceans. In general, conditions that could indirectly affect EFH include increased delivery of sediment and associated contaminants, which could smother bottom substrate and degrade water quality. However, as described in Section 3.3.4, the proposed project is not expected to result in significant water quality impacts, either within the streams or nearshore waters (including EFH). Rather, it is possible that some degree of benefit could be realized over the long-term through the capture and removal of sediment from the three proposed detention basins. As such, the proposed project is not expected to adversely affect EFH, either directly or indirectly.

Refer to Appendix K for the EFH analysis and the USACE's determination that the proposed project would have no adverse effect on EFH.

Conservation Plan(s)
There are no HCPs in place within the proposed alternative footprint, therefore, the project would have no direct or indirect effects on implemented HCPs.

Alternative 2B

Less than Significant Impact with Environmental Commitments Incorporated:

Plant Communities
Construction of Alternative 2B would involve clearing and trimming of vegetation within the construction limits (including any associated staging and access roads) at each of the structural measure sites. Of this area, vegetation would be permanently displaced with the construction of the Kanaha floodwall, Woodlawn Drive floodwall, Koali Road floodwall, Kaimuki High School floodwall, and the Ala Wai Canal floodwall (including the Ala Wai Golf Course). Vegetation would also be permanently displaced with the construction of the road closure structures associated with the floodwalls and inlets/outlets. Vegetation within the Makiki District Park detention basin would be temporarily displaced during construction. Excavation of the park district detention basin would temporarily impact turf grass. Construction of the earthen berms around the park district detention basin would also temporarily impact turf grass. Once construction is completed, the earthen berms would be reseeded with native grass species (where practicable). The long-term operation and maintenance of the structural features would need to be maintained in accordance with Corps of Engineers Engineering Pamphlet (EP) 1110-2-18. EP 1110-2-18 requires that a minimum 15-feet down slope of a floodwall, including earthen berms, needs to be a vegetation free zone (VFZ). The VFZ applies to all vegetation except for grasses for the purpose of erosion control.

The approximate areas that would be impacted are summarized in Table .

Table 39: Summary of Disturbance Acres for Alternative 2B Measures.

Structural Feature	Total Construction Area (acres)	Permanent Footprint (acres)	Vegetation Management Area for O&M (acres)	Inundation Area During Flood (acres)
Makiki District Park Detention Basin	8.46	6.77	6.77	2.26
Kanaha Floodwall	3.64	2.03	2.03	NA
Woodlawn Drive Floodwall	2.40	1.27	1.27	NA

Structural Feature	Total Construction Area (acres)	Permanent Footprint (acres)	Vegetation Management Area for O&M (acres)	Inundation Area During Flood (acres)
Koali Road Floodwall	5.00	2.47	2.47	NA
Kaimuki High School Floodwall	6.66	15.76	15.76	12.59
Ala Wai Canal Floodwall	43.82	180.31	180.31	156.03
TOTAL	**69.98**	**208.61**	**208.61**	**170.88**

The vegetation that would be impacted is predominantly comprised of non-native species, many of which are considered invasive. Native species present within the measure sites are commonly occurring throughout Hawaii, no federally listed plant species are expected to be present.

In general, impact to non-native vegetation is not considered to be significant. However, some of this vegetation may provide habitat for aquatic and other wildlife species within the watershed, such that impacts to the vegetation could affect the wildlife species. Specifically, riparian vegetation, even if non-native and/or invasive, still provides shade and cover that contributes to habitat quality for native stream species. Similarly, non-native tree species may still provide habitat for native birds or bats.

Although impacts to vegetation are generally expected to be less than significant, construction of the project could affect a few concentrations of native species. Specifically, this includes a series of niu and milo trees planted along the Ala Wai Canal. To the extent, these trees would be avoided during construction. Where impacts cannot be avoided, the individual trees would either be replaced in-kind following construction or relocated to a suitable location near the alternative footprint. The exact location and total numbers of trees to be affected and replaced/relocated would be determined as part of pre-construction surveys.

Following construction, long-term operation and maintenance of the project would require ongoing vegetation management, including clearing and trimming in select locations. Specifically, a 15-foot-wide buffer around the perimeter of the detention structures and floodwalls would be revegetated with a suitable grass species; vegetation management would involve mowing the grass and removing any woody vegetation. Vegetation along the access roads would also be periodically trimmed, as needed to maintain adequate clearance for access. The estimated area in which vegetation will be maintained is provided in Table 39. As the areas to be maintained are within the construction limits, they will have been previously disturbed as part of the construction (and revegetated, as appropriate); no sensitive species are expected to colonize these areas. Therefore, maintenance of these areas is not expected to result in more than minimal vegetation-related impacts.

During flood conditions, the Makiki Park District detention basin would occasionally be used to store flood waters, and vegetation within the inundation zone could be temporarily impacted by the floodwaters. The approximate extent of vegetated areas that would be inundated (based on the 20-year event) is summarized in Table 39. The inundation period would be relatively short (in general, about 24 hours for the Makiki District Park detention basin). Given the short duration

of inundation, coupled with the lack of sensitive vegetation resources in this area, operation of the detention basin is not expected to significantly affect vegetation resources.

Invasive plants, such as Java plum, strawberry guava, swamp mahogany, and albizia, are widespread within the alternative action area. Given the prevalence of these species, implementation of the project is not expected to result in a significant increase in the distribution or spread of invasive plant species within the sites. However, construction of the project could potentially result in the introduction of new invasive plant species within the site. However, construction of the project could potentially result in the introduction of new invasive species to the construction site. To minimize this potential impact, the following BMPs would be implemented:

- All construction equipment, materials, and vehicles arriving from outside of the island of Oahu would be washed and/or visually inspected (as appropriate) for excessive debris, plant materials, and invasive or harmful non-native species before transportation to the construction site; import of materials that are known or likely to contain seeds or propagules of invasive species that would be prohibited.
- Offsite sources of vegetation materials (such as seed mixes) would be certified as weed-free or inspected before transport to the alternative footprint.
- All areas that are hydroseeded would be monitored for six months after hydroseeding to identify invasive plants that establish from seeds inadvertently introduced as part of the seed mix; all invasive plants identified within the hydroseed areas would be removed.
- At the end of the construction period, areas impacted by construction of the project would be surveyed to confirm that no problematic and/or invasive species has been introduced and become established. Appropriate remedial actions would be undertaken to facilitate containment or eradication of the target species as soon as reasonably possible.

Based on the prevalence of non-native species and lack of sensitive vegetation resources, coupled with the mitigation measure to replace/relocate native species and minimize the introduction of invasive species, impacts to vegetative resources are expected to be less than significant.

Wildlife Communities

Wildlife resources that occur (or could potentially occur) within the watershed include a suite of native aquatic and terrestrial species, some of which are federally and state listed as endangered. Impacts to these resources are specifically addressed in the subsections below. In general, other wildlife is comprised of non-native and/or invasive species, although a limited number of non-listed native species could occur (e.g., native birds). Potential effects to non-listed native terrestrial species could include both direct impacts (e.g., disturbance, collision with project vehicles, etc.) and indirect impacts associated with habitat loss. However, non-listed native terrestrial species that occur in the alternative action area are generally common and widespread on Oahu, such that direct impacts would not significantly reduce the local population. The proposed project would reduce the amount of habitat available for these species, which could result in the displacement of some individuals. However, the amount of affected habitat represents a very small part of the total range available to each species. Consequently, impacts to non-listed terrestrial species are not considered significant.

Potential impacts to non-native wildlife species are not considered significant. Many of the potentially impacted species have been identified as invasive, which are species that are

considered likely to cause economic or environmental harm or harm to human health (EO 13112). For example, feral pigs are generally considered to be a threat to ecosystems as they often consume or trample native flora and fauna, accelerate erosion, alter soil properties, and promote the invasion of non-native plants (Stone et al., 1992; Courchamp et al., 2003). Invasive bird species aggressively chase and outcompete native species for food and space; they also spread the seeds of invasive plant species. As such, adverse impacts to invasive species could be considered a positive effect, although given the scale of the project, any change in local populations is likely to be so low as to be insignificant.

Aquatic Communities

Most aquatic species in the watershed are non-native species, many of which are considered invasive. Like non-native terrestrial species, potential impacts to non-native aquatic species are not considered significant. As many of the potentially impacted species have been identified as invasive (meaning they are considered likely to cause economic or environmental harm or harm to human health), adverse impacts could be considered a benefit. However, given the scale of the project, any actual change in local populations is likely to be so low as to be insignificant.

Although not abundant, native aquatic species have been documented in all of the streams and canals in the watershed (including four gobiid species [o'opu nakea (*Awaous stamineus*), o'opu nopili (*Sicyopterus stimpsoni*), o'opu naniha (*Stenogobius hawaiiensis*), and o'opu akupa (*Eleotris sandwicensis*)], two shrimp species ['opae kala'ole (*Atyoida155ompletena*) and 'opae 'oeha'a (*Macrobrachium grandimanus*)] and a mollusk species [hapawai (*Neritina155ompletenea*)]. Construction of the project features would primarily not occur within the streams but would be adjacent to streams. Construction of the floodwall along the right descending bank of the Manoa-Palolo canal would require the placement of a rock bench within the Manoa-Palolo canal adjacent to the stream bank. The rock bench would be approximately 15 feet in width and would run parallel to the channel bank. Equipment and personnel needed to construct the floodwall would be staged on the rock bench which would be completely removed once construction of the floodwall is complete. In addition to the above floodwall, the construction of inlet and outlet structures associated with the Ala Wai Canal floodwall could potentially require work within the canal. Work is anticipated to occur mostly from shore, but for outlets below the water line a cofferdam would need to be installed to block of the construction area from the surrounding aquatic environment. The cofferdam would be the minimum size needed to access the area and complete the construction activities. The cofferdam would be completely removed once construction is complete. The placement of the rock bench and cofferdams, though, could have potential impacts to aquatic species such as injury, death, or possible entrainment. To minimize potential impacts to species, each inlet/outlet structure requiring a cofferdam would be dewatered prior to construction, with proper fish exclusion protocols and other standard BMPs implemented, such that construction-related impacts to native aquatic species are expected to be less than significant. Recommended protocols and BMPs are expected to include the following:

- The extent and duration of instream work would be minimized to the extent possible.
- Construction activities within the stream channels would be limited to low-flow conditions. In addition to minimizing the extent of dewatering required, this would also serve to minimize the potential to disrupt migration of native species.
- Proper dewatering techniques would be implemented, as needed. For example, sand bags or a cofferdam would be used to isolate the work area. If needed, a pump would be used to dewater the construction area within the cofferdam. The pump would be properly screened to preclude entrapment of fish, and the area would be adequately inspected to ensure no fish are stranded.

As part of the long-term project operation, O&M activities would be required to keep the flood risk management structures in proper working order; in-stream O&M activities would include periodic sediment/debris removal from inlet and outlet structures. The above-listed BMPs would be implemented (as appropriate), such that impacts are expected to be less than significant.

In addition to the direct impacts to aquatic fauna, the project would also impact aquatic habitat, which could indirectly affect native aquatic species. The primary direct impact to aquatic habitat is during construction of the project. Construction of the Makiki Park Detention Basin, Koali Road Floodwall, and the Ala Wai Canal floodwall include inlet and outlet structures. The inlet structures intercept water and divert it either into a detention basin for storage or discharge interior drainage into a waterway on the other side of a floodwall. The outlet structures discharge stored water from a detention basin back into a waterway. Where these structures connect to the waterway, aquatic habitat could be impacted while construction is occurring. The project would incorporate BMPs to minimize erosion and turbidity into adjacent waterways while the inlet and outlet structures are being constructed. The design of the inlet and outlet structures would minimize the potential for scouring and erosion around the structures long-term. In addition, water discharged from the detention basin outlet structures has the potential to be less turbid as some sediment may fall out during storage. Therefore, less than significant impacts to aquatic habitat are anticipated.

Federal Listed Species and Species of Special Concern

Several ESA-listed species have the potential to be affected by the project; these are Hawaiian hoary bat, seabirds (i.e., band-rumped storm-petrel and Newell's Townsend's shearwater), Hawaiian waterbirds (i.e., Hawaiian duck, Hawaiian gallinule, Hawaiian coot, Hawaiian petrel, and Hawaiian stilt), Hawaiian monk seal, and sea turtles (i.e., green sea turtle and hawksbill sea turtle). Potential impacts to these species are summarized below, with further detail provided in the Biological Assessment (Appendix K). The project area does not contain critical habitat. ESA compliance is discussed in Section 6.1.

Hawaiian hoary bat (ESA status – Endangered): Should they occur, Hawaiian hoary bats could be directly or indirectly impacted by the project. Direct effects could include mortality or other forms of take (e.g., harm or harassment) to individual bats because of heavy equipment used for clearing and grubbing of the construction sites and construction of the flood risk management structures. The use of heavy equipment would also generate noise, which could disrupt bats that are present within the alternative action area. To avoid and minimize the potential for these impacts, vegetation clearing for the project would be performed during times of the year when Hawaiian hoary bats are not expected to be breeding to avoid potential for harm or disruption of juvenile bats that are unable to fly; specifically trees greater than 15 feet in height would not be cleared between June 1 and September 15. In addition, all construction activities would be scheduled to occur during daytime hours, thus avoiding potential bat foraging activities, which typically occur in the evening hours.

Other effects could include permanent loss or temporary impacts to habitat. However, given the amount of habitat available through the upper Ala Wai watershed, tree clearing within the alternative footprint is not expected to measurable decrease the amount of forest available to the local population of bats for roosting. In addition, on Oahu roost trees are plentiful and are not expected to be a limiting factor for the species. The forest habitat in the upper portions of the Ala Wai watershed is homogenous and does not vary significantly in composition or structure between adjacent patches. For these reasons, it is expected that any bats displaced by the clearing would readily find alternate roost sites in surrounding undisturbed forest.

With the implementation of seasonal restrictions for tree trimming/clearing and enforcement of construction hours, impacts to the Hawaiian hoary bat are expected to be insignificant, such that the project may affect, but is not likely to adversely affect the species.

Seabirds (i.e., band-rumped storm petrel [ESA status – Endangered], Hawaiian petrel [ESA status – Endangered], and Newell's Townsend's shearwater [ESA status – Endangered]): No direct effects due to implementation of the project are expected to sea bird species since the proposed alternative action area does not provide suitable nesting habitat. Therefore, there would be no direct impacts to sea bird nesting habitat. During construction of the proposed project, artificial lighting could be used during pre-dawn and pre-dusk hours within staging areas. Seabirds show a strong attraction to light sources, including artificial lights. Artificial lights can act as an attractant causing disorientation, confusion, and eventual grounding. The effects of artificial lights lead to a condition known as fallout, where fledgling young and adults are grounded and unable to regain flight, making them vulnerable to depredation or dehydration. Avoidance and minimization measures regarding artificial lighting would be implemented to reduce potential indirect impacts to seabirds that may be flying over the proposed alternative footprint. Given the above, coupled with the nature of activities proposed in the alternative footprint, impacts to seabirds are expected to be insignificant, such that the project may affect, but is not likely to adversely affect seabird species.

Hawaiian Waterbirds (i.e., Hawaiian duck (ESA status – Endangered), Hawaiian common gallinule [ESA status – Endangered], Hawaiian coot [ESA status – Endangered], and Hawaiian stilt [ESA status – Endangered]): The extent and quality of potentially suitable habitat within the proposed alternative action area is very limited and is likely to only be used as resting habitat for Hawaiian waterbird species. In the unlikely event that Hawaiian waterbird species are present within the proposed alternative action area, it is expected that they would readily disperse to nearby areas with higher quality habitat (e.g., Pearl Harbor National Wildlife Refuge) in response to disturbance; as such, the potential effects of the proposed project are expected to be limited to temporary construction-related disturbance (e.g., noise). Injury or mortality of Hawaiian waterbird species (or their nests) is not expected.

Areas of potentially suitable wetland habitat may be temporarily unavailable during construction (due to increased levels of disturbance), but sufficient habitat is expected to be available in nearby areas (e.g., Pearl Harbor National Wildlife Refuge). Following construction, the extent and quality of habitat is expected to be the same as the existing condition. During large-scale flood events, the detention basins would be inundated for short periods of time (i.e., about 1 day for Manoa Valley and Makiki Park District detention basins and about 2 days for the Ala Wai Golf Course detention basin), which could temporarily increase the extent of potential habitat. Although increased habitat may be viewed as a benefit, in heavily urbanized areas (such as the Ala Wai watershed), it can also create an attractive nuisance for waterbird species. Specifically, areas of increased habitat may attract waterbirds, which are then vulnerable to predator species that are prevalent in an urban environment (e.g., feral cats, mongoose). However, given the low probability of species occurrence and the infrequent recurrence and short-term duration of flooding, these conditions are not expected to significantly affect Hawaiian waterbirds. Based on the minimal extent and quality of suitable habitat, there is a low probability of species occurrence in the proposed alternative action area. Given the above, coupled with the nature of activities proposed, impacts to Hawaiian waterbirds are expected to be insignificant, such that the proposed project may affect, but is not likely to adversely affect Hawaiian waterbird species.

Hawaiian monk seal (ESA status – Endangered): Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with Hawaiian monk seal through:

1. Collision with vessels;
2. Direct physical impact;
3. Disturbance from human activity and equipment operation;
4. Exposure to elevated noise levels;
5. Exposure to elevated turbidity;
6. Exposure to wastes and discharges; and
7. Loss of forage habitat.

Collision with vessels:

Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

Direct physical impact:

Physical impact to Hawaiian monk seal is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact Hawaiian monk seal should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Hawaiian monk seal could also be pinned to the bottom and drowned. To minimize potential physical impacts to Hawaiian monk seal during cofferdam material placement, avoidance and minimization measures listed further below in this section under environmental commitments would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization measures (refer to the environmental commitments listed further below in this section for the complete list) would minimize the potential physical impact to Hawaiian monk seal during the placement and removal of cofferdam material.

Disturbance from human activity and equipment operation:

Although construction of the floodwalls would occur upland, work would occur near marine habitat where ESA-listed marine species may be directly exposed to project-related activity. Hawaiian monk seal may experience a startle reaction and resulting stress should they

encounter site preparation and construction activities. The reaction could range from one extreme where an animal calmly approaches and investigates the activity, to an opposite reaction of panicked flight, where an animal injures itself in an attempt to flee. However, marine mammals such as Hawaiian monk seal typically avoid human activity. Thus, the most likely effect of this interaction will be moderate level stress with a moderate to high energy avoidance behavior leading to the Hawaiian monk seal rapidly leaving the project footprint without injury.

Exposure to elevated noise levels:

Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for Hawaiian monk seal. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, most of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot-wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot-wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise during construction of these types of floodwalls. However, like the pile installation along the reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose Hawaiian monk seals to project-related activity. However, Hawaiian monk seals typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed further below in this section under environmental commitments. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon Hawaiian monk seal.

As described under environmental commitments, located further below in this section, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The operation of the project is passive161ompleter, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the Hawaiian monk seal due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 40. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

Table 40: Future Without Project and Future with Project Modeled Velocities at the 5%, 2%, and 1% AEP.

Ala Wai Canal Location	Existing Velocities at Different AEPs without Project			Predicted Velocities at Different AEPs with Project			Velocity Difference (+) increase (-) decrease		
	5% AEP	2% AEP	1% AEP	5% AEP	2% AEP	1% AEP	5% AEP	2% AEP	1% AEP
Mouth of Manoa-Palolo Canal	10,215	11,171	11,418	13,268	13,220	15,497	(+) 3,053	(+) 2,029	(+) 4,079
Ala Wai Golf Course Midpoint	1,713	1,732	1,990	1,336	3,045	4,543	(-) 377	(+) 1,313	(+) 2,553
Ala Wai Canal Terminus	465	649	684	557	569	833	(+) 92	(-) 80	(+) 149
Ala Wai Community Park	11,700	13,238	13,833	14,429	16,688	18,922	(+) 2,729	(+) 3,450	(+) 5,089
Mouth of Ala Wai Canal (Ala Moana Boulevard)	2,831	3,177	3,475	15,687	17,387	18,622	(+) 12,856	(+) 14,210	(+) 15,147

Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 23 shows selected time progressions of this storm's modeled turbidity plume.

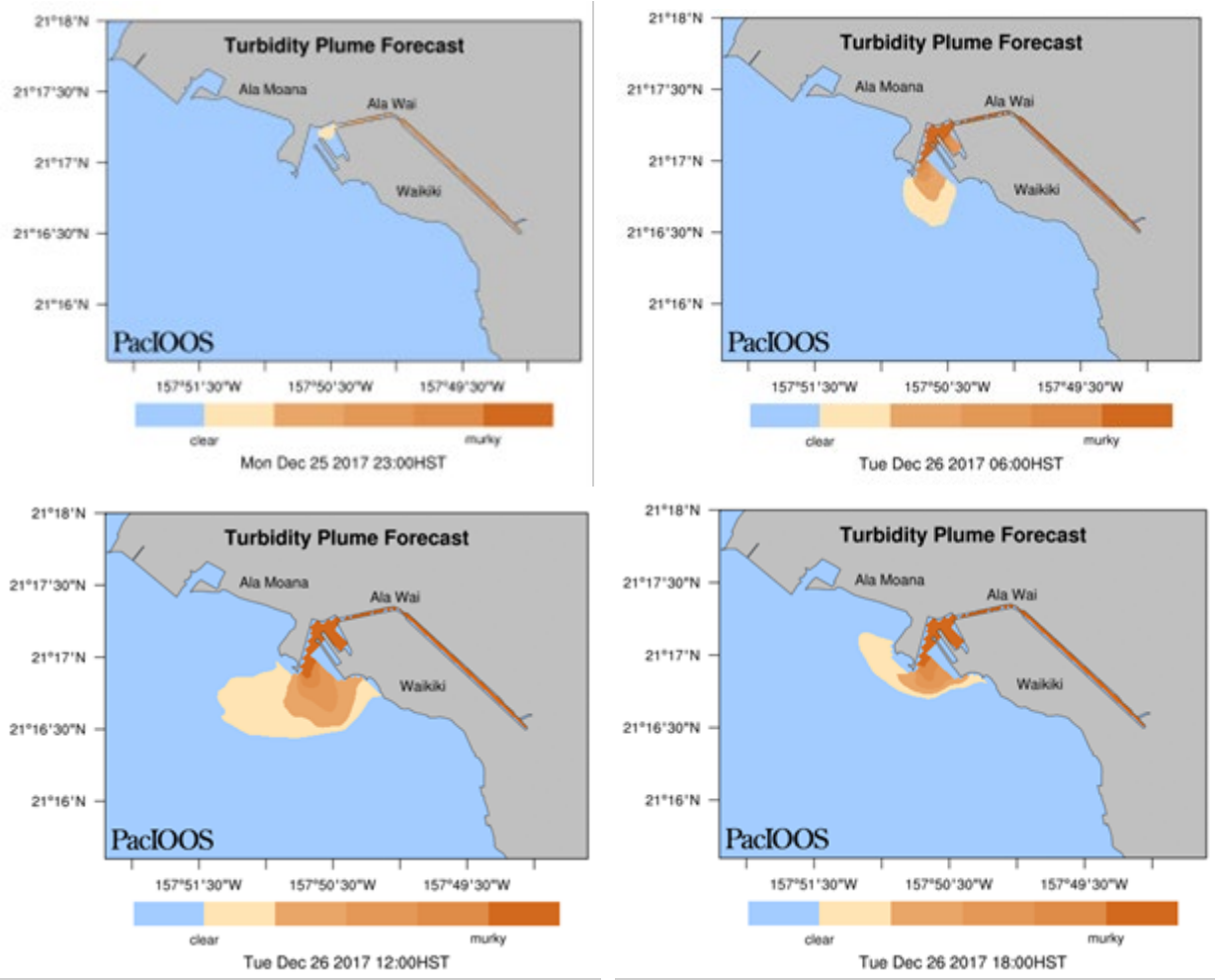

Figure 23: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

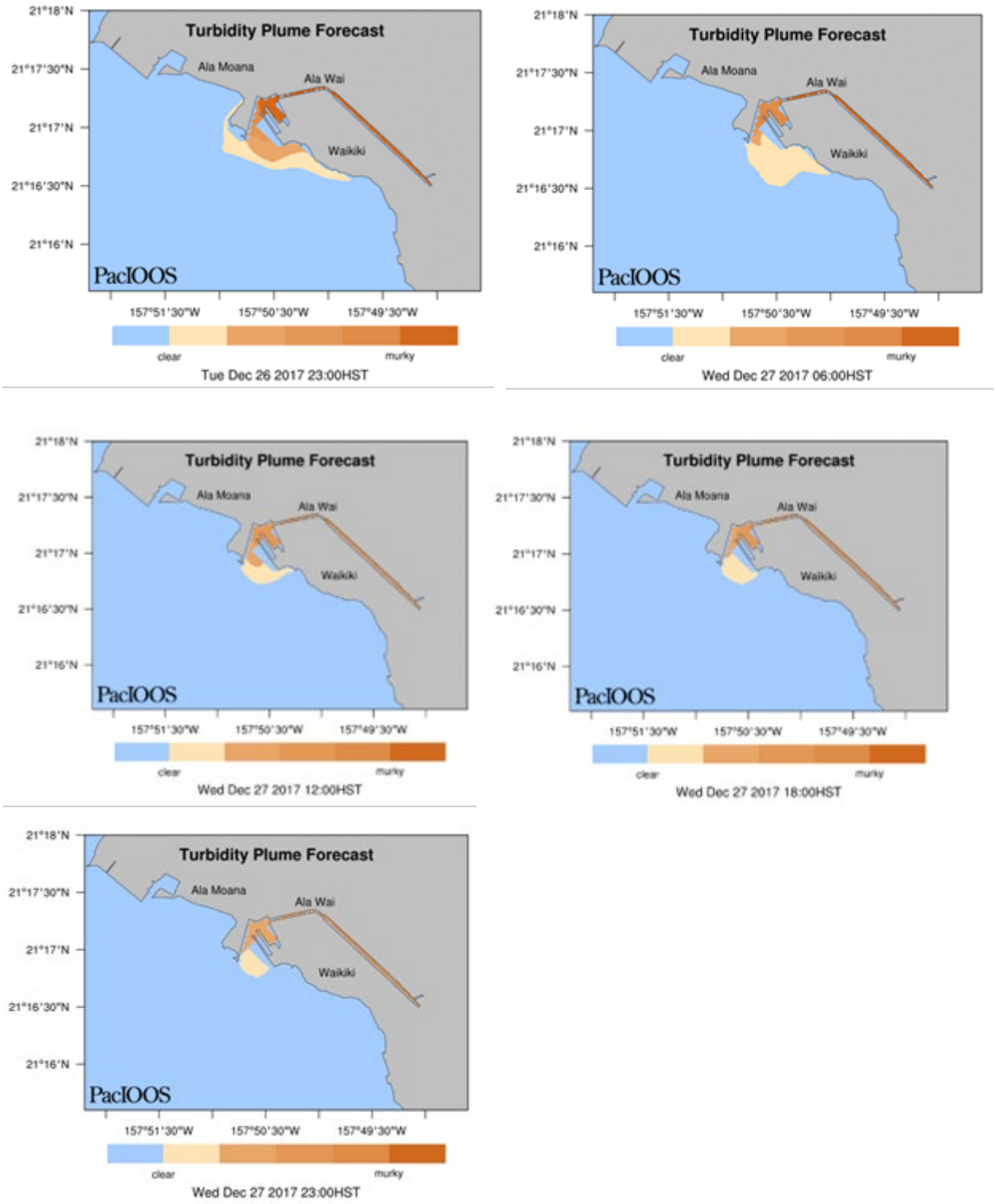

Figure 23, cont'd: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

As seen in the above time progressions, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact Hawaiian monk seal. However, given that Hawaiian monk seal breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by Hawaiian monk seal from acceleration of

the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

Exposure to wastes and discharges:

Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle Hawaiian monk seal. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose Hawaiian monk seal to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed under environmental commitments located further below in this section include measures intended to prevent or reduce exposure of Hawaiian monk seal to wastes and discharges in the marine environment.

Loss of forage habitat:

Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where Hawaiian monk seal may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure is located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of

potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.

Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother Hawaiian monk seal foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, Hawaiian monk seal foraging habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to Hawaiian monk seal foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on Hawaiian monk seal foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of Hawaiian monk seal foraging habitat.

Critical Habitat

Activities associated with the proposed action that could reasonably be expected to impact designated marine critical habitat for the Hawaiian monk seal include:

1. Exposure to elevated turbidity and sedimentation; and
2. Exposure to wastes and discharges.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels

would degrade ambient water quality within the construction footprint and immediate surrounding area which could include proposed designated critical habitat for the green sea turtle. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed under environmental commitments located further below in this section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat, green sea turtle proposed designated critical habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon designated critical habitat for the Hawaiian monk seal.

As described under environmental commitments, located further below in this section, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The long-term operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to designated critical habitat for the Hawaiian monk seal from potential water quality degradation. Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced primarily at nearby designated critical habitat for the Hawaiian monk seal sooner than under the without project condition. Turbidity plumes extending into nearby designated critical habitat for the Hawaiian monk seal may also take longer than approximately 24 hours for dissipation to begin. The degraded water quality caused by the turbidity plumes could stimulate and sustain algae growth within the action area. Currently, frondose algae, crustose coralline algae, and turf algae are common but not dominant in the action area. Filamentous algae or cyanobacteria are also present primarily seaward of Waikiki beaches but do not dominate the habitat. While the proposed project is likely to increase nutrient and sediment concentrations reaching the nearshore marine environment during a storm event, the degree of increase in concentrations is not expected to stimulate algae growth in such a way that algae would be expected to become dominant in the action area and smoother corals that provide habitat for Hawaiian monk seal prey. Hawaiian monk seals are “generalist” feeders, meaning they eat a wide variety of foods depending on availability. Hawaiian monk seals eat many species of common fishes, squids, octopuses, eels, and crustaceans (crabs, shrimps, and lobsters). There could be slight increases in algae growth observed due to increased nutrient and sediment concentrations and

turbidity taking longer to begin to dissipate, but the increase in algae growth would not be expected to be substantial to cause a loss of foraging habitat for the Hawaiian monk seal in the action area. Overall, the proposed project is not expected to substantially affect foraging habitat for the Hawaiian monk seal; therefore, the proposed project is not expected to destroy or adversely modify designated critical habitat for the Hawaiian monk seal.

Exposure to discharges:

Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, equipment spills and discharges likely consisting of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, could enter the nearshore marine environment and designated critical habitat for the Hawaiian monk seal to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects. Regarding foraging habitat for the Hawaiian monk seal (i.e., designated critical habitat), inadvertent spills and discharges from construction equipment has the potential to quickly kill Hawaiian monk seal prey. Highly motile prey such as fish, squid, octopus, and eels may be able to avoid harm by moving out of the area. Highly motile prey is also expected to be able to recolonize the affected area faster once contamination is contained and/or dissipates. Less motile prey such as crabs, shrimps, and lobsters are likely to be killed. Less motile prey is also expected to take longer to recolonize the affected area once contamination is contained and/or dissipates. Although inadvertent spills and discharges from construction equipment have the potential to kill Hawaiian monk seal prey, motile prey are expected to be able to avoid harm and recolonize the area quickly. Less motile prey species would likely take longer to recolonize the area, but since Hawaiian monk seals eat a wide variety of foods depending on availability, diet for the seals would likely consist of more motile species until less motile species are able to recolonize the area. It is important to note that local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed further below in this section under environmental commitments include measures intended to prevent or reduce exposure of the marine environment to wastes and discharges from construction equipment. Based on the above and the implementation of measures located further below in this section under environmental commitments, the proposed project is not expected to substantially affect foraging habitat for the Hawaiian monk seal; therefore, the proposed project is not expected to destroy or adversely modify designated critical habitat for the Hawaiian monk seal.

Overall, the proposed action involves minor in-water work which could expose Hawaiian monk seal to project-related activity. However, with the implementation of avoidance and minimization measures listed under environmental commitments located further below in this section potential impacts to Hawaiian monk seal due to project-related activity is expected to be minimized such that the proposed action may affect, but is not likely to adversely affect Hawaiian monk seal or designated critical habitat for Hawaiian monk seal.

Green Sea Turtle (ESA status – Threatened): Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with green sea turtle through:

1. Collision with vessels;
2. Direct physical impact;
3. Disturbance from human activity and equipment operation;
4. Exposure to elevated noise levels;
5. Exposure to elevated turbidity;
6. Exposure to wastes and discharges; and

7. Loss of forage habitat.

Collision with vessels:
Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

Direct physical impact:
Activities associated with the proposed action do not include the use of vessels in nearshore Physical impact to green sea turtle is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact green sea turtle should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Green sea turtle could also be pinned to the bottom and drowned. To minimize potential physical impacts to green sea turtle during cofferdam material placement, avoidance and minimization measures listed under environmental commitments, located further below in this section, would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization measures listed under environmental commitments, located further below in this section, would minimize the potential physical impact to green sea turtle during the placement and removal of cofferdam material.

Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. Construction of the Ala Wai Canal floodwall, however, includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose green sea turtles to project-related activity. However, sea turtles typically avoid human activity, so exposure to the project-related activity detailed above would be infrequent and non-injurious. In addition, avoidance and minimization measures would be implemented during construction such that in insignificant effects on the green sea turtle are anticipated.

Exposure to elevated noise levels:

Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for green sea turtle. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, most of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot-wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot-wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise during construction of these types of floodwalls. However, like the pile installation along the reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would

potentially expose green sea turtle to project-related activity. However, green sea turtles typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

Exposure to elevated turbidity and sedimentation:
In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed under environmental commitments, located further below in this section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon green sea turtle.

As described under environmental commitments, located further below in this section, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the green sea turtle due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 40. Although the

project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 23 shows selected time progressions of this storm's modeled turbidity plume.

As seen in Figure 23, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high

turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact green sea turtle. However, given that green sea turtles breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by green sea turtle from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

Exposure to wastes and discharges:
Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle green sea turtle. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose green sea turtles to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations

prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed under environmental commitments, located further below in this section, include measures intended to prevent or reduce exposure of green sea turtles to wastes and discharges in the marine environment.

Loss of forage habitat:
Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where green sea turtles may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure is located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.

Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother green sea turtle foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, green sea turtle foraging habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to green sea turtle foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or

no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on green sea turtle foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of green sea turtle foraging habitat.

Critical Habitat

Activities associated with the proposed action that could reasonably be expected to impact proposed designated habitat for the green sea turtle include:

1. Exposure to elevated turbidity and sedimentation; and
2. Exposure to wastes and discharges.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area which could include proposed designated critical habitat for the green sea turtle. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed under environmental commitments, located further below in this section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat, green sea turtle proposed designated critical habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon proposed designated critical habitat for the green sea turtle.

As described under environmental commitments, located further below in this section, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The long-term operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to proposed designated critical habitat for the green sea turtle from potential water quality degradation. Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced primarily at nearby proposed designated critical habitat for the green sea turtle sooner than under the without project condition. Turbidity plumes extending into nearby proposed designated critical habitat for the green sea turtle may also take longer than approximately 24 hours for dissipation to begin. The degraded water quality caused by the turbidity plumes could stimulate and sustain algae growth within the action area. Currently, frondose algae, crustose coralline algae, and turf algae are common but not dominant in the action area (USFWS, 2023b). Filamentous algae or cyanobacteria are also present primarily seaward of Waikiki beaches but do not dominate the habitat (USFWS, 2023b). While the proposed project is likely to increase nutrient and sediment concentrations reaching the nearshore marine environment during a storm event, the degree of increase in concentrations is not expected to stimulate algae growth in such a way that algae would be expected to become dominant in the action area. Green sea turtles are herbivores and eat mostly seagrasses and algae. Although the project is not expected to significantly stimulate algae growth, the project is also not expected to substantially decrease algae growth beyond that which currently occurs in the action area. Overall, the proposed project is not expected to substantially affect foraging habitat for the green sea turtle; therefore, the proposed project is not expected to destroy or adversely modify proposed designated critical habitat for the green sea turtle.

Exposure to discharges:

Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, equipment spills and discharges likely consisting of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, could enter the nearshore marine environment and proposed designated critical habitat for the green sea turtle to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects. Regarding foraging habitat for the green sea turtle (i.e., proposed designated critical habitat), inadvertent spills and discharges from construction equipment has the potential to quickly kill algae filaments; however, populations may recover rapidly by growth and vegetative reproduction of any unharmed fragments or spores (O'Brien and Dixon, 1976). Although inadvertent spills and discharges from construction equipment have the potential to kill algae, hydrocarbon-based chemicals generally have a greater adverse impact on algal grazers than algae (O'Brien and Dixon, 1976). Therefore, inadvertent spills and discharges would likely kill algal grazers and result in a temporary increase in algae until algal grazers are able to recolonize the impacted area (O'Brien and Dixon, 1976). It is important to note that local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed under environmental commitments, located further below in this section, include measures intended to prevent or reduce exposure of the marine environment to wastes and discharges from construction equipment. Based on the above and the implementation of measures under environmental commitments, located further below in this section, the proposed project is not expected to substantially affect foraging habitat for the green sea turtle; therefore, the proposed project is not expected to destroy or adversely modify proposed designated critical habitat for the green sea turtle.

Overall, the proposed action involves minor in-water work which could expose green sea turtle to project-related activity. However, with the implementation of avoidance and minimization

measures listed under environmental commitments, located further below in this section, potential impacts to green sea turtle due to project-related activity is expected to be minimized such that the proposed action may affect, but is not likely to adversely affect green sea turtle or proposed designated critical habitat for green sea turtle.

Hawksbill Sea Turtle (ESA status – Endangered): Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with hawksbill sea turtle through:

1. Collision with vessels;
2. Direct physical impact;
3. Disturbance from human activity and equipment operation;
4. Exposure to elevated noise levels;
5. Exposure to elevated turbidity;
6. Exposure to wastes and discharges; and
7. Loss of forage habitat.

Collision with vessels:
Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

Direct physical impact:
Activities associated with the proposed action do not include the use of vessels in nearshore Physical impact to hawksbill sea turtle is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact hawksbill sea turtles should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Hawksbill sea turtle could also be pinned to the bottom and drowned. To minimize potential physical impacts to hawksbill sea turtle during cofferdam material placement, avoidance and minimization measures listed under environmental commitments, located further below in this section, would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization measures (refer to environmental commitments located further below in this section for the complete list) would minimize the potential physical impact to hawksbill sea turtle during the placement and removal of cofferdam material.

Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. Construction of the Ala Wai Canal floodwall, however, includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose hawksbill sea turtles to project-related activity. However, sea turtles typically avoid human activity, so exposure to the project-related activity detailed above would be infrequent and non-injurious. In addition, avoidance and minimization measures would be implemented during construction such that in insignificant effects on the hawksbill sea turtle are anticipated.

Exposure to elevated noise levels:
Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for hawksbill sea turtle. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, most of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot-wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot-wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise during construction of these types of floodwalls. However, like the pile installation along the

reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose hawksbill sea turtle to project-related activity. However, Hawaiian monk seals typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting hawksbill sea turtle from potential noise-related impacts.

Exposure to elevated turbidity and sedimentation:
In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed under environmental commitments, located further below in this section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon hawksbill sea turtle.

As described under environmental commitments, located further below in this section, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality

impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the hawksbill sea turtle due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 40. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 23 shows selected time progressions of this storm's modeled turbidity plume.

As seen in Figure 23, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the

passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact hawksbill sea turtle. However, given that hawksbill sea turtles breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by hawksbill sea turtle from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would

hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

Exposure to wastes and discharges:
Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle hawksbill sea turtle. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose hawksbill sea turtle to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed under environmental commitments, located further below in this section, include measures intended to prevent or reduce exposure of hawksbill sea turtle to wastes and discharges in the marine environment.

Loss of forage habitat:
Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where hawksbill sea turtle may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure were located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.

Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother hawksbill sea

turtle foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, hawksbill sea turtle foraging habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to hawksbill sea turtle foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on hawksbill sea turtle foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of hawksbill sea turtle foraging habitat.

Overall, the proposed action involves minor in-water work which could expose hawksbill sea turtle to project-related activity. However, with the implementation of avoidance and minimization measures listed under environmental commitments, located further below in this section, potential impacts to hawksbill sea turtle due to project-related activity is expected to be minimized such that the proposed action may affect, but is not likely to adversely affect hawksbill sea turtle.

Essential Fish Habitat

Pursuant to the Magnuson-Stevens Act, an adverse effect is defined as any impact that reduces quality and/or quantity of EFH; this includes direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to species and their habitat, and other ecosystem components.

As described in Section 3.4.5, no portion of the proposed alternative action area has been designated as EFH, such that the proposed project is not expected to directly affect the quality and/or quantity of EFH. The nearshore waters downstream from the Ala Wai Canal (i.e., Ala Wai Small Boat Harbor, Mamala Bay, etc.) include EFH for various lifestages of bottomfish, pelagics, and crustaceans. In general, conditions that could indirectly affect EFH include increased delivery of sediment and associated contaminants, which could smother bottom substrate and degrade water quality. However, as described in Section 3.3.4, the proposed project is not expected to result in significant water quality impacts, either within the streams or nearshore waters (including EFH). Rather, it is possible that some degree of benefit could be realized over

the long-term through the capture and removal of sediment from the three proposed detention basins. As such, the proposed project is not expected to adversely affect EFH, either directly or indirectly.

Refer to Appendix K for the EFH analysis and the USACE's determination that the proposed project would have no adverse effect on EFH.

Conservation Plan(s)
There are no HCPs in place within the proposed alternative action area, therefore, the project would have no direct or indirect effects on implemented HCPs.

Alternative 5.3

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to biological resources within the alternative action area are generally expected to be similar. However, for comparison, the amount of acreage temporarily and permanently impacted under Alternative 5.3 is found below in Table 41.

Table 41: Summary of Disturbance Ares for Alternative 5.3 Measures.

Structural Feature	Total Construction Area (acres)	Permanent Footprint (acres)	Vegetation Management Area for O&M (acres)	Inundation Area During Flood (acres)
Woodlawn Drive Floodwall	2.40	1.27	1.27	NA
Koali Road Floodwall	5.00	2.47	2.47	NA
Ala Wai Golf Course Detention Basin	35.79	181.20	181.20	156.03
Ala Wai Canal Floodwall	42.17	23.30	23.30	NA
TOTAL	**85.36**	**208.24**	**208.24**	**156.03**

Alternative 6

Less than Significant Impact: Negligible long-term and negligible to minor short-term direct impacts to plant communities are expected to result from implementation of Alternative 6, because land disturbance for this alternative would be limited to modification of existing buildings and land disturbance in their immediate vicinity. Implementation of Alternative 6 would require construction access to all structures to be treated which would be expected to occur from existing roads. Similarly, localized maintenance such as repairs would be needed over time.

Negligible to minor short-term indirect adverse impacts to wildlife species are expected to result from implementation of Alternative 6, because land disturbance for this alternative would be limited to modification of existing buildings. Animal species would likely avoid the area during construction. Implementation of Alternative 6 would require temporary construction access to all structures to be treated; this would be expected to occur from existing roads. Similarly, localized

maintenance such as repairs will be needed over time. Overall, negligible to minor long-term indirect effects to wildlife species are expected as a result of future maintenance activities.

No aquatic communities or habitat will be impacted by the implementation of Alternative 6, therefore no short-term or long-term direct or indirect adverse effects to aquatic communities would occur.

Negligible to minor short-term or long-term adverse effects to threatened and endangered species are expected to result from implementation of Alternative 6, because land disturbance for this alternative would be limited to modification of existing buildings. There would be temporary land disturbance in yards and impervious surfaces surrounding the existing buildings; however, no new undeveloped habitats would be impacted. Implementation of Alternative 6 would require construction access to all structures to be treated, but this would be expected to occur from existing roads. Similarly, localized maintenance such as repairs will be needed over time.

Environmental Commitments

The following environmental commitments would be implemented by the contractor during construction activities to avoid and minimize potential impacts to biological resources.

EC BR-1: The following environmental commitments are designed to avoid or minimize impacts to fish and wildlife resources, and ESA-listed marine resources:

- Authorized filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project footprint.
- Turbidity and siltation from project-related work should be minimized and contained within the project footprint by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project footprint is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.
- All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a littler-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fwl.html) can help to prevent attraction and introduction of non-native species.
- Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.
- Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be

developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

- All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric, or native or non-invasive vegetation matting, hydro-seeding, etc.

EC BR-2: The following environmental commitments are designed to avoid and minimize potential project impacts to Hawaiian hoary bat:

- Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15).
- Do not use barbed wire for fencing.

EC BR-3: The following environmental commitments are designed to avoid and minimize potential project impacts to Hawaiian seabirds:

- To the maximum extent practicable, limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat areas.
- If construction activity time restrictions are not possible, use down shielding or directional lighting to avoid light trespass into bird habitat (i.e., use a 'Cobra' style light rather than an omnidirectional light system to direct light down to the roadbed). To the maximum extent practicable, while allowing for public safety, low intensity energy saving lighting (e.g., low pressure sodium lamps) will be used.
- Minimize illumination of lighting on associated construction or operation structures by using motion sensors or heat sensors.
- Bright white light, such as metal halide, halogen, fluorescent, mercury vapor, and incandescent lamps should not be used.
- Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledgling period, September 15 through December 15.

EC BR-4: The following environmental commitments are designed to avoid and minimize potential project impacts to Hawaiian waterbirds:

- In areas where waterbirds are known to be present, reduced speed limit signs will be posted to inform project personnel and contractors about the presence of endangered species on—site; and reduced speed limits will be implemented.
- Applicable USFWS BMPs regarding work in aquatic environments will be incorporated and implemented into the project design if water resources are located within or adjacent to the project footprint in order to contain stream sediments to the operational area.
- A biological monitor that is familiar with Hawaiian waterbirds' biology will conduct nest surveys where appropriate habitat occurs within the vicinity

of the proposed project footprint prior to project initiation. Surveys will be repeated within three days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest). If a nest or active brood is found:

- The USFWS will be contacted within 48 hours for further guidance.
- A 100-foot buffer will be established and maintained around all active nests and or broods until the chicks have fledged. Potentially disruptive activities will not be conducted, and habitat alteration will not occur within this buffer.
- A biological monitor that is familiar with the species' biology will be present on the project footprint during all construction or earth moving activities until the chicks fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

EC BR-5 The following environmental commitments are designed to avoid and minimize potential project impacts to green sea turtle, hawksbill sea turtle, and Hawaiian monk seal:

- Constant vigilance shall be kept for the presence of ESA-listed marine species during all aspects of the proposed action, particularly in-water activities.
- The USACE shall designate an appropriate number of competent trained observers to survey the areas adjacent to the proposed action for ESA-listed marine species.
- Surveys shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one-half hour. Periodic additional surveys throughout the workday are strongly recommended.
    - Special attention will be given to verify that no ESA-listed species are in the area where equipment or material is expected to enter the water where there is a risk of contact with the species.
    - Certain activities may require additional surveys as advised by NMFS on an *ad hoc* basis as identified during the consultation.
- All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area.
    - If ESA-listed motile marine species are noticed within 164 feet (50 meters) after work has already begun, that work may continue only if the activity will not adversely affect the animal(s). For example, divers performing underwater work such as monitoring or surveys would likely be permissible, whereas operation of heavy equipment is likely not.
- All objects will be lowered to the bottom (or installed) in a controlled manner to avoid contact with ESA-listed species. This can include the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.
- Do not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA-listed marine species.

- Report any monk seal sightings:
    - Email NMFS at pifsc.monksealsighting@noaa.gov
    - Call the Marine Animal Stranding, Entanglement, and Reporting Hotline at: 888-256-9840.
- No contamination of the marine environment shall result from project-related activities.
- A contingency plan to control toxic materials is required.
- Appropriate materials to contain and clean potential spills shall be stored at the work site and be readily available.
- Heavy equipment in and near water bodies shall consider the use of biofuels and non-petroleum-based hydraulic fluids.
- All project-related materials and equipment placed in the water shall be free of pollutants.
- The contractor and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected and shall not proceed until the leak is repaired and equipment cleaned.
- Fueling of land-based vehicles and equipment shall take place at least 164 feet (50 meters) away from the water, preferably over an impervious surface.
- Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.
- A plan shall be developed to prevent debris and other wastes from entering or remaining in the marine environment during the project.
- All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area.
- Minimize direct contact to corals, seagrass, or other sessile ESA-listed resources.
- All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area.
- Unauthorized Take – If a listed marine mammal is determined by the PSO to have been disturbed, harassed, harmed, injured, or killed (e.g., a listed marine mammal(s) is injured or killed or is observed entering a shutdown zone before operations can be shutdown), it will be reported to NMFS within one business day to Ron.Dean@noaa.gov. These PSO records, submitted in digital and guervable format to NMFS, will include:
    - Information to be provided in the final report;
    - Number and species of listed animals affected;
    - The date, time, and location of each event (provide geographic coordinates);
    - Description of the event;
    - The time the animal(s) was first observed or entered the shutdown zone, and, if known, the time the animal was last seen or exited the zone, and the fate of the animal;
    - Mitigation measures implemented prior to and after the animal was taken;

    - If a vessel struck a marine mammal, the contact information for the PSO on duty, or the contact information for the individual piloting the vessel if there was no PSO on duty;
    - Photographs or video footage of the animal(s) (if available).
- Stranded, injured, sick, or dead marine mammal (not associated with the project);
    - If PSOs observe an injured, sick, or dead marine mammal (i.e., stranded marine mammal), they will notify the Pacific Islands Marine Mammal Stranding Hotline at 888-256-9840. The PSOs will submit photos and data that will aid NMFS in determining how to respond to the stranded animal. Data submitted to NMFS in response to stranded marine mammals will include date/time, location of stranded marine mammal, species and number of stranded mammals, description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine mammals.
- All areas of temporary waterway or wetland fill will be restored to their original contour and character upon completion of the project. Temporary fil includes both fill that received authorization and fill that inadvertently enters a water of the U.S. (i.e., from slope failures, accidental broken sandbag cofferdams, etc.). All temporary fills and structures in waters of the U.S. will be removed in their entirety upon completion of use. This avoidance and minimization measure will ensure restoration of flow to waterbodies for fish migration and avoids creation of potential sources of sedimentation and erosion that may elevate turbidity and adversely impair water quality conditions of downstream waters where federally listed marine species may occur.
- All in-water excavation will be conducted within a cofferdam or other sediment containment device extending from the water surface to the substrate intended to isolate and contain in the work area. All in-water sediment containment devices will be placed to isolate the minimum area necessary to complete the work and will be removed upon completion of in-water work only after the water quality in the enclosed area has returned to ambient and would not release a turbidity plume. This avoidance and minimization measure isolates and contains sediments to the in-water work area and reduces potential for adverse impairment of water quality conditions with the rick of degrading water quality conditions of downstream waters where federally listed marine species may approach the in-water work area (I.e., Ala Wai Canal), the sediment containment device will create a physical barrier preventing interaction and potentially physical impact to federally listed marine species.
- All upland areas of disturbed soil will be mulched and seeded with an approved native or noninvasive herbaceous seed mix following construction and/or planted with native or noninvasive woody vegetation and trees appropriate during the first available planting season. In areas where there is little to no slope and erosion and invasive species establishment is unlikely, the native woody vegetation on the site will be allowed to regenerate naturally. This avoidance and minimization measure avoids creation of potential sources of sedimentation and erosion that may elevate turbidity and adversely impact water quality

conditions of downstream waters where federally listed marine species may occur.

- Temporary access roads placed in the riparian area will be constructed in a manner that they do not allow erosion into waters of the U.S. during construction. This avoidance and minimization measure avoids creation of potential sources of sedimentation and erosion that may elevate turbidity and adversely impair water quality conditions of downstream waters where federally listed marine species may occur.
- All off-road equipment and vehicles operation from existing open and maintained roads must be cleaned prior to entering the construction site to remove all soil, seeds, vegetation, or other debris that could contain seeds or reproductive portions of plants. All equipment will be inspected prior to off-loading to ensure that they are clean. This avoidance and minimization measure minimizes the spread of invasive plants that may degrade riparian habitats and erode sediments, resulting in reduced water quality conditions that may negatively affect green and hawksbill sea turtles and the Hawaiian monk seal.
- During construction, any disturbed soils will be temporarily stabilized with materials such as hay, mulch, plastic sheeting, erosion control mix, or other appropriate measures. This avoidance and minimization measure reduces the risk of erosion and exposure to reduced water quality conditions that may otherwise negatively affect green and hawksbill sea turtles and the Hawaiian monk seal.
- Cofferdam materials will be fully removed from the stream immediately following completion of in-water work, minimizing delays due to high stream flows following heavy precipitation. All areas of temporary bottom disturbance will be restored to their original contour and character upon completion of the project. This avoidance and minimization measure removes obstacles and barriers to fish passage and returns benthic habitat to its original composition, limiting sediment disturbance and the temporary effects of degraded water quality conditions to green and hawksbill sea turtles and the Hawaiian monk seal.
- All cofferdams will be removed using techniques to minimize turbidity releases. This includes allowing for the slow reintroduction of water into the work area and utilizing dirty water treatment systems for turbid water. This avoidance and minimization measure avoids degrading water quality conditions that may negatively affect green and hawksbill sea turtles and the Hawaiian monk seal.
- No equipment, materials, or machinery will be stored, cleaned, fueled, or repaired within any water of the U.S. All vehicle and equipment refueling activities will occur more than 100 feet from any water course and if not, all refueling areas will require fuel spill containment structures. A spill prevent and response plan will be prepared and implemented by the construction contractor. This avoidance and minimization measure avoids creation of a pollutant source that may degrade downstream water quality conditions where federally listed marine species may occur.
- All pumps and generators will have appropriate spill containment structures and/or spill remediation materials available, such as absorbent pads. This avoidance and minimization measure reduces the risk of

green and hawksbill sea turtle and Hawaiian monk seal exposure to petroleum products and other contaminants.

- All equipment used for in-stream work will be cleaned of external oil, grease, dirt, and mud such that turbid water does not enter any water of the U.S. Any leaks or accumulations of these materials will be correlated before entering streams of areas that drain directly to streams or wetlands. All releases into surface waters or wetlands will be reported immediately to the appropriate regulatory body. This avoidance and minimization measure reduces the risk of green and hawksbill sea turtles and the Hawaiian monk seal exposure to petroleum products and other contaminants.

Best Management Practices

No BMPS associated with impacts due to biological resources apply, although the environmental commitments listed above are similar to BMPs.

3.4.8 Agricultural and Forestry Resources

Regulatory Setting

Relevant federal and state laws/regulations include:

- Farmland Protection Policy Act

Existing Conditions

According to the United States Department of Agriculture (USDA, 2023) there are approximately 7,300 farms throughout the Hawaiian Islands. In addition, approximately 1,100 acres of land is in farms with the average farm size being approximately 151 acres. Following are the top 20 agricultural commodities produced by the State of Hawaii in 2021 (HDOA, 2022): seed crops, macadamia nuts, coffee, cattle, algae, basil, food crops grown under protection, potted orchids, eggs, papayas, lettuce, cabbage, taro, bananas, ornamental-aquaculture, potted palms, honey, green onions, sweet potatoes, and mushrooms. In addition to farms, Hawaii also has aquaculture production which includes the following overarching commodities: shellfish, finfish, algae, ornamental, and other (USDA, 2022).

Within the study area, there is no commercial agriculture for the most part. It is important to note that taro is grown along Manoa Stream near Dole Street. Ka Papa Loi O Kanewai sustains a taro patch that shares its resources with the surrounding community. Within the vicinity of the taro patch there are a variety of native and indigenous trees and shrubs growing along the stream and low-lying slopes. The Ka Papa Loi O Kanewai is part of the University of Hawaii at Manoa's School of Hawaiian Knowledge.

Regarding forestry, there are three timber management areas within the Hawaiian Islands. Timber management areas are State-owned lands designated for the sustainable production of forest products. Harvesting activities within the timber management areas need to follow a management plan approved by the Board of Land and Natural Resources and in accordance with the provisions regarding conservation of aquatic life, wildlife, and land plants, and with the provisions regarding environmental impact statements. The three active timber management areas in Hawaii currently are: Waiakea Timber Management Area, Kokee Timber Management Area, and Kapapala Canoe Forest Timber Management Area. None of these timber management areas are located on Oahu. However, the upper portion of Oahu is within a Conservation District. The Conservation District where forest is located is divided primarily into two subzones: protective and resource. Conservation District areas under the resource subzone

designation, sustainable commercial forestry can occur as long as it is conducted under an approved management plan and the necessary permit (Hawaii Administrative Rules, 13-5-24). Conservation District areas under the protective subzone designation, no commercial forestry is permitted (Hawaii Administrative Rules, 13-5-22).

Significance Criteria

Effects on agricultural and forestry resources would be considered significant if the proposed project would result in any of the following:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide importance (Farmland) to non-agricultural uses.
- Result in the loss of forest land or conversion of forest land to non-forest use.

Environmental Consequences

No Action Alternative

Under the No Action Alternative, no project would be constructed. As a result, the No Action Alternative would not cause the conversion of prime, unique, or farmland of statewide importance to non-agricultural uses; or result in the loss of forest land or conversion of forest land to non-forest use.

Alternative 1

No Impact: Regarding farmland, the NRCS web soil survey was reviewed to determine which soils in the area are designated as prime farmland (Table). The Manoa Valley District Park detention basin, portions of the Woodlawn Drive floodwall, portions of the Ala Wai Golf Course floodwall, and the Ala Wai Canal floodwalls are located on soils that are not prime farmland. The Makiki District Park detention basin (including the Kanaha floodwall), portions of the Woodlawn Drive floodwall, Koali Road floodwall, Kaimuki High School floodwall, portions of the Ala Wai Golf Course, and portions of the Manoa-Palolo Canal are located on soils that are prime farmland if irrigated. None of these areas are farmland currently and they are not expected to be converted to farmland in the future. One known taro farm operated by the University of Hawaii at Manoa's School of Hawaiian Knowledge is located along Manoa Stream. Ka Papa Loi O Kanewai is located near Dole Street, approximately 800 feet upstream of Kanewai Community Park. No project features are located within the vicinity of Ka Papa Loi O Kanewai, although the staging area for construction of the Koali Road Floodwall is located within Kanewai Community Park. No impacts to Ka Papa Loi O Kanewai during construction staging or project operation and maintenance are expected. Therefore, there would be no short-term or long-term impacts to prime farmland, unique farmland, or farmland of statewide importance due to implementation of the project.

Areas that are primarily forested within the watershed are located in the upper part of the watershed that has been designated as Conservation District. None of the project measures are located within the Conservation District.

Alternative 1 also requires potential mitigation measures to minimize induced flooding within the watershed. Potential nonstructural mitigation measures that are being considered include dry/wet floodproofing, elevation, and acquisition. These measures are similar to those proposed under the Nonstructural Alternative, therefore, refer to Alternative 6 below for the analysis of potential effects to agriculture and/or forestry resources. The only potential structural mitigation measure under consideration is a pump station(s), although due to the cost of construction the inclusion of this as a mitigation measure is highly unlikely. However, the potential impacts of a pump station(s) are assessed. Although the precise location of the pump station(s) is unknown

at this time, it is likely that if selected as a mitigation measure it would need to be constructed along Makiki Stream between Fern Street and the confluence of Makiki with the Ala Wai Canal. In this general area there are no existing farmlands, and the general area is not expected to be converted to farmland in the future. Similarly, there are no forested areas within the general area where a pump station(s) may be constructed. Therefore, the proposed project would have no short-term or long-term impacts to forest land or prime farmland, unique farmland, or farmland of statewide importance.

Alternative 2B

No Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to agricultural and forestry resources are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. Overall, the proposed project would have no short-term or long-term impacts to forest land or prime farmland, unique farmland, or farmland of statewide importance.

Alternative 5

No Impact: In general, the type of project features included in Alternative 5 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to agricultural and forestry resources are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5 project impacts. Overall, the proposed project would have no short-term or long-term impacts to forest land or prime farmland, unique farmland, or farmland of statewide importance.

Alternative 6

No Impact: The implementation of Alternative 6 would have no short-term or long-term direct or indirect adverse effects to agricultural or forestry resources because the alternative includes construction on existing structures only. Temporary construction access would be required but this is expected to occur from existing roads. Overall, the proposed project would have no short-term or long-term impacts to forest land or prime farmland, unique farmland, or farmland of statewide importance.

Environmental Commitments

No environmental commitments would be implemented since there would be no impacts to agricultural or forestry resources.

Best Management Practices

No BMPs would be implemented since there would be no impacts associated to agricultural or forestry resources.

3.5 Built Environment

3.5.1 Cultural Resources

Regulatory Setting

Relevant federal and state laws/regulations include:

- National Historic Preservation Act (NHPA)
- American Indian Religious Freedom Act (AIRFA)

- Historic Preservation Law (Chapter 6E, Hawaii Revised Statutes (HRS))
- Hawaii Environmental Protection Act (HEPA) (Chapter 343, Hawaii Revised Statutes)

The most important of these laws and regulations for the evaluation of impacts to cultural resources are NHPA, HRS Chapter 6E, and HEPA. HRS Chapter 6E consultation will be undertaken by the non-federal sponsor at an appropriate point in the design development process. Although the outcome of 6E consultation should be concordant with that of NHPA Section 106 consultation at the Federal level, it may potentially generate additional impact findings and mitigation requirements beyond what is contained in this section. NHPA compliance for the project is presently guided by an executed Programmatic Agreement (PA). However, if the PA's applicability period is not extended prior to project execution, NHPA Section 106 consultation will need to be re-initiated and a new PA developed with consulting parties. Re-initiation of consultation would be most productive at around the 35% design stage, although earlier coordination with the Hawaii State Historic Preservation Officer is recommended to help generate a design which minimizes impacts. Finally, HEPA compliance includes a requirement to evaluate the effects of a project on cultural beliefs, practices, and resources through the completion of a Cultural Impact Assessment (CIA) study. A CIA study was completed in 2014 for an earlier iteration of the Ala Wai project design. Updates to that CIA, and evaluation of its applicability to the current design, will be the responsibility of the non-federal sponsor, to be undertaken at an appropriate stage in the design development process.

Existing Conditions

Cultural and historic resources for the Ala Wai watershed were originally evaluated in the context of a National Historic Preservation Act PA signed in 2016 by the U.S. Army Corps of Engineers, the Hawaii State Historic Preservation Office, the State of Hawaii Department of Land and Natural Resources, the Oahu Island Burial Council, the Office of Hawaiian Affairs, and Historic Hawaii Foundation. The PA contains ten major stipulation categories, each with numerous subsections, which detail a procedure to be utilized to evaluate project effects and determine appropriate and mutually agreeable mitigation and treatment approaches for known or inadvertently discovered historic properties. The Ala Wai PA was fully executed on November 16, 2016, and remains in effect for a period of seven years.

Numerous technical studies were conducted to support the development of the 2016 PA and to identify cultural and historic resources within the Ala Wai watershed. These studies include:

- *Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project: Makiki, Mānoa and Pālolo Ahupuaʻa, Honolulu District, Oʻahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume I: Cultural Resources of the Makiki, Mānoa and Pālolo Ahupuaʻa, prepared for CH2M Hill, prepared by Cultural Surveys Hawaii, Inc., April 2010.*
- *Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project: Makiki, Mānoa and Pālolo Ahupuaʻa, Honolulu District, Oʻahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume II: Cultural Resources of Kakaʻako and Waikīkī Ahupuaʻa, prepared for CH2M Hill, prepared by Cultural Surveys Hawaii, Inc., April 2010.*
- *Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project, Honolulu, Makiki, Mānoa, Pālolo, and Waikīkī Ahupuaʻa, Honolulu District, Oʻahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume III:*

Ethnographic Study, prepared for CH2M Hill, prepared by Cultural Surveys Hawaii, Inc., April 2010.

- *Cultural Impact Assessment for the Ala Wai Canal Project, Waikīkī, Pālolo, Makiki, and Mānoa Ahupua'a, Honolulu (Kona) District, O'ahu, TMKs: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, prepared for CH2M Hill, prepared by Cultural Surveys Hawaii, Inc., July 2014.*
- *Synthesis and Summary of Cultural Resource Assessments for the Makiki, Mānoa, and Pālolo Watersheds in Support of the Ala Wai Restoration Project Oahu, Hawaii. Cultural Surveys Hawaii, Inc., 2004.*
- *Historic Structures Inventory Survey of the Ala Wai Watershed, Prepared by Mason Architects, Inc. for CH2M HILL, 2010.*

Archaeological Resources

As part of the assessment of archaeological resources within the Ala Wai watershed for the 2017 Ala Wai Canal Flood Risk Management EIS, archival research was conducted to identify the background history, *wahi pana* (place names), *mo'olelo* (traditional stories), and previously recorded archaeological sites within the watershed. Specifically, the archival research included a review of previous archaeological studies, cultural history documents, historic maps and photographs, and Land Commission Awards (LCAs). This information was compiled and used to identify potential localities within the watershed where archaeological resources may exist, and the type and potential significance of those resources. In addition, a field investigation was conducted as part of the 2017 Ala Wai Canal Flood Risk Management EIS to identify additional surface archaeological features. It is important to note that an archaeological survey has not been conducted throughout the entirety of the Area of Potential Effect (APE). Instead, provisions for additional archaeological surveys, if needed, are in the 2016 PA. Additional discussion of the various resources is contained in the *Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project, Vol I and II* (Cultural Surveys Hawaii, 2010).

Historic Structures

A historic structures inventory survey was conducted in 2010 for the Ala Wai watershed to inform analysis in the 2017 Ala Wai Canal Flood Risk Management EIS. The inventory identified a variety of structures dating from 1965 or earlier, including bridges, culverts, channel modifications, dams, and water supply structures. A detailed description of the various structures is contained in the *Historic Structures Inventory for the Ala Wai Watershed* (Mason Architects, 2010).

Traditional Cultural Uses and Practices

An ethnographic survey was conducted for the 2017 Ala Wai Canal Flood Risk Management EIS to evaluate potential "intangible" cultural resources, such as Traditional Cultural Places and places of traditional cultural and religious importance (Vogler et al., 2010). The survey area included the entire Ala Wai watershed.

Several themes emerged during the interviews for the survey, including those related to education and natural resource protection. Education was identified as an important component of fostering an appreciation for natural resources and preserving watershed resources. The participants described the extensive *lo'i* (irrigated agricultural terraces) that were once present within the watershed, noting that *lo'i* could serve as a valuable tool for teaching younger generations about traditional Hawaiian practices, as well as providing natural filtration and improving water quality. They described the role of agriculture within the community, explaining

the value of living off natural resources as part of the traditional Hawaiian culture, and protecting the land as a source of life.

Relative to flood risk management, the participants discussed the importance of keeping the streams clean (e.g., through community efforts) to maintain channel capacity. The transcripts and a more detailed summary of the interviews are contained in the *Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project, Vol III* (Cultural Surveys Hawaii, 2010).

Additional relevant research was later conducted in the form of a Cultural Impact Assessment (CH2M Hill, 2014). Although CIAs are not specifically designed to identify sites of traditional and religious significance, such sites are commonly a product of CIA research due to their association with historic and current cultural practices. During the interviews associated with the CIA, information provided included specific references to activities and resources provided by the waterways in the study area. Relative to stream-based activities, many of the participants recalled swimming in the streams during their childhood; this included two deep ponds downstream of Woodlawn Bridge and areas along Pālolo Stream. They also discussed various forms of sustenance, including *o'opu*, crayfish, *'ōpae*, and *pipipi* collected from the streams, as well as fruits and other plants. The participants referenced multiple *lo'i* use to grow *kalo* (taro), including Ka Papa Lo'i o Kanewai and 'Aihualama Lo'i in Manoa. The interviewees also referenced other resources that were gathered, including *lava'e* in Palolo Valley, *la'au* in Manoa and Makiki Valleys, and *limu* along the shoreline. These resources were not only used for food consumption, but also for ceremonial purposes. Other stream-based resources identified included water used for ceremonial purposes and rocks used for multiple purposes (rock wall building, *imu* [underground oven] use, and pounding poi). The interviewees noted that the areas along the streams and waterways were inhabited by native Hawaiians and indicated the potential for encountering burials (particularly in the Waikiki area). As a result of these investigations for the 2017 Ala Wai Canal Flood Risk Management EIS, a variety of cultural resources were identified.

Significance Criteria

Effects on cultural resources would be considered significant if the proposed project would result in any of the following:

- Alter, directly or indirectly, any of the characteristics of a resource that qualifies it for the NRHP, or State Register of Historic Properties so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.
- Isolate cultural resources, practices, or beliefs from their setting (or otherwise limit access to areas that support those resources, practices or beliefs).
- Introduce elements that substantially alter the setting in which cultural resources, practices, or beliefs occur.
- Disturb any human remains, including those interred outside of formal cemeteries.

The Guidelines for Assessing Cultural Impacts, adopted by the Environmental Council in 1997 defines cultural practices and beliefs to include subsistence, commercial, residential, access-related, recreational, and spiritual, among other customs. Therefore, under HRS 343 and HAR 11-200, canoe paddling and their access to waterways may be considered a cultural practice. As such, during design, consultation and coordination will be done with canoe halau to mitigate and maintain accessibility to the canal. Canoe paddling is further discussed in Section 3.5.4 Recreation.

Environmental Consequences

No Action Alternative

No Impact: Under this alternative, no flood risk management features would be implemented by USACE. Historic properties that occur within the existing floodplain could be affected by future flood-related events (e.g., through inundation, scouring of the ground surface, or deposition of debris).

Alternative 1

Less than Significant Impact with Environmental Commitments Incorporated: Based on the studies conducted to date, it was determined that construction and operation of the project could impact historic properties within the Direct APE. Potential impacts include modifications that may affect the integrity and/or characteristic of historic properties. Table 42 lists the effect determination for each historic property identified within the Direct APE. For those properties with an adverse effect determination, treatment recommendations have been identified. The intent of these recommendations is to identify conditions that can be placed on the design and construction to mitigate impacts to the resource (EC CUL-1). Historic buildings, bridges, and walls affected by construction would undergo appropriate historic documentation, and design input would be solicited from SHPO and interested consulting parties and incorporated into the final design where feasible. Where possible, impacts to archaeological resources would be avoided. Where avoidance is not possible, data recovery would be performed. Where practicable, construction measures would be microsited either up or downstream to minimize the impacts to features of Native Hawaiian cultural significance (Traditional Cultural Property [TCPs]) that could be disturbed by project actions. Considering that the project is still in the feasibility phase and that there are still several unknown variables that may result in adverse effects through the future planning, design, and construction phases, a Programmatic Agreement was fully executed on November 16, 2016, and remains in effect for a period of seven years. The Programmatic Agreement establishes a process for further resource identification and effects determinations, resolving adverse effects, and expands upon the treatment recommendations listed in Table 42. The Programmatic Agreement was coordinated with the Advisory Council on Historic Preservation (ACHP), SHPO, and other consulting parties. A copy is included in Appendix L of this report. Implementation of the treatment recommendations developed through consultation and as per the Programmatic Agreement is expected to reduce potential impacts to a less than significant level.

Construction of floodwalls within the watershed could affect aesthetics within the watershed. Therefore, as per the Programmatic Agreement, design input to minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated, as feasible, into the final design and construction of floodwalls (EC CUL-2). Since there could be significant impact to visual aesthetics, floodwalls proposed under Alternative 1 include a lava rock façade on both sides of the floodwall to minimize visual impacts. With the implementation of environmental commitments EC CUL-1 and EC CUL-2, impacts to cultural resources are expected to be reduced to less than significant.

The CIA also identified a variety of cultural resources, practices, and beliefs that relate to the action area. These include gathering native plants and animals and other resources (e.g., water and rocks) from the streams. Overall, gathering of resources and other cultural practices that occur within and immediately adjacent to the alternative footprint may be temporarily disrupted during construction, as access within the various measure locations would likely be restricted during ground disturbing activities. However, the specific areas where the measures would be located are overwhelmingly dominated by non-native species; furthermore, there would still be

abundant opportunities to gather resources along streams throughout the upper watershed. Following construction, for the most part the implemented measures are not expected to limit access to cultural resources or practices. The potential exception is outrigger canoe access. There are four canoe launches along Ala Wai Canal that would require closure structures. These canoe launch closure structures would primarily be open and would only be closed for a period prior to a storm event, during a storm event, and for a period after the storm event until they can be reopened. Closing the canoe launch closure structures prior to a storm event and the opening of the closure structures post storm event would likely have the greatest impact by limiting access to cultural practices when they would have normally been able to occur under the current condition. However, closure of the canoe launch structures would likely occur within one or two days of a storm event occurring and would likely open within one or two days after the storm event has passed. Therefore, this is considered a temporary less than significant impact by limiting access to cultural practices. During the storm event it is unlikely that the canoe launch closure structures would have an impact on cultural practices because a storm event would typically cause boats to refrain from being launched into the water due to human safety concerns. Therefore, the canoe launch closure structures would have a temporary less than significant adverse impact to cultural practices.

There is a high possibility that ancestral bones may be present within the alternative footprint and that land-disturbing activities during construction may uncover presently undetected burials or other cultural materials. The Programmatic Agreement stipulates measures that the USACE will undertake to address the potential for burials. Should burials or other cultural finds be identified during ground disturbance, the construction contractor would immediately cease all work in the area, and the appropriate agencies would be notified pursuant to applicable laws, including NHPA and HRS Section 6E (EC CUL-3). Implementing procedures regarding burials as stipulated in the Programmatic Agreement and following legislative protocols for inadvertent discovery of remains would reduce impacts to a less than significant level.

Alternative 1 also include the implementation of mitigation measures to minimize induced flooding. Potential nonstructural measures that are under consideration include dry/wet floodproofing, elevation, and acquisition. These proposed measures are similar to what is included in the Nonstructural Alternative, therefore, refer to Alternative 6 for the impact analysis of these potential mitigation measures. The only nonstructural measure under consideration as a potential mitigation measure is a pump station(s), although the cost of construction would make this mitigation measures highly unlikely to occur. The precise location of a pump station(s) is unknown at this time; however, it would likely be located along Makiki Stream somewhere between Fern Street and the confluence of Makiki Stream with the Ala Wai Canal. If found to be necessary, the location of the pump station along Makiki Stream would attempt to avoid impacting any historic properties. However, the construction of the pump station would require excavation into the ground adjacent to Makiki Stream for the wet well. Therefore, there is a high possibility that ancestral bones may be present within the pump station area and that land-disturbing activities during construction may uncover presently undetected burials or other cultural materials. The Programmatic Agreement stipulates measures that USACE will undertake to address the potential for burials. Should burials or other cultural finds be identified during ground disturbance for the pump station(s), the construction contractor would immediately cease all work in the area, and the appropriate agencies would be notified pursuant to applicable laws, including NHPA and HRS Section 6E (EC CUL-3). Implementing procedures regarding burials as stipulated in the Programmatic Agreement and following legislative protocols for inadvertent discovery of remains would reduce potentially significant adverse impacts to less than significant. The operation and maintenance of the pump station(s) is expected to have no impact on cultural resources.

Overall, Alternative 1 would have a potential short-term significant adverse impact on cultural resources; however, this impact would be reduced to less than significant with the implementation of environmental commitments EC CUL-1 through EC CUL-4. Long-term, the operation and maintenance of the project is expected to have a temporary less than significant adverse impact to access to cultural practices.

Table 42: Historic Properties Potentially Affected by the Ala Wai Canal Flood Risk Management Project.

Measure Location/Description	Site ID	Criteria	Effects Determination	Treatment Recommendation
1) Makiki: Makiki District Park Detention Basin				
Makiki District Park	No SIHP Assigned	None	Not historic	Monitoring during construction
2) Makiki: Kanaha Floodwall				
Makiki Stream	No SIHP Assigned	e	No Effect	Micrositing to avoid significant resources
3) Manoa: Manoa Valley Park Detention Basin				
Manoa Valley District Park	No SIHP Assigned	None	Not historic	Monitoring during construction
4) Manoa: Woodlawn Drive Floodwall				
None				
5) Manoa: Koali Road Floodwall				
None				
6) Palolo: Koali Road Floodwall				
None				
7) Manoa-Palolo: Kaimuki High School				
Manoa-Palolo Canal	Inventory No. 36	A,C	Adverse effect	Historic documentation
8) Manoa-Palolo: Ala Wai Golf Course				
Ala Wai Golf Course	No SIHP Assigned	None	Not historic	Monitoring during construction
Manoa-Palolo Canal	Inventory No. 36	A,C	Adverse effect	Historic documentation
9) Ala Wai: Ala Wai Canal Floodwalls				
Kalakaua Avenue Bridge	Inventory No. 02	A,C	Adverse effect	Match design with existing walls
McCully Street Bridge	Inventory No. 03	A,C	Adverse effect	Match design with existing walls
Kapahulu (Ala Wai Golf Course) Drainage	No SIHP Assigned	None	Not historic	Not historic
Ala Wai Canal	50-80-14-9757	A	Adverse effect	Mitigation plan/ historic documentation/ consulting party design & input

Measure Location/Description	Site ID	Criteria	Effects Determination	Treatment Recommendation
Ala Wai Park Clubhouse (City and County of Honolulu Art Deco Parks and Playgrounds)	50-80-14-1388/ No.90	C	Adverse effect	Historic documentation/ consulting party design input

Alternative 2B

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to cultural and archaeological resources are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts.

Alternative 2B differs from Alternative 1 in that it includes a floodwall around the Ala Wai Canal. In addition to implementing EC CUL-1 and EC CUL-2, EC CUL-4 would be implemented for the Ala Wai Canal floodwall specifically. EC CUL-4 includes an elevated walkway adjacent to the Ala Wai Canal floodwall to minimize visual impacts. In addition, as per the PA, design input to further minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated, as feasible, into the final design and construction of the floodwalls. The appropriate level of historic documentation of the Ala Wai Canal will also be developed with SHPO and other consulting parties. The elevated walkway would be approximately three feet above ground whereas the floodwall around the Ala Wai Canal would be approximately six feet above ground. This would allow the community, especially pedestrians, to still be able to see the water within the canal when they are walking on the elevated walkway. With the construction and operation of the Ala Wai Canal floodwall, there are four canoe launches that have the potential to be impacted (i.e., Manoa-Palolo Canoe launch, Canoe Club launch, Waikiki Surf Club and Boat Launch, and Kamehameha Canoe Club). Currently, the feasibility level design includes structures similar to road closure structures at each of the four canoe launches to minimize impacts to these properties and associated cultural practices. Overall, Alternative 2B would have a potential short-term significant adverse impact on cultural resources; however, this impact would be reduced to less than significant with the implementation of environmental commitments EC CUL-1 through EC CUL-4. Long-term, the operation and maintenance of the project is expected to have a temporary less than significant adverse impact to access to cultural practices.

Alternative 5.3

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to cultural and archaeological resources are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts. Overall, Alternative 5.3 would have a potential short-term significant adverse impact on cultural resources; however, this impact would be reduced to less than significant with the implementation of environmental commitments EC CUL-1 through EC CUL-4. Long-term, the operation and maintenance of the project is expected to have a temporary less than significant adverse impact to access to cultural practices.

Alternative 6

Less than Significant Impact with Environmental Commitments Incorporated: No infrastructure facilities in Honolulu have been identified as NRHP-eligible, so their modifications would not cause adverse effects to historic properties. However, where measures may cause ground disturbance, archaeological survey would be needed.

The potential elevation of any historical structures would consist of elevating the foundation of the structure on a new foundation so that the lowest finished flood is approximately above 12 feet NAVD88. All utilities and mechanical equipment, such as air conditioners and hot water heaters would also be raised to this elevation. Floodproofing of historic structures would consist

of sealing all areas of a structure up to a maximum of approximately three feet above ground level to reduce damage caused by coastal storm surge inundation by making walls, doors, windows, and other openings resistant to penetration by water. Walls would potentially be coated with sealants, waterproofing compounds, or plastic sheeting. Back-flow from water and sewer lines would be prevented by installing mechanisms such as drain plugs, standpipes, grinder pumps, and back-up valves. Openings, such as doors, windows, sewer lines, and vents, may also potentially be closed temporarily with sandbags or removable closures, or permanently sealed.

In residential areas, nonstructural measures would potentially cause moderate impacts to any NRHP eligible buildings. Elevating any NRHP eligible structure would be an adverse effect, but some designs are less so than others. Elevations may cause adverse visual effects to a historic district. Floodproofing may be adverse, or non-adverse. Dry floodproofing designs which require windows and doors to be sealed would cause adverse effects. There would also be beneficial effects to historic structures as the elevation and floodproofing measures would prevent flood damages to the structure. This alternative would be expected to have permanent, moderate adverse to beneficial effects.

Environmental Commitments

The following environmental commitments would be implemented to reduce potential impacts to cultural resources during construction of the project.

EC CUL-1: Historic buildings, bridges, and walls affected by construction would undergo appropriate historic documentation, and design input would be solicited from SHPO and interested consulting parties and incorporated into the final design where feasible. Where possible, impacts to archaeological resources would be avoided. Where avoidance is not possible, data recovery would be performed. Where practicable, construction measures would be microsited either up or downstream to minimize the impacts to features of Native Hawaiian cultural significance (Traditional Cultural Property [TCPs]) that could be disturbed by project actions.

EC CUL-2: Design input to minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated, as feasible, into the final design and construction of floodwalls.

EC CUL-3: If previously unknown cultural resources are discovered, work in the immediate area would cease until the requirements in 36 CFR 800.13 are complied with. The on-site supervisor shall contact the USACE's Project Manager and District Archaeologist, and an approved archaeological consultant immediately. The on-site supervisor shall additionally divert all Proposed Action-related activities to other areas until the discovery has been evaluated by the approved archaeological consultant. The USACE will determine if further mitigation measures are warranted in consultation with the SHPO and consulting parties.

EC CUL-4: Design of the Ala Wai Canal floodwalls includes an elevated walkway where feasible. In addition, as per the PA, design input to further minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated, as feasible, into the final design and construction of the floodwalls. The appropriate level of historic

documentation of the Ala Wai Canal will also be developed with SHPO and other consulting parties.

Best Management Practices

No BMPS associated with impacts to cultural resources apply.

3.5.2 Land Use and Planning

Regulatory Setting

Relevant federal and state laws/regulations include:

- Coastal Zone Management Act
- Farmland Protection Policy Act
- EO 11988 (Floodplain Management)
- HAR, Title 13, Chapter 5 – *Conservation District Rules*
- HRS, Chapter 25 – *State Land Use Law*
- HRS, Chapter 115 – *Public Access to Coastal and Inland Recreational Areas*
- HRS, Chapter 183C – *Conservation District*

Existing Conditions

A variety of different land uses are present in the watershed, both in urban and undeveloped areas. Land uses are primarily controlled by State Land Use designations, and further by County zoning designations. A summary of the existing lands uses, as well as the land use districts and zoning for each of the measures in the alternatives under consideration are listed in Table 43. For additional detail refer to the 2017 Ala Wai Canal Flood Risk Management Project, Oahu, Hawaii Integrated Feasibility Study and Environmental Impact Statement (USACE, 2017).

Table 43: Land Use Designations of Measure Sites

Measure	Existing Land Use	State Land Use	County Zoning	Special Management Areas (SMA) and Other Special Districts
Kanaha Floodwall	Adjacent to residential and commercial properties.	Urban	P-2	Not in SMA
Makiki District Park Detention Basin	Makiki District Park; adjacent to residential and commercial properties and St. Clements School	Urban	A-2	Not in SMA
Manoa Valley District Park Detention Basin	Manoa District Park; adjacent to residential properties and an elementary school	Urban	P-2	Not in SMA
Woodlawn Drive Floodwall	Adjacent to residential properties	Urban	R-7.5	Not in SMA
Koali Road Floodwall	Adjacent to residential properties	Urban	R-5	Not in SMA
Kaimuki High School Floodwall	Kaimuki High School; adjacent to Ala Wai Golf Course, commercial and residential properties	Urban	A-2	Not in SMA

Measure	Existing Land Use	State Land Use	County Zoning	Special Management Areas (SMA) and Other Special Districts
Ala Wai Golf Course Detention Basin	City & County Golf Course	Urban	P-2	Not in SMA
Ala Wai Canal Floodwalls	Open space associated with Ala Wai Canal, Ala Wai Promenade, and Ala Wai Community Park; adjacent to commercial and residential properties and an elementary school within Waikiki District	Urban	Public Precinct	Not in SMA; in Waikiki Special District

Significance Criteria

Effects on land use would be considered significant if the proposed project would result in any of the following:

- Preclude use of an area for its intended purposes or displace an existing land use.
- Substantially conflict with the objectives of any applicable land use regulation, plan, or policy.
- Directly or indirectly induce substantial population growth or development in a floodplain.
- Physically divide and/or affect the social connectedness of an established community.
- Displace substantial numbers of existing people or housing.

Environmental Consequences

No Action Alternative

No Impact: Under the No Action Alternative, no flood-risk management measures would be implemented and as such, significant portions of the watershed would continue to be at risk of flooding, thus threatening existing land uses (particularly in the urbanized watershed). Over the 50-year period of analysis for the future without-project condition, the boundaries and intended uses of the various land use designations are expected to be maintained. No portion of the Conservation District is expected to be rezoned to allow development. Within the Urban District, nearly all available land is already developed, leaving very little area for future development. As is already occurring, future development activities are expected to primarily consist of redevelopment of existing lots (CCH, 2023a).

Alternative 1

Less than Significant Impact with Environmental Commitments Incorporated: Construction of Alternative 1 would result in short-term temporary impacts to land use. Alternative 1 includes the construction of detention basins within Makiki District Park, Manoa Valley District Park, Kaimuki High School, and Ala Wai Golf Course. Construction of the Makiki District Park and Manoa Valley District Park detention basins requires excavating down 6-8 feet, constructing floodwalls around the basin, and constructing inlet and outlet structures for the basin. All these activities would prevent use of the park area while construction is occurring. Once construction is complete, activities could resume within the park areas. Regarding Kaimuki High School and the Ala Wai Golf Course, construction of the detention basins at these

locations would only involve floodwalls, and construction of an inlet and outlet structures for the golf course only. Use of portions of the athletic fields at the high school may be restricted during construction, although most activities would still be able to occur. Similarly, play at the golf course would likely be able to continue during construction, although use of some areas might be restricted. Once construction is complete, use of the athletic fields and play at the golf course would continue and areas that may have been restricted during construction would no longer be restricted.

The construction of floodwalls alone (i.e., Kanaha floodwall, Woodlawn Drive floodwall, Koali Road floodwall) would also result in short-term temporary impacts to land use while construction is occurring. The floodwalls are primarily located along urban corridors or near resident property lines. Measures would be implemented to include phasing of construction to minimize the extent of disturbance at any given time, and restoration of temporarily disturbed areas to pre-project conditions. In addition, for work on privately owned land, easements would be obtained, and would include fair compensation for loss of use by landowners during construction. Long-term, there would be temporary impacts to land use at Makiki District Park, Manoa Valley District Park, Kaimuki High School, and Ala Wai Golf Course during a storm event as the detention basins would begin to retain water beginning at the 5% AEP flood event. As the detention basins begin to collect stormwater, use of these areas would not be possible. In addition, use of these areas would not be able to resume until the detention basins are drained of water and any repairs to the areas from storm damage are complete (i.e., debris removal, replanting vegetation, etc.). It is important to note, however, that storms of the 20-year event and above currently flood these locations under the No Action Alternative preventing their use even without implementation of a project. In addition, the detention basins at the park districts are expected to retain stormwater for approximately 1 day before slowly draining and the Ala Wai Golf Course detention basin is expected to retain stormwater for approximately 2 days before slowly draining. Therefore, the time to resumption of activities at these locations would not be substantially increased under the with-project condition. Overall, due to the short-term nature of the construction activities and the short-term nature of storm events, the project is not expected to substantially preclude the use of an area for its intended purposes or displace an existing land use. Therefore, the impact to an existing land use would be less than significant.

As noted under the No Action Alternative for Land Use, nearly all available land within the Urban District of the Ala Wai watershed is already developed, leaving very little area for future development. Therefore, construction of the proposed project would protect existing residential and commercial properties from flood damages and would not promote development in the floodplain. Overall, the project would have no short-term or long-term impacts to development in the floodplain.

Alternative 1 also includes the implementation of potential mitigation measures to minimize induced flooding. Potential nonstructural mitigation measures that are under consideration include dry/wet floodproofing, elevation, and acquisition. These types of measures are part of the Nonstructural Alternative, therefore, refer to the impact analysis under Alternative 6. The only structural mitigation measure under consideration is a pump station(s), however, the cost of the pump station(s) makes it highly unlikely that it will be constructed. Regardless, the potential impacts of a pump station(s) follow. The exact location of the pump station(s) is unknown at the time; however, the pump station would likely be located along Makiki Stream between Fern Street and the confluence of Makiki Stream with the Ala Wai Canal. This general area is zoned A-2 (Medium-density Apartment District), BMX-3 (Community Business Mixed Use District), and AMX-2 (Medium-density Apartment Mixed Use District). Therefore, construction of the pump station(s) would not have any adverse impacts to the existing land uses or zoning within and

around the location of the pump station. There could be temporary minor adverse impacts surrounding the availability of parking while construction of the pump station(s) is occurring; however, the precise location of the pump station(s) is unknown at this time. Therefore, the construction, operation, and maintenance of the pump station(s) is not expected to alter the current land use within the general area or affect surrounding land uses, so no potential impacts are expected.

Overall, in terms of land use, the project would not substantially conflict with the objectives of any applicable land use regulation, plan, or policy; convert prime farmland, unique farmland, or farmland of statewide importance to non-agricultural uses; result in the loss of forest land or conversion of forest land to non-forest use; or directly or indirectly induce a substantial degree of development in a floodplain. In summary, the proposed project would have short-term and long-term minor adverse impacts on land use due to construction, maintenance, and operation activities precluding the use of an area for its intended purposes for a temporary time.

Alternative 2B

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to land use are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. Overall, Alternative 2B would have short-term and long-term minor adverse impacts on land use.

Alternative 5.3

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to land use are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts. Overall, Alternative 2B would have short-term and long-term minor adverse impacts on land use.

Alternative 6

Less than Significant Impact with Environmental Commitments Incorporated: Approximately 43 residences would be eligible for elevation or raising of their homes. It is currently unknown how many of the homes are structurally sound enough for an elevation. Elevation of structures would apply only to residences, and floodproofing would be done for critical infrastructure and some government facilities. The nonstructural measures are voluntary; therefore, any owner may opt out, but tenants would be subject and affected by the landlord's decision. Floodproofing treatments would be done for approximately 1501 commercial and governmental facilities. In these locations, the land use would not change. However, there would be a direct, long-term significant beneficial effect on land use because those residences and facilities would be more resilient to flooding. Alternative 6 should result in fewer flood damages to structures.

Alternative 6 would require the temporary relocation of residents during elevation construction, which would be a significant, short-term direct adverse effect due to the relative scarcity of housing. Construction would have to be phased such that there is adequate temporary housing available for each phase, to reduce the impact on residents and land use (EC LUP-1). Temporary indirect and direct adverse effects would result from construction noise and presence and use of heavy equipment in residential and commercial land use areas. It is

anticipated that, if possible, the nonstructural measures for whole blocks or streets of residences could be closed off and conducted simultaneously, so that construction windows within neighborhoods can be minimized (EC LUP-2).

Environmental Commitments

The following environmental commitments would be implemented to reduce potential impacts to land use and planning during construction of the project.

EC LUP-1: Phase construction to ensure there is adequate temporary housing available due to scarcity of housing in the area.

EC LUP-2: Simultaneously implement nonstructural measures for whole blocks or streets of residences so that construction windows within neighborhoods can be minimized.

Best Management Practices

No BMPS associated with impacts to land use and planning apply.

3.5.3 Hazardous, Toxic, and Radioactive Waste

Regulatory Setting

Relevant federal and state laws/regulations include:

- Resources Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Hawaii Administrative Rules, Chapter 11-260.1 – Hazardous Waste Management

Existing Conditions

In the 2017 Ala Wai Canal Flood Risk Management EIS, an assessment identified a variety of hazardous, toxic, and radioactive waste (HTRW) sites within the Manoa watershed. Additional information regarding the assessment results is provided in the Final Reconnaissance Phase Hazardous, Toxic, and Radioactive Waste Assessment for the Ala Wai Watershed Project (Myounghee Noh and Associates, 2009). The HTRW investigation was updated in 2023 to account for the changes in alternatives and in conditions. The updated assessment can be found in Appendix J.

Significance Criteria

The proposed project would result in potential significant impacts to HTRW if it would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- Be located on a site which is included on a list of hazardous materials sites and, as a result, would create a significant hazard to the public or the environment.

Environmental Consequences

No Action Alternative

No Impact: Under this alternative, no flood risk management features would be implemented by USACE. There would not be any disturbance to existing known or suspected waste sites or materials.

Alternative 1

Less than Significant Impact: Under this alternative, several detention basins would be constructed on recreational areas, and floodwalls would be constructed along portions of the waterways. A database investigation did not uncover any unresolved hazardous waste or remediation sites within the footprint of the proposed work thus it is not expected that any release of hazardous waste or transport of such materials would occur. Because the alignment of features may change during design phase and due to the dynamic nature of urban areas, it is recommended that the database sites near the proposed measures be reviewed during design to determine whether there are any impacts.

Construction of the detention basins, including the inlet and outlet structures, will involve excavation of soils and/or sediment. The quality of this material is unknown, however due to human impacts, the soil and sediment may contain pesticides, metals, PCBs and other organic compounds. It is recommended that future testing be conducted on materials that will be excavated, to determine the suitability of the soil for re-use or to determine proper disposal.

Alternative 1 also includes the potential implementation of mitigation measures to minimize induced flooding within the watershed. Nonstructural mitigation measures currently under consideration include dry/wet floodproofing, elevation, and acquisition. These potential nonstructural mitigation measures are similar to the nonstructural measures included under the Nonstructural Alternative. Therefore, refer to Alternative 6 below for an analysis of potential impacts to HTRW. The only structural mitigation measure under consideration is a pump station(s), although the cost of construction makes it highly unlikely that this potential mitigation measures will be implemented. Regardless, a discussion of the potential impacts that may result due to construction and operation of a pump station(s) is included below. Construction of the pump station(s), including the wet well, will involve excavation of soils. The quality of this material is unknown, however, due to human impacts, the soil may contain pesticides, metals, PCBs, and other organic compounds. It is recommended that future testing be conducted on materials that will be excavated to determine the suitability of the soil for re-use or to determine proper disposal.

During construction of the project features including potential mitigation measures, it is expected that the construction contractor would have a limited amount of potentially hazardous materials on site, including petroleum, oils, lubricants, degreasing compounds and similar materials needed for equipment operation and maintenance. A spill prevention plan would be required. Spill prevention methods, such as using drip pans for refueling operations and using containment pallets for storing barrels of liquid materials, would prevent the release of hazardous materials to the environment.

Once constructed, the detention basins and other disturbed soil areas (e.g., floodwalls, mitigation measures, etc.) will be either stabilized with vegetation (grass) or riprap (stone) to prevent erosion. All construction debris or waste materials would be properly disposed of off-site. The completed features will not create any potential for the release of hazardous materials or wastes.

Alternative 2B

Less than Significant Impact: Alternative 2B contains similar features to Alternative 1. There are no known hazardous waste or remediation sites within the proposed footprint of the measures, however it is recommended that the database results be updated and reviewed at the time of construction. All other issues, including excess soil handling, the use of potentially hazardous materials during construction, and the final state of the project features, would be similar to Alternative 1.

Alternative 5.3

Less than Significant Impact: Alternative 5.3 contains similar features to Alternative 1 and Alternative 2B. There are no known hazardous waste or remediation sites within the proposed footprint of the measures, however it is recommended that the database results be updated and reviewed at the time of construction. All other issues, including excess soil handling, the use of potentially hazardous materials during construction, and the final state of the project features, would be similar to Alternative 1 and Alternative 2B.

Alternative 6

Less than Significant Impact: Alternative 6 involves disturbance to existing structures of varying ages; therefore, the potential exists for some structures to contain lead-based paint (LBP), asbestos containing materials (ACM), or polychlorinated biphenols (PCBs). As a result, a Phase 1 Environmental Site Assessment should be conducted for any affected structure constructed prior to 1978. If any such contaminants are found, the construction contract must include procedures for the lawful demolition, removal, and disposal of such wastes. With this stipulation, there would be negligible adverse long-term and minor adverse short-term impacts on HTRW.

Environmental Commitments

No environmental commitments associated with impacts to HTRW apply.

Best Management Practices

Implementation of the following BMPs would ensure no release of hazardous materials, wastes or substances to the environment, and no impact to humans or the environment from hazardous materials, wastes or substances.

- Review of database returns and the conditions of adjacent properties during design phase, to ensure that any issues have been identified and addressed properly.
- Perform a Phase II investigation on any soil or sediment that will be excavated during construction, to determine appropriate disposition of the materials and any special handling requirements.
- Construction contractors shall develop a spill prevention plan and related Standard Operating Procedures (SOPs) to prevent the accidental release of fuels, oils, solvents or other potentially hazardous materials that will be stored or used on the project worksite.
- Construction contractors shall maintain spill response products and supplies on site during the project construction, to control any accidental releases to water or soil.
- All soils hauled off site shall have covered loads to prevent dirt from blowing into residential neighborhoods.
- Trucks shall use tire brushes or other methods to prevent tracking soils onto local roads.

3.5.4 Recreation

Regulatory Setting

Relevant federal and state laws/regulations include:

- Hawaii Revised Statutes, Chapter 115 – Public Access to Coastal and Inland Recreational Areas
- HRS Chapter 183 (Forestry and Wildlife; Recreation Areas; Fire Protection)
- HRS Chapter 198D (Hawaii Statewide Trail and Access System)
- ROH Chapter 10 (Rules, Regulations, Charges, and Fees for Public Parks and Recreation Facilities)

Existing Conditions

A wide range of recreational resources are available within the Ala Wai watershed, including federal, state, and county parks; hiking trails; a golf course; boating facilities; and the Ala Wai Canal. A brief description of recreational resources within the study area follows.

Park Facilities

Over 400 acres of City and County of Honolulu parks are located within the Ala Wai watershed, including two regional parks (i.e., Kapiolani Regional Park and Ala Moana Regional Park), two beach parks, four district parks, eight community parks, five neighborhood parks, ten mini-parks, eight urban parks, and several miscellaneous facilities. State Park facilities within the study area include Makiki Tantalus Recreation Area, Puu Ualaka State Park, and Waahila Ridge State Recreation Area; the Honolulu Forest Reserve also offers recreational opportunities. The only federal park facility within the Ala Wai watershed is the Fort DeRussy Armed Forces Recreation Center (Fort DeRussy Park), located in Waikiki.

Trails

Administered by DLNR DOFAW, Na Ala Hele is the State of Hawaii's Trail and Access Program. Developed in response to concerns over decreasing public access to trails and development threats to historic trails, Na Ala Hele is responsible for inventorying, constructing, maintaining, and regulating activities within their network of trails. A total of 15 Na Ala Hele trails are located within the Ala Wai watershed (DLNR, 2009c). Average use varies between trails, but is highest for the Manoa Falls Trail, which is a popular tourist destination.

Ala Wai Golf Course

The Ala Wai Golf Course is one of six municipal golf courses managed by the City and County of Honolulu, Department of Enterprise Services, Golf Course Division. It is located along the Ala Wai Canal on land owned by the State and is approximately 146 acres in size. It is the only public golf course located in the Honolulu area. The 18-hole course has been distinguished as the busiest golf course in the world, with about 500 rounds played per day (or 180,000 rounds annually).

Boating Facilities

Several boating facilities are located within the Ala Wai watershed, including the Ala Wai Small Boat Harbor and Kewalo Basin, as well as moorings off Waikiki Beach. Located between Waikiki and Ala Moana beaches, the Ala Wai Small Boat Harbor is the only recreational harbor in the Ala Wai watershed. Located on the west side of Ala Moana beach, approximately one mile west of the Ala Wai Small Boat Harbor, Kewalo Beach is a mixed-use harbor that provides berthing for commercial fishing and recreational vessels. In addition to these two facilities,

DOBOR provides temporary anchorage immediately offshore of Waikiki, from Fort DeRussy to Diamond Head (Kapua Channel moorings) (DLNR, 2009a).

Canoe Launches

There are approximately four designated canoe launches within the study area. Three are located along the Ala Wai Canal and one is located along the Manoa-Palolo Canal. The Kamehameha Canoe Club Hilo is located along the Ala Wai Canal between McCully Street and the Ala Wai Community Park. The club was originally founded in 1947 and promotes the art and sport of outrigger canoe racing. There are three separate canoe launches associated with the Kamehameha Canoe Club Hilo. The Waikiki Surf Club and Boat Launch is located along the Ala Wai Canal at the termination of University Avenue, between the Ala Wai Community Park and the Ala Wai Elementary School. The Waikiki Surf Club is one of the older outrigger canoe paddling clubs on Oahu having been founded in 1948.There are four separate cone launches associated with the Waikiki Surf Club. The Lokahi Canoe Club is located along the Ala Wai Canal between the Waikiki-Kapahulu Public Library and the Ala Wai Golf Course Club House. The Lokahi Canoe Club was formed in 1980 with one paved canoe launch. Lastly, the Iolani School has a canoe launch along the Manoa-Palolo Canal near the intersection of Hihiwai Street and the Iolani School driveway.

Ala Wai Canal

The Ala Wai Canal offers a variety of recreational opportunities, including outrigger canoe paddling, kayaking, and fishing; it supports the single largest concentration of canoe clubs in the State (Belt Collins, 1998). In addition, the promenade and other pathways along the Ala Wai are heavily used for walking, running, and biking. Overall, the Ala Wai Canal System (including the contributing streams) has been identified as a regionally outstanding recreational resource, as defined based on the diversity of high-quality experiences, unique characteristics, or unique combination of recreational attributes (Hawaii Cooperative Park Service Unit, 1990). The Ala Wai Canal is the most heavily used inland waterway in the state for recreational activities and is in almost constant use nearly every day of the year (Belt Collins, 1998). Access into the Ala Wai Canal is primarily via the following seven sites: Waikiki-Kapahulu Library, Manoa-Palolo Drainage Canal, Ala Wai Neighborhood Park, Ala Wai Community Park, Magic Island, Ala Wai Small Boat Harbor, and the Ala Wai Channel. Despite significant human health issues associated with poor water quality, fishing is another common recreational activity in the Ala Wai Canal. Fishing activities include pole fishing, throw netting, fay netting, and crabbing (Belt Collins, 1998). The Ala Wai Canal is regulated as a Fisheries Management Area (FMA), under which fishing or taking aquatic life is restricted to the conditions established by DLNR DAR (DLNR, 2009b).

Waikiki Beach

In addition to the designated beach parks managed by the City and County of Honolulu, Waikiki Beach itself offers some of the most popular recreational opportunities in the Ala Wai watershed. Waikiki Beach is one of the most popular beaches in the world with over 4 million visitors each year (CCH, 2023b). Recreational opportunities at Waikiki Beach include sailing, outrigger canoe paddling, kayaking, snorkeling, scuba diving, body boarding, surfing, swimming, fishing, walking, and sunbathing (DOT, 1981).

Significance Criteria

Effects to recreation would be considered significant if the proposed project would result in any of the following:

- Permanently restrict access to designated recreational areas.

- Substantially reduce availability of and access to designated recreational or open space areas.
- Increase the use of existing recreational areas such that substantial physical deterioration would occur or be accelerated.
- Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

Environmental Consequences

No Action Alternative

No Impact: Over the period of analysis for the project, the type and extent of recreational opportunities are expected to be consistent with the existing condition. Given the extent of development within the watershed, little to no open space is available to support new recreational facilities.

Under the No Action Alternative, recreational facilities and activities within the watershed would not be affected by construction of flood-risk management measures. However, in the absence of these flood risk management measures, significant portions of the watershed would remain within the 1% AEP floodplain and would continue to be subject to flood conditions, including the Manoa Valley District Park, Kanewei Community Park, Ala Wai Golf Course, and Ala Wai Community Park. It is expected that these sites would not be available for recreational use during and immediately following flood events (to allow for post-flood clean up and recovery).

Alternative 1

Significant Impact: Construction of the measures comprising Alternative 1 would result in short-term temporary impacts to recreational. Construction of the Manoa Valley District Park detention basin would render the four baseballs fields located along the right descending bank of Manoa Stream in accessible while construction is occurring. Similarly, construction of the Makiki District Park detention basin would render the large open field adjacent to Wilder Avenue inaccessible while construction is occurring. Construction of the Ala Wai Golf Course detention basin would involve floodwalls/earthen berm around the perimeter of the Golf Course. Therefore, play at the golf course is expected to be able to continue while construction is occurring, although the use of some areas might be temporarily restricted. Construction of the Woodlawn Drive floodwall would temporarily restrict land access to Manoa Stream along the right descending bank for recreational activities such as fishing, canoe access, bird watching, etc. There are no designated parks or open space in this area, however. Construction of the Koali Road floodwall is likely to cause temporary, short-term restricted areas to the public along the portion of Kanewei Community Park that is adjacent to the right descending bank of Manoa Stream as construction of the floodwall would be occurring here. Much of the park, however, would still be accessible to the public. In addition, land access to Manoa Stream and Palolo Stream where the floodwall is being constructed would be temporarily restricted for recreational activities such as fishing, canoe access, bird watching, etc. Construction of the Kaimuki High School floodwall is likely to cause temporary, short-term restricted areas to the public along the portions of the athletic fields and track that are adjacent to where the floodwalls would be located. Lastly, construction of the Kanaha floodwall is likely to cause temporary, short-term restricted areas to the public, especially for recreational activities such as fishing, canoe access, bird watching, etc. I''s important to note that the location of the Kanaha floodwall is heavily urbanized with property lines backing up to the Makiki Stream bank, so there is already limited access under the existing condition.

Long-term, there would be significant impacts to recreational activities along the waterways and within the parks that would be directly affected by the project. Floodwalls would permanently restrict land access to the waterways where the floodwalls are located. This would restrict use of these areas by recreational users trying to fish from the bank, launching a canoe/kayak, bird watching, etc. Access to Manoa Valley District Park would not permanently restrict access to designated recreational areas, but it would reduce availability of a portion of a designated recreational area. The detention basin at Manoa Valley Park District would permanently remove the four baseball fields where the detention basin is constructed; and due to the conversion of a flat area to concave, reconstruction of the baseball fields after construction would not be possible. The area would be planted with grass and could be used as an open space area, but use of the area for athletic fields would not be possible. Also, due to the lack of availability of open space within the current footprint of the Manoa Valley District Park, the baseball fields would be a long-term permanent loss. The detention basin at Makiki District Park would not permanently restrict access to a designated recreational area long-term, nor would it substantially reduce availability of a designated recreational / open space area. Although the flat open space would be converted to a concave open space, it would still be open space. The remainder of the areas discussed above (i.e., Ala Wai Golf Course, Kaimuki High School, etc.) would not be permanently impacted by restricting access long-term or substantially reducing availability of and access to a designated recreational or open space area. The designated uses of the Ala Wai Golf Course, and Kaimuki High School would be able to continue long-term.

In addition to the long-term impacts detailed above, there would also be the long-term impact of the Makiki District Park, Manoa Valley District Park, Kaimuki High School, and Ala Wai Golf Course being purposely flooded to detain water during storm events. However, it is important to note that under the No Action Alternative all the above sites except for the Makiki District Park would flood normally during a storm event. The potential difference long-term between the No Action Alternative and Alternative 1 is the duration which the water remains within these areas. After a storm event, it's anticipated that Makiki District Park and Manoa Valley District Park detention basins would retain collected water for approximately one day. Kaimuki High School, which is not a detention basin but connects to the Ala Wai Golf Course berm, is anticipated to retain water for one day as well. The Ala Wai Golf Course detention basin is expected to retain water for two days. In addition to potentially retaining water for longer under Alternative 1, these areas would also include operation and maintenance activities that could disrupt activities at these locations periodically following a storm event. Maintenance for these sites would include activities such as removing retained sediment/debris and potentially the replanting of vegetation. The floodwall drainage structures would also need to be monitored periodically for needed repairs, which could temporarily prevent activities in the area where repairs are being made.

Regarding increased use of existing recreational areas such that substantial physical deterioration would occur or be accelerated, the only area where this might happen is other parks around Manoa Valley District Park. Since the four baseball fields would be permanently removed from the Manoa Valley District Park, other baseball fields in the vicinity of the park such as those located on the University of Hawaii at Manoa and at Punahou School could experience more use. This may increase the deterioration of these baseball fields requiring more frequent repairs, however, the level of increase in use of these fields is unknown at this time.

Alternative 1 also includes potential mitigation measures that would be implemented to minimize induced flooding within the watershed. Nonstructural mitigation measures under consideration include dry/wet floodproofing, elevation, and acquisition. In general, these types of nonstructural measures make up the Nonstructural Alternative, therefore, refer to the impacts analysis under

Alternative 6 for the potential impacts of nonstructural measures on recreation. The only potential structural measure under consideration is a pump station(s), although the cost of construction makes the implementation of this feature as a mitigation measure highly unlikely. Regardless, the following is a discussion of the potential impacts on recreation a pump station(s) might have. Although the location of the pump station(s) is unknown at this time, it would likely be located along Makiki Stream between Fern Street and the confluence of Makiki Stream with the Ala Wai Canal. This general area is highly urbanized with mostly apartments and businesses. The location of the pump station(s) would not be on an area deemed as recreation, even though the precise location of the pump station(s) is unknown. During construction, the area around the pump station(s) would be fenced off for public safety. Depending on the location of the pump station and where it would be fenced off, there could be minor temporary impacts to walking and/or biking within the vicinity of this area. This would be temporary, though, and would only last the duration of construction. Once the pump station(s) is constructed, the fencing would be removed, and the area would not incur upon recreational walkers or bikers. Similarly, operation and maintenance of the pump station(s) would have no impact on recreational walkers or bikers in the area.

Lastly, Alternative 1 does not include the construction of recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

Overall, due to project features permanently restricting access to portions of the waterway and recreational areas; reducing availability of a designated recreational area; and potentially increasing the use of existing recreational areas such that substantial physical deterioration would occur or be accelerated, Alternative 1 would have a significant impact on recreation.

Alternative 2B

Significant Impact: Alternative 2B contains similar features to Alternative 1, although it lacks the Manoa Valley Park detention basin. Even though there would be no short-term or long-term impacts at this one park; the analysis of the floodwalls under Alternative 1 and their potential short-term and long-term impacts would be similar to those detailed for Alternative 1. Therefore, refer to the analysis under Alternative 1 for most of Alternative 2B project impacts.

Alternative 2B does include a floodwall around the Ala Wai Canal which is not part of Alternative 1. Construction of the Ala Wai Canal floodwall which extends along the Manoa-Palolo Canal downstream of H1 and down both sides of the Ala Wai Canal up to Ala Moana Boulevard would cause temporary restricted areas to the public being able to access/see the canals especially for recreational activities such as fishing, canoe access, bird watching, walking the river trail, etc. The Ala Wai Community Park is also adjacent to the Ala Wai Canal where floodwalls would be located. The portion of the park adjacent to the right descending bank of the Ala Wai Canal would have temporarily restricted areas where construction of the floodwalls is occurring. Much of the park, however, would still be accessible to the public.

Long-term, there would potentially be significant impacts to recreational activities along the waterway. Floodwalls have the potential of permanently restricting land access to the waterway where the floodwalls are located which would essentially prevent fishing along the canal. Canoe access could also potentially be restricted at the canoe launches along the canal. To minimize these potential impacts, the floodwall around the Ala Wai Canal would include an approximately three-foot elevated walkway adjacent to the six-foot floodwall. The elevated walkway would restore the Ala Wai Canal trail for walkers, runners, bicyclists, and other recreational users. The elevated path would also potentially allow for fishing within the canal to still occur, although site

of a fishing line in the water could still be partially impaired. In addition to the elevated walkway, the floodwall around the Ala Wai Canal would also include road closure type structures where canoe launches are located. This would allow access to the waterway for paddlers still, although launches would not be accessible prior to, during, and for a few days after a storm event when the closure structures would need to be closed.

Overall, due to project features permanently restricting access to portions of the waterway and recreational areas and reducing availability of a designated recreational area, Alternative 2B would have a significant impact on recreation.

Alternative 5.3

Significant Impact: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to recreation are generally expected to be similar. Although likely still a significant impact, the impact of Alternative 5.3 is expected to be less than the impact of Alternatives 1 or 2B since the alternative does not include the Makiki Park detention basin, Manoa Valley District Park detention basin, or the Kanaha floodwall. Nevertheless, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts.

Alternative 6

Less than Significant Impact: Alternative 6 involves construction on existing upland structures and temporary construction access. Construction staging areas would be directly co-located with the affected structures. Elevation of structures would apply only to residences and would therefore have no short-term or long-term direct or indirect effects on recreation.

No known recreational facilities would be affected directly or indirectly by this alternative. However, if they are, they will be compensated and/or relocated and would be at the very least temporarily closed during construction or relocation. For these reasons, this alternative could have a direct, negligible to minor, short-term adverse effect on recreation and a negligible to minor long-term adverse effect on recreation.

Environmental Commitments

No environmental commitments apply that would reduce the significant impacts to less than significant.

Best Management Practices

No BMPs apply that would reduce the significant impact to less than significant.

3.5.5 Aesthetics

Regulatory Setting

Relevant federal and state laws/regulations include:

- National Historic Preservation Act
- Coastal Zone Management Act
- HRS Chapter 205A (Coastal Zone Management)
- HRS Chapter 183C (Conservation District)
- Hawaii Scenic Byways Program
- General Plan for the City and County of Honolulu
- Primary Urban Center Development Plan

The visual landscape of the study area, which contributes to the aesthetics of the area, are generally comprised of natural stream corridor and forested habitat in the upper Ala Wai watershed and open spaces within the heavily developed middle to lower Ala Wai watershed. The General Plan for the City and County of Honolulu has identified specific views that should be preserved within the Ala Wai watershed, including panoramic views from the Ala Wai Canal promenade and Ala Moana Beach Park toward the Koolau Mountains, as well as *mauka-makai* view corridors along major roadways. In addition to these viewplanes, other important scenic resources that have been identified include those in the Waikiki District, including the Ala Wai Canal itself, which is listed as a historic property on the Hawaii Register of Historic Places. Two scenic byways have also been established in this area under the Hawaii Scenic Byways Program: the Diamond Head Scenic Byway and the Waikiki – Kauhale O Hookipa Scenic Byway (DOT, 2015). The Diamond Head Scenic Byway spans from Kapiolani Park to Diamond Head Crater. The Waikiki – Kauhale O Hookipa Scenic Byway includes the major thoroughfares through Waikiki, including Ala Wai Boulevard.

Significance Criteria

Effects to aesthetics would be considered significant if the proposed project would result in any of the following:

- Development that substantially conflicts with the surrounding landscape (i.e., a form, line, color, or texture that contrasts with the visual setting)
- Obstruction of established viewplane, significant view corridor, or other public views or important environmental resources and/or landscapes.
- Substantial reduction of the views or aesthetic values associated with a historic property, scenic byway, or other important landmark.

Environmental Consequences

No Action Alternative

No Impact: Under the No Action Alternative, the flood-risk management measures would not be constructed and therefore would not affect visual resources. Over the period of analysis, the natural features within the watershed (including Mamala Bay, the Koolau Mountains, and other geologic landforms) are not expected to significantly change in form, color, texture, or scale. As such, the visual characteristics of these features are expected to be consistent over time. As previously noted, the urbanized portions of the watershed may be subject to redevelopment, which could affect the overall visual landscape. However, it is assumed that the existing development guidelines and standards would continue to be implemented, thus maintaining significant views and other important visual qualities.

Alternative 1

Less than Significant Impact with Environmental Commitments Incorporated: Construction of the project would involve the use of large construction equipment, exposed soils, and staged materials, which could temporarily reduce the overall aesthetic quality at each of the measure locations. However, these activities would be temporary in nature; in addition, the construction sites would be kept free of litter and excess equipment and materials, and generally maintained in a clean and organized condition, such that impacts are expected to be less than significant.

Once constructed, the measures would introduce built elements to the natural environment, which could alter the visual landscape to some degree. Recognizing the effect that the measures could have on the visual landscape; project siting and design were conducted in a manner to best integrate each measure with the natural characteristics of the site and minimize

visual impacts to the extent possible. This effort focused on using the natural topography to minimize the overall size and obtrusiveness of the proposed structures.

In the case of the Makiki, Manoa Valley, and Ala Wai Golf Course detention basins, the implementation of these features introduces a built element to existing open space areas (i.e., Makiki District Park, Manoa Valley District Park, and Ala Wai Golf Course, respectively), and would be visible from adjacent areas including surrounding residences. However, in each case, the detention basins would be comprised of an earthen/grass berm designed to be a multi-purpose feature, which once constructed, is expected to blend and be visually commensurate with the existing parks or golf course facilities. None of the detention basins are expected to substantially diminish important environmental or landscape views from or toward the open space areas, nor are they expected to affect significant view corridors, including mauka views of the Koolau Mountains. As such, impacts to aesthetics associated with the detention basins are expected to be less than significant.

In addition to the detention basins described above, the alternative would also include floodwalls along Kanaha, Woodlawn Drive Bridge, Koali Road, and Kaimuki High School. Based on the conceptual designs, the floodwalls along all these reaches are currently expected to be approximately six feet high (on average). The above floodwalls would result in permanent landscape features, leading to the following changes in visual resources. The floodwalls, especially the wall around Kaimuki High School, would be typically dominate the view and would often only be somewhat compatible due to the alternative action area being a coastal landscape commonly holding panoramic views of water. The floodwalls, being an enclosure by design, often blocks these views and becomes a dominant feature in a now enclosed landscape. The floodwalls are characterized as only somewhat compatible because in many places they disrupt th219ompletnt harmony with the coastal landform, causing the broad and open experience currently available to be lost. For example, the floodwalls would partially obstruct views of the streams from the sides of the channels they are located on. Views from within the streams by paddlers would also be obstructed. Although the floodwalls may have a significant adverse effect on aesthetic resources, construction of the floodwalls would provide significant benefits in the form of protecting residential structures and commercial structures from the risk of inundation and resulting structural damage; the No Action Alternative would not offer such protection. To mitigate for the adverse impacts to aesthetic resources, the proposed floodwalls would have a fascia of lava rock on both sides to blend the walls into the surrounding environment as well as incorporate materials from the island.

Alternative 1 also includes potential mitigation measures for induced flooding within the watershed. Potential nonstructural mitigation measures include dry/wet floodproofing, elevation, and acquisition. The Nonstructural Alternative includes similar nonstructural measures, therefore, refer to Alternative 6 for the impact analysis of these potential mitigation measures on aesthetics. The only potential structural mitigation measure under consideration is a pump station(s), although it is highly unlikely that this mitigation measure will be implemented. Regardless, a discussion of potential impacts to aesthetics from construction, operation, and maintenance of a pump station is included below. Although the precise location of a pump station(s) is unknown at this time, it is anticipated that the pump station would be along Makiki Stream somewhere between Fern Street and the confluence of Makiki Stream with the Ala Wai Canal. Construction and grading activities for the pump station(s) would require the use of heavy equipment and storage of materials on-site. During construction, excavated areas, stockpiled soils, and other materials at the construction site and staging areas would constitute negative aesthetic elements in the visual landscape. If vegetation is present on the site where the pump station(s) would be constructed it would need to be removed in order to construct the

pump station(s). However, construction would last for a short period of time and the architecture of the pump station housing would be designed to blend in with the surrounding environment. Landscaping around the structure, if feasible, would restore the appearance of the disturbed area. This would reduce the short-term adverse effects of the pump station(s) on aesthetic resources to a less than significant level. Long-term, the operation and maintenance of the pump station is not expected to have a substantial adverse impact on aesthetic resources. Maintenance would require the presence of personnel vehicles, but maintenance activities would occur within the pump station(s) housing and would not be visible to the public.

Overall, Alternative 1 is expected to conflict with the surrounding landscape visually and obstruct established local viewplanes. Therefore, Alternative 1 would have a significant adverse effect on aesthetic resources, but that effect would be reduced to less than significant with the implementation of environmental commitments (EC CUL-4).

Alternative 2B

Less than Significant Impact with Environmental Commitments Incorporated:
Construction of the project would involve the use of large construction equipment, exposed soils, and staged materials, which could temporarily reduce the overall aesthetic quality at each of the measure locations. However, these activities would be temporary in nature; in addition, the construction sites would be kept free of litter and excess equipment and materials, and generally maintained in a clean and organized condition, such that impacts are expected to be less than significant.

Once constructed, the measures would introduce built elements to the natural environment, which could alter the visual landscape to some degree. Recognizing the effect that the measures could have on the visual landscape; project siting and design were conducted in a manner so as to best integrate each measure with the natural characteristics or the site and minimize visual impacts to the extent possible. This effort focused on using the natural topography to minimize the overall size and obtrusiveness of the proposed structures.
In the case of the Makiki detention basin, refer to the analysis under Alternative 1.

In addition to the Makiki detention basin, the project would also include floodwalls along Kanaha, Woodlawn Drive Bridge, Koali Road, Kaimuki High School, Ala Wai Golf Course, and a majority of the Ala Wai Canal. Based on the conceptual designs, the floodwalls along all of these areas are currently expected to be approximately six feet high (on average). The above floodwalls would result in permanent landscape features, leading to the following changes in visual resources. The floodwalls would be typically dominant and often only somewhat compatible due to the alternative action area being a coastal landscape commonly holding panoramic views of water. The floodwalls, being an enclosure by design, often block these views and becomes a dominant feature in a now enclosed landscape. The floodwalls are characterized as only somewhat compatible because in many places they disrupt the current harmony with the coastal landform, cause the broad experience currently available to be lost. For example, the floodwalls would partially obstruct views of the streams from the sides of the channels they are located on. Views from within the streams by paddlers would also be obstructed, especially along the Ala Wai Canal. The broad expanse views are not only an important resource for the Waikiki District in general, but they are also significant in terms of the Ala Wai Canal as a historic property on the Hawaii Register of Historic Places, as well as the Kauhale O Hookipa Scenic Byway (which includes Ala Wai Boulevard). Although the floodwalls may have a significant adverse effect on aesthetic resources, construction of the floodwalls would provide significant benefits in the form of protecting residential structures and commercial structures from the risk of inundation and resulting structural damage; the No Action Alternative

would not offer such protection. To mitigate for the adverse impacts to aesthetic resources, the proposed floodwalls would have a fascia of lava rock on both sides to blend the walls into the surrounding environment as well as incorporate materials from the island. Further refinements would be made during PED and would further evaluate opportunities to reduce the dimensions of the floodwalls, as well as incorporate additional design details that may minimize potential visual impacts. This effort would incorporate design input solicited as part of the NHPA Section 106 consultation process as described in Section 3.5.1.

Although further refinements and design input would occur during the preconstruction engineering and design (PED) phase, some design elements have already been incorporated to minimize potential impacts to contributing factors to the Ala Wai Canal historic property. The current design of all the floodwalls includes a fascia of lava rock on both sides of the wall. The intent is to blend the walls into the environment and make them more visually appealing. In addition, EC CUL-4 (refer to Section 3.5.1, environmental commitments) includes an elevated walkway where feasible as part of the design for the Ala Wai Canal floodwall only. The lava rock fascia on the floodwalls and the implementation of EC CUL-4 are expected to reduce potentially significant visual and aesthetic impacts to less than significant with environmental commitments incorporated.

Alternative 5.3

Less than Significant Impact with Environmental Commitments Incorporated: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to aesthetics are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts. Overall, Alternative 5.3 would have a short-term adverse effect and a long-term significant adverse effect to visual and aesthetic resources. The long-term significant adverse effect would be reduced to less than significant with the implementation of the lava rock fascia on the floodwalls and EC CUL-4.

Alternative 6

Less than Significant Impact: The nonstructural measures, particularly elevation, would change the appearance of homes opting in. This could be a beneficial or adverse effect, depending on perspective. Depending on current FFE, the final elevation would be between three and 12 feet off the ground. The homes would be placed on timber supports. Lifting the homes this far off the ground would make them more visible for longer distances. In some neighborhoods, only a few homes would be treated, and those might stand out in the neighborhood due to height.

Land disturbance for this alternative would be limited to modification of existing buildings. Structures that will be elevated would remain similar in appearance, except that they would be seen from further distances. Implementation of Alternative 6 would require construction access to all structures to be treated which would be expected to occur from existing roads. Similarly, localized maintenance such as repairs would be needed over time. During those timeframes only, construction vehicles would be visible. Overall, minor to moderate short-term and long-term adverse impacts to aesthetics are expected to result from implementation of Alternative 6.

Environmental Commitments

Refer to Section 3.5.1, environmental commitments for the description of EC CUL-4.

Best Management Practices

BMPs used to minimize impacts to aesthetics during construction include:

- Work and staging areas will be kept orderly and free of trash and debris.
- Construction lighting fixtures will be shielded by providing side flaps on lights. Onsite construction lighting will be arranged so that direct rays will not shine or produce glares to nearby residences.

3.5.6 Public Health and Safety

Regulatory Setting

Relevant federal and/or state laws/regulations include:

- HRS, Chapter 26 and Chapter 126 – *Civil Defense Advisory Council*
- HRS, Chapter 127A – *Emergency Management*

Existing Conditions

In the event of catastrophic flooding, potential safety threats include loss of life, injury, and post-flood health hazards. Elevated and/or high-velocity floodwaters can threaten physical health and safety (e.g., risk of drowning and injury from movement of debris and other large objects), as well as mental health (e.g., stress and anxiety). Other health and safety hazards that could occur because of flooding include potential contamination of floodwaters (e.g., including sewage, fuel oil, pesticides, and solvents); in addition, flood conditions can increase exposure to bacteria and/or mold (e.g., leptospirosis).

Flooding

As detailed under Section 3.3.4, flooding within the study area creates a public safety concern. The watershed currently has a flood warning system that includes multiple real-time rain and stream gages. These are sponsored by the City and County of Honolulu Department of Environmental Services (ENV); however, sponsorship is not expected to continue over the long-term. Although evacuation planning is an important contributor to flood-related safety, there are generally no designated evacuation routes in the study area for riverine flooding.

Flooding within the area, specifically Palolo Stream, in 2021 led to the rescue of five boys by the Honolulu Fire Department. The boys were playing in Palolo Stream after school when they were swept away by fast-moving water; none of the boys were injured in the incident.

Pollution

Pollution within the Ala Wai Canal and Ala Wai Boat Harbor has created a long-standing public safety concern. In 2006, a man died after contracting three bacterial infections from falling in the Ala Wai Boat Harbor (Cocke, 2013). Canoe paddlers who frequently use the canal complain of infections that cause sores and itchy scabs. The Canal has tested positive for now banned pesticides (e.g., dieldrin, chlordane, and DDT) and heavy metals (e.g., arsenic, mercury, lead, cadmium, copper, zinc, nickel, and chromium) linked to cancer, birth defects, and damage to the nervous system.

Significance Criteria

The proposed project would result in a potentially significant impact to public health and safety if it would:

- Increase health and safety risks to residents and visitors.
- Decrease access to or functionality of critical infrastructure, or other public facilities including schools.

- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Environmental Consequences

No Action Alternative

No Impact: Under the No Action Alternative, the flood risk management measures would not be implemented, and public health and safety would continue to be threatened by large-scale flood events. The currently affected population of approximately 54,000 residents; 48,000 students; and approximately 79,000 visitors to the Waikiki area would remain in the 1% AEP floodplain and could potentially grow as the population increases over time.

As evidenced by past flooding events, there is some potential for life loss because of flooding in the watershed. The existing flood warning system is expected to significantly reduce the potential for life loss by providing residents and visitors with sufficient warning to evacuate; however, the long-term funding and support of the flood warning system is uncertain. Regardless, the potential flood characteristics are not projected to be of a depth and velocity that imminently threaten life safety. Rather, the more prominent health and safety threats are expected to be injuries associated with movement of debris and/or health concerns related to contaminated floodwaters.

Much of the watershed's critical infrastructure would remain within the floodplain, which elevates the risk associated with these health and safety threats. Critical infrastructure that is within the existing 1% AEP floodplain would remain subject to flooding, including four fire stations (McCully, Waikiki, Ala Moana, and Makiki), one police station (Waikiki), two medical centers (both in Waikiki) and nine emergency shelters (three in Waikiki, two in McCully/Moiliili, three in Manoa, and one in Kaimuki).

Alternative 1

Less than Significant Impact: During construction of the project, areas within the alternative footprint that may currently be available to the public would need to be cordoned off. Construction fencing would likely be placed around the perimeter of the alternative footprint that would restrict the public from accessing the construction sites. Heavy equipment will need to access the alternative footprints, including haul trucks that would periodically be coming to and from the site to provide materials/haul materials away. Signage would be posted to warn the public of entering/exiting haul vehicles while construction is occurring. Due to construction fencing and construction signage, construction of the project would not substantially increase the health and safety risks to residents and visitors to the area. Once construction is complete, the operation of the project features is passive. During a storm event, the features would detain and convey floodwaters through the system. The features would reduce the potential impact of flooding to residents and visitors within the Ala Wai Watershed. There could be concern that residents, especially children within the areas of the park detention basins, could access these sites during a flood event when the detention basins would be full of water. Signage placed around the detention basin sites would warn residents that the detention basins should not be used during storm events and would warn of the potential risk of drowning. Maintenance of the project could include heavy equipment to make repairs, clean up debris, remove sediment, etc. and smaller equipment for visual assessments of the features. Maintenance requiring larger equipment would likely only be necessary after a significant rainfall event. The use of smaller vehicles to visually assess the project features and make small repairs is expected to occur on a more regular basis. Vehicles would need to move slow in areas where the public can access the site, use flashers, and potentially put-up signage that notify the public repair work is occurring.

With the implementation of signage and safety fencing the construction, operation, and maintenance of the project is not expected to substantially increase the health and safety risks to residents and visitors to the area.

Construction of the project overall is not expected to decrease access to or functionality of critical infrastructure or other public facilities. For a discussion of the potential impacts to critical infrastructure and utilities refer to Section 3.5.7. The project does include the construction of a floodwall around the perimeter of the athletic fields for Kaimuki High School. Construction of the floodwall at Kaimuki High School has the potential to decrease access or functionality of the school's athletic fields. To minimize the potential impacts due to construction, construction could be phase to minimize disruptions during student arrival and dismissal times. Construction at the school could also be phased to occur when school is not in session (i.e., during summer break). Long-term, the operation and maintenance of the project is not expected to have a substantial impact on access of functionality of Kaimuki High School. Routine maintenance of the floodwall would likely be phased so that it occurs when school is not in session. However, emergency maintenance/repairs would need to occur as soon as possible, meaning that they could occur while school is in session. Similarly, when road closure structures are put into place, the road closure structures could interfere with access to Kaimuki High School as well as other facilities located near floodwalls. Although road closure structures could interfere with access to Kaimuki High School, access would likely not be substantially different than it is under the No Action Alternative. Under the No Action Alternative, road closures already occur during storm events due to flooding and cleanup activities post-storm. Interference to accessing Kaimuki High School would likely be like interference already experienced during storm events under the No Action Alternative. The cause of the interference would be road closure structures instead of flooding, and both alternatives would still require post-storm cleanup activities. Overall, construction and operation and maintenance of the project is not expected to substantially decrease access to or functionality of critical infrastructure, or other public facilities including schools.

The construction of the project should not substantially impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Project features are not located on roads nor does staging occur on any roadways where one lane of the road could potentially be temporarily closed. Haul trucks and construction personnel accessing and egressing from the site could increase traffic where it may not typically occur. This increase is not expected to substantially impair implementation or interfere with an emergency response of evaluation plan. The long-term maintenance of the project is also not expected to substantially impair implementation or physically interfere with an adopted emergency response or evacuation plan. Annual maintenance would primarily entail visually assessing the project features and making small repairs if needed. None of these activities would block a roadway for any extended period. Emergency maintenance activities such as extensive repairs, debris clean up, sediment removal, etc. could occur periodically throughout the life of the project after a large storm event. These activities are not expected to block any evacuation routes although like construction, there could be heavy equipment and repair crews accessing and egressing from a site which could increase traffic in an area where it is not typical. Regarding operation of the project, road closure features are included to bridge the gap between floodwalls where a roadway or walkway occur. These road closure features would be assembled prior to the notice of a severe storm event, during the storm event, and would be removed after the completion of the severe storm event. Road closure features put up prior to a storm event and during a storm event could physically interfere with an adopted emergency response plan or emergency evacuation plan as they would prevent movement along a roadway where they are located. The main features of concern under Alternative 1 are the road closure

structures associated with the floodwalls/earthen berms around Kaimuki High School and Ala Wai Golf Course. Under Alternative 1, the road closure structures that could impact evacuation during a tsunami warning are the road closure structure at Date Street to bridge the gap between Kaimuki High School floodwall and the Ala Wai Golf Course floodwall/earthen berm, and the road closure structure at Ala Wai Golf Course Drive. Ala Wai Golf Course Drive is not a throughway; therefore, the road closure structure here would have no impact on evacuation during a tsunami warning. The Date Street Road closure structure is a throughway and would prevent traffic from crossing the Date Street Bridge during a potential tsunami warning. There are nearby throughways such as Kapiolani Boulevard and Kapahulu Avenue which provide access to H-1 and other roadways that provide evacuees access to the tsunami safe (Figure 24). None of the other road closure structures under Alternative 1 would interfere with an adopted emergency response plan or emergency evacuation plan as they are located within the tsunami safe zone.

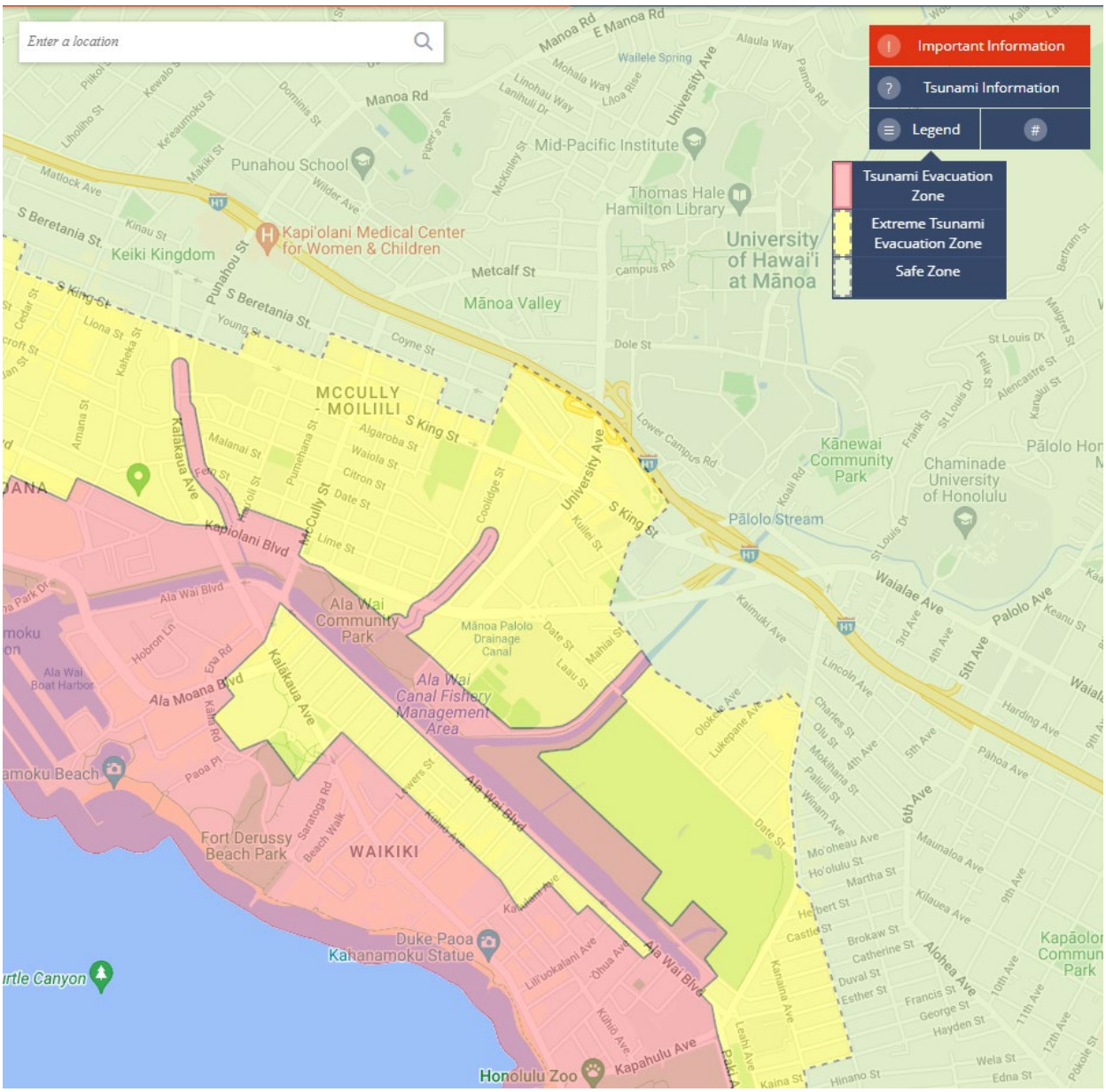

Figure 24: Tsunami Evacuation Zones within the Vicinity of the Ala Wai Watershed.

Alternative 1 also includes the implementation of potential mitigation measures for induced flooding. Potential mitigation measures include nonstructural measures such as dry/wet floodproofing, elevation, and acquisition. The potential nonstructural mitigation measures are generally included in the Nonstructural Alternative, therefore, refer to the impact analysis for Alternative 6 for these measures. The only potential structural mitigation measure under consideration is a pump station(s), although it is highly unlikely due to cost that a pump station will be constructed. Regardless, the potential effects of a pump station on public health and safety are analyzed below. Although the precise location of the pump station(s) is unknown at this time, it is likely to be located along Makiki Stream between Fern Street and the confluence of Makiki Stream with Ala Wai Canal. Because of the urban nature of the general area, short-term minor adverse safety effects on the public (e.g., motorists, bicyclists, and pedestrians) and emergency services could occur during construction of the pump station(s). There is the potential for temporary road closures and/or reduced lanes, but alternate routes would be provided. The construction area would be secured from trespassers and construction worker safety protocols would be followed as prescribed by the Occupational Safety and Health Act (OSHA). Long-term, the operation of the pump station(s) would have negligible adverse impacts on safety since maintenance workers would follow safety protocols as prescribed by OSHA. The operation of the pump station(s) during storm events would have a beneficial impact on public health and safety since it would minimize induced flooding.

Overall, the project is not expected to substantially increase health and safety risks to residents and visitors; decrease access to or functionality of critical infrastructure, or other public facilities including schools; or impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, the project would have a less than significant impact on public health and safety and no mitigation would be required.

Alternative 2B

Less than Significant Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to public health and safety are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. It is important to note that Alternative 2B includes more floodwalls than Alternative 1 and specifically around the Ala Wai Canal. Construction, operation, maintenance, and mitigation impacts are generally expected to be similar to those discussed under Alternative 1; however, a discussion specific to potential long-term impacts to interference with an adopted emergency response plan or emergency evacuation plan is discussed below.

Alternative 2B includes additional road closure structures within tsunami evacuation zones due to the alternative including a floodwall around the Ala Wai Canal. As discussed above, road closure structures are used to bridge the gap between floodwalls and are typically assembled prior to the notice of a severe storm event, left in place during a storm event, and removed after completion of the severe storm event. Road closure structures assembled prior to a storm event and during a storm event could physically interfere with an adopted emergency response plan or emergency evacuation plan as they would prevent movement along a roadway where they are located. The road closure structure at Date Street to bridge the gap between the Kaimuki High School and the Ala Wai Golf Course floodwall/earthen berm was discussed under Alternative 1. In addition, there are road closure structures at Kapiolani Boulevard, McCully Street, and Kalakaua Avenue. The Kapiolani Boulevard road-closure structure would prevent passage of evacuees to tsunami safe zones if they were in place at the same time as a tsunami warning was issued (Figure 24). Other nearby alternative throughways include University Avenue, King Street, and Kapahulu Avenue which either connect directly to tsunami safe zones

or direct traffic to H-1. The McCully Street and Kalakaua Avenue road-closure structures would prevent evacuees from Waikiki reaching tsunami safe zones if the road closure structures are in place as the same as a tsunami warning is issued. Other nearby alternative throughways include Ala Moana Boulevard, Ala Wai Boulevard, and Kalakaua Avenue heading south. All of these throughways connect to other throughways allowing evacuees to get to H-1 or tsunami safe zones. Reducing the number of roads that evacuees can take to access tsunami safe zones would increase traffic on the alternative throughways from the Waikiki area. There would be no substantial impact to those outside of the Waikiki area attempting to evacuate. Within the Waikiki area there would be a reduction in the number of evacuation routes from four to three, although it is important to note that one of the remaining evacuation routes would not allow traffic to exit via two directions, only one (i.e., Kalakaua Avenue). Although this would likely increase traffic on these three remaining evacuation routes it is likely to not be a substantial increase. Traffic signage could be placed when road closure structure is assembled to bring awareness to the community that the throughway where the road closure structure is located is temporarily unavailable as a tsunami evacuation route. Traffic signs could also be placed to bring awareness to the community of alternative tsunami evacuation routes.

Overall, the project is not expected to substantially increase health and safety risks to residents and visitors; decrease access to or functionality of critical infrastructure, or other public facilities including schools; or impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, the project would have a less than significant impact on public health and safety and no mitigation would be required.

Alternative 5

Less than Significant Impact: In general, the type of project features included in Alternative 5 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to public health and safety are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5 project impacts.

Alternative 6

Less than Significant Impact: Alternative 6 involves temporary construction on existing structures, demolition of structures to be acquired, and construction access for both. During construction, if all safety regulations are followed there would be negligible temporary adverse effects on safety.

There would be long-term minor direct and indirect beneficial effects for safety as a result of this alternative. Elevation and dry floodproofing both aid in adaptation of structures to future flood events due to climate change. Acquisition and demolition will eliminate buildings that are expected to sustain significant damage from future storms and relocate residents to higher ground. In addition, the resulting open space could also help absorb storm floodwaters and potentially help reduce flooding and unsafe conditions elsewhere.

Environmental Commitments

No environmental commitments associated with impacts to public health and safety apply.

Best Management Practices

BMPs used to minimize impacts to public health and safety include:

- Signs depicting road closure structure locations.
- Signs showing alternative tsunami evacuation routes when road closure structures are in place.

3.5.7 Public Services and Utilities

Regulatory Setting

The following federal/state laws or regulations are associated with public services and utilities.

- HRS Chapter 46-11.5 – *Maintenance of Channels, Streambeds, Streambanks, and Drainageways*
- ROH Section 41-26.3 – *Maintenance of Channels, Streambeds, Streambanks, and Drainageways*

Existing Conditions

Public services that are available within the Ala Wai Watershed include police, fire, emergency medical services, public libraries, public schools, and community centers. Utilities that are available within the Ala Wai Watershed include infrastructure for electricity, telecommunications, solid waste, water, and wastewater. Other services include stream channel maintenance. The following is a brief overview of each of these services and utilities.

Police, Fire Protection, and Emergency Medical Services

Police services on the island of Oahu are provided by the Honolulu Police Department (HPD). HPD's headquarters are in downtown Honolulu, just within the western boundary of the watershed. The island is divided into eight patrol districts; the Ala Wai Watershed includes three of these districts, including most of District 1 (Central Honolulu), all of District 6 (Waikiki), and the western half of District 7 (East Honolulu).

In general, fire protection services for the island of Oahu are provided by the Honolulu Fire Department (HFD). The HFD is responsible for multi-mission emergency response for events including fire, emergency medical situations, hazardous material incidents, search and rescue (i.e., for mountain and ocean), motor vehicle accidents, and natural disasters. The island is divided into five battalions containing 44 fire stations. The Ala Wai Watershed includes portions of Battalion 1 and 2, with a total of 7 stations.

The Department of Forestry and Wildlife also has a Fire Management Program, which provides protection for wildlands, including forest reserves, natural area reserves, wildlife and plant sanctuaries, and public hunting areas. Portions of the upper watershed are designated as DOFAW primary response areas. In addition, DOFAW will cooperate with HFD for the protection of other wildlands not within their primary response area, to the extent needed to provide for public safety (DOFAW, 2010).

Emergency medical facilities within the Ala Wai Watershed include Straub Hospital and Kapiolani Medical Center for Women and Children. Straub Hospital is a full-service hospital located near the western boundary of the watershed, in the Ala Moana/Kakaako neighborhood. Kapiolani Medical Center for Women and Children is in lower Makiki, near the border with the Manoa neighborhood. Specializing in care for women and children, it offers a full array of medical services, including a pediatric emergency services and intensive care facilities. Queen's Medical Center, considered to be the primary trauma hospital on the island, is located just outside the western boundary of the watershed.

Public Schools, Cultural Centers, and Community Centers

The Hawaii State Public Library System is the only statewide public library system in the United States. There are 51 branches throughout the six islands of the state. There are four library branches of the Hawaii State Public Library System located within the Ala Wai Watershed. They

are the Library for the Blind and Print Disabled located at 402 Kapahulu Avenue, which provides books and magazines in audio and braille for patrons who are certified as having visual impairment or other physical limitation that prevents them from reading standard printed material. The McCully Moiliili Public Library (2211 S. King Street) which includes the Korean Library Foundation that maintains the largest Korean language collection in the library system. The last two branches within the Ala Wai Watershed at the Manoa Public Library (2716 Woodlawn Drive) and Wakiki-Kapahulu Public Library (400 Kapahulu Avenue).

The Hawaii State Department of Education is a large statewide school district comprised of 257 schools that are divided into seven small districts across the Hawaiian Islands. On the islands of Oahu, there are four smaller districts—Honolulu, Central, Leeward, and Windward. The Ala Wai Watershed is located within the Honolulu District and the Farrington-Kaiser-Kalani Complex. The Farrington-Kaiser-Kalani Complex has approximately 7,433 total students and 931 teachers (HI DOE, 2017). Public kindergarten through twelfth grade schools within the Ala Wai Watershed include: Ala Wai Elementary School, Aliiolani Elementary School, Hokulani Elementary School, Jefferson Elementary School, Kuhio Elementary School, Liholiho Elementary School, Lunalilo Elementary School, Manoa Elementary School, Noelani Elementary School, Palolo Elementary School, Waikiki Elementary School, Jarrett Middle School, Stevenson Middle School, Washington Middle School, Avenue Elementary through High School, Kaimuki High School, Roosevelt High School, and Hawaii School for the Deaf & Blind. Higher education facilities within the watershed include the University of Hawaii at Manoa and Chaminade University of Honolulu.

Cultural facilities within the Ala Wai Watershed include the Manoa Valley Heritage Center. Within the Manoa Valley Heritage Center is Kukaoo Heiau, an ancient agricultural temple originally built centuries ago but restored in 1933. In addition, the Japanese Cultural Center of Hawaii is also located within the Ala Wai Watershed.

Community centers within the Ala Watershed include Hanalei's Cultural Community Center, Kapahulu Center, Maryknoll Community Center, Moiliili Community Center, and Waikiki Community Center.

Electricity and Telecommunications

Hawaiian Electric Company (HECO) is the primary electrical utility provide for the island of Oahu. None of the power plants on the island of Oahu are located within the Ala Wai watershed. HECO's island-wide transmission and distribution system is comprised of various substation facilities and a broad network of power lines (some of which are located underground), with capacities ranging from 12 kilovolt (kV) to 138 kV.

Telecommunication services that are provided throughout the watershed include various radio, cell phone, and internet technologies.

Solid Waste

Solid waste services for the island of Oahu are provide by the City and County of Honolulu ENV. Specific services include drop-off facilities, curbside collection, and recycling. Most residential and general commercial trash is disposed at H-POWER, the City's waste-to-energy plant (located at Campbell Industrial Park). H-POWER processes over 600,000 tons of waste annually, producing approximately 7% of Oahu's electricity. Noncombustible construction and demolition (C&D) debris and industry waste is disposed of as landfill (ENV, 2005). The island's two landfills are located approximately 35 miles west of the watershed.

Water and Wastewater

City and County of Honolulu Board of Water Supply (BWS) manages the municipal water supply and distribution system on the island of Oahu. BWS is responsible for providing water service for consumers, regulating water availability for new developments, and protecting, developing, and conserving the island's water resources. In fiscal year 2014, municipal water use for the island of Oahu totaled approximately 140 million gallons per day (mgd) (BWS, 2014a). For comparison, approximately 61 mgd was consumed within the primary urban core, which is comprised mostly by the Ala Wai watershed (BWS, 2014b).

The City and County of Honolulu ENV is responsible for management of wastewater on the island of Oahu. There are a total of nine wastewater treatment plants (WWTP) in operation; the Ala Wai watershed is serviced by the Sand Island WWTP, located approximately 2 miles west of the watershed. The Sand Island WWTP is the largest plant on Oahu and receives approximately 85% of the island's wastewater, processing more than 60 mgd (ENV, 2010).

Stormwater Drainage

The City and County of Honolulu ENV is also responsible for the island's storm drain system. This system, which is referred to as the Municipal Separate Sewer System (MS4), captures storm water and conveys it directly to streams, canals, and/or the ocean to prevent flooding in developed areas.

Stream Channel Maintenance

HRS Section 46-11.5 mandates that "each county shall provide for the maintenance of channels, streambeds, streambanks, and drainageways, whether natural or artificial, including their exits to the ocean, in suitable condition to carry off storm waters; and for the removal…(of) any debris which is likely to create an unsanitary condition or otherwise becomes a public nuisance." However, the statute specifies that waterways that are owned by the State or by a private entity shall be maintained by their respective owners. A large percentage of the streams are privately owned, with an estimated 150 private landowners along Manoa Stream along (Oceanit, 2008). Section 41-26.3 of the ROH dictates that private owners are responsible for maintaining, dredging, and clearing the stream of any debris, vegetation, silt, or other items of any kind that may interfere with the natural flow of water. However, many private landowners are not aware of this responsibility of the scope of activities that are entailed (Townscape, 2008).

Given the diverse ownership of land, management responsibilities for the waterways are divided amongst many agencies and individuals. Many stakeholders have expressed frustration with the lack of adequate stream channel maintenance, which stems from the complexity of land ownership, with issues including fractured or inconsistent approaches to maintenance by different landowners, limited accessibility, limited resources, and excessive costs.

Significance Criteria

Effects to utilities would be considered significant if the proposed project would result in any of the following:

- Substantially interfere with, or increase the response time of police, fire, or emergency medical services.
- Substantially interfere with, or increase performance objectives for public services such as schools, parks, or other public facilities.
- Permanently disrupt or decrease the level of service for any public utility.

- Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.
- Generate solid waste in excess of the capacity of local infrastructure.

Environmental Consequences

No Action Alternative

No Impact: Under the No Action Alternative, the federal flood risk management measures would not be constructed, and as a result, there would be no construction-related impacts to public services and utilities. However, large portions of the watershed (and the associated public services and utilities) would remain vulnerable to increased levels of flooding. Flood-related impacts include increased emergency response requirements by police, fire, and medical teams during flood events. In addition, portions of the utility infrastructure may be subject to flooding (including the sewer and stormwater drainage systems, as well as electrical substations), which could cause widespread service disruptions.

Given the current development and the extensive network of utilities within the watershed, it is assumed that the distribution and scope of public utilities and services would remain relatively constant over the duration of the period of analysis.

Alternative 1

Less than Significant Impact: According to the 2019 Service Efforts & Accomplishments Report for the City and County of Honolulu (CCH, 2019), the average response time for Priority 1 calls (i.e., emergencies and in-progress cases) by the Honolulu Police Department is 7.24 minutes. The average response time for Priority 2 calls (i.e., forgery, fraud, vandalism, weapons, prostitution, drugs, gambling, driving while intoxicated, etc.) by the Honolulu Police Department is 10.04 minutes. Also, according to the 2019 Service Efforts & Accomplishments Report for the City and County of Honolulu (CCH, 2019), the average response time for Honolulu Fire Department Emergency Medical Services for Urban Tier I locales is 8.12 minutes. Similarly, the average fire response time for the HFD is also 8.12 minutes. The average response time for Urban Tier II HFD EMS is about 9.30 minutes, which is also the same average response time for a fire by the HFD. Lastly, the rural average response time for HFD EMS and fire response is about 16 minutes.

During construction of the project, the response times for HPD and HFD are not expected to increase or decrease substantially. Construction personnel would be using area roadways to access the project staging areas in the morning and afternoon and construction vehicles such as haul trucks would sporadically be using the area roadways to access the project staging areas for deliveries and/or pick-ups. None of the project staging areas are located on part of a roadway nor are any roadways expected to be partially closed (e.g., single lane closure) during construction of the project. Therefore, short-term construction of the project would not substantially increase or decrease emergency services response times.

Long-term there could be potential impacts to emergency services response times. Increases in response times would likely occur during large storm events when road closure structures are put in place to span the gap between constructed floodwalls. Roads where road closure structures are located would be impassible prior to a storm event occurring, during the storm event, and for a short time after the event until maintenance can reach the road closure structures and remove them. Although closure of the roads would likely increase emergency

service response times, the increase in response time would likely not be substantially different than it is under the No Action Alternative. Under the No Action Alternative, road closures already occur during storm events due to flooding and cleanup activities post-storm. The emergency response times that are experienced during storm events under the No Action Alternative would likely be similar to the emergency response times that would be experienced under Alternative 1 during and after a storm event. Overall, the construction and operation and maintenance of the project is not expected to substantially interfere with or increase the response time of police, fire, or emergency medical service. Therefore, the project would have a less than significant impact and no mitigation would be required.

Regarding other public services such as schools, parks, or other public facilities, construction of the project could have a short-term impact primarily on parks. Refer to the discussion on potential impacts to parks under Section 3.5.4. Regarding other facilities such as schools, libraries, community centers, etc. short-term construction of the project is not expected to have a significant impact. For the most part, construction activities do not include staging or access/egress through the above areas. The one exception is Kaimuki High school, where construction of a floodwall along the perimeter of the athletic fields would occur. Construction could be phased to minimize disruptions during student arrival and dismissal times. Long-term, the project is not expected to substantially interfere with other public services. Regarding long-term interference with area parks refer to Section 3.5.4. For other facilities such as schools, libraries, community centers, etc. long-term operation and maintenance of the project would not be expected to substantially interfere with these facilities. Again, the only exception is likely Kaimuki High School where a floodwall would be located long-term around the perimeter of the athletic fields. Routine maintenance would likely be able to be phased so that it occurs when school is not in session. However, emergency maintenance/repairs would need to occur as soon as possible, meaning that they could occur while school is still in session. Similarly, when road closure structures are put into place, the road closure structures could interfere with access to Kaimuki High School as well as other facilities located near floodwalls. Although road closure structures could interfere with access to the above facilities, the access to the above facilities would likely not be substantially different than it is under the No Action Alternative. Under the No Action Alternative, road closures already occur during storm events due to flooding and cleanup activities post-storm. Interference to accessing other public service facilities would likely be similar to interference already experienced during storm events under the No Action Alternative. The cause of the interference would be road closure structures instead of flooding, and both alternatives would still require post-storm cleanup activities. Overall, construction, operation and maintenance of the project is not expected to substantially interfere with other public services. Therefore, the project would have a less than significant impact and no mitigation would be required.

Construction of the project does not include new or expanded water, wastewater treatment, electric power, natural gas, or telecommunications facilities which could cause significant environmental effects. The project does include the construction of stormwater detention basins and inlet/outlets to and from these stormwater detention basins which results in the construction of new storm water drainage. The detention basins are located on two community parks and a golf course which are comprised of turf grass. Therefore, construction of these facilities would not cause significant environmental effects. Construction of the project features, in addition to the detention basins, could result in the relocation of utilities. The specific locations of existing utility lines and detailed relocation plans would be identified as part of the design phase. There may be some temporary interruptions in service, as needed to accommodate utility removal/relocation, but the interruptions would be minimized to the extent practicable and adequate notification would be provided, such that these impacts are expected to be less than

significant. Any existing utilities that need to be replaced/relocated during construction, are not expected to cause a long-term impact to the level of service for any public utility. Planned utility relocations being conducted by others would be coordinated and accommodated through the final design phase, to the extent practicable. Long-term, there are no utility requirements expected for the operation and maintenance of the project. As such, the project is not expected to permanently disrupt or decrease the level of service for any public utility nor require the relocation of construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.

Currently, Oahu is serviced by a single landfill, Waimanalo Gulch Sanitary Landfill. The landfill accepts municipal solid waste, sandblast media, and non-hazardous contaminated soils. The landfill is scheduled for permanent closure in 2028, with the City and County of Honolulu currently evaluating potential sites on Oahu for a new landfill. The following analysis assumes that the Waimanalo Gulch Sanitary Landfill is still in service when the proposed project is constructed; however, the analysis would also apply to any new landfill in operation as the new landfill would likely have the same or higher daily maximum capacity than the Waimanalo Gulch Sanitary Landfill which could be retired by the time the project is constructed. During construction of the project, approximately 203,757.61 cubic yards of material would be excavated for construction of project features. Construction of the project does require fill and the intent is to reuse material excavated on site as fill material for project features. The estimated amount of fill required for the project is 173,957.43 cubic yards of material. Excess excavated material that cannot be reused onsite would be disposed of offsite at the Waimanalo Gulch Sanitary Landfill. This excess material would not be disposed of offsite all at once, but daily. The quantities of material that would be transported to the local landfill for disposal daily would be minor in relation to the capacity of the landfill. Annual maintenance generally would include the excavation of sediments from the detention basins and recovery of trash/debris; however, the quantities removed/recovered and disposed of per day would be nominal in relation to the capacity of the Waimanalo Gulch Sanitary Landfill. Therefore, less than significant impacts associated with solid waste disposal would occur and no mitigation would be required.

Alternative 1 also includes the implementation of potential mitigation measures for induced flooding. Potential mitigation measures include nonstructural measures such as dry/wet floodproofing, elevation, and acquisition. The potential nonstructural mitigation measures are generally included in the Nonstructural Alternative, therefore, refer to the impact analysis for Alternative 6 for these measures. The only potential structural mitigation measure under consideration is a pump station(s), although it is highly unlikely due to cost that a pump station will be constructed. Regardless, the potential effects of a pump station on public health and safety are analyzed below. Although the precise location of the pump station(s) is unknown at this time, it is likely to be located along Makiki Stream between Fern Street and the confluence of Makiki Stream with Ala Wai Canal. Short-term, construction of the pump station(s) would potentially have temporary minor adverse construction-related effects. The pump station(s) does require a reliable source of power for the pump motor drives. The pump station(s) will also include an emergency power supply such as electric power feed from two independent power distribution lines; an on-site standby generator; an adequate portable generator with quick connection; and a stand-by engine drive. The construction of the pump station(s) is not expected to substantially effect public utilities with its need for a power source. Long-term, the operation and maintenance of the pump station(s) would have no impact on public utilities as the pump station would have its own public utility lines.

Overall, Alternative 1 is expected to have short-term minor adverse impacts on public utilities during construction and less than significant long-term adverse impacts to public utilities from operation and maintenance.

Alternative 2B

Less than Significant Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to public services and utilities are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. Overall, Alternative 2B is expected to have short-term minor adverse impacts on public utilities during construction and less than significant long-term adverse impacts to public utilities from operation and maintenance.

Alternative 5.3

Less than Significant Impact: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to public services and utilities are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts. Overall, Alternative 5.3 is expected to have short-term minor adverse impacts on public utilities during construction and less than significant long-term adverse impacts to public utilities from operation and maintenance.

Alternative 6

Less than Significant Impact: There would be minor, short-term to long-term impacts to utility infrastructure with implementation of Alternative 6. Implementation of measures such as elevation and dry floodproofing would likely require local investigations for existing utilities at those locations, such as service lines to individual buildings for gas, water, sewage and in some cases (where lines are underground) power. Telecommunications should not be affected by the nonstructural measures. Elevation of structures is the measure most likely to require utilities investigations, including elevation of local utilities that service individual buildings. Local actions may include raising of HVAC structures, power substation raising, and possibly relocating and/or altering water service lines. Such impacts would be minor, temporary, and limited to individual buildings and, therefore, would not be significant. Overall, there would be short-term negligible to minor adverse impacts to utilities and negligible long-term effects on utilities.

Environmental Commitments

No environmental commitments associated with impacts to public services and utilities apply.

Best Management Practices

No BMPs associated with impacts to public services and utilities apply.

3.5.8 Transportation and Traffic

Regulatory Setting

Regulatory conditions for traffic and analysis are generally dictated by overall transportation industry standards as published by the Federal Highway Authority and the U.S. Department of Transportation. These organizations serve as oversight agencies ensuring the respective regional, state, and local jurisdictions follow the appropriate guidelines and parameters. For traffic analysis parameters, delays are generally considered the leading indicators of traffic flow and operations; the shorter the delay, the better the roadway segment flows, and the

intersections operate. Federal regulations do not dictate specific levels of operation or minimum delays. Instead, it is primarily the local jurisdiction's judgement, supported by the analyst's qualitative calculations, that established the best option.

- City and County of Honolulu's Traffic Standards Manual, 1976
- Subdivision Street Standards, 2001
- Act 54, Session Laws of Hawaii (SLH) 2009
- Bike Plan Hawaii, 2003
- Oahu Bike Plan, 2012
- Oahu Metropolitan Planning Organization Complete Streets Checklist, 2013
- Hawaii Statewide Pedestrian Master Plan, 2013
- City Complete Street Checklist, 2014
- Honolulu Complete Streets Ordinance (ROH Chapter 14, Article 33)
- HRS, Section 264-20, Flexibility in Highway Design; Liability of State, Counties, and Public Utilities

Existing Conditions

A variety of roadways occur within the Ala Wai watershed, ranging from one of the State's primary freeways, to major thoroughfares and collector streets, to local access roads. H-1 (Lunalilo Freeway is one of four freeways on the island of Oahu, providing access between the Ewa district and Hawaii Kai, which constitutes the island's primary urban corridor. It is approximately 27 miles long, of which approximately 4 miles occurs within the Ala Wai watershed. The number of lanes varies throughout the corridor, but within the watershed there are typically three lanes in each direction, not including ramps and auxiliary lanes. The only State Route (SR) within the watershed is SR 92, more commonly referred to as Ala Moana Boulevard, which parallels the shoreline in the western portion of the watershed (DOT, 2008). Other major thoroughfares within the watershed include Beretania Street, King Street, Kapiolani Boulevard, Ward Avenue, Kalakaua Avenue, University Avenue, Waialae Avenue, and Kapahulu Avenue. Most of these roadways serve as collector roads, carrying traffic between areas of activity within the urban district. These roadways are generally oriented in either an east-west direction (Beretania Street, King Street, Kapiolani Boulevard, and Waialae Avenue) or a mauka-makai direction (Ward Avenue, Kalakaua Avenue, University Avenue, and Kapahulu Avenue). The remainder of the transportation network within the Ala Wai watershed is comprised of smaller, local roads, such as those providing access into the residential neighborhoods. With the exception of H-1 and SR 92, all of the roads within the watershed are under the jurisdiction of the City and County of Honolulu Department of Transportation Services (DTS). Traffic conditions vary by location, but in general, many of the major roadways are over capacity during morning and afternoon peak hours, resulting in significant traffic delays.

The City and County of Honolulu DTS operates TheBus and TheHandi-Van public transportation systems. Annual ridership on TheBus is 68,274,031 while the annual ridership for TheHandi-Van is 890,453 (DTS, 2022). The study area is serviced by approximately 12 bus routes (Table 44) as well as nine bus routes which service the University of Hawaii (Table 45). In addition to the public bus transit system, the Waikiki Trolley red line and blue line also operate along roads within the vicinity of Ala Wai Canal.

Table 44: Bus Routes Servicing All or Portions of the Study Area.

Bus Route Number	Route	Type of Route
1	Kaimuki/Kalihi	Frequent Urban Route

Bus Route Number	Route	Type of Route
2	Waikiki/School/Middle	Frequent Urban Route
3	Kaimuki/Salt Lake	Frequent Urban Route
5	Ala Moana/ Manoa	Local Route
6	Pauoa/Woodlawn	Local Route
8	Ala Moana/Waikiki/Makiki	Frequent Urban Route
9	Kaimuki/Pearl Harbor	Local Route
13	Liliha/ Waikiki /University	Frequent Urban Route
14	St. Louis/Maunalani	Local Route
18	Kapahulu/Aina Haina	Local Route
19	Waikiki/Airport/Hickam	Frequent Urban Route
20	Waikiki/Airport/Pearlridge	Frequent Urban Route

Table 45: Bus Routes Servicing the University of Hawaii.

Bus Route Number	Route	Type of Route
80A	Hawaii Kai Park & Ride Express (UH)	Commute Route
83	Wahiawa Town Express	Commute Route
84	Mililani Express/North	Commute Route
84A	Mililani Express/South	Commute Route
85	Windward Express/Kaneohe	Commute Route
86	Windward Express/Haiku	Commute Route
87	Windward Express/Kailua	Commute Route
90	Pearl City Express	Commute Route
94	Villages of Kapolei/Kaupea Express	Commute Route

There are no airports located within the Ala Wai watershed. The nearest airport is the Honolulu International Airport (HIA) which is located approximately 10 miles north of Waikiki.

The Oahu Bike Plan (DTS, 2012) was developed to guide bikeway planning for the entire island of Oahu. It identifies the existing bicycle network and provides recommendations of new facilities as part of a strategy for better integrating bicycling into the transportation system.

Significance Criteria

Effects to transportation would be considered significant if the proposed project would result in any of the following:

- Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.
- Substantially increase vehicle travel times due to increased congestion, delays in traffic movement and circulation, and/or reduced roadway capacity.
- Substantially increase hazards due to a geometric design feature (e.g., sharper curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- Substantially decrease access to businesses, residences, or public facilities.
- Substantially displace parking and/or cause other significant changes in parking supply.

Environmental Consequences

No Action Alternative

No Impact: Over the period of analysis for this project, it is anticipated that traffic levels could increase, but the transportation resources within the watershed are not expected to substantially change. Under the No Action Alternative, none of the proposed flood risk management measures would be implemented and the anticipated reductions in potential flooding within the watershed would not be realized. As such, none of the construction-related impacts to traffic and transportation resources would occur, but nor would the benefits associated with protecting important roadways during flood conditions.

Alternative 1

Less than Significant Impact with Mitigation Incorporated: Construction of Alternative 1 would require the delivery of construction equipment and materials, as well as the transportation of construction personnel to each of the project locations, which is expected to impact traffic and transportation. Specific impacts that are anticipated include the following:

- Increased traffic congestion and/or reduced circulation when trucks are hauling material to/from a site.
- Increased degradation of existing pavement/condition of roadways, curbs, or intersections from large, heavy construction vehicles and equipment.
- Decreased driver safety because of reduced sight-distance or increased visual hazards associated with construction vehicles.
- Temporary changes in access to businesses, residences, or public facilities in areas adjacent to construction sites.
- Temporary reduction in availability of public, on-street parking because of construction activities.

An overview of the roadways and other transportation resources that are expected to be affected at each project feature location is provided in Table 46.

Table 46: Roadways and Other Transportation Resources Potentially Affected by Proposed Project.

Feature	Summary of Roadways Potentially Affected	Other Transportation Resources Potentially Affected
Kanaha Floodwall	Major Thoroughfares (e.g., Punahou Street and Nehoa Street) Collector Streets (e.g., Mott Smith Drive, Liholiho Street, Kewalo Street, Keeaumoku Street, Makiki Street, Anapuni Street, Wilder Avenue, and Piikoi Street)	
Makiki District Park Detention Basin	Major Thoroughfares (e.g., Punahou Street and Nehoa Street) Collector Streets (e.g., Wilder Avenue, Keeaumoku Street, Makiki Street, Kinau Street, Lunalilo Street, and Waiau Place)	Bus Route 5 (Ala Moana/ Manoa) and Bus Route 18 (Kapahulu/Aina Haina)
Manoa Valley District Park Detention Basin	Major Thoroughfares (e.g., Oahu Avenue, Manoa Road, and East Manoa Road) Collector Streets (e.g., Lowrey Avenue, Olopua Street, and Kahaloa Drive)	Bus Route 5 (Ala Moana/ Manoa) and Bus Route 6 (Pauoa/Woodlawn)

Feature	Summary of Roadways Potentially Affected	Other Transportation Resources Potentially Affected
Woodlawn Drive Floodwall	Major Thoroughfares (e.g., East Manoa Road and Oahu Avenue) Collector Streets (e.g., Woodlawn Drive, Lowrey Avenue, Kolowalu Street, Pamoa Road, Woodlawn Drive, Pamoa Road, and Hipawai Place)	
Koali Road Floodwall	Major Thoroughfares (e.g., Waialae Avenue and South King Street) Collector Streets (e.g., St. Louis Drive, Dole Street, Kanewai Street, Kamakini Street, and Koali Road)	Bus Route 1 (Kaimuki/Kalihi), Bus Route 13 (Liliha/ Waikiki /University), and Bus Route 14 (St. Louis/Maunalani)
Kaimuki High School Floodwall	Major Thoroughfares (e.g., Kapahulu Avenue, Ala Wai Boulevard, and Kapiolani Boulevard) Collector Streets (e.g., Date Street, Olokele Avenue, and Winam Avenue)	Bus Route 3 (Kaimuki/Salt Lake)
Ala Wai Golf Course Detention Basin	Major Thoroughfares (e.g., Kapahulu Avenue) Collector Streets (e.g., Date Street) Other (e.g., Ala Wai Golf Course Drive)	Bus Route 3 (Kaimuki/Salt Lake), and Bus Route 13 (Liliha/ Waikiki /University)

These impacts could significantly increase travel times and/or affect other transportation resources. However, these impacts would be limited to construction, such that they would be temporary in nature. In addition, the contractor would be required to prepare and implement a Transportation Management Plan (EC TT-1). Preparation and implementation of the plan would be coordinated with relevant transportation agencies, including DOT and DTS. With implementation of the plan, it is anticipated that impacts to traffic and transportation resources would be reduced to less than significant.

Once constructed, the project would not permanently displace any transportation facilities, including roadways, bicycle lanes, pedestrian pathways and/or parking. The project would function to reduce the extent of flooding within the Ala Wai watershed and would effectively remove many major thoroughfares and collector streets (as well as small access roads) from the floodplain, including Kapiolani Boulevard, Kapahulu Avenue, Kalakaua Avenue, and Ala Wai Boulevard. By decreasing the potential for flooding of these roadways, the project would provide important benefits, including improved access within and out of the watershed during flood conditions, including routes used for evacuation and flood response activities. During non-flood conditions, operations and maintenance of the proposed project would require the use of trucks and other vehicles (e.g., to remove and dispose of debris, minor repairs, etc.). However, only a minimal number of vehicles would be required typically, and these activities would occur on a periodic basis, such that traffic and transportation resources are not expected to be significant impacted long term.

Alternative 1 also includes potential mitigation measures that would be implemented to minimize induced flooding within the watershed. Nonstructural mitigation measures under consideration include dry/wet floodproofing, elevation, and acquisition. In general, these types of nonstructural measures make up the Nonstructural Alternative, therefore, refer to the impacts analysis under

Alternative 6 for the potential impacts of nonstructural measures on recreation. The only potential structural measure under consideration is a pump station(s), although the cost of construction makes the implementation of this feature as a mitigation measure highly unlikely. Regardless, the following is a discussion of the potential impacts on recreation a pump station(s) might have. Although the location of the pump station(s) is unknown at this time, it would likely be located along Makiki Stream between Fern Street and the confluence of Makiki Stream with the Ala Wai Canal. This general area is highly urbanized with mostly apartments and businesses. During construction, the area around the pump station(s) would be fenced off for public safety. Depending on the location of the pump station and where it would be fenced off, there could be minor temporary impacts to driving, walking, or biking within the vicinity of this area. This would be temporary, though, and would only last the duration of construction. Once the pump station(s) is constructed, the fencing would be removed, and the area would not incur upon transportation and traffic. Similarly, operation and maintenance of the pump station(s) would have no impact on transportation and traffic in the area.

Alternative 2B

Less than Significant Impact with Mitigation Incorporated: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to public health and safety are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts. It is important to note that Alternative 2B includes more floodwalls than Alternative 1 and specifically around the Ala Wai Canal. Table 47 shows the additional roads/bus routes that would potentially be impacted during project construction specific to the Ala Wai Canal floodwalls.

Table 47: Roadways and Other Transportation Resources Potentially Affected by Ala Wai Canal Floodwalls.

Feature	Summary of Roadways Potentially Affected	Other Transportation Resources Potentially Affected
Ala Wai Canal Floodwalls	Major Thoroughfares (e.g., Ala Moana Boulevard, Kalakaua Avenue, McCully Street, Ala Wai Boulevard, Kapiolani Boulevard, King Street, and Kapahulu Avenue) Collector Streets (e.g., Date Street, Kaimuki Avenue, Laau Street, Hihiwai Street, University Avenue, Kamoku Street, and Mahiai Street) Other (e.g., Iolani School Driveway, Ala Wai Golf Course Drive)	Bus Route 2 (Waikiki/School/Middle), Bus Route 3 (Kaimuki/Salt Lake), Bus Route 8 (Ala Moana/Waikiki/Makiki), Bus Route 9 (Kaimuki/Pearl Harbor), Bus Route 13 (Liliha/ Waikiki /University), Bus Route 19 (Waikiki/Airport/Hickam), and Bus Route 20 (Waikiki/Airport/Pearlridge), Ala Wai Promenade, Ala Wai Park Trail,

Overall, with the implementation of EC TT-1, Alternative 2B is expected to have a less than significant impact with mitigation incorporated on transportation and traffic resources.

Alternative 5.3

Less than Significant Impact with Mitigation Incorporated: In general, the type of project features included in Alternative 5.3 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and

degree of potential impacts to public services and utilities are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5.3 project impacts.

Alternative 6

Less than Significant Impact: Alternative 6 involves temporary construction on existing structures and construction access. Staging areas would not directly affect roadways, however, heavy equipment entering and exiting the transportation network could cause temporary, indirect negligible to minor travel delays. During construction, if all safety regulations are followed there would be negligible short-term adverse effects on transportation safety.

Environmental Commitments

The following environmental commitments would be implemented by the contractor during construction activities to further minimize any potential adverse effects to transportation and traffic:

EC TT-1: Construction contractor would be required to prepare and implement a Transportation Management Plan. Measures to be included in the plan are expected to include the following:

- Institute time-of-day restrictions for large, oversized construction vehicles to minimize interference with peak-hour or commute traffic.
- Maintain at least one travel land on roadways to the extent possible; if complete lane closures are required, post adequate signage for potential detours or possible delays, or conduct full lane closures at night.
- Establish temporary increases in lane capacity, as needed (e.g., widen existing shoulders for bypass traffic).
- Provide advance warning and proper roadway signage along potential construction routes to warn motorists, residents, businesses of changes in roadway and traffic-related conditions (e.g., potential vehicles entering and exiting the roadway, etc.).
- Identify safe and reasonable detours, including those needed for pedestrians and bicyclists, and provide adequate notification.
- Provide written, advanced notice to property owners and businesses adjacent to construction areas.
- Use pilot vehicles when slow or oversized/wide loads are being hauled.
- Use flaggers, as necessary, to direct traffic when large equipment is exiting or entering public roads to minimize risk of accidents.
- Provide temporary parking in nearby locations to the extent possible.
- Repair surface damage to local roads used for construction haul routes to pre-construction conditions.

Best Management Practices

No BMPS associated with impacts to transportation and traffic apply.

3.6 Economic Environment

3.6.1 Socioeconomic/Environmental Justice

Regulatory Setting

Relevant federal and state laws/regulations include:

- Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*
- Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*
- Article XI, Section 9 of the Hawaii Constitution (1978)

Existing Conditions

The U.S. Census QuickFacts was queried for demographic data on the State of Hawaii as well as Honolulu County (Table 48) (U.S. Census Bureau, 2022; City and County of Honolulu, 2022).

Table 48: Demographics Within the Study Area.

	Ala Moana/ Kakaako	Palolo	Makiki/ Tantalus	Manoa	McCully /Moiliili	Diamond Head/ Kapahulu	Waikiki	Honolulu County	Hawaii
Population	25,096	12,880	31,434	23,343	27,226	19,769	18,298	979,682	1,420,074
Persons under 18 years	12.6%	17.3%	12.7%	14.4%	13.5%	13.9%	8%	21.3%	21.4%
White	13.7%	13.2%	19.4%	21.0%	14.3%	22.7%	39.8%	37.7%	42.3%
Black or African American	2.1%	0.5%	1.8%	0.8%	1.4%	0.6%	4.3%	2.8%	2.2%
American Indian and Alaska Native	0.0%	0.03%	0.3%	0.0%	0.2%	0.5%	0.0%	0.3%	0.4%
Asian	64.9%	41.8%	51.2%	51.8%	53.6%	49.0%	42.2%	60.8%	56.3%
Native Hawaiian and Other Pacific Islander	3.8%	23.0%	10.7%	4.5%	8.1%	4.5%	3.3%	24.8%	26.3%
Hispanic or Latino	0.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.0%	10.7%
Two or more races	1.0%	13.4%	0.7%	0.6%	1.5%	0.5%	0.9%	22.8%	24.2%
25+ High School or Higher	88%	87%	90.5%	95%	88%	89%	92%	92.4%	92.5%
25+ BA or Higher	34%	29%	37%	53%	31%	28%	33%	36.2%	34.3%
Median Household Income	$68,200	$59,792	$63,769	$83,946	$61,187	$78,445	$88,000	$87,722	$88,005
Persons in poverty	10.8%	7.5%	10.7%	11.5%	16.4%	6.9%	16.5%	8.0%	10.2%

Significance Criteria

Effects to socioeconomics and environmental justice would be considered significant if the proposed project would result in any of the following:

- Substantially reduce employment opportunities or income levels in the area.
- Disproportionately affect any particular low-income or minority group.
- Disproportionately endanger children in areas within or near the action area.

Environmental Consequences

No Action Alternative

As discussed in above, the demographics of the alternative action area generally reflects that of the island-wide and state-wide population, except that the McCully/Moiliili and Waikiki neighborhoods contain a substantially greater percentage of people with an income below the poverty level. In addition, the median age throughout the watershed is greater than that of the island or state, which is indicative of a high percentage of elderly residents; this trend is expected to continue in the future, as Hawaii's population continues to age. Without implementation of the proposed flood risk management project, a large portion of the Ala Wai watershed (including the lower income population in much of the McCully/Moiliili and Waikiki neighborhoods, as well as a percentage of the elderly population) would remain within the 1% AEP floodplain and would continue to be within at risk of catastrophic flooding. In addition, a total of 11 schools (including University of Hawaii at Manoa), as well as libraries, community centers and other social facilities would continue to be at risk. These conditions are not expected to significantly change over the period of analysis.

Alternative 1

Less than Significant Impact: Short-term, the construction of Alternative 1 is not expected to substantially reduce employment opportunities or income levels in the area. During construction, skilled and unskilled labor would be necessary to construct the project which may in turn temporarily increase employment opportunities in the area. Long-term, the operation of the project is passive meaning labor above the existing condition would not be necessary. Therefore, long-term there would not be a substantial increase in employment opportunities, nor would there be a substantial decrease in employment opportunities within the alternative action area.

Regarding environmental justice, Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) states that federal agencies are responsible to conduct their programs, policies, and activities that substantially effect human health of the environment in a manner that ensures that such programs policies, and activities do not exclude persons from participation in, or deny persons the benefits of, or subject persons to discrimination under such programs, policies, and activities because of their race, color, or national origin. USEPA's environmental justice (EJ) mapping and screening tool was used to query the alternative action area. The EJScreen tool was used to ascertain if Alternative 1 would have a disproportionate adverse impact on a minority population, low-income population, or child population (i.e., persons under five years of age). According to EJScreen data, there is not a significantly different under age 5 population within the alternative action area when compared to the State of Hawaii or the U.S. Percentage of the population under 5 within the study area is approximately 4% which is less than the State average and U.S. average of 6% (Figure 25). Therefore, since the percentage of the population under 5 within the alternative action area is less than the percentage of the population under 5 within the State and the U.S., implementation of Alternative 1 would not have a disproportionate impact to this population.

Regarding a low-income population, approximately 24% of the population within the alternative action area are low-income. When compared to the State and the U.S., this percentage is slightly higher than the average percentage for the State (i.e., 22%), but lower than the average percentage for the U.S. (i.e., 30%). Since the percentage of the population that is low-income within the alternative action area is similar to the State and less than the U.S., implementation of Alternative 1 would not have a disproportionate impact on a low-income population.

Regarding a minority population, approximately 82% of the population within the alternative action area are people of color. This is slightly higher than the average percentage for the State of Hawaii (i.e., 78%) and significantly higher than the average percentage for the U.S. (40%). Since the percentage of the population that is considered a minority is greater than 50%, and is significantly higher than the average percentage for the U.S., a minority population is considered present within the alternative action area. Therefore, implementation of Alternative 1 has the potential to disproportionately impact a minority population. However, the objective of the project is to reduce flood risk and flood impacts within the alternative action area. By reducing flood risk and flood impacts, implementation of Alternative has the potential to have a beneficial impact on a minority population.

Alternative 1 also includes potential mitigation measures that would be implemented to minimize induced flooding within the watershed. Nonstructural mitigation measures under consideration include dry/wet floodproofing, elevation, and acquisition. In general, these types of nonstructural measures make up the Nonstructural Alternative, therefore, refer to the impacts analysis under Alternative 6 for the potential impacts of nonstructural measures on recreation. The only potential structural measure under consideration is a pump station(s), although the cost of construction makes the implementation of this feature as a mitigation measure highly unlikely. Regardless, the following is a discussion of the potential impacts on recreation a pump station(s) might have. Although the location of the pump station(s) is unknown at this time, it would likely be located along Makiki Stream between Fern Street and the confluence of Makiki Stream with the Ala Wai Canal. The average median household income in this general area ranges from < $50,000 to $70,000 annually. Although in an area with an average median household income less than the average median household income by census tract (i.e., $77,661); the general area where the pump station(s) could be located doesn't contain many households because it is near the Ala Moana Center. The minority population in this general area ranges from 1,200 to 6,000. Census tracts with the highest minority populations are located more in the upper watershed; therefore, the location of the pump station would not disproportionately adversely affect a minority community. The pump station is not expected to have disproportionately substantial adverse impacts either short-term or long-term to a low-income or a minority population. Ultimately, the pump station would minimize induced flooding which would have a long-term beneficial effect on for the communities located along lower Makiki Stream.

Overall, implementation of Alternative 1 could have a temporary increase in construction jobs available during the construction of the project as well as have a beneficial impact on a minority population. Therefore, the proposed project would have a less than significant impact on socioeconomics / environmental justice and no environmental conservation measures are proposed.

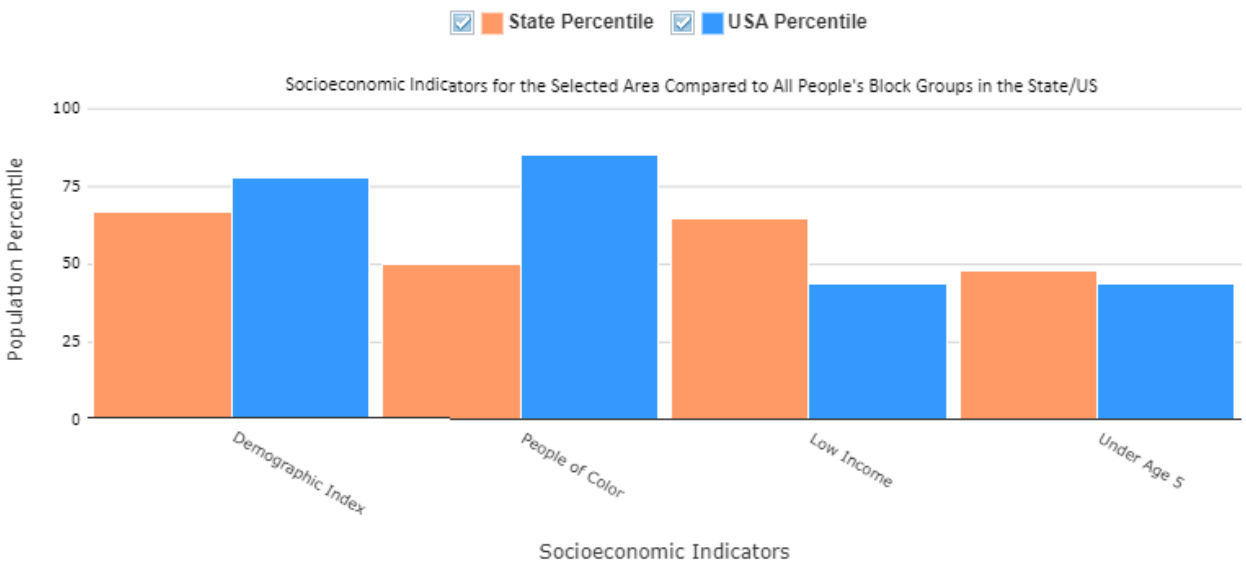

Figure 25: EJScreen Graph Depicting Socioeconomic Indicators within the Ala Wai Watershed

Alternative 2B

Less than Significant Impact: In general, the type of project features included in Alternative 2B would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1, such that the nature and degree of potential impacts to socioeconomics / environmental justice are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 for Alternative 2B project impacts.

Alternative 5

Less than Significant Impact: In general, the type of project features included in Alternative 5 would have similar construction, operation, maintenance, and mitigation requirements as Alternative 1 and Alternative 2B, such that the nature and degree of potential impacts to socioeconomics / environmental justice are generally expected to be similar. Therefore, refer to the analysis under Alternative 1 and Alternative 2B for Alternative 5 project impacts.

Alternative 6

Less than Significant Impact: Alternative 6 involves construction on existing upland structures and construction access and staging. Construction staging areas would be directly co-located with the affected structures.

Elevation and Floodproofing

Approximately 43 residences located throughout Honolulu would be eligible for elevation or raising of homes. Elevation of structures would apply only to residences, would be voluntary for property owners, and would have a beneficial effect on socioeconomics in the form of less damage from flooding. However, structural elevations may cause daily inconvenience to all, and special hardships to the elderly and handicapped. Floodproofing treatments would be done for approximately 1501 public, commercial, and multi-unit housing facilities.

For elevation, temporary relocation and/or restriction of use by residents and businesses would be necessary during construction. Because elevations and floodproofing are voluntary, property owners would not receive temporary relocation aid; however, tenants occupying affected

residences would be eligible for the aid under the Uniform Relocation Assistance Act (URA). Temporary relocations are anticipated to be difficult and expensive due to the number of temporary relocations and the scarcity of housing noted by the City and County of Honolulu. Time spent moving also would cause some, including some low-income households, to miss days of work and income. Temporary relocation during construction also could present special hardships to the elderly, handicapped, minority, or low-income people, for whom moving may be more burdensome, and relocation options may be more limited. Also, restricted use of individual residences and businesses during construction would be an adverse social impact. Therefore, temporary displacement during construction could be a short-term significant adverse impact. The assistance provided pursuant to the URA would help offset these impacts. In addition, construction would need to be phased and timed to ensure that adequate lodging is available, and neighborhoods done simultaneously, if possible.

As stated above, approximately 43 residences would be eligible for elevation or raising of homes. Elevation would be voluntary for all residence owners; and both homeowners and renters would be forced to move temporarily while the elevation construction is accomplished. Residential structures were identified for elevation based on an assessment of which measures produced the most economic benefit. The economic modeling and analysis completed in this study compared the reduction in damage, or economic benefit, provided by elevation and acquisition for each structure at risk to flooding, to the cost to implement that measure. However, Alternative 6 must be compliant with the Uniform Relocation Assistance and Real Property Acquisition Act (URA) which provides protections and benefits to residents affected by acquisition or elevation of their residence.

In accordance with the Environmental Justice EO, USACE has determined that there are potentially significant adverse short-term impacts, as well as significant long-term beneficial effects on disadvantaged minority and low-income populations.

Thousands of residences within low or low-to-moderate income dominated census block groups would be eligible for residence elevation. It should be noted that this does not mean that all residences located in a low or low-to-moderate income dominated census block group are low income and/or minority populations. It means that the majority of the population within that block meets that description. It is also important to note that there also may be affected disadvantaged individuals throughout Honolulu County who do not necessarily reside in a low or low-to-moderate income block group.

Affected residents would be compensated through relocation to comparable residences and provided relocation aid subject to the URA. For elevation, because this measure is voluntary no relocation reimbursements would be anticipated under the URA for homeowners. However, an exception to paying relocation expenses exists when there is an eligible tenant in the property, and the tenant (rather than the property owner) is displaced to accomplish the voluntary measure benefitting the property owned by the lessor. In this case, such tenants may receive relocation benefits. Given that many low-income and minority families are tenants, this would help mitigate the adverse effect on those populations. Regarding floodproofing, dry floodproofing includes sealing all opening below a certain elevation to prevent floodwaters from entering a structure. The maximum height a structure can be dry floodproofed is three feet above ground elevation due to engineering constraints. Structure owners would have to place the barriers prior to a storm, but once placed, damages could be reduced significantly. Wet floodproofing is a strategy where uninhabited space of a structure are intentionally allowed to flood.

Eligible tenants temporarily locating are reimbursed for the cost of temporary alternate housing, meals, and incidentals (such as laundry services), and the fees for disconnection and connection of utilities at the temporary residence. Alternate housing could be hotels or apartments, depending upon availability in the community. All temporary housing costs require advance approval by the NFS after first obtaining the prior written approval of USACE. General Services Administration (GSA) per diem rates are the basis of allowable hotel reimbursement. Apartment costs are on market rents.

All conditions of temporary relocation must be reasonable. Any residential tenant who temporarily relocated for more than one year must be offered permanent relocation assistance, which may not be reduced by the amount of any temporary relocation assistance previously provided. At a minimum, tenants shall be provided the following: reimbursement for all reasonable out-of-pocket expenses incurred in connection with the temporary relocation, including the cost of moving to and from the temporarily occupied housing, and any increase in monthly rent or utility costs at such housing. Tenants are entitled to receive relocation advisory services as well, including reasonably advance written notice of the following:

- Address of the suitable decent, safe, and sanitary dwelling to be made available for the temporary period;
- Terms and conditions under which the tenant may lease and occupy a suitable decent, safe, and sanitary dwelling in the building/complex upon completion of the project;
- Provisions of reimbursement for all reasonably out of pocket expenses incurred in connection with the temporary relocation as noted above; and
- In addition to relocation advisory services, displaced tenants may be eligible for other relocation assistance including relocation payments for moving expenses and replacement housing payments for the increased costs of renting or purchasing a comparable replacement dwelling.

The temporary displacement during construction could be potentially significant, due to the number of temporary relocations and the scarcity of housing noted by Honolulu County. Work would have to be phased such that there was adequate temporary housing for all affected residents. It is intended that phasing would be grouped such that whole neighborhoods could be done simultaneously, to minimize ingress/egress conflicts during construction.

Once construction is complete, residences would be permanently made more resilient to flooding. Elevations could present special hardships to the elderly, handicapped, minority, or low-income people for whom moving may be more burdensome. Elevation heights (new foundation heights) would range from three to 12 feet, with an average of about nine feet. Some homes May require an elevator or lift for the disabled. Elevations also could cause individuals to have to miss days of work during the process, which could adversely affect their families' income Over a thousand low and low-to-moderate income households would be subject to the temporary impact of being relocated during the elevation of their homes. This could cause significant temporary effects. One mitigating factor is that elevation is a voluntary measures; property owners may choose not to take advantage of elevation. However, if the residents are renters, then they would be subject to the decisions of the property owners. Another mitigating factor is that tenants would quality for temporary relocation costs reimbursement. Also, the disruption would be temporary; they could return to the same residences so their communities would not be permanently disrupted. Therefore, the elevation measure would not cause significant adverse long-term effects on any disadvantaged populations. There would be beneficial long-term effects for elevation in that resident relocated to areas would be less susceptible to flood damage in the form of improved flood risk management.

Alternative 6 would result in fewer flood damages to structures and an overall improvement of socioeconomic resilience through the ability of the population to resume normal life after a coastal storm, by keeping infrastructure functional for longer. This would be a significant benefit as critical infrastructure includes utilities, emergency services, and other essential elements of daily life. Short-term indirect and direct adverse effects would result from construction noise and presence and use of heavy equipment in residential and commercial structures. A beneficial temporary socioeconomic effect would be that additional construction work would support jobs locally or bring workers into the area resulting in a negligible to minor economic benefit.

Environmental Commitments

No environmental commitments associated with impacts to socioeconomics / environmental justice apply.

Best Management Practices

No BMPS associated with impacts to socioeconomics / environmental justice apply.

3.7 Cumulative Effects

A cumulative impact is the impact on the environment which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time in the study area. Those actions could be undertaken by various agencies (federal, state, or local) or private entities. A discussion of cumulative impacts resulting from actions and projects that are proposed, under implementation, or reasonably anticipated to be implemented in the near future is required.

Cumulative environmental impacts are most likely to arise when a relationship exists between a proposed action and other projects expected to occur in a similar location, time period, and/or involving similar actions. Project in proximity to the proposed action would be expected to have more potential for a relationship that could result in potential cumulative impacts than those more geographically separated. Temporary and geographical limits for the proposed action must be established to frame the cumulative impacts analysis. These limits can vary by the resources that are affected. The temporal limits for assessment of this impact would initiate with the construction of the Ala Wai Canal in 1920 and end 50 years after construction of a proposed project is complete in 2077. The geographical boundaries for this discussion of cumulative impacts would be broadened to consider the effects beyond the proposed project. The geographic extent is considered to be the Ala Wai watershed.

Past and Present Actions within the Ala Wai Watershed

It has been estimated that the area comprising the Waikiki District once supported approximately 2,000 acres of coastal wetlands. The streams emerging from Manoa, Palolo, and Makiki valleys flowed parallel to one another before dispersing into multiple smaller waterways which meandered through the coastal wetlands before entering the ocean. The Ala Wai Canal was constructed in the 1920s (due to health concerns over mosquitoes and a desire to more fully develop the Waikiki District). Dredged material was used to fill the wetlands, thus allowing these areas to be developed for residential and commercial purposes. Over the next several decades, various stream channelization projects were completed in response to flooding; these included joining and channelization of Manoa and Palolo streams to form the Manoa-Palolo Drainage Canal, as well as channelization of extensive lengths of Makiki and Palolo streams. Upper portions of the watershed, which historically supported a dense forest with a variety of native species, were also significantly altered. Harvesting of native woods for trade and cattle

grazing in the late 1800s led to deforestation of the upper valleys (Griffith, 1902). Subsequent reforestation efforts, first in an effort to protect Honolulu's water supply and later, in an attempt to establish a timber supply, replaced the once native forest with a patchwork of fast-growing, introduced species (Ziegler, 2002). The introduction of pigs also have a deleterious impact on many endemic species and the biological composition of the forest ecosystem (Mueller-Dombois, 1981). These changes over time provide context for the consideration of cumulative impacts.

Reasonably Foreseeable Actions within the Ala Wai Watershed

Table 49 provides an overview of reasonably foreseeable actions within the Ala Wai Watershed. The effects of the actions listed in the table were considered in combination with the degree and timing of the potential adverse and beneficial effects of the proposed alternatives to determine the types and significant of potential cumulative effects. For this analysis, implementation of the project is considered cumulatively significant if, in concert with other past, present, or reasonably foreseeable future actions, it would exacerbate the declining status of an identified resources (a resource that is already adversely affected) or create a condition in which an effect is initially minor but is part of an irreversible declining trend.

Table 49: Reasonably Foreseeable Actions within the Ala Wai Watershed.

Project Name	General Location	Construction Period	Description
Ala Wai Small Boat Harbor Vision Report	Ala Wai Small Boat Harbor	Waikiki	A team of faculty in the University of Hawaii Community Design Center, School of Architecture, and the Department of Urban and Regional Planning were commissioned by Hawaii's Department of Land and Natural Resources, Division of Boating and Ocean Recreation to create a concept/vision plan for the Ala Wai Small Boat Harbor and generate a conceptual cost estimate for the vision plan. The purpose was to offer insight for future requests for proposals for the harbor. The Vision Report summarizes the process and outcomes of the project. Drawing on the findings from community engagement facilitated by DTL in 2017, DOBOR's Strategic Plan completed in 2019, and a guided site visit with Senator Sharon Moriwaki and the AWSBH Working Group, the team prepared two concepts for the harbor that they shared with key stakeholders to gather feedback. The Vision Report proposals did not include feasibility assessments.
Ala Moana Boulevard Elevated Pedestrian Walkway	1050 Ala Moana Blvd.	Kakaako	The project includes construction of an elevated pedestrian bridge over Ala Moana Boulevard between the intersections of Ward Avenue and Kamakee Street. The busy intersection connects to Ward Village, Kewalo Basin Harbor, and Ala Moana Beach Park. The project is currently under construction. Construction is anticipated to be completed by October 23, 2023.

Project Name	General Location	Construction Period	Description
Ala Pono (Ala Wai Bridge) Project, Honolulu District, Oahu Island, Hawaii	Ala Wai Canal between Ala Moana Boulevard and Manoa/Palolo Stream	Waikiki, McCully, and Moiliili	The proposed project consists of a new pedestrian and bicycle bridge that would span the historic Ala Wai Canal, improving access for people traveling by foot or by bicycle across the Ala Wai Canal between Ala Moana Boulevard and the Manoa/Palolo Stream and would connect the Waikiki, McCully, and Moiliili neighborhoods; businesses; parks; schools; and recreational activities. The project's goal is to improve multimodal network connectivity and enhance public safety for people walking and bicycling. The proposed project is consistent with numerous regional and area plans that have been developed in the last two decades, particularly fulfilling part of the broader Honolulu Complete Streets Program, which implements projects to improve safety, accessibility, and comfort for all people walking, bicycling, accessing transit, and driving.
Ala Wai Boulevard Complete Streets Project	Ala Wai Blvd from Kalakaua Ave. to Kapahulu Ave.		The purpose of the Ala Wai Boulevard Complete Streets project is to make the street safer for everyone, including those walking, using a wheelchair, on a bike, riding transit, and in a car. Proposed improvements include: two-way protected bikeway; curb extensions; additional pedestrian crossings; pedestrian crossing beacons; speed limit reduction to 25 mph; lighting improvements; and time-of-day parking changes.
Kapiolani Boulevard: Honolulu Urban Core Complete Streets Project	Kapiolani Blvd. between South Street and King/Waialae intersection.	2022 estimated construction timeline	The proposed project includes full right-of-way reconstruction along Kapiolani Boulevard. Includes crossing Manoa-Palolo Canal.
Kapiolani Boulevard: Honolulu Urban Core Complete Streets Project	Kapiolani Blvd. between Ward Ave. and King/Waialae intersection.	2019 estimated construction timeline	The proposed project includes interim repaving of Kapiolani Boulevard. Includes crossing Manoa-Palolo Canal.

Project Name	General Location	Construction Period	Description
South King Street: Honolulu Urban Core Complete Streets Project	King Street Corridor between South Street and the Waialae/Kapiolani Intersection	2022 estimated construction timeline	The proposed project includes pedestrian crossing safety improvements, curb extensions, reserve-in angle parking, and a land reconfiguration to address speeding issues while maintaining capacity. Includes crossing Manoa-Palolo Canal.
University, McCully, & Metcalf Complete Streets Project	University Avenue between Maile Way near UH Manoa and Hihiwai Street just before the Ala Wai Canal; McCully Street from Beretania Street to the intersection with Kalakaua Avenue; and Metcalf Street between University Avenue and McCully Street.		
Kuhio Avenue Bus Priority Lanes Complete Streets Project	Kuhio Ave. from Olohana Street to Kapahulu Ave.	Late 2023 estimated construction timeline	The proposed project is a bus-priority project. The proposed project includes bus-priority lanes on Kuhio Avenue which will make more effective use of limited right-of-way space in the dense Waikiki neighborhood. The intent of the project is to reduce operational delays due to traffic congestion for buses in Waikiki. The proposed improvements will increase the speed of buses and enhance the rider experience, making buses more reliable, affordable, and convenient way to travel for local residents, employees, and visitors in Waikiki. The bus-priority lane will be limited to City buses, private bus carriers, bicyclists, and right-turning vehicles at designated areas.
Kalakaua Avenue Road Rehabilitation Project	Kalakaua Ave. from Olohana St. to Monsarrat Ave.; and Kalakaua Ave. from	June 2023 – March 2023	The project includes the reconstruction of asphalt roads, concrete curbs and gutters, and the installation of vehicle detector loops. The project also includes upgrading the Barnes Dance crossings (i.e.,

Project Name	General Location	Construction Period	Description
	Dillingham Fountain to Poni Moi Road.		All-Way Crossing) with improved striping at Royal Hawaiian Avenue, Seaside Avenue, Kaiulani Avenue, Liliuokalani Avenue, and Paoakalani Avenue. The proposed project will also make safety and comfort improvements to the existing bike lane on Kalakaua Avenue.
Arrillaga Student Center	Iolani School Campus	Tentatively Summer 2024 – Winter 2025	The Arrillaga Student Center will replace the existing student center on campus. The proposed project includes the construction of a large indoor, two-story dining and social gathering space; fully equipped commercial kitchen and food storage; wellness center; campus store; faculty & staff lounge; residential life space for students to relax and interact; additional office and storage spaces; large roof space for photovoltaic panels to power the center; new 6th grade community (i.e., eight new classrooms and outdoor learning space); eight new upper school classrooms; entry courtyard connecting to a newly designed chapel garden; expansive covered and open-air outdoor eating and gathering spaces; and rooftop event and gathering spaces with stunning, unobstructed views of Diamond Head and Waikiki skyline.
1538 Kapiolani Tower	1538 Kapiolani Blvd.	Ala Moana	A mixed-use development including 311 market-rate residential for-sale units, plus 101 off-site affordable residential rental units, and 8,711 square feet of commercial space. The project will allow heights up to 400 feet and density up to a 10.0 floor area ratio. Proposed project is currently under city council review.
Ala Moana Plaza	451 Piikoi Street and Ala Moana Blvd.	Ala Moana	A mixed-use development including 459 market-rate residential rental units, 124 affordable residential rental units, and 1,570 square feet of commercial space. The project will allow heights up to 400 feet and density up to a 7.0 floor area ratio. The

Project Name	General Location	Construction Period	Description
			proposed project has received approval for construction by the City Council; however, construction has not commenced.
The Park on Keeaumoku	805, 815, 819, 835, 903, 905, 915, and 919 Keeaumoku Street and 1519 Liona Street.	Ala Moana	A mixed-use development including 818 market-rate residential units, 146 affordable residential units, 88,000 square feet of commercial space, 26,000 square feet of public park/plaza space, and a community center. The project will allow heights up to 400 feet and density up to a 7.0 floor area ratio. The proposed project is currently under construction.
The Sky Ala Moana	1388, 1400, and 1420 Kapiolani Blvd.	Ala Moana	A mixed-use development including 300 condo-hotel units, 390 market-rate residential units, 84 affordable residential units, and 15,000 square feet of commercial space. The project will allow heights up to 400 feet and density up to a 10.0 floor area ratio. The proposed project is currently under construction.
1500 Kapiolani	1460, 1470, 1488, and 1500 Kapiolani Blvd, and at 611 Keeaumoku Street	Ala Moana	A mixed-use development including 444 condo-hotel units, 6 residential units, 78 affordable rental units, and 8,700 square feet of commercial space. The project will allow heights up to 400 feet and density up to a 9.2 floor area ratio. The proposed project has received City Council approval, but construction has not commenced.
Hawaii City Plaza	710 Sheridan Street	Ala Moana	A mixed-use development including 130 market-rate residential units, 33 affordable residential units, and 10,000 square feet of commercial space. The project will allow heights up to 250 and density up to a 5.0 floor area ratio. The proposed project has received City Council approval, but construction has not commenced.
Manaolana Place	1685, 1687, 1689, 1691, and 1695 Kapiolani Blvd., 508 and 512 Atkinson	Ala Moana	A mixed-use development including 125 hotel units, 109 residential units, 12,300 square feet of commercial space, and 4,900 square feet of public plaza space. The project will allow heights up to 400 feet and density up to a 10.0 floor area ratio. The

Project Name	General Location	Construction Period	Description
	Drive, and 1674 and 1676 Kona Street		proposed project has received City Council approval, but construction has not commenced.

Analysis of Cumulative Impacts

The assessment below focuses on addressing the following: (1) the area(s) in which the effects of the alternatives would be felt; (2) the effects that are expected in the area(s) from the alternatives; (3) past, present, and reasonably foreseeable future actions that have or that are expected to have impacts in the same area; (4) the impacts or expected impacts from these other actions; (5) and the overall impact(s) that can be expected if the individual impacts are allowed to accumulate.

There is one project listed in Table 49 that is located within the Ala Wai Canal and the immediate project footprint of the proposed project. The project is the Ala Wai Bridge Project, Honolulu District, Oahu Island, Hawaii.

The Ala Wai Bridge Project includes a new pedestrian and bicycle bridge that would span the historic Ala Wai Canal, improving access for people traveling by foot or by bicycle across the Ala Wai Canal between Ala Moana Boulevard and the Manoa/Palolo Stream and would connect the Waikiki, McCully, and Moiliili neighborhoods; businesses; parks; schools; and recreational activities. The project's goal is to improve multimodal network connectivity and enhance public safety for people walking and bicycling. The proposed project is consistent with numerous regional, and area plans that have been developed in the last two decades, particularly fulfilling part of the broader Honolulu Complete Streets Program, which implements projects to improve safety, accessibility, and comfort for all people walking, bicycling, accessing transit, and driving. Construction of the proposed project is expected to take approximately four years. The potential month and year of project construction initiation is unknown at this time; therefore, the proposed project could overlap with the Ala Wai Bridge Project.

Based on an analysis of the potential effects of the proposed project, the other past, present, and reasonably foreseeable future actions listed in Table 49 could cumulatively impact a variety of resources. Each of these areas is briefly described below.

Climate and Climate Change: The proposed project in combination with other past, present, and reasonably foreseeable future actions would not significantly impact climate and/or climate change. Emissions from construction related to the proposed project and past, present, and reasonably foreseeable future actions identified in Table 49 would be temporary, localized to the construction sites identified for the cumulative projects, and would be a small fraction of GHG emissions produced annually on Hawaii. If construction of other projects identified above and the proposed project occurs at the same time, collectively they are not anticipated to exceed GHG emission thresholds due to the implementation of BMPs which can be used to decrease GHG emissions from diesel engines.

Geology, Seismicity, and Soils: The proposed project in combination with other past, present, and reasonably foreseeable future actions would not significantly impact geology, seismicity, and/or soils. Construction of the proposed project would temporarily expose soils that could be subject to erosion by water and wind. Similarly, past, present, and reasonably foreseeable future actions identified in Table 49 could also temporarily expose soils during construction activities that could be subject to erosion. If construction of other projects identified above and the proposed project occurs at the same time, collectively they are not anticipated to expose soils to such a degree that there would be substantial erosion. In addition, the implementation of BMPs during construction activities to minimize potential soil erosion impacts would be used. Long-term, temporarily disturbed areas that are part of the proposed project would be seeded to prevent erosion and it is anticipated that this would occur for past, present, and reasonably foreseeable future actions as well.

Air Quality: The proposed project in combination with other past, present, and reasonably foreseeable future actions would not significantly impact air quality. Emissions from construction related to the proposed project and past, present, and reasonably foreseeable future actions identified in Table 49 would be temporary, localized to the construction sites identified for the cumulative projects, and would not be expected to greatly exceed current thresholds. If construction of other projects identified above and the proposed project occurs at the same time, collectively they are not anticipated to exceed current emissions thresholds due to the need to implement BMPs.

Groundwater Resources: The proposed project in combination with other past, present, and reasonably foreseeable future actions would not significantly impact groundwater resources. Construction and maintenance of the proposed project along with the construction of past, present, and reasonably foreseeable future actions could have temporary, localized impacts to groundwater quality if inadvertent spills of petroleum type products associated with use of heavy construction equipment were to occur. However, if construction of other projects identified above and the proposed project occurs at the same time, collectively they are not anticipated to have a significant impact on groundwater quality due to the implementation of BMPs to minimize the risk of inadvertent spills. Long-term, the construction of the proposed project along with the construction of past, present, and reasonably foreseeable future actions could have localized impacts to groundwater recharge with the addition of impervious surfaces. However, the proposed project limits the construction footprint to only the area required for construction of flood risk management features and along with past, present, and reasonably foreseeable future actions is not anticipated to have a significant cumulative adverse effect on groundwater recharge.

Surface Water Resources: The proposed project in combination with other past, present, and reasonably foreseeable future actions would not significantly impact surface water resources. Construction of the proposed project along with the construction of past, present, and reasonably foreseeable future actions could have temporary, localized impacts to surface water resources due to the construction of inlet and outlet structures associated with the floodwalls and the Ala Wai Golf Course detention basin. None of the features would permanently obstruct or change the course of a waterway or modify the existing floodplain, but would include the minor placement of fill within waters of the U.S. Operation of the proposed project could have a minor beneficial effect on surface water resources as the Ala Wai Golf Course detention basin could reduce peak flows during storm events which in turn could reduce erosion rates and provide some degree of benefit to channel stability. Collectively, the proposed project combined with other past, present, and reasonably foreseeable future actions is not expected to have a significant impact on surface water resources.

Hydrology and Hydraulics: The proposed project in combination with other past, present, and reasonably foreseeable future actions would potentially significantly impact hydrology and hydraulics. Construction of the proposed project along with the construction of past, present, and reasonably foreseeable future actions could substantially increase the extent of flooding within the Ala Wai watershed such that structures could potentially experience induced flooding. The implementation of mitigation measures such as acquisition, elevation, and floodproofing is anticipated to minimize this potentially significant impact.

Water Quality: The proposed project in combination with other past, present, and reasonably foreseeable future actions would not significantly impact water quality. Although sediment-bound pollutants are known to occur throughout the watershed (particularly in the urbanized

areas), none of the soils that would be exposed by construction are expected to contain excessive levels of contamination. In addition, soils to be exposed would be minor and would be directly linked to the construction of inlet and outlet structures associated with the floodwalls and the Ala Wai Golf Course detention basin. Like the discussion under groundwater quality, construction and maintenance of the proposed project along with the construction of past, present, and reasonably foreseeable future actions could have temporary, localized impacts to water quality if inadvertent spills of petroleum type products associated with use of heavy construction equipment were to occur. However, if construction of other projects identified above and the proposed project occurs at the same time, collectively they are not anticipated to have a significant impact on water quality due to the implementation of BMPs to minimize the risk of inadvertent spills. Long-term, the presence of the Ala Wai Golf Course detention basin could have a minor beneficial impact on water quality as the detention basin would collect water during a storm event and then slowly release it back into the waterway. The slow release of the water back into the waterway would provide some time for suspended sediments binded to contaminants the chance to settle out of the water column.

Sediment Quality: The proposed project in combination with other past, present, and reasonably foreseeable future actions would not significantly impact sediment quality. The construction of the proposed project along with the construction of past, present, and reasonably foreseeable future actions could have temporary, localized impacts as sediment would be disturbed with the construction of inlet and outlet structures associated with the floodwalls and the Ala Wai Golf Course detention basin. Typically, less than 0.02 acres of streambed sediments would have the potential of being disturbed and potentially mobilized with the construction of these structures. Long-term, the Ala Wai Golf Course detention basin would potentially have a minor beneficial effect as water detained within the basin during a storm event would have some time to allow mobilized sediments to settle out within the detention basin. This means water leaving the detention basin could contain less sediment and potentially contaminated sediments, than the water that was entrained in the basins. During maintenance activities, sediment that settles out on the golf course would be collected and disposed of upland. In addition to the proposed project, dredging of the Ala Wai Canal is expected to continue in the future which would aid in removing potentially contaminated sediment from the canal. Therefore, the combination of these actions is expected to not significantly adversely impact sediment quality.

Noise: The proposed project in combination with other past, present, and reasonably foreseeable future actions would have no significant impacts on noise. Cumulatively, construction activities associated with the proposed project and other past, present, and reasonably foreseeable future actions identified in Table 49 would result in temporarily increased noise levels from building and demolition activities, increased presence of construction vehicles, and operation of heavy construction equipment. It is expected that these impacts would be minimized to the extent possible because construction activities would be conducted during standard daytime hours, construction crews would implement BMPs and appropriate measures to avoid and minimize effects of generated noise (e.g., use of equipment mufflers, and orientation of noisy equipment away from residential, park, or gathering areas). See Section 3.3.9, Noise, for a detailed listing of measures that would be implemented to reduce impacts from the proposed project.

Biological Communities: The proposed project in combination with other past, present, and reasonably foreseeable future actions would have long-term, negligible, beneficial and adverse impacts to biological resources, including sensitive species and habitats. Preconstruction

surveys would be required for any construction activities involving tree removal as part of the proposed project, such that no impacts occur to the roosting habitat of the Hawaiian hoary bat.

Conservation Plans: There are no HCPs in place within the proposed action area, therefore, the proposed project would have no impact on HCPs. Since HCPs would not be directly affected by the proposed project, implementation of the proposed project would not contribute to a cumulative effect on the resource. Because of this, the proposed project in combination with other past, present, and reasonably foreseeable future actions would have no cumulative impacts on HCPs.

Agricultural and Forestry Resources: The proposed action area does not occur on areas that are farmed currently, nor areas expected to be converted to farmland in the future. In addition, the proposed project is not located within a designated Conservation District. Therefore, the proposed project would have no impact on agricultural and/or forestry resources. Since agricultural and forestry resources would not be directly affected by the proposed project, implementation of the proposed project would not contribute to a cumulative effect on the resource. Because of this, the proposed project in combination with other past, present, and reasonably foreseeable future actions would have no cumulative impact on HCPs.

Cultural Resources: As stated in Section 3.5.1, the Ala Wai Canal is listed on the Hawaii Register of Historic Places. The proposed project would include the construction of floodwalls along the Ala Wai Canal which would disrupt view plane and setting of the Ala Wai Canal, thereby resulting in a potential adverse effect. Avoidance, minimization, and mitigation measures have been identified in a PA with SHPO dated November 9, 2016 (Appendix L). These measures will be incorporated into the project to offset the adverse effect. Construction of the Ala Bridge Project would result in additional adverse effects to the Ala Wai Canal. Similarly, the Ala Wai Bridge Project will implement mitigation measures, which will be defined in a Memorandum of Agreement (MOA) with SHPO. Therefore, with the consideration of the Ala Wai Bridge Project and the other identified projects in Table 49, the proposed project is not anticipated to contribute to cumulative effects on cultural resources.

Land Use and Planning: The proposed project in conjunction with other past, present, and reasonably foreseeable future actions would have long-term, minor, beneficial impacts on land use and planning. Because the proposed action and other past, present, and reasonably foreseeable future actions would be constructed in a highly developed and modern built environment, less than significant, negligible, adverse impacts on visual resources would be expected. The project would not introduce any incompatible land uses and would be consistent with the urban landscape. Existing land uses would potentially benefit from improved walkways and accessibility due to floodwalls with elevated sidewalks and the Complete Streets Projects.

Hazardous, Toxic, and Radioactive Waste: The proposed project in conjunction with other past, present, and reasonably foreseeable future actions would have a less than significant impact on HTRW. The implementation of BMPs during construction as well as future testing to be conducted on materials that will be excavated to determine the suitability of the soil for re-use or to determine proper disposal would minimize the potential for the release of hazardous materials or waste. Like the discussion under groundwater quality, construction and maintenance of the proposed project along with the construction of past, present, and reasonably foreseeable future actions could have temporary, localized impacts if inadvertent spills of petroleum type products associated with the use of heavy construction equipment were to occur. However, if construction of other project identified above and the proposed project

occurs at the same time, collectively they are not anticipated to have a significant impact on the environment due to the implementation of BMPs to minimize the risk of inadvertent spills.

Recreation: The proposed project in combination with other past, present, and reasonably foreseeable future actions would have less than significant, minor impacts on recreation. As a result of the proposed project and the Complete Streets Projects, the sidewalks on either side of the Ala Wai Canal would be improved as well as the accessibility of the sidewalks. Any impacts to recreational areas, including impacts to aesthetics, would be mitigated through the restoring and replanting of disturbed areas with appropriate landscaping, relocating trees where feasible, and utilizing shielding devices for lighting.

Aesthetics: The proposed project in combination with other past, present, and reasonably foreseeable future actions would have less than significant impacts on aesthetics. If construction of other projects identified above and the proposed project occur at the same time, collectively there would be a short-term minor impact to aesthetics due to the presence of construction equipment and construction activities. Long-term, the combination of the proposed project with other past, present, and reasonably foreseeable future actions would have either minor beneficial or minor adverse impacts to aesthetics depending on perspective. The proposed project would incorporate mitigation measures such as lava rock façade to blend in the proposed floodwalls with the character of the surrounding area. In addition, the proposed floodwalls along the Ala Wai Canal include an elevated walking path which in combination with Complete Streets Projects, would improve sidewalks as well as accessibility of the sidewalks. The above could be seen as a minor long-term beneficial effect to the aesthetics of the area. Conversely, the construction of floodwalls along the Ala Wai Canal and in other areas would contribute to the already urbanized aesthetic of the area. The height of the floodwalls would also impede views of the Ala Wai Canal to vehicular traffic, bicyclists, and pedestrians not using the elevated walking path along the canal. Lastly, the construction of the floodwalls along the Ala Wai Canal would require the removal of trees along the canal and replanting of trees within 15 feet of the floodwalls would not be allowed due to maintenance requirements. The above could be seen as a long-term adverse effect to the aesthetics of the area.

Public Health and Safety: The proposed project in combination with other past, present, and reasonably foreseeable is not expected to substantially increase health and safety risks to residents and visitors. If construction of other projects identified above and the proposed project occur at the same time, collectively there would potentially be short-term minor adverse impacts to public health and safety due to the presence of construction vehicles and construction activities. However, the implementation of BMPs such as fencing around construction areas, slow speeds for construction vehicles, etc. the potential temporary adverse impacts would be minimized. Long-term, a beneficial cumulative impact is anticipated since the purpose of the project is flood risk management which would reduce flood risk and damage to the area.

Public Service and Utilities: The proposed project in combination with other past, present, and reasonably foreseeable future actions would have short-term, minor effects and long-term minor effects on public services and utilities. Temporary, minor, cumulative effects could be expected because of construction activities which may be within the vicinity of public service facilities, therefore, delaying access to these facilities. It is important to note, however, that access to public service facilities would not be completely blocked off; there may be a delay to accessing areas if construction vehicles need to move out of the way to allow access. Long-term, the operation of the project would prevent easy access to some areas due to road closure structures that would need to be put in place prior to a storm event arriving, during the storm event, and for a relatively short period of time after the storm event has passed through.

Although this would be an adverse effect, it is anticipated to be minor since the project would minimize flooding in areas thereby allowing continued access that may have been limited under the future without project condition. Clean up following a storm event would likely need to occur, but it would be no different than what currently occurs under the future without project condition following a storm event. Therefore, the long-term effect could be beneficial by allowing continued access to areas that may have been in accessible due to flooding under the future without project condition. The long-term effect would also be a less than significant adverse impact due to road closure structures needing to be in place prior to a storm event arriving, which would block of access to areas that were accessible under the future without project condition.

Transportation and Traffic: The proposed project in combination with other past, present, and reasonably foreseeable future actions would have short-term, minor effects and long-term, minor, effects on transportation and traffic. Temporary, minor, cumulative effects could be expected because of construction related road or intersection closures from the proposed project in combination with other past, present, and reasonably foreseeable future actions identified in Table 49. However, signage as well as potential detours would be established where necessary to minimize inconvenience and prevent excessively delayed traffic. Temporary, minor, cumulative effects could be expected long-term because of closing road closure structures prior to a projected storm event and temporarily after a projected storm event. The closing of road closure structures when combined with other past, present, and reasonably foreseeable future actions identified in Table 49 could result in increased detours and congested roadways during storm events for residents and tourists as well as for construction workers and construction vehicles working in areas where road closure structures are located.

Socioeconomic/Environmental Justice: No significant impacts are expected because of the proposed project in combination with other past, present, and reasonably foreseeable future actions listed in Table 49. Cumulative effects are anticipated to be temporary and minor during construction of the proposed project. Cumulative effects over the long term of the project are anticipated to be minor.

3.8 Relationship Between Short-term Uses of the Environment and Maintenance and Enhancement of Long-term Productivity

The analysis of short-term uses versus long-term productivity considers the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. This should include a discussion on the extent to which the alternatives involve tradeoffs among short-term and long-term gains and losses, as well as whether future options are foreclosed, whether the range of beneficial uses of the environment are narrowed, and whether the alternatives poses long-term risks to health and safety.

As described throughout the documents, the proposed alternatives would involve construction and operation of measures that would function to reduce the risk of flooding throughout the Ala Wai watershed. Implementation of these measures would result in potential short-term, adverse impacts to noise, cultural resources, recreation, and aesthetics. Given the efforts to avoid, minimize, and mitigate potential environmental impacts, the project is not expected to substantially narrow the range of beneficial uses of the environment or foreclose future options. Overall, the proposed alternatives are designed to minimize flood-related risk, thereby reducing health and safety hazards, as well as protecting housing units, commercial structures, and public facilities from flooding. By decreasing flood risk, the proposed alternatives would reduce the potential for incurring costs associated with clean-up, debris removal, and building and

infrastructure repair as a result of flood events, thus maintaining productivity and increasing the potential for long-term growth opportunities throughout the watershed. Given the extent of area and the affected population protected from flood hazards relative to the anticipated environmental impacts, the project-related efforts to enhance long-term productivity are expected to outweigh the short-term uses of the environment.

3.9 Irreversible or Irretrievable Commitments of Resources

An irreversible or irretrievable commitment of resources refers to impacts on or losses to resources that cannot be reversed or recovered, even after an activity has ended and facilities have been decommissioned. A commitment of resources is related to use or destruction of nonrenewable resources, and effects that such a loss will have on future generations. For example, if prime farmland is developed there would be a permanent loss of agricultural productivity. The proposed project would involve the irreversible and irretrievable commitment of material resources and energy, land resources, and human resources. The impacts on these resources would be permanent.

Material Resources. Material resources irretrievably used for the proposed project could include steel, concrete, lave rock, and possibly other materials for construction. Such materials are not expected to be in short supply and would not be expected to limit other unrelated construction activities. The irretrievable use of material resources would not be considered significant.

Energy Resources. Energy resources used for the proposed project would be irretrievably lost. These would include petroleum-based products (e.g., gasoline and diesel) and electricity. During construction, gasoline and diesel fuel would be used for the operation of construction vehicles. Consumption of these energy resources would not place a significant demand on their availability in the region. Therefore, no significant impacts would be expected.

Human Resources. The use of human resources for construction is considered an irretrievable loss only in that it would preclude such personnel from engaging in other work activities.

Chapter 4: Plan Comparison and Selection

4.1 Plan Comparison

A summary of the comparison of the final array of alternatives is presented below in Table 50. A summary of comparison with respect to the four accounts, evaluation criteria, contribution to the planning objectives, and risk and uncertainty are provided in the following sections.

Table 50: Summary of Comparison of the Final Array of Alternatives

Consideration	Alt. 0. No Action	Alt. 1. Storage Plan	Alt. 2B. Conveyance Plan	Alt. 5. Hybrid Plan	Alt. 6. Nonstructural Plan
1. Account Analysis					
A. National Economic Development (NED)					
(1) Average Annual Net Benefits	$0	$17,743,000	$23,195,000	$33,104,000	$14,023,000
(2) BCR	0	3.0	2.1	2.7	1.8
(3) Rank	5th	4th	2nd	1st	3rd
B. Regional Economic Development (RED)					
(1) Employment*	0 jobs	2,197 jobs	5,562 jobs	8,141 jobs	6,279 jobs
(2) Labor Income	$0	$161,392,000	$408,582,000	$608,967,000	$447,000,000
(3) Rank	5th	4th	2nd	1st	3rd
C. Other Social Effects					
(1) Life Safety	0 decrease in expected annual life loss	0.09 increase in expected annual life loss	0.18 increase in expected annual life loss	0.003 reduction in expected annual life loss	0 reduction in expected annual life loss
(2) Social Vulnerability	No additional impacts to socially vulnerable communities	Medium benefit to socially vulnerably communities	Largest increase in risk to socially vulnerable communities	Largest benefit to socially vulnerable communities	No significant benefit anticipated for socially vulnerable communities
(3) Rank	4th	2nd	5th	1st	3rd
D. Environmental Quality					
(1) Environmental Impacts	No additional impact to environmental resources	Minimally impactful to environmental resources	Most impactful to environmental resources	Minimally impactful to environmental resources	Least impactful to environmental resources
(2) Rank	2nd	3rd (tie)	4th	3rd (tie)	1st
2. Alternative Evaluation					
A. Criteria					
(1) Efficiency	No net economic benefits. Rank = 5th	$17,743,000 in net benefits. Rank = 3rd	$23,195,000 in net benefits. Rank = 2nd	$33,104,000 in net benefits. Rank = 1st	$14,023,000 in net benefits. Rank = 4th
(2) Effectiveness (Damage)	No damages reduced. Rank = 5th	$26,835,000 in damages reduced. Rank = 4th	$43,464,000 in damages reduced. Rank = 2nd	$52,303,000 in damages reduced. Rank = 1st	$32,367,000 in damages reduced. Rank = 3rd

(3) Effectiveness (Life Safety)	No reduction in life safety risk. Rank = 2nd (tie)	0.180 increase in expected annual life safety risk. Rank = 4th	0.092 increase in expected annual life safety risk. Rank = 3rd	0.003 reduction in expected annual life safety risk. Rank = 1st	No significant change in life safety risk. Rank = 2nd (tie)
(4) Acceptability	Meets acceptability criteria. Rank=1st (tie).	Meets acceptability criteria. Rank=1st (tie).	Meets acceptability criteria. Rank=1st (tie).	Meets acceptability criteria. Rank=1st (tie).	Meets acceptability criteria. Rank=1st (tie).
(5) Completeness	Meets completeness criteria. Rank=1st (tie).	Meets completeness criteria. Rank=1st (tie).	Meets completeness criteria. Rank=1st (tie).	Meets completeness criteria. Rank=1st (tie).	Meets completeness criteria. Rank=1st (tie).
(6) Environmental Effects	No effect on environmental resources. Rank = 1st.	No significant effects on environmental resources. Rank =2nd (tie).	No significant effects on environmental resources. Rank =2nd (tie).	No significant effects on environmental resources. Rank =2nd (tie).	No significant effects on environmental resources. Rank =2nd (tie).
(7) Rank	5th	4th	2nd	1st	3rd
B. *Contribution to Objectives*					
(1) Life Safety	No benefits to life safety. Rank = 2nd (tie).	Highest induced life safety risk. Rank = 4th.	Induced life safety risk. Rank = 3rd.	Largest reduction in life safety risk. Rank = 1st.	No benefits to life safety risk. Rank = 2nd (tie).
(2) Economic Damages	No reduction in economic damages. Rank = 5th.	$26,835,000 in damages reduced. Rank = 4th	$43,464,000 in damages reduced. Rank = 2nd	$52,303,000 in damages reduced. Rank = 1st	$32,367,000 in damages reduced. Rank = 3rd
(3) Reduce impacts to commerce and tourism	No reduction in disruptions to commerce and tourism. Rank = 5th.	Minor effects on Waikiki and Ala Moana. Positive effect on Manoa. Rank = 3rd.	Positive impact to Waikiki and areas along Manoa. Negative effect to Ala Moana. Rank = 2nd.	Greatest positive impact (i.e., reduced risk) in all target reaches. Rank = 1st.	Would benefit target reaches; participation may impact benefits. Rank = 4th.
(4) Rank	5th	4th	2nd	1st	3rd
C. Risk and Uncertainty					
(1) Residual Risk	No change in flood risk throughout the watershed. Greatest residual risk. Rank=5th.	Fourth largest reduction in residual risk. Rank = 4th.	Second largest reduction in residual risk. Rank = 2nd.	Largest reduction in residual risk. Rank = 1st.	Third largest reduction in residual risk. Rank = 3rd.

(2) Uncertainty	Relies completely on non-federal action to reduce flood risk. Rank = 3rd.	Mitigation requirements are currently unknown. Rank = 1st (tie).	Mitigation requirements are currently unknown. Rank = 1st (tie).	Mitigation requirements are currently unknown. Rank = 1st (tie).	Participation rates could affect benefits. Rank = 2nd.
(3) Rank	5th	4th	2nd	1st	3rd

*Jobs are presented in full-time equivalence (FTE).

System of Accounts. Alternative 5 has the greatest net economic benefits ($33,104,000). Alternative 1 has the highest BCR (3.0). Alternative 5 is the alternative that has the highest RED, NED, and OSE benefits, and has minimal impacts to the EQ account.

Alternative Evaluation. Alternative 5 was ranked 1st in terms of evaluation based on the planning criteria, being ranked 1st or tying for 1st based on efficiency (i.e., largest expected net economic benefits), effectiveness (i.e., maximally reduces economic damages and life safety risk), completeness, and acceptability. Alternative 5 is also not expected to have significant environmental effects. Alternative 5 also maximally meets all three planning objectives of reducing economic damages, impacts to commerce and tourism, and life safety risk. Finally, Alternative 5 is characterized by the least residual risk and has similar uncertainty related to mitigation for induced flooding and interior drainage as compared to Alternatives 1 and 2B.

4.2 Identification of the NED Plan

Federal policy requires identification of the plan that reasonably maximizes net NED benefits (i.e., the NED plan); the NED plan must be recommended for implementation unless there are overriding reasons for recommending another plan. Alternative 5 was identified as the NED plan with the highest net NED benefits of $33,104,000.

4.3 Plan Selection

Alternative 5 was selected as the Tentatively Selected Plan (TSP) given that it is both the NED Plan and the Comprehensive Benefits Plan; Alternative 5 reasonably maximizes net NED benefits and benefits across all Four Accounts and is the most competitive alternative within the Final Array of Alternatives.

Chapter 5: The Tentatively Selected Plan

5.1 Plan Accomplishments

Alternative 5 (Hybrid Plan) is the TSP.

The TSP maximizes benefits within the NED, RED, and OSE accounts, having the greatest net economic benefits, regional economic benefits (i.e., labor income and jobs supported), maximizing reductions in life safety risk, and maximizing benefits to socially vulnerable communities and populations. The TSP is the most equitable in terms of flood risk reduction by ensuring socially vulnerable communities experiencing recurring and frequent flooding receive comparable flood risk reduction opportunities as more affluent communities in the watershed.

The TSP will have only minor environmental impacts and is an acceptable plan from an environmental standpoint. Specifically, the recommended plan will not have significant impacts on the environment under the NEPA and will have no effect on federally listed species or designated critical habitat under the ESA. The TSP can be implemented in compliance with all applicable environmental laws and regulations. The TSP will constitute an undertaking under Section 106 of the National Historic Preservation Act (NHPA) and has a potential to affect historic properties listed on, or determined eligible for, the National Register of Historic Places under 36 C.F.R. § 800.3. All compliance and mitigation requirements under Section 106 will be satisfied prior to project implementation.

5.2 Plan Components

Alternative 5 (Hybrid Plan) includes the Makiki District Park Detention Basin, Manoa Valley District Park Detention Basin, Woodlawn Drive Floodwall, and the Koali Road Floodwall. Figure 26 provides a conceptual diagram of Alternative 5.

Ala Wai Golf Course Detention Basin– At the Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately 6 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 5,640ft in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. Near the vicinity of the Kapahulu Avenue and Ala Wai Boulevard intersection, the levee would join with the Ala Wai Canal Floodwall on the left descending bank of Ala Wai Canal. The existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be riprapped and used as an inlet for stormwater to overflow into the Ala Wai Golf Course Detention Basin. Three concrete drainage structures with flap gates would be constructed along the southwest side of the Ala Wai Golf Course to allow collected stormwater to slowly drain into Ala Wai Canal. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

Manoa Valley District Park Detention Basin– At Manoa Valley District Park, in Manoa Valley, a detention basin (i.e., Manoa Valley District Park Detention Basin) would be constructed to temporarily store stormwater. The detention basin would be constructed by excavating down approximately 6 to 8 ft and constructing a 6-foot-high around the perimeter of the park (~1,580 ft in length). The Manoa Valley District Park Detention Basin would have a storage volume of approximately 54 acre-feet. The purpose of the Manoa Valley District Park Detention Basin is to reduce the risk of flooding to residential structures downstream of the park.

Makiki District Park Detention Basin – At Makiki District Park, in Makiki Valley, a detention basin (i.e., Makiki District Park Detention Basin) would be constructed to temporarily store stormwater runoff. The detention basin would be constructed by excavating down approximately 6 to 10 ft and constructing a 6-foot-high floodwall with earthen slopes around the perimeter of the park (~1,200 ft in length). The Makiki District Park Detention Basin would have a storage volume of approximately 22 acre-feet. A floodwall extending 6 ft above ground level would be constructed along the right descending bank of the Kanaha Ditch (i.e., Kanaha Floodwall). The floodwall would be approximately 2,200 ft long, with five road closure structures. The Makiki District Park Detention Basin and Kanaha Floodwall function as a system, with the floodwall helping to move water efficiently and effectively from the Kanaha Ditch into the Makiki District Detention Basin, reducing the risk of flooding for adjacent and downstream communities.

Ala Wai Canal Floodwall & Kaimuki High School Floodwall– At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 24,140 ft long. Fourteen existing stormwater sewers inletting into the Ala Wai Canal would be modified to include a flap gates. Twelve road closure structures would be constructed. The purpose of the Ala Wai Canal Floodwall would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki. At Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending 6 ft above ground (i.e., Kaimuki High School Floodwall) would be constructed along the left descending bank of Manoa Manoa-Palolo Canal. The floodwall alignment is different from the alignment in Alternatives 1 and 2B. Under Alternative 5, the Kaimuki High School Floodwall would be approximately 3,260 ft long, cutting between the athletic fields and joining the Ala Wai Canal Floodwall near Date Street. The Kaimuki High School Floodwall would reduce flood risk within communities east/southeast of Kaimuki High School. The Ala Wai Canal and Kaimuki High School Floodwalls would function as a system.

Woodlawn Drive Floodwall & Koali Road Floodwall– Also within Manoa Valley, a floodwall extending 6 ft above ground level (i.e., Woodlawn Drive Floodwall) would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,625 ft in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,485 ft in length. Two box culverts would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two road closure structures would be constructed. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system.

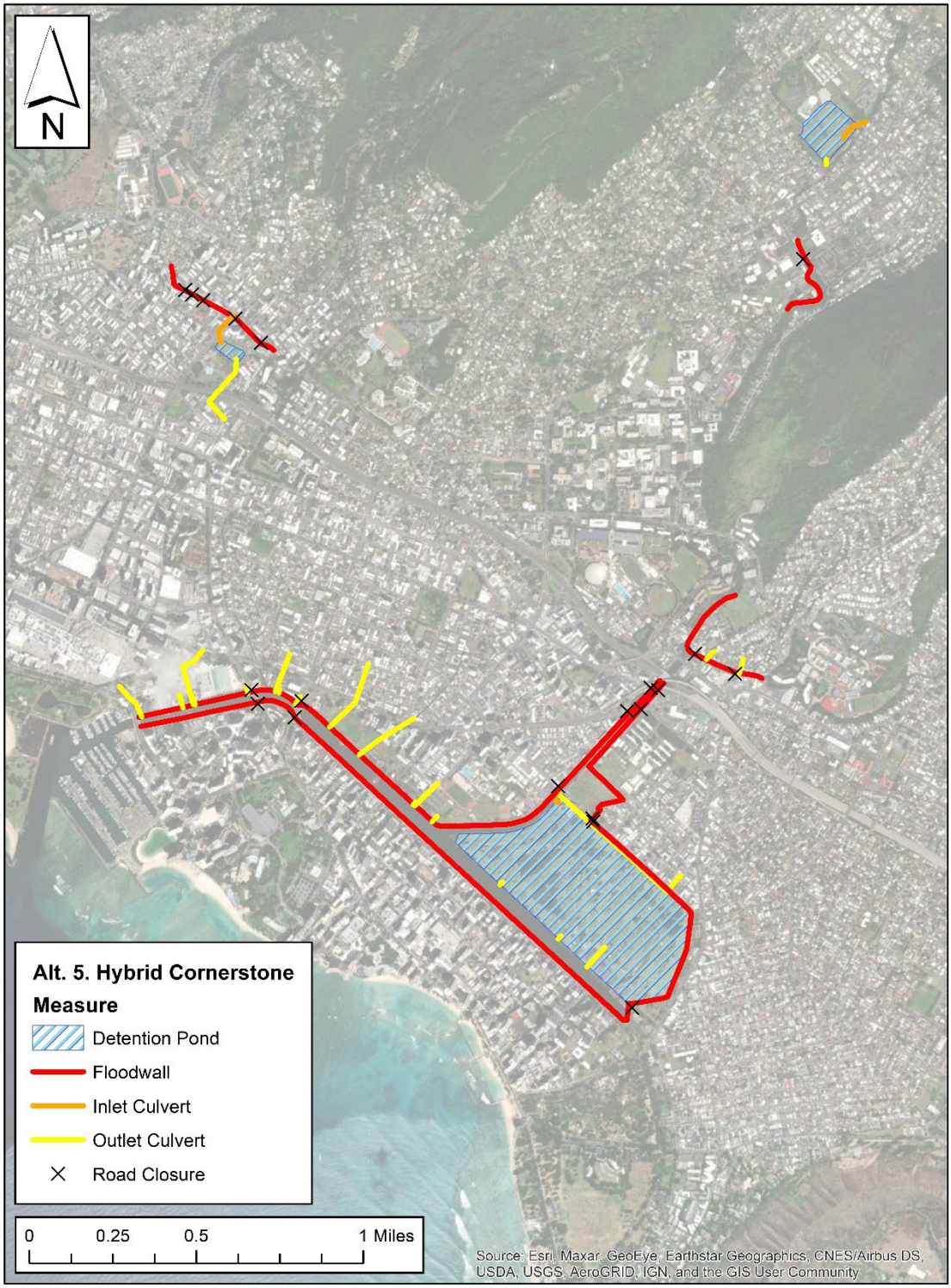

Figure 26: Conceptual Diagram of Alternative 5.

Incremental Justification

The study team conducted an incremental justification analysis for measures included in Alternative 5—the NED and comprehensive benefits plan. For the purposes of this analysis, the study team considered the following as separable elements:

Table 51: Incremental Justification Assessment

Element/System	Analysis & Results	Determination
Makiki District Park Detention Basin and Kanaha Floodwall	Additional H&H and economic analysis indicated that the Makiki District Park Detention and Kanaha Floodwall are not separably economically justified (i.e., benefits do not outweigh the costs), do not substantially reduce life safety risk, and would not benefit the most socially vulnerable communities.	Remove from Alternative 5.
Manoa District Park Detention Basin	Additional H&H and economic analysis indicated that the Manoa District Park Detention Basin is not separably economically justified, does not substantially reduce life safety risk, and would not benefit the most socially vulnerable communities.	Remove from Alternative 5
Woodlawn Drive Floodwall and Koali Road Floodwall	H&H and economic results were compared with and without the Woodlawn Drive and Koali Road Floodwall system. These results indicated that these measures are economically justified (i.e., benefits outweigh the costs) and would benefit the most socially vulnerable communities.	Retain in Alternative 5
Ala Wai Golf Course Detention Basin	Comparison of model runs with and without the Ala Wai Golf Course Detention Basin indicate that it is economically justified (i.e., benefits outweigh the cost) and that it helps reduce induced risk resulting from the other project features.	Retain in Alternative 5
Ala Wai Canal Floodwall and Kaimuki High School Floodwall	Comparison of model runs with and without the Ala Wai Canal and Kaimuki High School Floodwalls indicate these measures are separably justified (i.e., benefits outweigh the costs) and that it helps reduce risks to socially vulnerable populations.	Retain in Alternative 5

Alternative 5.1–- Modified Tentatively Selected Plan (TSP). A summary and associated map of the features included in the tentatively selected plan after completion of the incremental analysis efforts is provided below; this modification of Alternative 5 is being called Alternative 5.1 (Figure 27).

From Alternative 5, the modified TSP includes the Ala Wai Golf Course Detention Basin, Ala Wai Canal Floodwall, Kaimuki High School Floodwall, Woodlawn Drive Floodwall, and the Koali

Road Floodwall and excludes the Manoa Valley District Park Detention Basin and the Makiki District Park Detention Basin.

Figure 27: Conceptual Diagram of Alternative 5.1.

Optimization

The study team optimized Alternative 5.1 with a two-fold goal. First, the study team assessed whether structural features within the TSP could be modified to reduce residual risk while also capturing more project benefits and, second, the study team wanted to minimize the potential for induced flooding and induced damages to occur from implementation of the TSP.

Table 52 summarizes the progression of Alternative 5 as it evolved through the plan formulation process. These changes were informed by extensive modeling and detailed evaluations to determine if the changes were effective in meeting the aforementioned goals.

The study team also analyzed the possibility of including physical nonstructural measures into Alternative 5, based on previous analysis which had identified reaches where nonstructural measures would likely be economically justified as standalone measures and within reaches where the study team believe residual flood risk could be reduced further through the application of nonstructural measures. Figure 28 provides a conceptual diagram of the reaches where nonstructural measures were considered for inclusion in the TSP; only reaches AW2R, AW2L, and AW9R were considered.

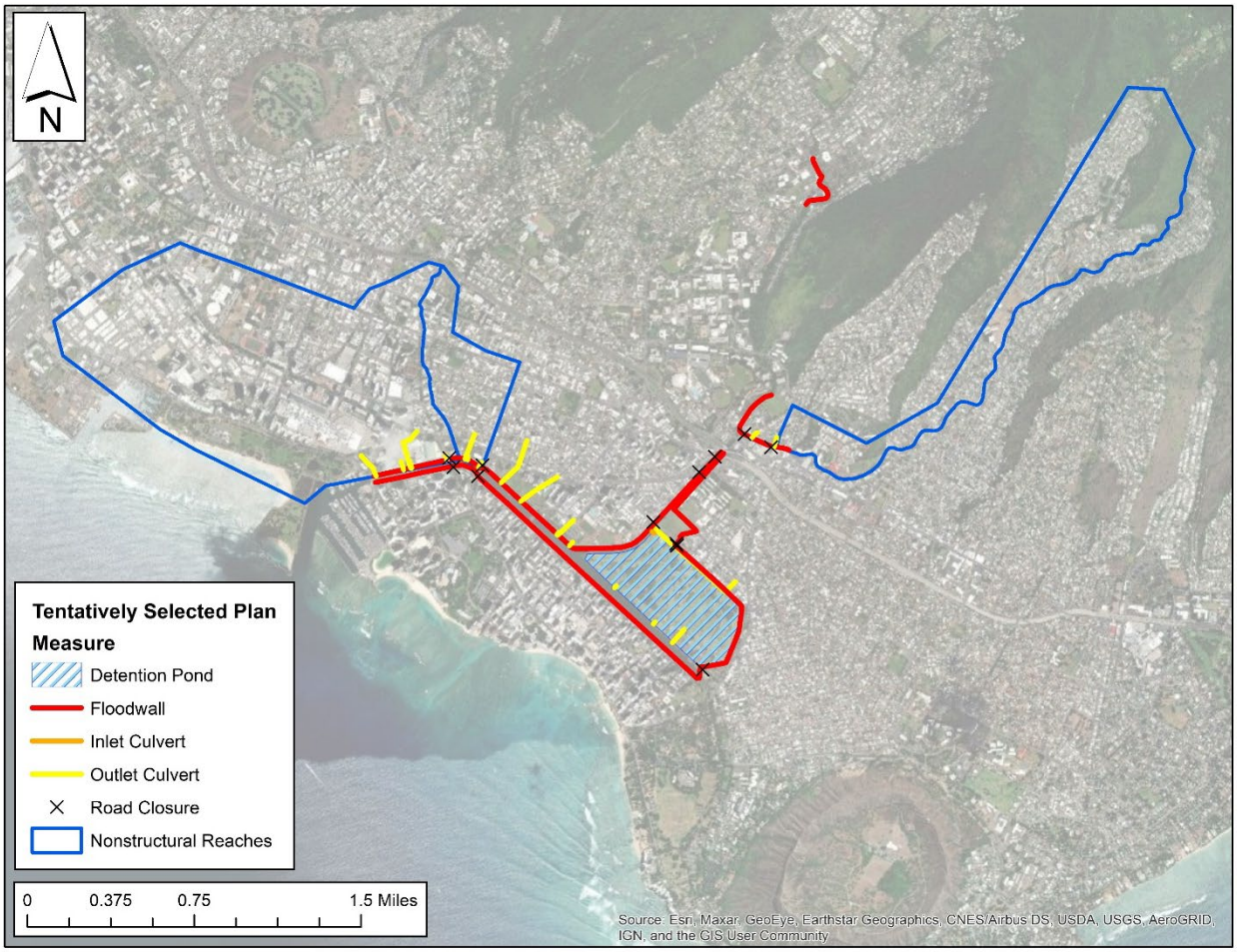

Figure 28: Conceptual Diagram of Potential Nonstructural Measures for Alternative 5.

Nonstructural measures were screened from inclusion in the TSP for the following reasons:

- A high-level economic analysis was conducted on Alternative 5 to assess the viability of incorporating nonstructural measures in conjunction with structural measures. This analysis concluded that is unlikely that incorporating structural measures in conjunction with nonstructural measures within the target reaches would result in a substantial increase in benefits.
- The structure groupings which were most likely to realize the highest benefits, via the application of nonstructural measures, were already receiving benefits from key structural measures in Alternative 5.
- Neither the effectiveness nor the efficiency of the Alternative 5 would be enhanced through the inclusion of nonstructural measures.

Table 52: Summary of Changes to Alternative 5 (TSP).

Alternative	Measures Added/Modifications	Measures Removed
Alternative 5.1 (Incremental Analysis)	None.	Makiki District Park Detention and the Kanaha Floodwall were removed because this measure was not justified when evaluated as a separable element. Manoa Valley District Park Detention was removed because this measure was not justified when evaluated as a separable element.

Alternative	Measures Added/Modifications	Measures Removed
Alternative 5.2 (Optimization)	Makiki Floodwalls were added to address induced flooding concerns in Lower Makiki. A ringwall around the club house at the Ala Wai Golf Course was added to address flooding concerns at the club house. Berm and floodwall alignments were adjusted on the southeastern portion of the Ala Wai Golf Course Detention to improve the performance of the system. The alignment of floodwalls near Kaimuki High School was adjusted to improve the performance of the system. An elevated walking path was added to the Ala Wai Canal Floodwalls to mitigate for negative viewshed impacts.	
Alternative 5.3 (Optimization)	Floodwall alignment adjusted at the Ala Wai Community Park to improve channel conveyance. Floodwall alignment on the Ala Wai Canal, near the golf course, was adjusted to increase channel conveyance. Many segments of the berm around the Ala Wai Golf Course were raised from 6 feet to 9 feet to increase total storage volume of the Ala Wai Golf Course detention feature.	Makiki Floodwalls were removed because additional analysis concluded that they were not effective in reducing potential induced damages. Ringwall at the Ala Wai Golf Course removed to increase the storage area of the Ala Wai Golf Course detention. Wet floodproofing of the clubhouse will likely be needed.

Figure 29 visually displays the changes of Alternative 5.2, which led to the TSP maturing into Alternative 5.3. All substantial changes to Alternative 5.2 are displayed in red on the figure.

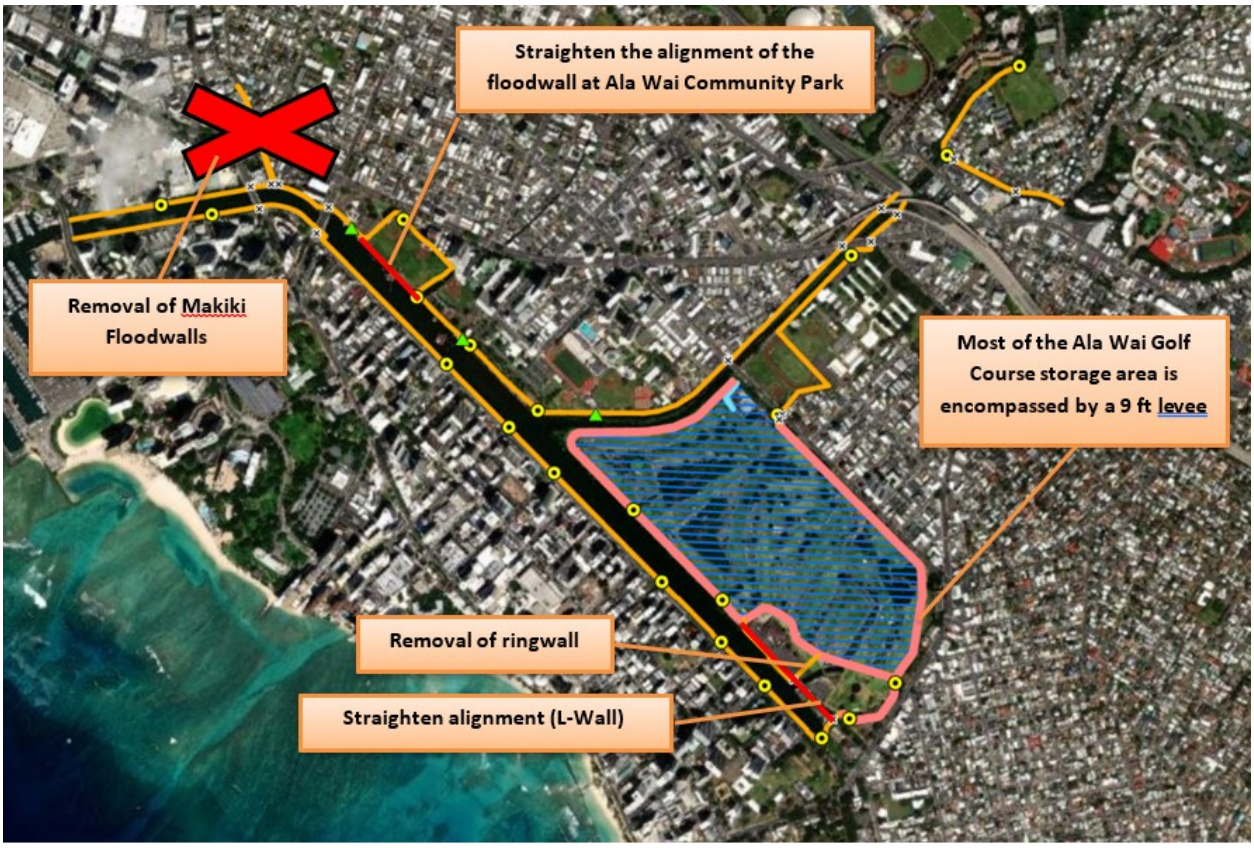

Figure 29: Conceptual Diagram of Changes to Alternative 5.2.

Alternative 5.3 is a considerable improvement from Alternative 5 in that the benefits it captures have been optimized; additionally, induced damages have been reduced, to the extent possible, through extensive adjustments to the structural measures contained in the alternative. Figure 30 displays a conceptual diagram of Alternative 5.3 and its optimized measures. Alternative 5.3 is the optimized version of Alternative 5 that is being recommended in this report.

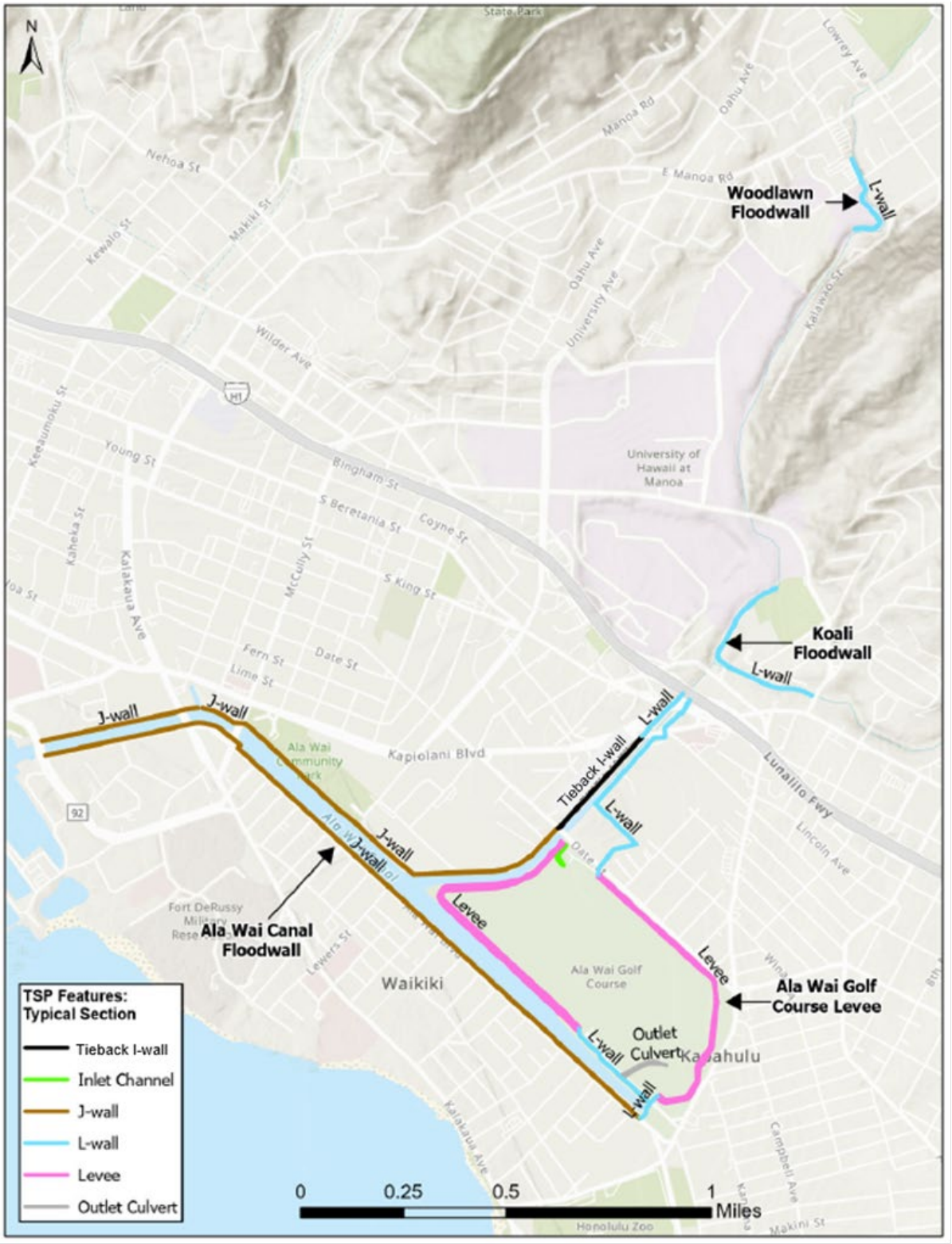

Figure 30: Conceptual Diagram of Alternative 5.3.

Mitigation

Formulation of Mitigation Measures

Efforts to address potential induced flooding were undertaken in accordance with Engineer Regulation 1105-2-100, Planning Guidance Notebook, dated USACE policy and guidance, which directs development of mitigation when economically justified, if there are overriding reasons of safety, economic, or social concerns, and/or if a determination of a real estate taking has been made.

Structures with less than 0.5 feet of induced flooding were assumed to not require mitigation for induced flooding because data inputs and modeling do not allow for differentiation of outcomes at or below 0.5 feet of flood depth. This assumption is based on multiple factors including data inputs and model uncertainty. Uncertainties are accounted for in the HEC-RAS model and in the HEC-FDA portion of the analysis including accuracy of terrain data (described in Appendix B). The primary sources of uncertainty present in the calculation of economic damages include storm water discharge, water surface elevations, levee performance, structure elevations including first floor elevations, structure and structure content values, and depth-damage relationships. Further, the method for establishing induced flooding requires modeling water surface elevation and structures over a grid. The grid methodology can sometimes show a small decimal water surface elevation change in a grid where there is no true water surface elevation change (referred to as model noise). The model cannot establish induced flooding below 0.5 feet due to this uncertainty combined with uncertainty about first floor elevations (described in Appendix C).

This assumption is additionally based on the Federal Emergency Management Agency (FEMA)/USACE Joint Actions on Planning for Flood Risk Management Projects memorandum, dated 29 June 2012. This memorandum helps define areas requiring revisions to flood insurance rate maps under National Flood Insurance Program (NFIP) regulations (44 C.F.R. 65.12) and mitigation associated with induced flooding following implementation of a USACE flood risk management project. Specifically, areas subject to 44 C.F.R. 65.12 and mitigation for induced flooding are those where: '…a logical transition can be shown between the revised flood elevations, flood plain boundaries, and floodways and those developed previously for areas not affected by the revision. Unless it is demonstrated that it would not be appropriate, the revised and unrevised base flood elevations must match within one-half foot where such transitions occur.' This assumption will be reevaluated during PED following any updates to the models or underlying data. Reevaluation will be reflective of model and site-specific uncertainties, which may be greater or less than the 0.5 feet of induced flooding described above.

Potential mitigation actions were developed for structures with greater than 0.5 feet of induced flooding for the 5% and 1% AEP events to provide a range of potential mitigation options in the face of uncertainty in potential mitigation requirements. Real estate analysis evaluates parcels while economic analysis uses a structure inventory to identify individual structures. Costs associated with mitigation for structures is based on total structures regardless of whether multiple structures are located on single real estate parcels.

With Alternative 5.3 in place, water surface elevation would be induced slightly for certain events and reaches. Induced flooding generally occurs in areas that are flooding under the FWOP condition, and the additional water surface induced by the project is minimal for frequent events and larger for the least frequent events. The most frequent event at which a structure

with no FWOP flooding becomes flooded is the 10% AEP event. There are 21 structures (out of nearly 6,000 in the floodplain) that have induced flooding at the 1% AEP flood event that do not already experience FWOP flooding. Structures with expected induced flooding will be evaluated on an individual basis to determine annualized impact over the full stage-frequency curve rather than just a single event. There may be some instances where structures see induced flooding at one event, but the annualized impact is negligible, or even beneficial. Conversely, some of these structures may see induced flooding across multiple events and require a different kind of mitigation. The uncertainty in the cost of these activities is captured in the range of costs due to mitigation.

Potential Mitigation Measures

Pump Station: Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cubic feet per second. At the time of compiling this Draft GRR/SEIS, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed, or the effectiveness of this measure as compared to nonstructural measures. Additional analysis will likely be conducted during the Preconstruction Engineering and Design (PED) phase to determine the above and appropriate supplemental NEPA analysis and coordination would be conducted as necessary.

Preliminary analyses undertaken during the development of alternative plans indicate expected technical challenges and inefficiencies associated with utilizing pumps for reducing induced flooding. Therefore, the current mitigation analysis excludes pump stations and focuses on potential application of nonstructural measures, as described in the following sections.

Nonstructural Measures: Nonstructural mitigation measures considered included dry and wet floodproofing, structure elevation, and buyouts and relocations. Dry floodproofing involves sealing flood prone structures from water with door and window barriers, small scale rapid deployable floodwalls, or sealants. A sump pump and drain system may be required as part of the project to remove seepage or interior drainage. Dry floodproofing is generally feasible and effective up to a maximum height of three to four feet above ground level. Wet floodproofing does not prevent water from entering the structure but moves or protects damageable items from the water so that once the surge recedes, the damage to the structure and contents is greatly reduced and re-establishment accelerated. Wet floodproofing can include evacuating the first floor, elevation of contents/utilities, and/or installation of flood vents to reduce hydrostatic forces on exterior walls. Floodproofing is only recommended for non-residential structures, such as commercial buildings and critical infrastructure that cannot be elevated due to their large size. Elevation of structures is limited to residential structures. Whether a structure may be elevated depends on several factors including the foundation type, size of the structure, condition, etc. The goal of elevating a home is to modify the structure so that the finished floor is at a height where it is less likely that the structure and/or contents will be damaged by flooding.

Additional analysis would be conducted during PED to determine the precise number and location of structures recommended for dry/wet floodproofing, elevation, or acquisition, as well as to reconsider other structural mitigation measures, as appropriate. Supplemental NEPA analysis and coordination would be conducted in subsequent phases of the project, as appropriate, to ensure proper consideration is given to required mitigation actions.

Table 53 shows structure/occupancy type and the associated nonstructural mitigation action that would be appropriate . Single-family residential structures that are one or two story with no

basement would be recommended to be elevated. Commercial Structures would be dry floodproofed, and hotels and multi-family (apartment) structures would be wet floodproofed by evacuating the first floor. All floodproofing and structure elevation actions would be below four feet and 12 feet, respectively.

Table 53: Number of residential (RES), commercial (COM), industrial (IND), and public (PUB) structures assessed for nonstructural mitigation within each study reach under the 5% and 1% AEP flood events.

	5% AEP Event					1% AEP Event				
Reach	**RES**	**COM**	**IND**	**PUB**	**Total**	**RES**	**COM**	**IND**	**PUB**	**Total**
AW1	0	1	0	0	1	0	1	0	0	1
AW2L	0	1	0	0	1	0	1	0	0	1
AW2R	3	16	2	1	22	13	18	2	2	35
AW3L	0	0	0	0	0	0	0	0	0	0
AW3R	0	0	0	0	0	0	0	0	0	0
AW4	1	0	0	0	1	4	0	0	0	4
AW5	0	0	0	0	0	0	1	0	0	1
AW6	3	7	0	0	10	4	4	1	0	9
AW7L	0	0	0	0	0	0	0	0	1	1
AW7R	5	0	0	0	5	5	4	0	1	10
AW8L	1	3	2	2	8	1	3	2	2	8
AW8R	0	0	0	0	0	0	0	0	0	0
AW9L	0	0	0	0	0	0	0	0	0	0
AW9R	0	0	0	0	0	0	0	0	0	0
Total	13	28	4	3	48	27	32	5	6	70

Mitigation for the 5% AEP Event

A total of 48 structures within seven study reaches were identified as having expected induced flooding at the 5% AEP flood event, including 35 non-residential structures and 13 residential structures (Table 53; see Figure 2 for location of each study reach). Six structures would be recommended for elevation, eight structures for evacuation and wet floodproofing of the first floor, and 34 structures for dry floodproofing. No structures that would be candidates for dry floodproofing have greater than 4 feet of flooding. Table 54 shows the number of structures appropriate for elevation, dry floodproofing, or evacuation and wet floodproofing of the first floor per study reach to mitigate for induced flood risk under the 5% AEP event.

Table 54: Nonstructural Induced Flooding Mitigation by Reach (5% AEP).

Reach	Elevate	Dry Floodproof	Evacuate First Floor & Wet Floodproof	Total
AW1	0	1	0	1
AW2L	0	0	1	1
AW2R	0	19	3	22
AW4	1	0	0	1
AW6	1	7	2	10
AW7R	3	0	2	5

Reach	Elevate	Dry Floodproof	Evacuate First Floor & Wet Floodproof	Total
AW8L	1	7	0	8
Total	6	34	8	48

The study team developed rough order of magnitude costs for nonstructural mitigation using existing USACE studies, including studies in American Samoa and North Carolina. Mitigation costs were developed and included for the 48 structures with mitigation measures at the 5% AEP event. Construction costs were assumed to be $500,000 per structure and included 100% contingency to address uncertainties in implementation of nonstructural measures, including mitigation action and construction costs. Utilizing these cost estimates and assumptions, construction associated with elevation and floodproofing measures for the 48 structures included for mitigation under the 5% AEP event are $48,000,000. Anticipated costs also include $2,400,000 in temporary relocations ($50,000 per structure); real estate review and administration costs $384,000 ($8,000 per structure); $8,640,000 (18%) for planning, engineering and design; and $3,360,000 in construction management (7%). Total mitigation costs for elevating and floodproofing structures under the 5% AEP event are $62,784,000.

The estimate above assumes that real estate is not compensable and impacted property owners will be offered the opportunity to voluntarily participate in non-structural mitigation measures described above. Purchasing of the real estate and relocation of the 48 structures with induced flooding at the 5% AEP flood event would cost approximately $239,000,000.

Mitigation for the 1% AEP Event

A total of 70 structures within nine study reaches were identified as having induced flooding at the 1% AEP flood event, including 43 non-residential structures and 27 residential structures (Table 53). Twelve structures would be recommended for elevation, 16 structures for evacuation and wet floodproofing of the first floor, and 42 structures for dry floodproofing. No structures that were candidates for dry floodproofing (non-residential) had greater than 4 feet of flooding. Table 55 shows the number of structures appropriate for elevation, dry floodproofing, or evacuation and wet floodproofing of the first floor per study reach in order to mitigate for induced flood risk under the 1% AEP flood event.

Table 55: Nonstructural Induced Flooding Mitigation by Reach For The 1% AEP Event

Reach	Elevate	Dry Floodproof	Evacuate First Floor & Wet Floodproof	Total
AW1	0	1	0	1
AW2L	0	0	1	1
AW2R	3	22	10	35
AW4	3	0	1	4
AW5	0	1	0	1
AW6	2	5	2	9
AW7L	0	1	0	1
AW7R	3	5	2	10
AW8L	1	7	0	8
Total	12	42	16	70

Utilizing the same cost estimates and assumptions described above, construction of nonstructural mitigation measures for the 70 structures included for mitigation under the 1% AEP event are $70,000,000. Anticipated costs also include $3,500,000 in temporary relocations ($50,000 per structure); $560,000 in associated real estate review and administration costs ($8,000 per structure); $12,600,000 for planning, engineering and design (18%); and $4,900,000 in construction management (7%). Total mitigation costs for induced flooding under the 1% AEP event are $91,560,000.

The estimate above assumes that real estate is not compensable and impacted property owners will be offered the opportunity to voluntarily participate in non-structural mitigation measures described above. Purchasing of all real estate and relocation of the 70 structures with greater than 0.5 feet of induced flooding at the 1% AEP event would cost in excess of $2,000,000,000.

Proposed Mitigation
The study team acknowledges recent case law regarding what level of induced flooding constitutes a takings (i.e., requires purchase of affected properties and relocation of affected inhabitants away from the flood hazard) that may change how USACE interprets and implements policy regarding induced flooding. The study team will include those potential risks in discussions and analyses moving forward. Given this uncertainty, the study team recommends incorporating $300,000,000 in potential mitigation costs. These costs are expected to cover a combination of acquisition and relocation or elevation/floodproofing of all 70 structures with induced flooding under the 1% AEP event. Potential mitigation scenarios that could be covered by the $300,000,000 include elevation and floodproofing of all 70 structures ($91,560,000) or acquisition and relocation of all 48 structures with induced flooding under the 5% AEP and elevation/floodproofing of the remaining structures with induced flooding under the 1% AEP ($292,000,000).

5.3 Cost Estimate

The project first cost (October 2023 price level) of the TSP is summarized in Table 56; additional detail is provided in the Cost Engineering Appendix (Appendix G). Costs for the structural components alone and with expected mitigation for induced flooding at the 1% AEP event are shown. The project first cost (constant dollar cost) serves as the basis for providing the cost of the project for which authorization is sought; it includes costs associated with (1) PED, (2) construction (including mitigation activities for impacts to aquatic habitat and cultural resources), (3) lands, easements, rights-of-way, relocations and disposal (LERRD), and (4) contingencies. In accordance with ER 1110-2-1302 and Engineering Construction Bulletin (ECB) 2007-17, a cost and schedule risk analysis will be conducted, prior to the release of the Final Report, to identify and measure the cost impact of project cost uncertainties. Contingencies will be identified using a Cost-Schedule Risk Analysis.

Table 56 displays updated costs for the optimized TSP, Alternative 5.3. Total project first costs associated with the structural features are $774.5 million, and the average annual cost is $29.8 million at an FY23 2.5% discount rate. With nonstructural mitigation, total project firsts costs are $1.075 billion. The total average annual cost including nonstructural mitigation is $40.4 million at an FY23 2.5% discount rate.

Table 56: Alternative 5.3 (TSP) Cost Summary Without (Structural Components Only) and With Nonstructural Measures to Mitigate for Induced Flooding During the 1% AEP Event

Category	Alternative 5.3 w/o Mitigation ($1000's, FY23 Price Levels)	Alternative 5.3 w/ Mitigation ($1000's, FY23 Price Levels)
Construction Cost	$570,904	$570,904
Lands and Damages	$58,089	$58,089
Planning, Engineering, and Design	$105,617	$105,617
Construction Management	$39,963	$39,963
Nonstructural Mitigation	-	$300,000
Total Project First Costs	$774,574	$1,074,573
Interest During Construction	$59,462	$60,390
Total Gross Investment	$834,036	$1,134,963
Annual Cost of Total Gross Investment	$29,406	$40,017
Annual OMRR&R	$359	$359
Average Annual Cost	$29,765	$40,376

Table 57shows average annual net benefits for the TSP with and without the nonstructural mitigation measures for reducing induced flooding, which are $22.5 million and $17.9 million, respectively. The BCR for the TSP with and without nonstructural mitigation measures is 1.8 and 1.4, respectively, at an FY23 discount rate of 2.5%.

Table 57: Alternative 5.3 (TSP) Benefit-Cost Evaluation Without (Structural Components Only) and With Nonstructural Measures to Mitigate for Induced Flooding During the 1% AEP Event.

Category	Alternative 5.3 w/o Mitigation ($1000's, FY23 Price Levels)	Alternative 5.3 w/ Mitigation ($1000's, FY23 Price Levels)
Equivalent Average Annual Benefits	$52,303	$58,252
Average Annual Costs	$29,765	$40,376
Net Annual Benefits	**$22,537**	**$17,876**
Benefit to Cost Ratio	**1.8**	**1.4**

5.4 Implementation of the Tentatively Selected Plan

The tentatively selected plan is estimated to be at approximately a 10% design level and is based upon current information and the best available estimates and projections of future conditions in the study area. Therefore, modifications to the project design and operations are likely during later stages of project design and construction to ensure that the project considers any unforeseen changes in the existing or future conditions that have occurred since the completion of this Draft GRR/SEIS. Modifications may require new investigation into environmental and social impacts. There are also some analyses that have been deferred to or must occur during the PED phase when more detailed plans and specifications are developed, including:

- Detailed cultural resources surveys.
- Review of conditions that may have changed since the completion of the feasibility study that would affect the design of structural or nonstructural measures included in the tentatively selected plan.

- Detailed assessment of structures identified for nonstructural measures, including but not limited to surveys, structural assessments, etc.
- Any additional environmental coordination that may be required if there are environmental, cultural, and/or historic resource impacts that were not identified during the feasibility study.

This feasibility study was delegated to the Pittsburgh District. Once the Ala Wai Canal General Reevaluation Study is complete, the Pittsburgh District will transfer the study documentation to the Honolulu District, which will immediately assume responsibility for the design and construction of the project.

5.5 Participation in Nonstructural Measures

The tentatively selected plan includes elevation of residential homes and floodproofing of non-residential structures throughout the Ala Wai watershed. The primary economic analysis assumes 100% participation of the structures included in the tentatively selected plan. The total project cost that is ultimately authorized into law will be the estimated cost to implement 100% of the structures recommended for nonstructural measures. However, these measures will be implemented on a voluntary basis and structure owners may choose to participate in the project. Thus, participation rates could affect the overall cost and benefits associated with the TSP. Differing participation rates are not expected to affect the overall viability of the TSP given that the Alternative 5.3 represented the NED plan both without application of nonstructural mitigation measures and with 100% participation across the 70 structures for which nonstructural mitigation was considered.

5.6 Lands, Easements, Rights-of-Way, Relocations, and Disposal

The estimated real estate cost associated with the TSP is approximately $58,088,600, including all recommended lands, easements, rights-of-way, relocations, and disposals (LERRDs), relocations, incremental real estate contingency, administrative costs to be carried out by the NFS, and Government costs for LERRDs monitoring and certification. Preliminary analyses undertaken during the development of alternative plans indicate expected technical challenges and inefficiencies associated with utilizing pumps for reducing induced flooding. Therefore, the current mitigation analysis excludes pump stations and focuses on potential application of nonstructural measures. Real estate considerations for nonstructural measures, described previously in this report, are included in this estimated real estate cost. Additionally, further analysis is needed regarding induced flooding and real estate takings. Due to recent Federal Circuit legal opinions, a conservative range of estimated buyouts is assumed, which indicates a fee simple value ranging from $124.55M to $5.47B. However, due to the uncertain outcome of this analysis as well as the additional analysis related to nonstructural mitigation measures, the estimated value of buyouts is not included in the estimated real estate cost associated with the TSP.

The NFS is responsible for providing all LERRDs required for the construction, operation, and maintenance of the project. The NFS is instructed to acquire the minimum real estate interests necessary for the project. LERRDs required for the proposed project include:

Flowage Easement (permanent)

- Ala Wai Golf Course Detention Basin: 128.35 acres

The minimum estate required for the detention basins is a permanent flowage easement totaling approximately 128.35 acres.

Flood Protection Levee Easement
- Ala Wai Golf Course Levee: 9.18 acres
- Ala Wai Golf Course Floodwall: 3.83 acres
- Koali Road Floodwall: 0.70 acres
- Woodlawn Drive Floodwall: 0.35 acres

The minimum estate required for the floodwalls is a perpetual flood protection levee easement totaling approximately 14.06 acres.

Temporary Work Area Easement
Construction and Staging Areas: 5.54 acres

The minimum estate required for construction and staging, including access, is a temporary work area easement totaling approximately 5.54 acres. The temporary work area easement is estimated to be required for two (2) years during project construction.
Utility Easement
Utility Relocations: 3.35 acres

The minimum estate required for relocation of existing sewer, water, gas, and power utilities along the Koali Road Floodwall, Ala Wai Golf Course Detention Basin, and the Ala Wai Cana Floodwall is a utility easement totaling approximately 3.35 acres. The size of the utility easement is assumed as a 20-foot wide easement.

Induced Flooding
Induced flooding is reasonably anticipated as a result of the Ala Wai Golf Course Detention Basin, Ala Wai Golf Course Floodwall, Koali Road Floodwall, and Woodlawn Drive Floodwall. Due to the significant induced flooding estimated to cover the entirety of the detention basin, a permanent flowage easement is required. Additionally, induced flooding is also anticipated as a result of the proposed floodwalls. Further legal analysis is required on a parcel-by-parcel basis regarding physical invasion takings and just compensation payment requirements. Due to recent Federal Circuit legal opinions, a conservative range of estimated buyouts is assumed, which indicates a fee simple value ranging from $124.55M to $5.47B.

5.7 Operations, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R)

The federal government is responsible for preparing and providing an OMRR&R manual to the sponsor as the final Recommended Plan is being implemented. OMRR&R costs associated with this TSP are considered ‘de-minimis’ (requiring only periodic surveillance by the non-federal sponsor). If nonstructural measures are ultimately included in the final Recommended Plan, each individual property owner is responsible for maintenance of their elevated or floodproofed structure/home.

5.8 Project Risks

Residual Risk

Table 58 displays damages by event with the TSP in place for the future condition. With the TSP in place, expected annual damages (EAD) are reduced in most reaches at the 1% AEP flood event. Approximately 1,200 structures experience a reduction in flooding at the 2% AEP event in reach AW1.

Table 58: EAD by Flood Event Future Condition.

Reach	10% AEP Structures	10% AEP Damages	2% AEP Structures	2% AEP Damages	1% AEP Structures	1% AEP Damages	0.2% AEP Structures	0.2% AEP Damages
AW1	1	$51	1	$194	1	$222	77	$269
AW2L	108	$12,651	180	$22,169	200	$25,757	313	$47,607
AW2R	153	$46,227	448	$123,310	579	$159,592	765	$216,501
AW3L	18	$6,562	93	$19,973	124	$25,934	185	$41,150
AW3R	43	$8,979	86	$32,964	101	$38,988	128	$47,534
AW4	3	$39	86	$10,474	281	$32,883	632	$78,348
AW5	0	$0	1	$350	1	$1,781	3	$2,647
AW6	1	$1	18	$7,518	22	$12,079	90	$15,278
AW7L	0	$0	1	$516	3	$2,310	54	$5,203
AW7R	2	$92	15	$2,035	38	$9,284	65	$15,376
AW8L	58	$4,889	110	$11,227	126	$14,361	144	$17,848
AW8R	5	$805	36	$3,282	44	$5,085	54	$6,614
AW9L	3	$255	12	$1,010	24	$2,075	31	$3,325
AW9R	28	$3,012	56	$9,416	64	$11,983	80	$15,183
Total	**423**	**$83,564**	**1,143**	**$244,439**	**1,608**	**$342,333**	**2,621**	**$512,885**

Uncertainty

Identifying and managing risk is critical to making informed planning decisions in the face of uncertainty. However, some level of uncertainty will remain following any decision. Understanding and characterizing this remaining uncertainty is also critical as it can affect the outcome of any decision. This section characterizes uncertainty associated with each alternative.

There is a degree of uncertainty surrounding project performance given the highly complex hydrology and hydraulics of the watershed. The timing of storm and flood events can greatly impact project performance, especially pertaining to the proposed project features in the lower watershed. There is also uncertainty related to how the stormwater drainage in the study area will interact with the TSP features; detailed modeling will be conducted in PED.

5.9 Cost Sharing

All estimates are at the 2023 price level and may change due to inflation prior to construction. The non-federal sponsor must provide self-certification of financial capability as required by USACE policy. Use of funds from other federal programs, including any non-federal contribution required as a matching share, to meet financial obligations of the non-federal sponsor is not permitted unless USACE authorizes use of those funds in writing.

Project design and implementation costs are shared 65% federal and 35% non-federal. The non-federal sponsor is required to provide all LERRDs. Based on these requirements, the

estimated non-federal contribution for the structural components of the TSP is $271,101,000, which includes $36,966,000 for PED, $58,089,000 in LERRD costs, and $176,047,000 in construction costs (Table 59).

Table 59: Federal and Non-Federal Cost Share for the TSP.

	Costs ($000s) with Nonstructural Mitigation		
Construction Item	**Federal Cost**	**Non-Federal Cost**	**Total Cost**
PED*	$68,651	$36,966	$105,617
LERRDs	$0	$58,089	$58,089
Construction Costs*	$434,821	$176,047	$610,867
Subtotal	$434,821	$234,135	$668,956
Total Project	$503,472	$271,101	$774,574
	Costs ($000s) w/ Nonstructural Mitigation		
Construction Item	**Federal Cost**	**Non-Federal Cost**	**Total Cost**
PED*	$68,651	$36,966	$105,617
LERRDs	$0	$58,089	$58,089
Construction Costs*	$434,821	$176,047	$610,867
Subtotal	$434,821	$234,135	$668,956
Nonstructural mitigation	$195,000	$105,000	$300,000
Total Project	$698,472	$376,101	$1,074,573
*Construction costs include construction and construction management			

The estimated non-federal contribution for the TSP including nonstructural mitigation for induced flooding is $376,101,000 which includes $105,000,000 for mitigation in addition to the PED, LERRDs, and construction costs associated with the structural elements (Table 59).

5.10 Design and Construction

Due to the level of design for this design (approximately 5-10% level) the estimate falls into a Class 4 category, based on ER 1110-2-1302. There is still substantial lack of technical information and scope clarity resulting in major estimate assumptions in technical information and quantities, heavy reliance on cost engineering judgment, cost book, parametric, historical, and little specific crew-based costs. While certain construction elements can be estimated in detail, there is still a great deal of uncertainty relative to major construction components. For the corollary cost data, recent projects in Hawaii (including the previous Ala Wai Feasibility Study) with similar scope were used when possible to give the most reasonable similar costs.
The quantity takeoff was developed by the technical team and Cost Engineer based on preliminary design concepts. Quantities will be further refined as the project progresses through feasibility phase. Due to the preliminary stage of design, quantities may change as the design progresses. This risk will be captured in the Risk Analysis and accounted for in the contingency amounts.

Based on the MII estimate a preliminary schedule of 3 to 4 years is expected (with multiple crews on critical path items due to the large footprint of the different alternatives).

5.11 Environmental Commitments

Table 60 shows the environmental commitments that have been incorporated into the proposed project for the purpose of minimizing environmental effects.

Table 60: Summary of Environmental Commitments.

Resources Category	Environmental Commitments (Mitigation Measures)
Geology, Seismicity, and Soils	**MM GSS-1:** During construction activities, the project applicant shall incorporate the conclusions and recommendations included in the Geotechnical Investigation Appendix. Geotechnical conclusions and recommendations are in Appendix D and discuss geologic hazards such as slope stability, liquefaction, settlement potential, soil suitability, soil corrosivity, etc.
Natural Environment	**EC BR-1:** The following environmental commitments are designed to avoid or minimize impacts to fish and wildlife resources, and ESA-listed marine resources: • Authorized filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project footprint. • Turbidity and siltation from project-related work should be minimized and contained within the project footprint by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project footprint is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site. • All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a littler-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fwl.html) can help to prevent attraction and introduction of non-native species. • Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from

	erosion (e.g., filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf. • Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases. • All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric, or native or non-invasive vegetation matting, hydro-seeding, etc. **EC BR-2:** The following environmental commitments are designed to avoid and minimize potential project impacts to Hawaiian hoary bat: • Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15). • Do not use barbed wire for fencing. **EC BR-3:** The following environmental commitments are designed to avoid and minimize potential project impacts to Hawaiian seabirds: • To the maximum extent practicable, limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat areas. • If construction activity time restrictions are not possible, use down shielding or directional lighting to avoid light trespass into bird habitat (i.e., use a 'Cobra' style light rather than an omnidirectional light system to direct light down to the roadbed). To the maximum extent practicable, while allowing for public safety, low intensity energy saving lighting (e.g., low pressure sodium lamps) will be used. • Minimize illumination of lighting on associated construction or operation structures by using motion sensors or heat sensors. • Bright white light, such as metal halide, halogen, fluorescent, mercury vapor, and incandescent lamps should not be used. • Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary. • Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area. • Avoid nighttime construction during the seabird fledgling period, September 15 through December 15.

	EC BR-4: The following environmental commitments are designed to avoid and minimize potential project impacts to Hawaiian waterbirds: • In areas where waterbirds are known to be present, reduced speed limit signs will be posted to inform project personnel and contractors about the presence of endangered species on—site; and reduced speed limits will be implemented. • Applicable USFWS BMPs regarding work in aquatic environments will be incorporated and implemented into the project design if water resources are located within or adjacent to the project footprint in order to contain stream sediments to the operational area. • A biological monitor that is familiar with Hawaiian waterbirds' biology will conduct nest surveys where appropriate habitat occurs within the vicinity of the proposed project footprint prior to project initiation. Surveys will be repeated within three days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest). If a nest or active brood is found: o The USFWS will be contacted within 48 hours for further guidance. o A 100-foot buffer will be established and maintained around all active nests and or broods until the chicks have fledged. Potentially disruptive activities will not be conducted, and habitat alteration will not occur within this buffer. o A biological monitor that is familiar with the species' biology will be present on the project footprint during all construction or earth moving activities until the chicks fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted. **EC BR-5:** The following environmental commitments are designed to avoid and minimize potential project impacts to green sea turtle, hawksbill sea turtle, and Hawaiian monk seal: • Constant vigilance shall be kept for the presence of ESA-listed marine species during all aspects of the proposed action, particularly in-water activities. • The USACE shall designate an appropriate number of competent trained observers to survey the areas adjacent to the proposed action for ESA-listed marine species. • Surveys shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one-half hour. Periodic additional surveys throughout the workday are strongly recommended. o Special attention will be given to verify that no ESA-listed species are in the area where equipment or material is expected to enter the water where there is a risk of contact with the species.

	○ Certain activities may require additional surveys as advised by NMFS on an *ad hoc* basis as identified during the consultation. • All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area. ○ If ESA-listed motile marine species are noticed within 164 feet (50 meters) after work has already begun, that work may continue only if the activity will not adversely affect the animal(s). For example, divers performing underwater work such as monitoring or surveys would likely be permissible, whereas operation of heavy equipment is likely not. • All objects will be lowered to the bottom (or installed) in a controlled manner to avoid contact with ESA-listed species. This can include the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent. • Do not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA-listed marine species. • Report any monk seal sightings: ○ Email NMFS at pifsc.monksealsighting@noaa.gov ○ Call the Marine Animal Stranding, Entanglement, and Reporting Hotline at: 888-256-9840. • No contamination of the marine environment shall result from project-related activities. • A contingency plan to control toxic materials is required. • Appropriate materials to contain and clean potential spills shall be stored at the work site and be readily available. • Heavy equipment in and near water bodies shall consider the use of biofuels and non-petroleum-based hydraulic fluids. • All project-related materials and equipment placed in the water shall be free of pollutants. • The contractor and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected and shall not proceed until the leak is repaired and equipment cleaned. • Fueling of land-based vehicles and equipment shall take place at least 164 feet (50 meters) away from the water, preferably over an impervious surface.

	• Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions. • A plan shall be developed to prevent debris and other wastes from entering or remaining in the marine environment during the project. • All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area. • Minimize direct contact to corals, seagrass, or other sessile ESA-listed resources. • All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area. • Unauthorized Take – If a listed marine mammal is determined by the PSO to have been disturbed, harassed, harmed, injured, or killed (e.g., a listed marine mammal(s) is injured or killed or is observed entering a shutdown zone before operations can be shutdown), it will be reported to NMFS within one business day to Ron.Dean@noaa.gov. These PSO records, submitted in digital and guervable format to NMFS, will include: o Information to be provided in the final report; o Number and species of listed animals affected; o The date, time, and location of each event (provide geographic coordinates); o Description of the event; o The time the animal(s) was first observed or entered the shutdown zone, and, if known, the time the animal was last seen or exited the zone, and the fate of the animal; o Mitigation measures implemented prior to and after the animal was taken; o If a vessel struck a marine mammal, the contact information for the PSO on duty, or the contact information for the individual piloting the vessel if there was no PSO on duty; o Photographs or video footage of the animal(s) (if available). • Stranded, injured, sick, or dead marine mammal (not associated with the project); o If PSOs observe an injured, sick, or dead marine mammal (i.e., stranded marine mammal), they will notify the Pacific Islands Marine Mammal Stranding Hotline at 888-256-9840. The PSOs will submit photos and data that will aid NMFS in

	determining how to respond to the stranded animal. Data submitted to NMFS in response to stranded marine mammals will include date/time, location of stranded marine mammal, species and number of stranded mammals, description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine mammals. • All areas of temporary waterway or wetland fill will be restored to their original contour and character upon completion of the project. Temporary fil includes both fill that received authorization and fill that inadvertently enters a water of the U.S. (i.e., from slope failures, accidental broken sandbag cofferdams, etc.). All temporary fills and structures in waters of the U.S. will be removed in their entirety upon completion of use. This avoidance and minimization measure will ensure restoration of flow to waterbodies for fish migration and avoids creation of potential sources of sedimentation and erosion that may elevate turbidity and adversely impair water quality conditions of downstream waters where federally listed marine species may occur. • All in-water excavation will be conducted within a cofferdam or other sediment containment device extending from the water surface to the substrate intended to isolate and contain in the work area. All in-water sediment containment devices will be placed to isolate the minimum area necessary to complete the work and will be removed upon completion of in-water work only after the water quality in the enclosed area has returned to ambient and would not release a turbidity plume. This avoidance and minimization measure isolates and contains sediments to the in-water work area and reduces potential for adverse impairment of water quality conditions with the rick of degrading water quality conditions of downstream waters where federally listed marine species may approach the in-water work area (I.e., Ala Wai Canal), the sediment containment device will create a physical barrier preventing interaction and potentially physical impact to federally listed marine species. • All upland areas of disturbed soil will be mulched and seeded with an approved native or noninvasive herbaceous seed mix following construction and/or planted with native or noninvasive woody vegetation and trees appropriate during the first available planting season. In areas where there is little to no slope and erosion and invasive species establishment is unlikely, the native woody vegetation on the site will be allowed to regenerate naturally. This avoidance and minimization measure avoids creation of potential sources of sedimentation and erosion that may

	elevate turbidity and adversely impact water quality conditions of downstream waters where federally listed marine species may occur. • Temporary access roads placed in the riparian area will be constructed in a manner that they do not allow erosion into waters of the U.S. during construction. This avoidance and minimization measure avoids creation of potential sources of sedimentation and erosion that may elevate turbidity and adversely impair water quality conditions of downstream waters where federally listed marine species may occur. • All off-road equipment and vehicles operation from existing open and maintained roads must be cleaned prior to entering the construction site to remove all soil, seeds, vegetation, or other debris that could contain seeds or reproductive portions of plants. All equipment will be inspected prior to off-loading to ensure that they are clean. This avoidance and minimization measure minimizes the spread of invasive plants that may degrade riparian habitats and erode sediments, resulting in reduced water quality conditions that may negatively affect green and hawksbill sea turtles and the Hawaiian monk seal. • During construction, any disturbed soils will be temporarily stabilized with materials such as hay, mulch, plastic sheeting, erosion control mix, or other appropriate measures. This avoidance and minimization measure reduces the risk of erosion and exposure to reduced water quality conditions that may otherwise negatively affect green and hawksbill sea turtles and the Hawaiian monk seal. • Cofferdam materials will be fully removed from the stream immediately following completion of in-water work, minimizing delays due to high stream flows following heavy precipitation. All areas of temporary bottom disturbance will be restored to their original contour and character upon completion of the project. This AMM removes obstacles and barriers to fish passage and returns benthic habitat to its original composition, limiting sediment disturbance and the temporary effects of degraded water quality conditions to green and hawksbill sea turtles and the Hawaiian monk seal. • All cofferdams will be removed using techniques to minimize turbidity releases. This includes allowing for the slow reintroduction of water into the work area and utilizing dirty water treatment systems for turbid water. This AMM avoids degrading water quality conditions that may negatively affect green and hawksbill sea turtles and the Hawaiian monk seal. • No equipment, materials, or machinery will be stored, cleaned, fueled, or repaired within any water of the U.S. All

		vehicle and equipment refueling activities will occur more than 100 feet from any water course and if not, all refueling areas will require fuel spill containment structures. A spill prevent and response plan will be prepared and implemented by the construction contractor. This AMM avoids creation of a pollutant source that may degrade downstream water quality conditions where federally listed marine species may occur. • All pumps and generators will have appropriate spill containment structures and/or spill remediation materials available, such as absorbent pads. This AMM reduces the risk of green and hawksbill sea turtle and Hawaiian monk seal exposure to petroleum products and other contaminants. • All equipment used for in-stream work will be cleaned of external oil, grease, dirt, and mud such that turbid water does not enter any water of the U.S. Any leaks or accumulations of these materials will be correlated before entering streams of areas that drain directly to streams or wetlands. All releases into surface waters or wetlands will be reported immediately to the appropriate regulatory body. This AMM reduces the risk of green and hawksbill sea turtles and the Hawaiian monk seal exposure to petroleum products and other contaminants.
Hydrology and Hydraulics	**EC HH-1:**	Potential pump station(s) located within the vicinity of Makiki Stream to minimize induced flooding. The location, size, and number of pumps that may be required will be analyzed and detailed during PED. Generally, due to the cost of this mitigation measure it is highly unlikely that this proposed mitigation measure would be implemented.
	EC HH-2:	Dry and/or wet floodproofing commercial structures in areas where induced flooding occurs. The number of structures and the location of structures that would need to be dry and/or wet floodproofed will be analyzed and detailed during PED.
	EC HH-3:	Elevating residential structures in areas where induced flooding occurs. The number of structures and the location of structures that would need to be elevated will be analyzed and detailed during PED.
	EC HH-4:	Acquisition of commercial and/or residential structures in areas where induced flooding occurs. The number of structures and the location of structures that would need to be acquired will be analyzed and detailed during PED.

Noise	**MM NV-1:**	Obtain a community noise permit from the City of Honolulu.
	MM NV-2:	Appropriate level of sound attenuation would be used during construction to meet local ordinances. Potential sound attenuation measures that could be considered include, but are not limited to, temporary sound barriers between the sources of construction noise and noise-sensitive receptors, as appropriate.
	MM NV-3:	Residents and businesses near the construction sites would be provided with advance notice of project activities, schedule, anticipated traffic, and potential noise issues. The advance notice would describe the potential noise disruption and the steps that would be taken to minimize the noise.
	MM NV-4:	Haul trucks operating near sensitive receptor sites would be spaced apart to avoid noise effects from simultaneous operation.
	MM NV-5:	Engineer brake (jake brake) use within city limits would be prohibited. Many noise complaints arise from heavy truck use of engine brakes to slow the truck down. Use of this type of braking can be avoided by proper speed control.
	MM NV-6:	The contractor would properly maintain and tune engines of all equipment and maintain properly functioning mufflers on all internal combustion engines to minimize noise levels.
Cultural Resources	**EC CUL-1:**	Historic buildings, bridges, and walls affected by construction would undergo appropriate historic documentation, and design input would be solicited from SHPO and interested consulting parties and incorporated into the final design where feasible. Where possible, impacts to archaeological resources would be avoided. Where avoidance is not possible, data recovery would be performed. Where practicable, construction measures would be microsited either up or downstream to minimize the impacts to features of Native Hawaiian cultural significance (Traditional Cultural Property [TCPs]) that could be disturbed by project actions.
	EC CUL-2:	Design input to minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated, as

		feasible, into the final design and construction of floodwalls.
	EC CUL-3:	If previously unknown cultural resources are discovered, work in the immediate area would cease until the requirements in 36 CFR 800.13 are complied with. The on-site supervisor shall contact the USACE's Project Manager and District Archaeologist, and an approved archaeological consultant immediately. The on-site supervisor shall additionally divert all Proposed Action-related activities to other areas until the discovery has been evaluated by the approved archaeological consultant. The USACE will determine if further mitigation measures are warranted in consultation with the SHPO and consulting parties.
	EC CUL-4:	Design of the Ala Wai Canal floodwalls includes an elevated walkway where feasible. In addition, as per the PA, design input to further minimize visual impacts to the greatest extent possible will be solicited from SHPO and interested consulting parties, and incorporated, as feasible, into the final design and construction of the floodwalls. The appropriate level of historic documentation of the Ala Wai Canal will also be developed with SHPO and other consulting parties.
Land Use and Planning	**EC LUP-1:**	Phase construction to ensure there is adequate temporary housing available due to scarcity of housing in the area.
	EC LUP-2:	Simultaneously implement nonstructural measures for whole blocks or streets of residences so that construction windows within neighborhoods can be minimized.
Aesthetics	**Refer to Cultural Resources, EC CUL-4.**	
Transportation and Traffic	**MM TT-1:**	Construction contractor would be required to prepare and implement a Transportation Management Plan. Measures to be included in the plan are expected to include the following: • Institute time-of-day restrictions for large, oversized construction vehicles to minimize interference with peak-hour or commute traffic. • Maintain at least one travel land on roadways to the extent possible; if complete lane closures are required, post adequate signage for potential detours or possible delays, or conduct full lane closures at night.

	• Establish temporary increases in lane capacity, as needed (e.g., widen existing shoulders for bypass traffic). • Provide advance warning and proper roadway signage along potential construction routes to warn motorists, residents, businesses of changes in roadway and traffic-related conditions (e.g., potential vehicles entering and exiting the roadway, etc.). • Identify safe and reasonable detours, including those needed for pedestrians and bicyclists, and provide adequate notification. • Provide written, advanced notice to property owners and businesses adjacent to construction areas. • Use pilot vehicles when slow or oversized/wide loads are being hauled. • Use flaggers, as necessary, to direct traffic when large equipment is exiting or entering public roads to minimize risk of accidents. • Provide temporary parking in nearby locations to the extent possible. • Repair surface damage to local roads used for construction haul routes to pre-construction conditions.

5.12 Project-Specific Considerations

Federal implementation of the recommended plan would also be subject to non-federal sponsor compliance with the following applicable federal laws and policies:

- Inform affected interests of the extent of protection afforded by the project no less than once each year.

- Agree to participate in and comply with applicable federal floodplain management and flood insurance programs.

- Prepare a floodplain management plan within one year of the signing of the project partnership agreement and implement the plan no later than one year following completion of project constructions as specified in Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12).

- Prevent obstructions or encroachments on the project, including prescribing and enforcing regulations to prevent obstructions or encroachments, such as new developments on project lands, easements, and rights-of-way or the addition of facilities that may reduce the level of protection the project affords, hinder project OMRR&R, or interfere with project function.

- Publicize floodplain information and provide this information to zoning and other regulatory agencies for use in adopting regulations, taking other actions to prevent unwise future development, and ensuring compatibility with protection levels provided by the project.

- Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655) and the Uniform Regulations contained in 49 CFR Part 24 in acquiring lands, easements, and rights-of-way required for construction and OMRR&R of the project, including those necessary for relocations, borrowing of material, or disposal of dredged or excavated material. Inform all affected persons of applicable benefits, policies, and procedures in connection with these laws and regulations.

- For so long as the project remains authorized, complete OMRR&R requirements on the project at no cost to the Federal Government in a manner compatible with the project's authorized purposes and in accordance with applicable federal and state laws, regulations, and any specific directions prescribed by the federal government.

- Give the federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-federal sponsor owns or controls for access to the project for the purposes of completing, inspecting, or conducting pre-completion OMRR&R on the project.

- Hold and save the U.S. free from all damages arising from the construction or OMRR&R of the project and any betterments, except for damages due to the fault or negligence of the U.S. or its contractors.

- Keep and maintain books, records, documents, or other evidence pertaining to costs and expenses incurred pursuant to the project for a minimum of three years after final accounting.

- Comply with all applicable federal and state laws and regulations, including but not limited to: Section 601 of the Civil Rights Act of 1964 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; the Age Discrimination Act of 1975 (42 U.S.C. 6102); the Rehabilitation Act of 1973, as amended (29 U.S.C. 794) and Army Regulation 6007 issued pursuant thereto; 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (labor standards originally enacted as the Davis-Bacon Act, the Contract Work Hours and Safety Standards Act, and the Copeland Anti-Kickback Act).

- Perform, or ensure performance of, any investigations that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Public Law 96-510, as amended (42 U.S.C. 9601-9665) that may exist in, on, or under lands, easements, or rights-of-way that the federal government determines to be required for construction and completion of OMRR&R of the project. However, for lands that the federal government determines to be subject to the navigation servitude, only the federal government shall perform such investigations unless the federal government provides the non-federal sponsor with prior specific written direction, in which case the non-federal sponsor shall perform such investigations in accordance with such written direction.

- Assume, as between the federal government and the nonfederal sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, or rights-of-

way that the federal government determines to be required for construction and completion of OMRR&R of the project.

- Agree, as between the federal government and the non-federal sponsor, that the non-federal sponsor shall be considered the operator of the project for the purposes of CERCLA liability, and to the maximum extent practicable, OMRR&R the project in a manner that will not cause liability to arise under CERCLA.

- Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and Section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project, or separable element thereof, until each non-federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

5.13 Environmental Operating Principles (EOP)

This study and the associated recommended plan maintain the USACE commitment to environmental stewardship by conforming to the following USACE Environmental Operating Principles:

Foster sustainability as a way of life throughout the organization. The TSP fosters environmental sustainability by representing the plan with no significant or permanent environmental impacts. Proactively consider environmental consequences of all USACE activities and act accordingly. The study team coordinated with appropriate environmental agencies to identify all possible environmental impacts and sought avenues to minimize those impacts throughout the development and evaluation/comparison of alternative plans.

Create mutually supporting economic and environmentally sustainable solutions. The recommended plan reduces flood risk to communities throughout the study area through the implementation of measures that have no significant or permanent environmental impacts. Continue to meet our corporate responsibility and accountability under the law for activities undertaken by USACE, which may impact human and natural environments. The study team is engaged in the activities necessary to assess and minimize cumulative impacts to the environment through NEPA via necessary surveys and agency coordination. It is expected that the recommended plan will be compliant with all applicable laws and policies.
Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs. Environmental risks were identified early in the study process and used to inform plan formulation decisions.

Leverage scientific, economic, and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner. The study team worked with local and regional stakeholders and held multiple scoping meetings with the public to obtain all existing scientific, economic, and social knowledge regarding environmental context and used this information during the plan formulation process.

Employ an open, transparent process that respects views of individuals and groups interested in USACE activities. The study team was open and transparent regarding the study process and possible outcomes during site visits and the public scoping meetings. All feedback obtained during these outreach activities was incorporated into the planning process. The recommended plan will be reviewed and potentially modified during the PED phase. If changes to the project result in effects that have not been previously evaluated, then pursuant to NEPA, USACE will prepare a separate NEPA document to address the changes and evaluate the associated effects. USACE and its contractors commit to avoiding, minimizing, and mitigating for adverse effects during construction activities.

5.14 Views of the Non-Federal Sponsor

The non-federal Sponsor (NFS), represented by the City and County of Honolulu, has expressed support of the draft plan. A letter of intent acknowledging the NFS's intent to support project implementation will be included in the final report.

Chapter 6: Compliance with Environmental Laws and Regulations

6.1 Federal Requirements

Clean Air Act of 1972, as amended, 42 USC 7401, et seq. *Full Compliance*. The TSP is not expected to violate any federal or state air quality standards, exceeds USEPA's general conformity de minimis threshold, or hinder the attainment of air quality objectives. Implementation of BMPs would minimize any potential impacts. Thus, the USACE has determined that the TSP will have no significant effects on the future air quality in the area.

Endangered Species Act of 1973, as amended, 16 USC 1531, et seq. *Partial Compliance*. In accordance with Section 7(c), the USACE obtained a list of federally listed and proposed species likely to occur in the study area. In addition, the USACE reinitiated informal consultation with the USFWS regarding the TSP and will submit the Biological Assessment to the USFWS at the same time as the Draft IFR/SEIS is released for public review (Appendix K).

Similarly, the USACE obtained a list of federally listed and proposed marine species likely to occur in the study area. USACE reinitiated informal consultation with NMFS regarding the TSP and will submit the Biological Assessment to NMFS at the same time as the Draft IFR/SEIS is released for public review (Appendix K).

Executive Order 11988, Floodplain Management. *Full Compliance*. The objective of this Executive Order is the avoidance, to the extent possible, of long and short-term adverse effects associated with the occupancy and modification of the base flood plain (1% AEP), and the avoidance of direct and indirect support of development in the base floodplain wherever there is a practicable alternative. The TSP is the only practicable way to reduce flood risk in the Ala Wai Watershed. The TSP, in combination with State and City and County of Honolulu efforts in other parts of the watershed, protect the existing urban population while providing residual risk information to the appropriate agencies making land use decisions in the area. Therefore, the TSP does not contribute to increased development in the floodplain and is in compliance with the executive order.

Executive Order 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. *Full Compliance*. This Executive Order states that federal agencies are responsible to conduct their programs, policies, and activities that substantially affect human health of the environment in a manner that ensures that such programs, policies, and activities do not exclude persons from participation in, or deny persons the benefits of, or subject persons to discrimination under such programs, policies, and activities because of their race, color, or national origin. USEPA's environmental justice (EJ) mapping and screening tool was used to query the action area. In the EJScreen, a two-mile buffer was drawn around the study area. The EJScreen tool was used to ascertain if the TSP would have a disproportionate adverse impact on a minority population, low-income population, or child population (i.e., persons under five years of age). For the Ala Wai watershed, a low income population is considered to be present within the study area since the low income population is above the 50th percentile (Figure 29). The state percentile with regard to a low-income population is also greater when compared to the United States percentile (Figure 31). The implementation of the TSP is not expected to have a disproportionate impact on a low-income population since the project reduces flood risk and flood impacts for this population which is expected to be a beneficial impact.

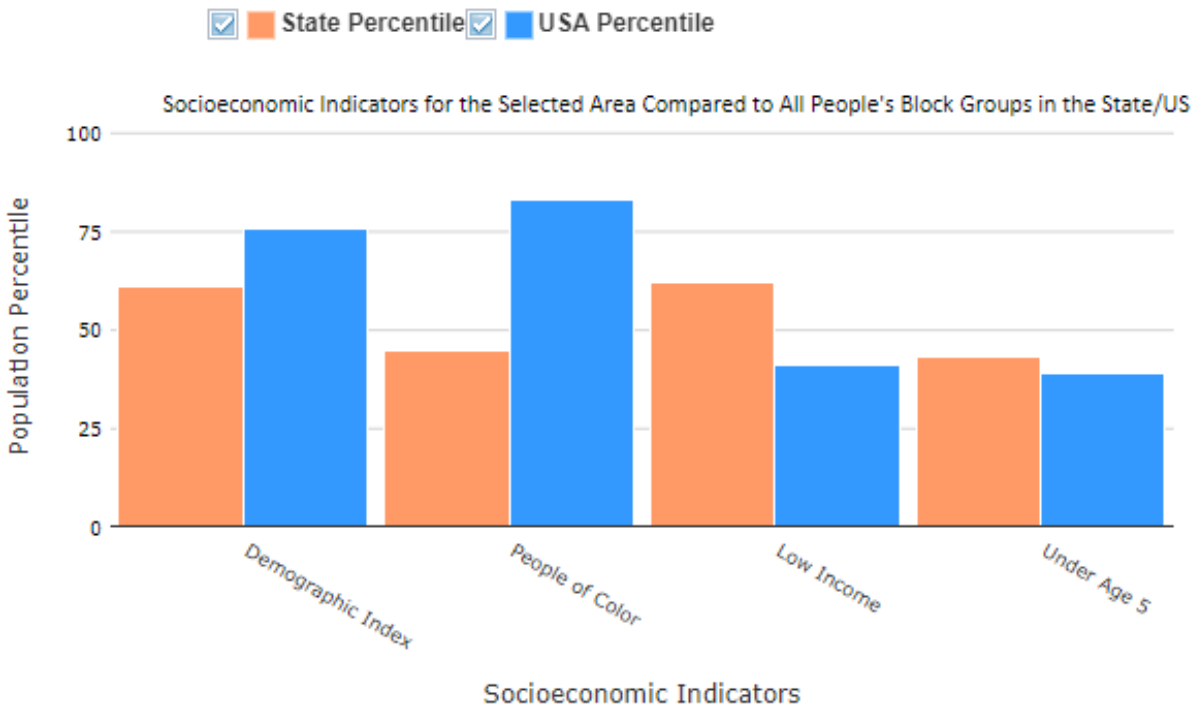

Figure 31: EJScreen Graph Depicting Socioeconomic Indicators within the Ala Wai Watershed.

Farmland Protection Policy Act, 7 USC 4201, et seq. *Full Compliance*. This act requires a federal agency to consider the effects of its actions and program son the Nations' farmland. According to Table 10, portions of the TSP are located on soils that are not prime farmland while other portions are located on soils that are prime farmland if irrigated. None of the project footprints for the TSP are currently located on farmland nor are these areas expected to be converted to farmland prior to the project being constructed. Therefore, there would be no adverse effects to farmland and the TSP is in compliance with this act.

Fish and Wildlife Coordination Act of 1958, as amended, 16 USC 661, et seq. *Partial Compliance*. This act requires federal agencies to consult with the USFWS and State fish and wildlife agencies before undertaking or approving water projects that control or modify surface water. Federal agencies undertaking water projects are required to fully consider recommendations made by the USFWS. The USACE sent a formal request to USFWS for a Fish and Wildlife Coordination Act Report on July 18, 2022 (Appendix K). The USACE received the draft Fish and Wildlife Coordination Act Report on June 22, 2023 (Appendix K).

Magnuson-Stevens Fishery Conservation and Management Act. *Partial Compliance*. This legislation requires that all federal agencies consult with NMFS regarding all actions or proposed actions permitted, funded, or undertaken that may adversely affect EFH. EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The USACE reinitiated consultation with NMFS for EFH and submitted an EFH assessment will be provided to NMFS at the same time as the Draft IFR/SEIS is released for public review.

Migratory Bird Treaty Act of 1936, as amended, 16 USC 703, et seq. *Full Compliance*. This Act provides protection for migratory birds as defined in 16 USC 715.

National Environmental Policy Act of 1969, as amended, 42 USC 4321, et seq. *Partial Compliance*. This integrated GRR and SEIS is in partial compliance with this act. Comments received during the public review period will be incorporated in the GRR and SEIS as appropriate and a comments and responses appendix will be prepared. The final GRR and SEIS will be accompanied by a signed Record of Decision (ROD) if determined to be appropriate by the ASA(CW) after consideration of public comments. These actions will provide full compliance with this act.

National Historic Preservation Act of 1966, as amended (54 USC 306101, et seq.). *Partial Compliance*. Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of a proposed undertaking on properties that have been determined to be eligible for, or included in, the NRHP. The implementing regulations for Section 106 are 36 CFR § 800.

6.2 State of Hawaii Requirements

Hawaii Environmental Protection Act. *Partial Compliance*. This joint NEPA/HEPA document is in partial compliance with HEPA requirements. Comments received during the public review period will be considered and incorporated into the final GRR and SEIS, as appropriate. The Governor of Hawaii will consider accepting the GRR and SEIS to obtain full compliance with HEPA.

Hawaii Endangered Species Act. *Partial Compliance*. This act requires the non-federal agency to consider the potential adverse effect on state-listed species. As a joint NEPA/HEPA document, this GRR and SEIS will consider the potential effects and provide a determination for state listed species.

6.3 Summary of Environmental Compliance

Table 61 shows the status of environmental compliance for the proposed project with relevant laws, regulations, EOs, etc.

Table 61: Summary of Environmental Compliance.

Reference	Environmental Statutes/Regulations	Project Compliance
42 USC 1996, et seq.	American Indian Religious Freedom Act of 1978, as amended	C
54 USC 312501 et seq.	Archaeological and Historic Preservation Act of 1974, as amended	C
16 USC 470, et seq.	Archaeological Resources Protection Act of 1979, as amended	C
42 USC 7401, et seq.	Clean Air Act of 1972, as amended	C
33 USC 1344, et seq.	Clean Water Act	P
16 USC 1531, et seq.	Endangered Species Act of 1973, as amended	P
7 USC 4201, et seq.	Farmland Protection Policy Act	C

Reference	Environmental Statutes/Regulations	Project Compliance
16 USC 661, et seq.	Fish and Wildlife Coordination Act of 1958, as amended	P
16 USC 1801, et seq.	Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended	P
16 USC 703, et seq.	Migratory Bird Treaty Act of 1936, as amended	C
42 USC 4321, et seq.	National Environmental Policy Act of 1969, as amended	P
54 USC 306101, et seq.	National Historic Preservation Act of 1966, as amended	C
25 USC 3001, et seq.	Native American Graves and Repatriation Act of 1990	C
42 USC 4901, et seq.	Noise Control Act of 1972, as amended	C
7 USC 7701, et seq.	Plant Protection Act of 2000	C
22 USC 403, et seq.	Rivers and Harbors Act of 1899	C
EO 11988	Floodplain Management	C
EO 11990	Protection of Wetlands	C
EO 12898	Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	C
EO 13007	Indian Sacred Sites	C
EO 13112	Invasive Species	C
EO 13175	Consultation with Indian Tribes, Alaska Natives, and Native Hawaiians	C
EO 13751	Safeguarding the Nation from the Impacts of Invasive Species	C

[a] C = Compliant, P = Pending, NC = Non-Compliant

Chapter 7: Public Involvement and Agency Coordination

Recognizing the importance of involving the public in the planning process, the USACE planning guidance specifies that open channels of communication should be developed and maintained with the public in order to give full consideration of public views and information throughout the project. Critical components of the public involvement effort should include (1) disseminating project-related information, (2) understanding the public's desires, needs, and concerns, (3) providing for consultation with the public before decisions are reached, and (4) taking into account the public's views (USACE, 2000). Public and agency involvement efforts have been conducted to comprehensively address USACE policies, as well as specific regulatory requirements for consultation. In particular, NEPA and HRS Chapter 343 require public involvement as part of the environmental review process. In addition, NHPA Section 106 requires consultation with interested parties and NHOs as part of a federal agency's consideration of the effects of their proposed undertaking on historic properties.

Based on the size of the watershed and the range of conditions, stakeholder concerns, and potential project measures and alternatives, a public engagement strategy was developed. The public engagement strategy initially included four rounds of community engagement opportunities for the community throughout the study. The first round of community engagements were to present the problem and discuss possible opportunities and potential solutions. The second round of community engagements were to discuss a more focused set of potential solutions under consideration at that stage; prior to the release of the Draft Report. The third round of community engagements were to discuss the TSP as presented in the Draft Report. The final round of community engagements were to review the Recommended Plan prior to release of the Final Report.

The public engagement strategy was refined based on feedback received during the initial public workshops to provide additional opportunities for interested parties to provide input in the study process and the development of alternative flood risk management plans. Fundamental elements of the revised public engagement strategy include:

- Continuous, virtual, asynchronous engagement through website, email, documents
- Workshops and structured meetings aligned with study milestones (hybrid – i.e., simultaneously virtual and in-person – when possible)
- Additional meetings with stakeholders for updates and focused exercises (virtual)
- Continuous, virtual, asynchronous engagement through website, email, documents

Following is a summary of the specific public and agency involvement efforts that have been conducted to date specific to this current effort. In addition, the summary below provides an overview of input received as a result of the above efforts and an overview of additional opportunities for public and agency involvement as the project moves forward. Previous coordination on this project and input received is incorporated by reference from the 2017 Ala Wai Canal Flood Risk Management Study (USACE, 2017). Additional detail and supporting information is provided in Appendix M.

7.1 NEPA and HRS Chapter 343 Scoping

Pursuant to the requirements of NEPA, an NOI was originally published on February 22, 2023 (88 FR 10880). A copy of the NOI is contained in Appendix M.

Initial Public Scoping meetings were held on November 10 and November 13, 2021. Additional scoping opportunities were also afforded through other stakeholder outreach events, including focus group meetings, as further discussed in Section 7.2.

As required by HRS Chapter 343, an EISPN was published in OEQC's Environmental Notice on April 8, 2023. Publication of the EISPN includes a 30-day comment period. A copy of the OEQC publication is contained in Appendix M.

7.2 Other Public and Agency Consultation Efforts

A significant number of stakeholder and agency meetings and other public involvement efforts have been conducted throughout the planning process to date. In general, the timing and focus of these events have been determined in response to project-related needs and stakeholder interests and desires. Events conducted specific to this Draft GRR/SEIS are summarized in Table 62.

Table 62: Summary of Public and Agency Engagement Efforts (Between June 2021 and May 2023).

Meeting Date	Meeting Type	Meeting Focus
November 10, 2021	Virtual Workshop	Problems, opportunities, and potential solutions
November 13, 2021	Virtual Workshop	Problems, opportunities, and potential solutions
January 20, 2022	Virtual Meeting	Update on public engagement strategy, process way ahead, and study schedule.
April 1, 2022	Virtual Workshop	Focused input on the Makiki and Palolo Sub-Watershed
April 8, 2022	Virtual Workshop	Focused input on the Manoa Sub-Watershed
April 14, 2022	Virtual Workshop	Focused input on the Ala Wai Canal and Lower Watershed
April 22, 2022	Virtual Workshop	Continued discussions on focused watershed discussion and question and answer opportunity
July 26, 2022	Virtual Workshop	Initial alternatives array
July 28, 2022	In-person Workshop	Initial alternatives array
December 13, 2022	Virtual Workshop	Update to the initial discussion on alternative plans being developed

7.3 Input Received Prior to Public Review

A wide range of input has been provided as part of the various public and agency meetings held to date. Following is a summary of the substantive input provided by stakeholders relative to the proposed project and the proposed flood risk management measures.

- Coordination with other projects is very important and should be considered as part of the planning and design process; key projects identified by stakeholders included the Waikiki Regional Circulator Study (which proposes a pedestrian bridge over the Ala Wai Canal).
- Proper O&M has and will always be an issue for the stream channels. Existing stream channel infrastructure is not currently maintained; the community is losing faith in local government because of the lack of support and follow through. The community can help with maintenance, but needs support.

- Many stakeholders expressed support for the project and emphasized the need for near-term action to reduce the risk of flooding. Some stakeholders questioned the need for the project, and in some cases suggested that improved stream maintenance would adequately address the existing flooding problem.
- Ala Wai Canal is a historic property (listed on National Register of Historic Places), and there is concern that the floodwalls would cause physical and visual separation between the sidewalk and the Canal, which would impact viewplanes and open space. In addition, there is concern with the height of the floodwalls. Stakeholders questioned whether the floodwalls need to be so high and/or whether they are needed on the makai side of the Canal (instead, allow open spaces to flood, with berms to protect the schools).
- Stakeholders expressed the desire for the floodwalls to be designed to match the existing historic walls.
- In addition to the visual impact of the floodwalls, other concerns expressed by stakeholders include the potential for graffiti and congregation/loitering of homeless people. Loitering is a particular concern if the floodwalls are set back from the existing Canal edge, as this would provide a corridor that is somewhat hidden and difficult to monitor.
- The floodwalls need to allow for recreational access to the Canal, both for pedestrians and canoe paddlers. The stairs on the makai side of the Canal are used by fishermen; these stairs should be maintained as access. The canoe clubs primarily use three launch locations: near McCully Bridge, at the bottom of University Avenue, and near the Golf Course at Kapahulu; consider using flood gates instead of stairs or ramps to maintain adequate access in these locations.
- Canoe clubs use the corner of Ala Wai Community Park for turning their canoe trailers. The floodwalls around the Ala Wai Canal (specifically in the area of Hausten Ditch) should be sited to maintain adequate space for the trailers.
- The amenities that are provided between Ala Wai Boulevard and the Canal (including the sidewalk, trees, landscaping and benches) are used as a linear park. Stakeholders have high expectations for this area to remain accessible and well-maintained.
- Stakeholders raised concerns about the potential of encountering pre-Contact or historic properties in the action area; there is particular concern with potential burials in the Waikiki area.
- Flapgates have high maintenance requirements, and are a liability if they fail. It is important to use high quality products.
- Need to ensure the detention basins are properly maintained and provide for emergency access. In addition, need to make sure that the berms do not pose a safety concern for recreational users.
- Stakeholders stressed the importance of not affecting the technical aspects of the golf course. For example, decreasing the length of the course would eliminate it as a venue for certain golf tournaments.
- Consider the possibility of locating the berm for the Ala Wai Golf Course detention basin away from the existing chain-link perimeter fence to allow for the fringes of the golf course to be used by the general public.
- Stakeholders requested ongoing outreach, including coordination with neighborhood boards.

As discussed throughout this document, these issues have been considered as part of the plan formulation and impact evaluation processes, and have been addressed as appropriate. All input that has been received and prepared FAQ's are found in Appendix M. In addition, information provided by the public on the 2017 Ala Wai Canal Flood Risk Management Study IFR/EIS (USACE, 2017) is incorporated by reference.

7.4 Draft Report Distribution and Public Review

Consistent with the requirements of NEPA and HRS Chapter 343, the Draft GRR/SEIS will be circulated for a 45-day public review. The review period is anticipated to start May 2023. Copies of the document will be distributed to a variety of individuals and organizations, requesting their comments on the project. In addition, a limited number of documents will be provided as loan copies in libraries, as well as online through the OEQC online library and project website.

The distribution list for the Draft GRR/SEIS was developed based on the recommended list provided by OEQC and was expanded to include all project stakeholders identified to date. This list includes federal, state, and local agencies; elected officials; community groups and organizations; adjacent landowners; libraries' and the new media. The complete distribution list and public notification postings on OEQC and the Federal Register are provided in Appendix M.

7.5 Public Comments Received and Responses

To be filled out after the 45-day public review of the Draft GRR/SEIS.

Chapter 8: District Engineer Recommendation

On the basis of the conclusions of this study, I recommend the implementation of the optimized TSP, which includes the Ala Wai Golf Course Detention Basin, Ala Wai Canal Floodwall, Kaimuki High School Floodwall, Woodlawn Drive Floodwall, and the Koali Road Floodwall. Structural and nonstructural mitigation measures would be implemented, including an integrated elevated walking path to mitigate for negative viewshed impact and the elevation and floodproofing of 70 structures to mitigate for induced flooding in specific areas throughout the watershed.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for authorization and implementation funding. However, prior to transmittal to higher authority, the sponsors, the state, interested federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

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Acronyms

ACRONYMS	DEFINITIONS
AEP	Annual Exceedance Probability
APE	Area of Potential Effect
BCR	Benefit Cost Ratio
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
EAD	Expected Annual Damages
EJ	Environmental Justice
EOP	Environmental Operating Principles
EQ	Environmental Quality
ER	Engineering Regulation
ESA	Endangered Species Act
FCSA	Federal Cost Share Agreement
FEMA	Federal Emergency Management Agency
FWCA	Fish and Wildlife Coordination Act
FWOP	Future Without Project
FY23	Fiscal Year 23
GIS	Geographic Information Systems
GRR	General Reevaluation Report
HEC-FDA	Hydrologic Engineering Center's Flood Damage Reduction Analysis
HTRW	Hazardous, Toxic, and Radioactive Wastes
LERRD	Land, Easements, Rights-of-Way, Relocation, and Disposal
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
NAAQS	National Ambient Air Quality Standards
NED	National Economic Development
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NNBF	Natural and Nature-based Features
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
OMRR&R	Operations, Maintenance, Repair, Replacement and Rehabilitation
OSE	Other Social Effects
PDT	Project Delivery Team
PED	Pre-construction Engineering and Design
PM	Particulate Matter

RED	Regional Economic Development
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VAT	Vulnerability Assessment Tool
WRDA	Water Resources Development Act

US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix A — Plan Formulation

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This document contains CONTROLLED UNCLASSIFED INFORMATION (CUI). It contains information that may be exempt from public release under the Freedom of Information Act (5 USC 552). It is to be controlled, stored, handled, transmitted, distributed, and disposed of in accordance with USACE policy relating to CUI information and it is not to be released to the public or other personnel who do not have a valid “need to know” without prior written approval of an authorized USACE official.

Report Status: Draft, November 2023

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1. Purpose

The purpose of the Plan Formulation Appendix is to provide additional details on the plan formulation process that were not included in the body of the main report.

2. Introduction

2.1. Planning Policy

The U.S. Army Corps of Engineers (USACE) conducts its planning efforts in accordance with the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, established by the Water Resources Council in 2013. The Principles, Requirements and Guidelines, referred to as the PR&G, establish federal water resource planning for the USACE, Bureau of Reclamation, Tennessee Valley Authority, and the National Resource Conservation Service. Engineering Regulation (ER) 1105-2-100, Planning Guidance Notebook, defines the specific planning policies of the USACE based on the PR&G. Federal planning efforts must comply with federal laws, including the National Environmental Policy Act (NEPA) and the Clean Water Act (CWA).

2.2. Planning Process

The USACE planning process consists of six major steps, done in iterations. The six steps are:

1. Identify problems and opportunities.
2. Inventory and forecast conditions.
3. Formulate alternative plans.
4. Evaluate alternative plans.
5. Compare alternative plans.
6. Select a plan.

Each iteration of the process is completed, in part or fully, as additional information is developed which inform the process. Figure 2-1 provides a conceptual diagram of the United States Army Corps of Engineers' (USACE) Six-Step Planning Process.

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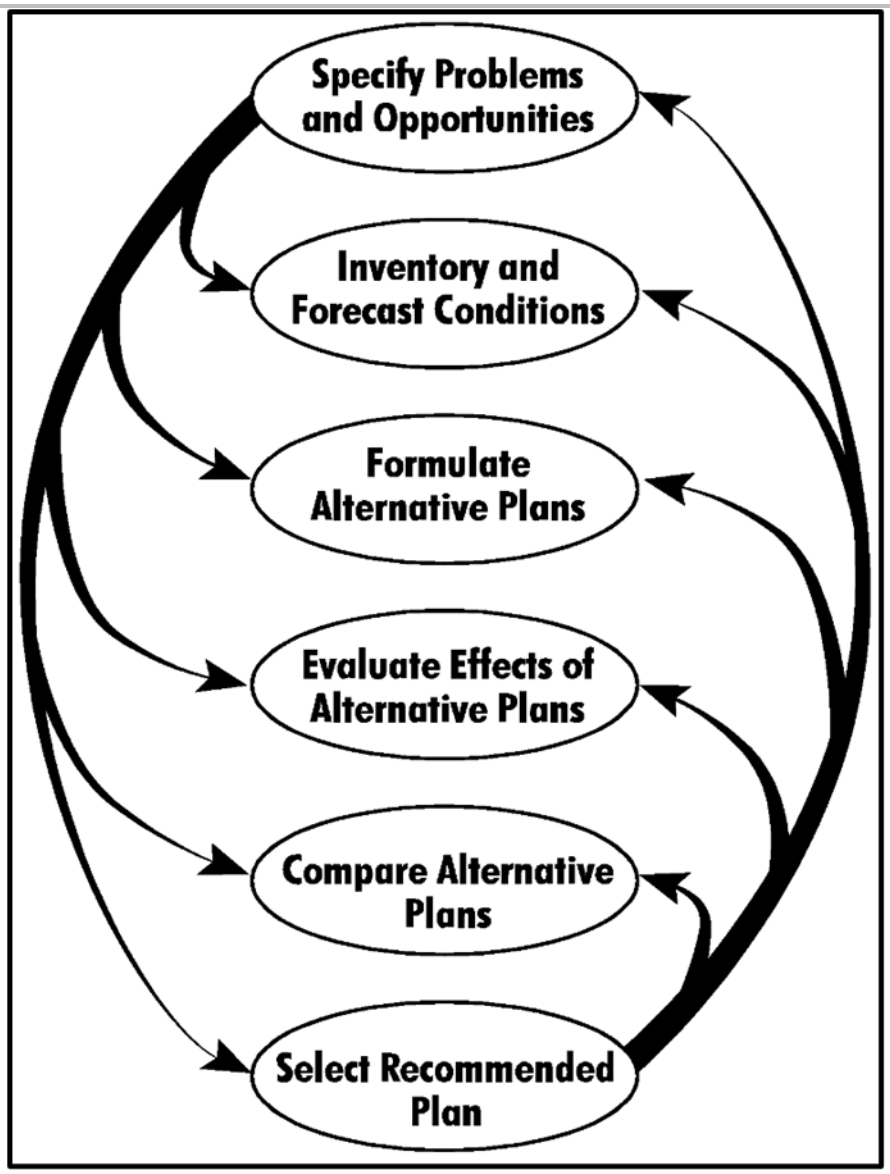

Figure 2-1: Conceptual Diagram of the USACE Six-Step Planning Process

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3. Study Area Reach Map

The Ala Wai Watershed is located on the southeastern side of the island of Oahu, Hawaii. The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Ko'olau Mountains to the nearshore waters of Mamala Bay. It includes the Makiki, Manoa, and Palolo streams, which flow to the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands. The construction and subsequent draining allowed the development of the Waikiki District. The study area was divided into 14 reaches which were informed by the hydrology and hydraulics of the watershed and intended to group structures appropriately for modeling and benefit evaluation. Figure 3-1 displays the study area reaches.

Figure 3-1: Ala Wai Reach Map

4. Preliminary Alternative Development

The initial screening of measures demonstrated that the urban nature of the study area (high land values and a lack of available real estate) tended to self-select for measures that have potential to reduce large amounts of flood risk throughout the watershed while they would likely

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be implemented in confined areas. Based on these considerations, the following strategies were used for developing alternative flood risk management plans:

Focus on Increasing Storage – This strategy aims to reduce the risk and impacts of flooding by increasing flood water storage within existing greenspace throughout the watershed.
Focus on Improving Diversion and Drainage – This strategy aims to reduce the risk and impacts of flooding by improving drainage or diverting flood water away from the community.
Focus on Improving Channel Conveyance – This strategy aims to reduce the risk and impacts of flooding by more efficiently transporting flood waters received from the channels.
Focus on Improving Channel Capacity – This strategy aims to reduce the risk and impacts of flooding by increasing food water storage within existing channels.
Focus on Natural and Nature-Based Features (NNBFs) – This strategy aims to reduce the risk and impacts of flooding by implementing natural and nature-based features. These measures are landscape features that are used to provide engineering functions relevant to flood risk management, while producing additional economic, environmental, or social benefits.
Maximize Nonstructural and Floodproofing - This strategy aims to reduce the impacts of flooding by retrofitting existing buildings and infrastructure to be more flood resistant.

5. Measure Screening

A total of 224 individual management measures were identified either during the planning charrette or through various public involvement pathways, including the public meetings and online tools (i.e., email, online GIS applications). Management measures provided by the public during the 2017 Ala Wai Canal Flood Risk Management Feasibility Study were also considered. A full list of management measures is provided on the Management Measure Tracker spreadsheet, which can be found as Attachment A at the end of this appendix. A summary table is provided below:

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Table 5–1: Summary of Management Measures

Category	Description	Type	No.
Bridge Modification	Modify bridges identified as choke points on tributaries to increase capacity and reduce risk of adjacent inundation.	S	4
Bypass	Construction of a channel bypass to divert floodwaters away from a damage center or problem area, discharging back into the same drainage. Channel bypasses could be above or below ground, including large-scale tunnels or conduits.	S	44
Channel Modification	Widening, deepening, and/or lining of the channel to increase capacity and conveyance and prevent overtopping. Modification could occur along the tributaries, as well as the Ala Wai Canal.	S	20
Pumps	Construction of interior pumping stations to increase the rate at which floodwaters drain, reducing inundation extents and durations.	S	9
Debris Management	Measures designed to strategically capture debris during high-flow events to reduce downstream risks (e.g., direct damage and blockage/altered hydraulics).	S	11
Detention	Detention basins to store water either on (online) or off (offline) the stream network during high-flow events. Offline detention could be above ground within existing open space and/or underground.	S	58
Floodwall/Levee	Construction of a floodwall or levee along the Ala Wai Canal (i.e., construction of new floodwall or raising of existing canal walls) or its tributaries to reduce risk of inundation in adjacent areas. Floodwalls and levees could be integrated into more aesthetic, park-like features.	S	14
Gates	Control structures within or at the outlet of the Ala Wai Canal to permit lowering the water level and increasing storage and/or controlling tidal and storm surge influence. Also includes flap gates on existing drainage systems.	S	6
Grade Control Structure	Construction of grade control structures (e.g., weirs, stilling basin) to slow water velocities in the tributaries, reducing peak flows downstream and decreasing erosion and sediment.	S	6
Other	Structural measures that do not fit cleanly into more common management measure types.	S	3
Nonstructural	Physical (e.g., acquisition and relocation, floodproofing, and elevation) and nonphysical (e.g., flood warning system, risk communication, education, and planning) measures.	NS	10
Reforestation	Actions taken to protect, preserve, manage, and restore natural resources at the watershed scale (e.g., reforestation and restoring native vegetation) that restore natural process and reduce flood risk.	NNB	8
Water Quality	Measures, such as filter strips, that could be implemented in coordination with other flood risk management measures to improve water quality, as permitted by USACE policy.	NNB	4
Wetland/Floodplain	Creation or restoration of wetlands, riparian areas, and floodplains within available open space to store and dissipate flood waters.	NNB	11
Channel Naturalization	The process of restoring the geomorphic characteristics of natural stream channels, such as geometry, access to adjacent floodplains, and meanders, to increase the natural capacity of the river and reduce flood risk. This measure could also include restoring the natural stream bed and daylighting.	NNB	6
Impervious Surface Reduction	Reduce impervious surfaces and increase pervious surfaces (e.g., pervious pavement, green roofs) to reduce runoff and promote infiltration.	NNB	9
No Action	No measures would be implemented by the federal government to achieve the planning objectives.	NA	1

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All 224 management measures were evaluated and either retained or screened from further consideration prior to alternative formulation. Management measure screening was conducted in two phases. Phase 1 involved a high-level assessment of engineering feasibility and policy compliance. Measures remaining after phase 1 screening were then tiered to prioritize additional analyses and maximize analytical efficiency. Phase 2 screening criteria are provided below in Table 2. When possible, existing data were used for screening during phase 2.

Table 5–2: Management Measure Screening Criteria

Criteria	Account	Description	Metric(s)
Efficiency	NED	Cost effectiveness—comparison of economic benefits and project costs.	Semi-quantitative – comparison of preliminary costs and expected benefits
Effectiveness (Damages Reduced)	NED	Damages to buildings, related contents, and vehicles.	Semi-quantitative – expected benefits based on previous study iterations
Effectiveness (Life Safety)	OSE	Changes in life safety risk expected with alternative implementation.	Semi-quantitative – expected benefits based anticipated water surface elevation reductions.
Acceptability	OSE	Workability and viability with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and policies.	Qualitative – Description
Environmental Effects	EQ	Effects to aquatic (stream, wetland) and terrestrial (riparian, upland) habitats, water quality, and threatened/endangered species	Qualitative – Low, medium, high based on footprint of each alternative.

Table 4–2 outlines the screening criteria used to assess each management measure assessed during phase 2 of measure screening. Metrics, and their corresponding descriptions, used to assess each criterion are provided in the table. The associated account (NED = National Economic Development; RED = Regional Economic Development; OSE = Other Social Effects; EQ = Environmental Quality; NA = Not Applicable) is also provided for each criterion. Screening results for all measures are provided in the Management Measure Tracker, included in this appendix as Attachment A. Thirty measures were retained and incorporated into the formulation of alternative plans.

6. Initial Array of Alternatives

The “cornerstone” (first-added) formulation strategy was utilized to develop an initial array of alternatives that each focused on reducing flood risk via different combinations of retained measures. For each alternative, one or more measures were first identified as the cornerstone—or the single most important measure(s). Additional measures were then added to meet objectives not served by the cornerstone. A summary of the initial array of alternatives is provided in Table 5–1, below. Incorporation of each measure within each alternative for the

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initial array (C = cornerstone; Y = yes) and measure type (S = structural; NS = nonstructural; NNB = natural and natures based; NA = not applicable) are also provided.

Table 6–1: Measures Utilized in the Initial Array of Alternatives

	Inclusion in at Least 1 Iteration of Plan Formulation										
Name	0	1	2A	2B	2C	3	4	5	6	Description	Type
Ala Wai Canal Floodwall		Y	Y	C	Y	Y	Y	C		Floodwall system along the Ala Wai Canal that may extend up the Manoa-Palolo Canal and Makiki.	S
Ala Wai Canal Tunnel (2nd Outlet)				Y						Eastern end of canal will be extended via subsurface tunnel as a second outlet to the ocean.	S
Ala Wai Golf Course Detention		C				Y	Y	Y		Design the Ala Wai Golf Course to include berm features for increased storage near the canal.	S
Daylight Ala Wai Canal (2nd Outlet)					C					Eastern end of canal will be extended via daylighting as a second outlet to the ocean.	S
Dredge Ala Wai Canal			Y	Y				Y		Ala Wai Canal will be dredged to its design depth or acceptable level of dredging, considering environmental impacts, stability, and structural integrity.	S
Dredge Manoa-Palolo Canal			Y	Y			Y			Dredge Manoa-Palolo Canal to increase storage and conveyance from Palolo and Manoa.	S
Kaimuki High School Berm / Floodwall		Y					Y			Extension of the Ala Wai Canal floodwall adjacent to/in the playing fields of the Kaimuki High School.	S
Kanaha Floodwall		Y	Y	C	Y		Y	Y		Floodwall on the Kanaha Stream where water jumps bank and flows towards Ala Moana.	S
Kapiolani Park Detention Basin		Y								Divert water to Kapiolani Park for additional flood storage.	S
Koali Road Floodwall		Y	Y	C	Y		Y	Y		Floodwall along the Manoa and Palolo Streams along Koali Rd, downstream of Kanewai Park.	S
Makiki District Park Detention		C		Y	Y		Y	Y		Makiki District Park multi-purpose detention pond.	S
Makiki Tunnel						C				Subsurface tunnel diverting water from the headwaters of the Makiki Stream to the harbor/ocean.	S
Manoa Valley District Park Detention		C	Y				Y	C		Manoa Valley District Park multi-purpose detention pond.	S
Waikiki Bypass			C	Y						Utilize existing storm sewer system or add bypasses from the Ala Wai Canal to the ocean.	S
Paki Ave Bypass			C							Utilize existing storm sewer system along Paki Ave as a bypass for Ala Wai Canal waters.	S
Palolo Channel Modification			Y				Y	Y		Deepen or widen channel to provide more within-bank storage.	S
Palolo Culverts			C							Bypass from Palolo Stream along Kapahulu Ave to Waikiki Wall outfall by upgrading existing storm sewer infrastructure.	S

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	Inclusion in at Least 1 Iteration of Plan Formulation										
Name	0	1	2A	2B	2C	3	4	5	6	Description	Type
Palolo Valley District Park Detention		Y					Y			Palolo Valley District Park multi-purpose detention pond.	S
Piikoi Street Bypass			C			Y	Y	Y		Bypass from Kanaha Stream down Piikoi Street to Ala Moana Park by upgrading/utilizing existing storm sewer infrastructure.	S
Pumps/other structures		Y	Y	Y	Y	Y	Y	Y		Pumps and other structures, such as flap gates, to mitigate interior drainage impacts of other measures.	S
SWIFT Tunnel (Manoa)						C				Subsurface tunnel diverting water from the headwaters of the Manoa Stream to the harbor/ocean.	S
SWIFT Tunnel (Palolo)						C				Subsurface tunnel diverting water from the headwaters of the Palolo Stream to the harbor/ocean.	S
Woodlawn Drive Floodwall		Y	Y	C	Y	Y	Y	Y		Floodwall along Manoa Stream at Woodlawn Drive bridge.	S
Woodlawn Bridge Modification		Y								Modify the bridge at Woodlawn Drive to increase conveyance.	S
Woodlawn Channel Modification		Y			Y		Y	Y		Channel modification along Manoa Stream near Woodlawn Drive bridge.	S
Woodlawn Drive Bypass		Y	C	Y			Y	C		Bypass of Manoa Stream at Woodlawn Drive by constructing new inlet and upgrading/utilizing existing storm water infrastructure.	S
Nonstructural Measures		Y	Y	Y	Y	Y	Y	Y	Y	Physical (e.g., acquisition and relocation, floodproofing, and elevation) and nonphysical (e.g., flood warning system, risk communication, education, and planning) measures.	NS
Watershed Management							C			Removing invasive species and replanting with native species; controlling ungulates to reduce destruction of vegetation; and reducing impervious surfaces.	NNB
Daylight Makiki Stream		Y	Y				Y			Increasing conveyance and reducing restrictions along Makiki Stream by daylighting.	NNB
No Action	Y									No federal action.	NA

Table 5–2 provides descriptions for each alternative that was formulated for the Initial Array of Alternatives. Measure types are included in the table (S=structural; NS=nonstructural; NNB=natural and natures based; NA=not applicable) and number of iterations undergone prior to the alternative being retained or screened are also provided. Each alternative underwent multiple iterations to improve plan performance and maximize efficiency and benefits prior to either being retained or screened from further consideration. Evaluation criteria utilized during each formulation iteration are summarized below. A detailed description of the formulation and evaluation of each alternative is provided in the Plan Formulation Tracker, including in this appendix as Attachment B.

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Table 6–2: Description of Initial Array of Alternatives

Alt.	Description	Type	Iterations	Retained
0	No action alternative.	NA	NA	Y
1	Storage Cornerstone – Reduces flood risk by increasing storage.	S	4	Y
2A	Conveyance (Existing Infrastructure) Cornerstone – Reduces flood risk by increasing conveyance using existing infrastructure.	S	2	N
2B	Conveyance (Floodwalls) Cornerstone – Reduces flood risk by increasing conveyance using floodwalls at various locations.	S	3	Y
2C	Conveyance (2nd Outlet) Cornerstone – Reduces flood by increasing conveyance via a second Ala Wai Canal outlet.	S	4	N
3	Tunnel Cornerstone – Reduces flood risk by implementing subsurface tunnels.	S	6	N
4	Natural and Nature-Based Cornerstone – Reduces flood risk through natural and nature-based features.	NNB	4	N
5	Hybrid Cornerstone – Reduces flood risk by combining cornerstones of other plans.	S	4	Y
6	Nonstructural Cornerstone – Reduces flood risk through nonstructural implementation.	NS	4	Y

The decision to screen or retain each alternative was determined through a set of evaluation criteria that was utilized throughout all iterations of the plan formulation process. Descriptions of and metrics used to assess each criterion are provided. The associated account (NED = National Economic Development; RED = Regional Economic Development; OSE = Other Social Effects; EQ = Environmental Quality; NA = Not Applicable) is also provided for each criterion.

Table 6–3: Alternative Evaluation Criteria

Criteria	Account	Description	Metric(s)
Efficiency	NED	Cost effectiveness—comparison of economic benefits and project costs.	Semi-quantitative – comparison of preliminary costs and expected benefits
Effectiveness (Damages Reduced)	NED	Damages to buildings, related contents, and vehicles.	Semi-quantitative – expected benefits based on previous study iterations
Effectiveness (Commerce / Tourism)	NED, RED	Degree to which flood risk is reduced in commercialized reaches and reaches frequented by tourists.	Qualitative – expected benefits in targeted reaches
Effectiveness (Life Safety)	OSE	Changes in life safety risk expected with alternative implementation.	Qualitative – expected benefits based anticipated water surface elevation reductions.
Acceptability	OSE	Workability and viability with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and policies.	Qualitative – Description
Environmental Effects	EQ	Effects to aquatic (stream, wetland) and terrestrial (riparian, upland) habitats, water quality, and threatened and endangered species	Qualitative – Low, medium, high based on footprint of each alternative.
Completeness	NA	Extent to which each plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects.	Qualitative – Description

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A summary of screening results for the final iteration of each alternative are provided in Table 5–4, below. Only the results associated with the final iteration are presented. Green indicates a positive determination for each criterion; amber indicates a neutral determination or a metric that would require further quantitative evaluation; and red indicates a negative determination.

Table 6–4: Evaluation Results for the Initial Array of Alternatives

Alt.	Effic.	Effect. (Damages)	Effect. (Lif. Saf.)	Effect. (Comm./Tour.	Accept.	Env.	Comp.
0	No	No	No	No	No	No	Positive
1	Positive	Positive	Positive	Positive	No	Positive	Positive
2A	Negative	Negative	Negative	Negative	No	No	Positive
2B	Positive	Positive	Positive	Positive	No	No	Positive
2C	Negative	No	No	Negative	No	Negative	Positive
3	Negative	No	No	No	No	Negative	Positive
4	Negative	Negative	Negative	Negative	Positive	Positive	Positive
5	Positive	Positive	Positive	Positive	No	No	Positive
6	Positive	Positive	No	Positive	No	Positive	Positive

Alternative 0. No Action Plan. USACE planning policy (Engineering Regulation 1105-2-100) and the National Environmental Policy Act (NEPA) require consideration of 'No Action'. The No Action assumes no measures would be implemented by the federal government to achieve the planning objectives. Any activities to be pursued by local, state, and/or other federal agencies are assumed to be undertaken.

Alternative 1. Storage Cornerstone. Based on the benefits calculations provided by previous studies, the storage cornerstone is likely to have positive net benefits. It is also expected to be effective at providing flood risk reduction benefits associated with all 3 study objectives—damage reduction, life safety risk reduction, and reduced impacts to commerce and tourism—throughout the watershed. Alternative 1 would also have minimal impacts to aquatic and terrestrial habitats, as well as some benefit to water quality through increased infiltration. Benefits to socially vulnerable populations in the lower portion of the watershed would likely still experience risks due to flooding along the Ala Wai Canal. Alternative 1 would be compatible with laws, regulations, and policies; however, use of public parks as detention facilities could reduce acceptability by the public.

Alternative 2A. Conveyance (Existing Infrastructure) Cornerstone. Cornerstone measures included in Alternative 2A, including the Piikoi, Woodlawn Drive, Waikiki, and Paki Avenue Bypasses, and the Palolo Culverts, were found to be largely ineffective at reducing water surface elevations and were screened out during various iterations of the plan formulation process. As a result, Alternative 2A was screened from further consideration.

Alternative 2B. Conveyance (Floodwalls) Cornerstone. Based on the benefits calculations provided by previous studies, the storage cornerstone is likely to have positive net benefits. It is also expected to be effective at providing flood risk reduction benefits associated with all 3 study objectives—damage reduction, life safety risk reduction, and reduced impacts to commerce and tourism—throughout the watershed. Alternative 2B would have some impact to riparian and marine habitats, including increasing the rate at which contaminants reach the ocean.

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Alternative 2B would be compatible with laws, regulations, and policies; however, extensive floodwalls along the Ala Wai Canal could reduce acceptability by the public.

Alternative 2C. Conveyance (2nd Outlet) Cornerstone. Based on the benefits calculations provided by previous studies and preliminary costs, it was determined that the Ala Wai Canal 2nd Outlet would not have positive net benefits. Through coordination with partnering resource agencies, it was also determined that a 2nd canal outlet would also have significant environmental effects on marine resources and would also impact the tourism industry through impacted water quality along Waikiki Beach. As a result, Alternative 2C was screened from further consideration.

Alternative 3. Tunnel Cornerstone. Modeling results and preliminary cost estimates indicate that the water surface elevation reductions and associated benefits would not be sufficient to offset the costs of tunnel construction. Through coordination with partnering resource agencies, it was also determined that a 2nd canal outlet would also have significant environmental effects on marine resources. As a result, Alternative 3 was screened from further consideration.

Alternative 4. Natural and Nature-Based Cornerstone. Sensitive analysis and modeling results quantifying the potential benefits associated with watershed management activities, including reforestation, invasive management, and reducing imperviousness, indicate that these activities would not be effective at modifying hydrology and hydraulics at events larger than the 50% annual exceedance probability event. Thus, the cornerstone measures for Alternative 4 would be ineffective at reducing risk during the events that drive risk throughout the watershed. As a result, Alternative 4 was screened from further consideration.

Alternative 5. Hybrid Cornerstone. Based on the benefits calculations provided by previous studies and preliminary costs, Alternative 5 is likely to have positive net benefits. It is also expected to be effective at providing flood risk reduction benefits associated with all 3 study objectives—damage reduction, life safety risk reduction, and reduced impacts to commerce and tourism—throughout the watershed. Alternative 5 would have some impact to riparian and marine habitats, including increasing the rate at which contaminants reach the ocean; however, increasing storage and infiltration may work to reduce impacts to water quality. Alternative 5 would be compatible with laws, regulations, and policies; however, use of public parks as detention facilities and extensive floodwalls along the Ala Wai Canal could reduce acceptability by the public.

Alternative 6. Nonstructural Cornerstone. Based on the benefits calculations provided by previous studies and preliminary costs, it was determined that nonstructural measures would have positive net benefits in many portions of the watershed. It is also expected to be effective at providing flood risk reduction benefits associated with all 3 study objectives—damage reduction, life safety risk reduction, and reduced impacts to commerce and tourism—throughout the watershed. However, lower participation rates could render this alternative incomplete and impact overall efficiency. Alternative 6 would have minimal impact on environmental resources.

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7. Final Array of Alternatives

The final array consisted of 5 alternatives, as outlined below.

Alternative 0. No Action: USACE planning policy (Engineering Regulation 1105-2-100) and the National Environmental Policy Act (NEPA) require consideration of 'No Action'. The No Action assumes no measures would be implemented by the federal government to achieve the planning objectives. Any activities to be pursued by local, state, and/or other federal agencies are assumed to be undertaken.

Alternative 1. Storage Cornerstone: Alternative 1 primarily focuses on increasing storage throughout the Ala Wai watershed to reduce flood risk. Implementation of this alternative would include the construction of several detention basins and floodwalls in strategic locations.

Makiki District Park Detention Basin & Kanaha Floodwall–At Makiki District Park, in Makiki Valley, a detention basin (i.e., Makiki District Park Detention Basin) would be constructed to temporarily store stormwater runoff. The detention basin would be constructed by excavating down approximately 6 to 10 ft and constructing a 6-foot-high floodwall with earthen slopes around the perimeter of the park (~1,200 ft in length). The Makiki District Park Detention Basin would have a storage volume of approximately 22 acre-feet. A floodwall extending 6 ft above ground level would be constructed along the right descending bank of the Kanaha Ditch (i.e., Kanaha Floodwall). The floodwall would be approximately 2,200 ft long, with five road closure structures. The Makiki District Park Detention Basin and Kanaha Floodwall function as a system, with the floodwall helping to move water efficiently and effectively from the Kanaha Ditch into the Makiki District Detention Basin, reducing the risk of flooding for adjacent and downstream communities.

Manoa Valley District Park Detention Basin–At Manoa Valley District Park, in Manoa Valley, a detention basin (i.e., Manoa Valley District Park Detention Basin) would be constructed to temporarily store stormwater. The detention basin would be constructed by excavating down approximately 6 to 8 ft and constructing a 6-foot-high around the perimeter of the park (~1,580 ft in length). The Manoa Valley District Park Detention Basin would have a storage volume of approximately 54 acre-feet. The purpose of the Manoa Valley District Park Detention Basin is to reduce the risk of flooding to residential structures downstream of the park.

Woodlawn Drive Floodwall & Koali Road Floodwall–Also within Manoa Valley, a floodwall extending 6 ft above ground level (i.e., Woodlawn Drive Floodwall) would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,625 ft in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,485 ft in length. Two box culverts would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two road closure structures would be constructed. The purpose of the Koali Road Floodwall is to reduce risk to adjacent

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residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system.

Kaimuki High School Floodwall–At Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending 6 ft above ground (i.e., Kaimuki High School Floodwall) would be constructed along the left descending bank of Manoa-Palolo Canal. The floodwall would be approximately 4,400 ft long. The Kaimuki High School floodwall would extend around the perimeter of Kaimuki High School's athletic fields. Two road closure structures would be constructed. The floodwall would be to reduce the risk of flooding to communities east/southeast of Kaimuki High School.

Ala Wai Golf Course Detention Basin–An earthen levee approximately 6 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 10,665 ft in length. The golf course detention basin would have a storage volume of approximately 314 acre-feet. A concrete in-stream weir diversion structure would be constructed approximately 50 feet downstream of the Date Street Bridge, allowing stormwater to enter the golf course detention basin starting at the 20-year storm event. Three concrete drainage structures with flap gates would be constructed along the southwest side of the Ala Wai Golf Course to allow collected stormwater to slowly drain into the Ala Wai Canal. Three road closure structures would be constructed. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

Nonstructural Measures–Physical nonstructural measures, including structure elevation, floodproofing, and acquisition and relocation, were considered in relevant reaches to reduce residual risk not addressed by structural measures. Nonphysical measures, including risk communication, were also considered for incorporation.

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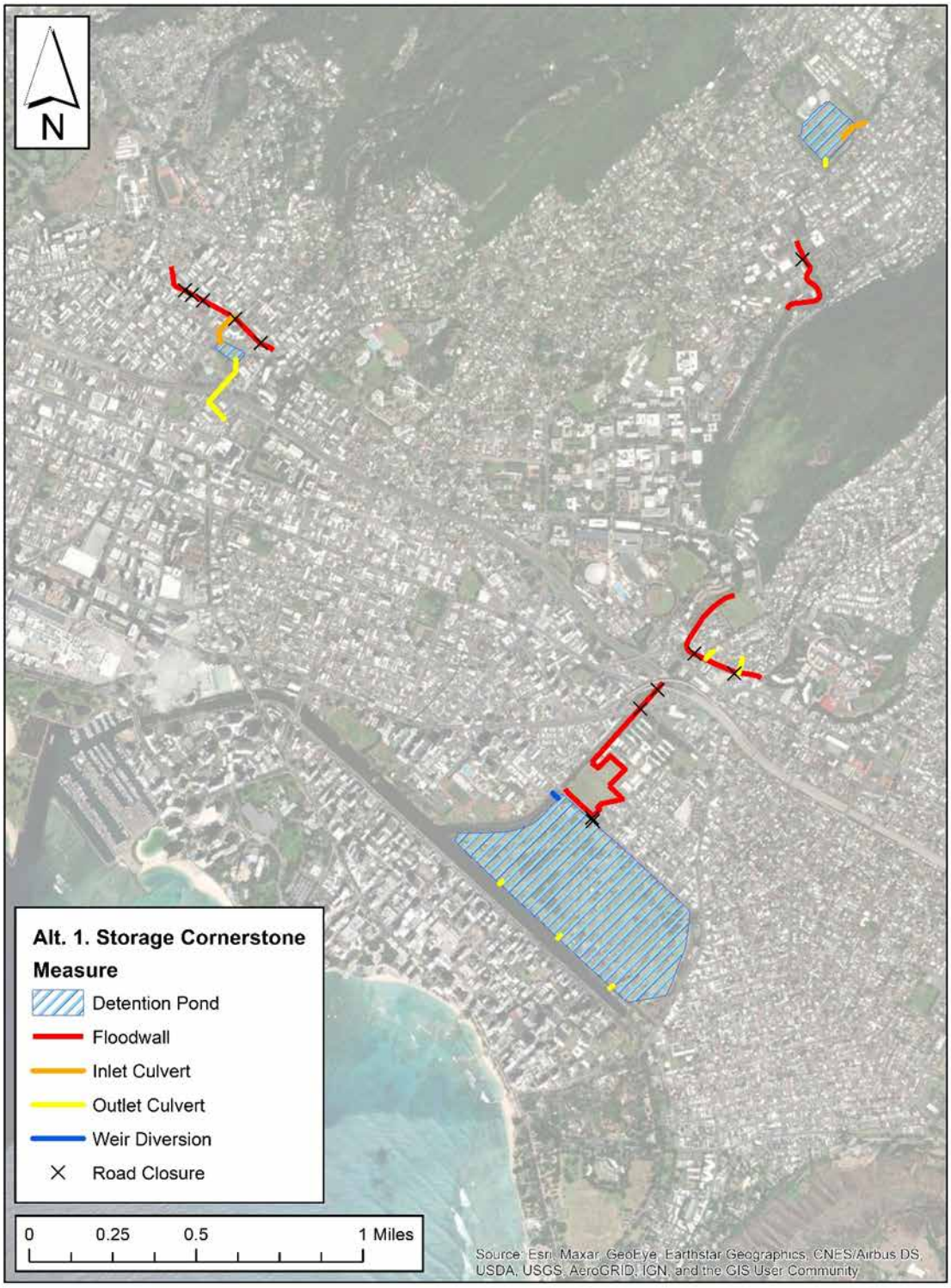

Figure 7-1: Conceptual Diagram of Alternative 1

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Alternative 2B. Conveyance (Floodwalls) Cornerstone: Alternative 2B includes the Makiki District Park Detention Basin, Kanaha Floodwall, Woodlawn Drive Floodwall, Koali Road Floodwall, and Nonstructural Measures as described above under Alternative 1.

Ala Wai Canal Floodwall and Kaimuki High School Floodwall–Along the Ala Wai Golf Course, Manoa-Palolo Canal, and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 24,745 ft long. Six existing stormwater sewers inletting into the Ala Wal Canal would be modified to include a flap gate. Nine road closure structures would be constructed. The purpose of the Ala Wai Canal Floodwall would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki. At Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending 6 ft above ground (i.e., Kaimuki High School Floodwall) would be constructed along the left descending bank of Manoa Manoa-Palolo Canal. The floodwall alignment is different from the alignment in Alternative 1. Under Alternative 2B, the Kaimuki High School Floodwall would be approximately 3,660 ft long, extending around the perimeter of Kaimuki High School's athletic fields and joining the Ala Wai Canal Floodwall near Date Street as discussed below. The Kaimuki High School Floodwall would reduce flood risk within communities east/southeast of Kaimuki High School. The Ala Wai Canal and Kaimuki High School Floodwalls would function as a single system.

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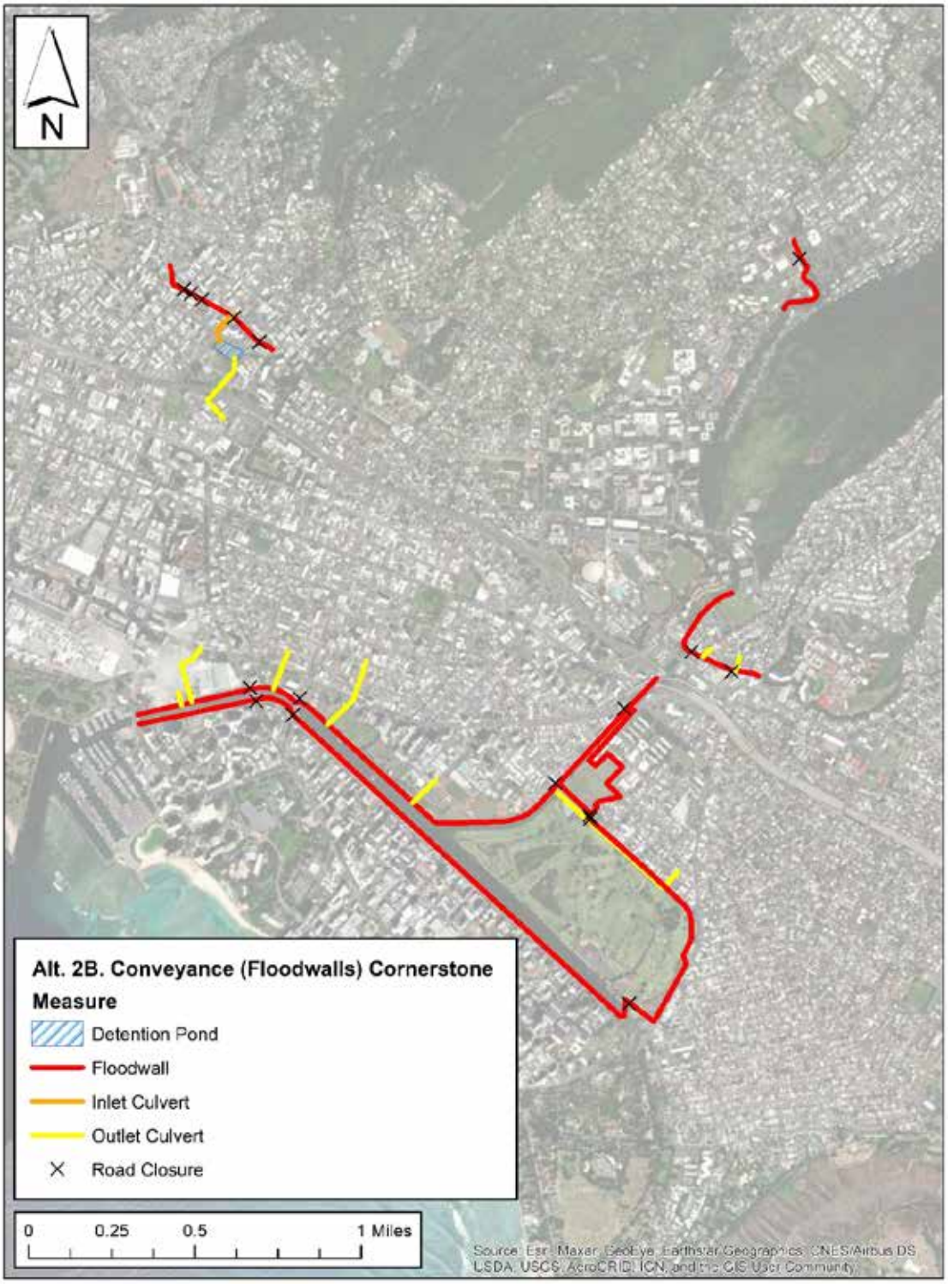

Figure 7-2: Conceptual Diagram of Alternative 2B

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Alternative 5. Hybrid Cornerstone: Alternative 5 includes the Makiki District Park Detention Basin, Kanaha Floodwall, Manoa Valley District Park Detention Basin, Woodlawn Drive Floodwall, Koali Road Floodwall, and Nonstructural measures as described under Alternative 1.

Ala Wai Golf Course Detention Basin–At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately 6 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 5,640ft in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. Near the vicinity of the Kapahulu Avenue and Ala Wai Boulevard intersection, the levee would join with the Ala Wai Canal Floodwall on the left descending bank of Ala Wai Canal. The existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be riprapped and used as an inlet for stormwater to overflow into the Ala Wai Golf Course Detention Basin. Three concrete drainage structures with flap gates would be constructed along the southwest side of the Ala Wai Golf Course to allow collected stormwater to slowly drain into Ala Wai Canal. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

Ala Wai Canal Floodwall & Kaimuki High School Floodwall– At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 24,140 ft long. Fourteen existing stormwater sewers inletting into the Ala Wai Canal would be modified to include a flap gates. Twelve road closure structures would be constructed. The purpose of the Ala Wai Canal Floodwall would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki. At Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending 6 ft above ground (i.e., Kaimuki High School Floodwall) would be constructed along the left descending bank of Manoa Manoa-Palolo Canal. The floodwall alignment is different from the alignment in Alternatives 1 and 2B. Under Alternative 5, the Kaimuki High School Floodwall would be approximately 3,260 ft long, cutting between the athletic fields and joining the Ala Wai Canal Floodwall near Date Street. The Kaimuki High School Floodwall would reduce flood risk within communities east/southeast of Kaimuki High School. The Ala Wai Canal and Kaimuki High School Floodwalls would function as a system.

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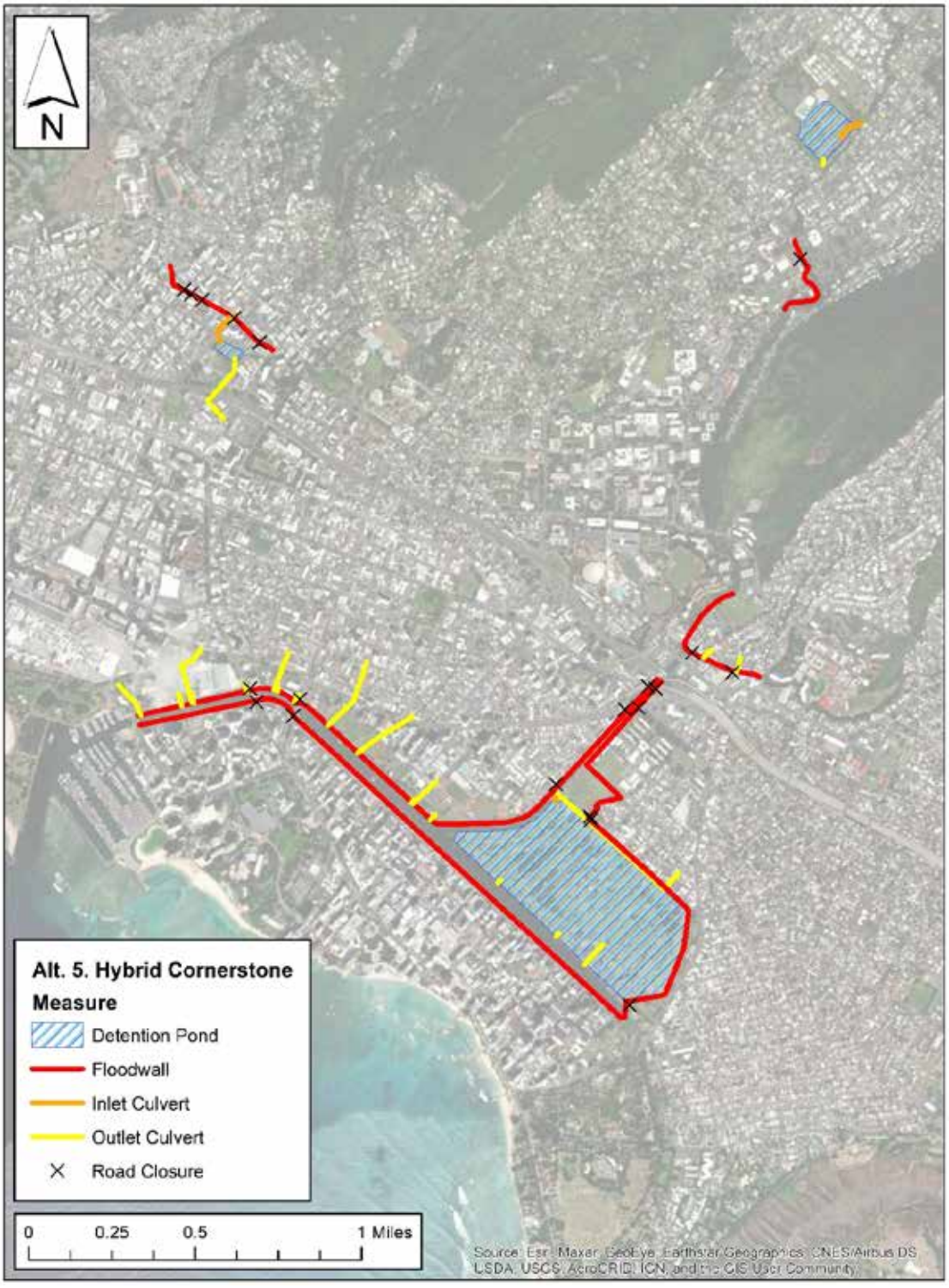

Figure 7-3: Conceptual Diagram of Alternative 5

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Alternative 6. Nonstructural Cornerstone: Alternative 6 consists of floodproofing and elevation of a total of 1,544 structures—43 elevations and 1501 with dry floodproofing—within 3 separate reaches with positive NED benefits. Structures within the 1% AEP floodplain in reaches AW1 (953) and AW2R (542) would be elevated or floodproofed to the 1% AEP flood stage (see Figure 7-4 for location of each reach). Structures within the 2% AEP floodplain in reach AW7R (49) would be elevated or floodproofed to the 2% AEP event. The target stage for all reaches is the 1% AEP event.

Figure 7-4: Targeted Reaches for Nonstructural Measures

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8. Comparison of the Final Array of Alternatives

A summary of the comparison of the final array of alternatives is presented below in

Table 8–1: Summary of Comparison of the Final Array of Alternatives

Consideration	Alt. 0. No Action	Alt. 1. Storage Plan	Alt. 2B. Conveyance Plan	Alt. 5. Hybrid Plan	Alt. 6. Nonstructural Plan
1. Account Analysis					
A. National Economic Development (NED)					
(1) Average Annual Net Benefits	$0	$26,835,000	$43,464,000	$52,303,000	$32,367,000
(2) BCR	0	3.0	2.1	2.7	1.76
(3) Rank	5th	4th	2nd	1st	3rd
B. Regional Economic Development (RED)					
(1) Employment	0 full-time equivalent jobs	2,197 full-time equivalent jobs	5,562 full-time equivalent jobs	8,141 full-time equivalent jobs	6,279 full-time equivalent jobs
(2) Labor Income	$0	$161,392,000	$408,582,000	$608,967,000	$447,000,000
(3) Rank	5th	4th	2nd	1st	3rd
C. Other Social Effects					
(1) Life Safety	0 expected annual life loss reduction	0.092 expected annual life loss induction	0.180 expected annual life loss induction	0.003 expected annual life loss reduction	0 expected annual life loss reduction
(2) Social Vulnerability	No additional impacts to socially vulnerable communities	Medium benefit to socially vulnerably communities	Largest increase in risk to socially vulnerable communities	Largest benefit to socially vulnerable communities	No significant benefit anticipated for socially vulnerable communities
(3) Rank	4th	2nd	5th	1st	3rd
D. Environmental Quality					
(1) Environmental Impacts	No additional impact to environmental resources	Minimally impactful to environmental resources	Most impactful to environmental resources	Minimally impactful to environmental resources	Least impactful to environmental resources
(2) Rank	2nd	3rd (tie)	4th	3rd (tie)	1st
2. Alternative Evaluation					
A. Criteria					
(1) Efficiency	No net economic benefits. Rank = 5th	$17,743,000 in net benefits. Rank = 3rd	$23,195,000 in net benefits. Rank = 2nd	$33,104,000 in net benefits. Rank = 1st	$14,023,000 in net benefits. Rank = 4th

(2) Effectiveness (Damage)	No damages reduced. Rank = 5th	$26,835,000 in damages reduced. Rank = 4th	$43,464,000 in damages reduced. Rank = 2nd	$52,303,000 in damages reduced. Rank = 1st	$32,367,000 in damages reduced. Rank = 3rd
(3) Effectiveness (Life Safety)	No reduction in life safety risk. Rank = 2nd (tie)	0.180 increase in expected annual life safety risk. Rank = 4th	0.092 increase in expected annual life safety risk. Rank = 3rd	0.003 reduction in expected annual life safety risk. Rank = 1st	No significant change in life safety risk. Rank = 2nd (tie)
(4) Acceptability	Meets acceptability criteria. Rank=1st (tie).	Meets acceptability criteria. Rank=1st (tie).	Meets acceptability criteria. Rank=1st (tie).	Meets acceptability criteria. Rank=1st (tie).	Meets acceptability criteria. Rank=1st (tie).
(5) Completeness	Meets completeness criteria. Rank=1st (tie).	Meets completeness criteria. Rank=1st (tie).	Meets completeness criteria. Rank=1st (tie).	Meets completeness criteria. Rank=1st (tie).	Meets completeness criteria. Rank=1st (tie).
(6) Environmental Effects	No effect on environmental resources. Rank = 1st.	No significant effects on environmental resources. Rank =2nd (tie).	No significant effects on environmental resources. Rank =2nd (tie).	No significant effects on environmental resources. Rank =2nd (tie).	No significant effects on environmental resources. Rank =2nd (tie).
(7) Rank	5th	4th	2nd	1st	3rd
B. *Contribution to Objectives*					
(1) Life Safety	No benefits to life safety. Rank = 2nd (tie).	Highest induced life safety risk. Rank = 4th.	Induced life safety risk. Rank = 3rd.	Largest reduction in life safety risk. Rank = 1st.	No benefits to life safety risk. Rank = 2nd (tie).
(2) Economic Damages	No reduction in economic damages. Rank = 5th.	$26,835,000 in damages reduced. Rank = 4th	$43,464,000 in damages reduced. Rank = 2nd	$52,303,000 in damages reduced. Rank = 1st	$32,367,000 in damages reduced. Rank = 3rd
(3) Reduce impacts to commerce and tourism	No reduction in disruptions to commerce and tourism. Rank = 5th.	Minor effects on Waikiki and Ala Moana. Positive effect on Manoa. Rank = 3rd.	Positive impact to Waikiki and areas along Manoa. Negative effect to Ala Moana. Rank = 2nd.	Greatest positive impact (i.e., reduced risk) in all target reaches. Rank = 1st.	Would benefit target reaches; participation may impact benefits. Rank = 4th.
(4) Rank	5th	4th	2nd	1st	3rd
C. Risk and Uncertainty					
(1) Residual Risk	No change in flood risk throughout	Fourth largest reduction in	Second largest reduction in	Largest reduction in	Third largest reduction in

	the watershed. Greatest residual risk. Rank=5th.	residual risk. Rank = 4th.	residual risk. Rank = 2nd.	residual risk. Rank = 1st.	residual risk. Rank = 3rd.
(2) Uncertainty	Relies completely on non-Federal action to reduce flood risk. Rank = 3rd.	Mitigation requirements are currently unknown. Rank = 1st (tie).	Mitigation requirements are currently unknown. Rank = 1st (tie).	Mitigation requirements are currently unknown. Rank = 1st (tie).	Participation rates could affect benefits. Rank = 2nd.
(3) Rank	5th	4th	2nd	1st	3rd

System of Accounts. Alternative 5 has the greatest net economic benefits ($33,104,000). Alternative 1 has the highest BCR (3.0). Alternative 5 is the alternative which reasonably maximizes benefits across the Four Accounts. The TSP is made up of measures, also referred to as project features, to minimize the extent of flooding within the Ala Wai watershed during frequent storm events.

Alternative Evaluation. Alternative 5 represents the most efficient plan in terms of net economic benefits, but Alternative 1 represents the most efficient plan in terms of BCR. Alternative 5 ranked the highest in terms of all three effectiveness criteria – having the greatest reduction in economic damages, the great reduction in impacts to commerce and tourism, and the great benefit to life safety. Alternative 5 appears to also be the most effective in reducing flood risk in socially vulnerable communities which, in turn, enhances community resiliency and community cohesion.

9. Tentatively Selected Plan (TSP)

Alternative 5 is the Tentatively Selected Plan (TSP). Based on the cost and benefit analysis of the final array of alternatives, the NED Plan is Alternative 5. Based on the evaluation of decision-driving metrics across the Four Accounts, Alternative 5 is also the Comprehensive Benefits Plan, as it reasonably maximizes benefits across the NED, RED, EQ, and OSE accounts.

10. Incremental Justification

The study team conducted an incremental justification analysis for measures included in Alternative 5—the NED and comprehensive benefits plan. For the purposes of this analysis, the study team considered the following as separable elements:

Table 10–1: Incremental Justification Assessment

Element/System	Analysis & Results	Determination
Makiki District Park Detention Basin and Kanaha Floodwall	Additional H&H and economic analysis indicated that the Makiki District Park Detention and Kanaha Floodwall are not separably economically justified (i.e., benefits do not outweigh the costs), do not substantially reduce life safety	Remove from Alternative 5.

	risk, and would not benefit the most socially vulnerable communities.	
Manoa District Park Detention Basin	Additional H&H and economic analysis indicated that the Manoa District Park Detention Basin is not separably economically justified, does not substantially reduce life safety risk, and would not benefit the most socially vulnerable communities.	Remove from Alternative 5
Woodlawn Drive Floodwall and Koali Road Floodwall	H&H and economic results were compared with and without the Woodlawn Drive and Koali Road Floodwall system. These results indicated that these measures are economically justified (i.e., benefits outweigh the costs) and would benefit the most socially vulnerable communities.	Retain in Alternative 5
Ala Wai Golf Course Detention Basin	Comparison of model runs with and without the Ala Wai Golf Course Detention Basin indicate that it is economically justified (i.e., benefits outweigh the cost) and that it helps reduce induced risk resulting from the other project features.	Retain in Alternative 5
Ala Wai Canal Floodwall and Kaimuki High School Floodwall	Comparison of model runs with and without the Ala Wai Canal and Kaimuki High School Floodwalls indicate these measures are separably justified (i.e., benefits outweigh the costs) and that it helps reduce risks to socially vulnerable populations.	Retain in Alternative 5

Alternative 5.1 - Modified Tentatively Selected Plan (TSP). A summary and associated map of the features included in the tentatively selected plan after completion of the incremental analysis efforts is provided below; this modification of Alternative 5 is being called Alternative 5.1.

Woodlawn Drive Floodwall & Koali Road Floodwall– Also within Manoa Valley, a floodwall extending 6 ft above ground level (i.e., Woodlawn Drive Floodwall) would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,625 ft in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,485 ft in length. Two box culverts would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two road closure structures would be constructed. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system.

Ala Wai Golf Course Detention Basin– At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately 6 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 5,640 ft in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. Near the vicinity of the Kapahulu Avenue and Ala Wai Boulevard intersection, the levee would join with the Ala Wai Canal Floodwall on the left descending bank of Ala Wai Canal. The existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be riprapped and used as an inlet for stormwater to overflow into the Ala Wai Golf Course Detention Basin. Three concrete drainage structures with flap gates would be constructed along the southwest side of the Ala Wai Golf Course to allow collected stormwater to slowly drain into Ala Wai Canal. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

Ala Wai Canal Floodwall & Kaimuki High School Floodwall– At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 24,140 ft long. Fourteen existing stormwater sewers inletting into the Ala Wai Canal would be modified to include a flap gates. Twelve road closure structures would be constructed. The purpose of the Ala Wai Canal Floodwall would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki. At Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending 6 ft above ground (i.e., Kaimuki High School Floodwall) would be constructed along the left descending bank of Manoa Manoa-Palolo Canal. The floodwall alignment is different from the alignment in Alternatives 1 and 2B. Under the incrementally justified Alternative 5, or TSP, the Kaimuki High School Floodwall would be approximately 3,260 ft long, cutting between the athletic fields and joining the Ala Wai Canal Floodwall near Date Street. The Kaimuki High School Floodwall would reduce flood risk within communities east/southeast of Kaimuki High School. The Ala Wai Canal and Kaimuki High School Floodwalls would function as a system.

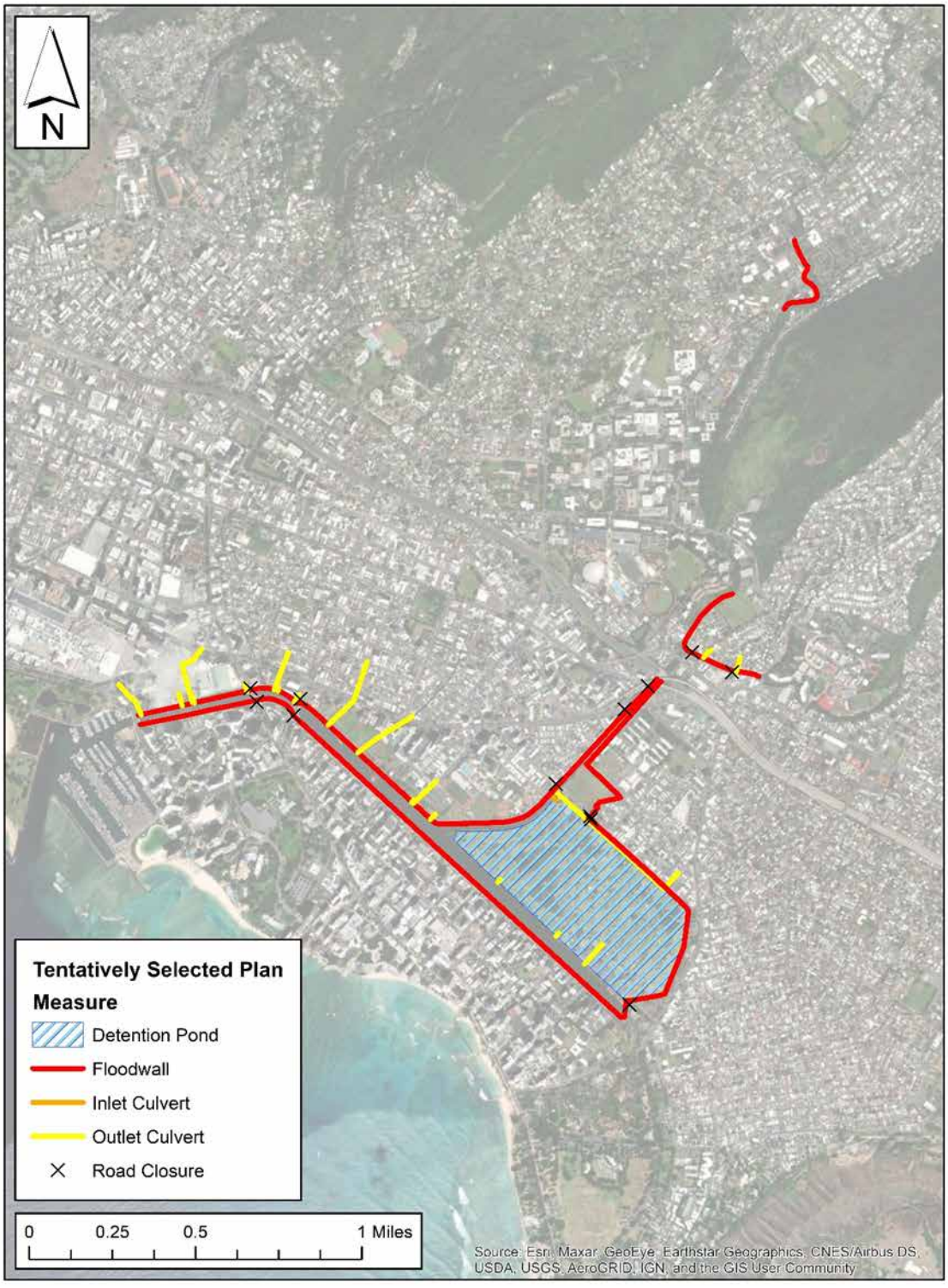

Figure 10-1: Conceptual Diagram of Alternative 5.1

11. Optimization

11.1. Overview of Optimization

The study team optimized Alternative 5.1 with a two-fold goal. First, the study team assessed whether structural features within the TSP could be modified to reduce residual risk while also capturing more project benefits and, second, the study team wanted to minimize the potential for induced flooding and induced damages to occur from implementation of the TSP. Table 11–1 summarizes the progress of Alternative 5 as it evolved through the plan formulation process. These changes were informed by extensive modeling and detailed evaluations to determine if the changes were effective in meeting the aforementioned goals.

Table 11–1: Summary of Changes to Alternative 5 (TSP)

Alternative	Measures Added/Modifications	Measures Removed
Alternative 5.1 (Incremental Analysis)	None.	Makiki District Park Detention and the Kanaha Floodwall were removed because this measure was not justified when evaluated as a separable element. Manoa Valley District Park Detention was removed because this measure was not justified when evaluated as a separable element.
Alternative 5.2 (Optimization)	Makiki Floodwalls were added to address induced flooding concerns in Lower Makiki. A ringwall around the club house at the Ala Wai Golf Course was added to address flooding concerns at the club house. Berm and floodwall alignments were adjusted on the southeastern portion of the Ala Wai Golf Course Detention to improve the performance of the system. The alignment of floodwalls near Kaimuki High School was adjusted to improve the performance of the system. An elevated walking path was added to the Ala Wai Canal Floodwalls to mitigate for negative viewshed impacts.	
Alternative 5.3 (Optimization)	Floodwall alignment adjusted at the Ala Wai Community Park to improve channel conveyance. Floodwall alignment on the Ala Wai Canal, near the golf course, was adjusted to increase channel conveyance.	Makiki Floodwalls were removed because additional analysis concluded that they were not effective in reducing potential induced damages. Ringwall at the Ala Wai Golf Course removed to increase the

	Many segments of the berm around the Ala Wai Golf Course were raised from 6 feet to 9 feet to increase total storage volume of the Ala Wai Golf Course detention feature.	storage area of the Ala Wai Golf Course detention. Wet floodproofing of the clubhouse will likely be needed.

Figure 11-1 visually displays the changes of Alternative 5.2, which led to the TSP maturing into Alternative 5.3. All substantial changes to Alternative 5.2 are displayed in red.

Figure 11-1: Conceptual Diagram of Changes to Alternative 5.2

The study team also analyzed the possibility of including physical nonstructural measures into Alternative 5, based on previous analysis which had identified reaches where nonstructural measures would likely be economically justified as standalone measures and within reaches where the study team believe residual flood risk could be reduced further through the application of nonstructural measures. Figure 10-1 provides a conceptual diagram of the reaches where nonstructural measures were considered for inclusion in the TSP; only reaches AW2R, AW2L, and AW9R were considered.

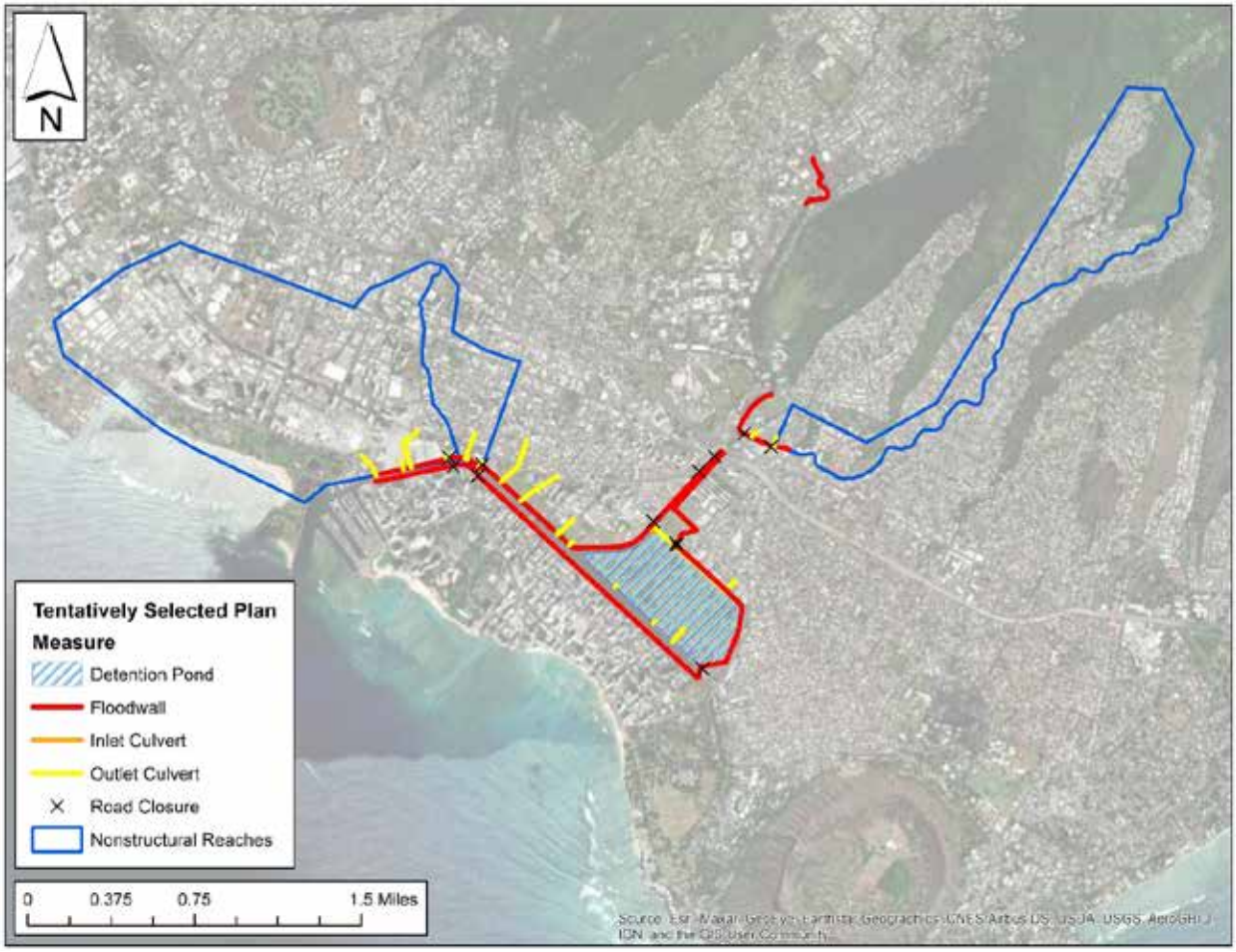

Figure 11-2: Conceptual Diagram of Nonstructural Measures for the TSP

The study team developed rough order of magnitude costs for nonstructural mitigation using existing USACE studies, including studies in American Samoa and North Carolina. Mitigation costs were developed and included for the 48 structures with mitigation measures at the 5% AEP event. Construction costs were assumed to be $500,000 per structure and included 100% contingency to address uncertainties in implementation of nonstructural measures, including mitigation action and construction costs. Utilizing these cost estimates and assumptions, construction associated with elevation and floodproofing measures for the 48 structures included for mitigation under the 5% AEP event are $48,000,000. Anticipated costs also include $2,400,000 in temporary relocations ($50,000 per structure); real estate review and administration costs $384,000 ($8,000 per structure); $8,640,000 (18%) for planning, engineering and design; and $3,360,000 in construction management (7%). Total mitigation costs for elevating and floodproofing structures under the 5% AEP event are $62,784,000.

The estimate above assumes that real estate is not compensable and impacted property owners will be offered the opportunity to voluntarily participate in non-structural mitigation measures described above. Purchasing of the real estate and relocation of the 48 structures with induced flooding at the 5% AEP flood event would cost approximately $239,000,000.

The study team acknowledges recent case law regarding what level of induced flooding constitutes a takings (i.e., requires purchase of affected properties and relocation of affected inhabitants away from the flood hazard) that may change how USACE interprets and implements policy regarding induced flooding. The study team will include those potential risks in discussions and analyses moving forward. Given this uncertainty, the study team recommends incorporating $300,000,000 in potential mitigation costs. These costs are expected to cover a combination of acquisition and relocation or elevation/floodproofing of all 70 structures with induced flooding under the 1% AEP event. Potential mitigation scenarios that could be covered by the $300,000,000 include elevation and floodproofing of all 70 structures ($91,560,000) or acquisition and relocation of all 48 structures with induced flooding under the 5% AEP and elevation/floodproofing of the remaining structures with induced flooding under the 1% AEP ($292,000,000).

11.2. Alternative 5.3 Benefit-Cost Evaluation

After the TSP was identified, the plan was optimized to reduce uncertainty in engineering modeling and real estate assumptions, and to reduce induced damages. As a result, floodwall alignments were updated in the H&H modeling, and the berm at the Ala Wai Golf Course detention basin was increased to allow for greater storage capacity, resulting in lower induced damages in Reaches 2R and 2L. The updated TSP was named Alternative 5.3. For a comprehensive summary of measures modeled in HEC-RAS for different iterations of the TSP, please see Appendix B of this report.

Alternative 5.3 is a considerable improvement from Alternative 5 in that the benefits it captures have been optimized; additionally, induced damages have been reduced, to the extent possible, through extensive adjustments to the structural measures contained in the alternative. Figure 11-2 displays a conceptual diagram of Alternative 5.3 and its optimized measures.

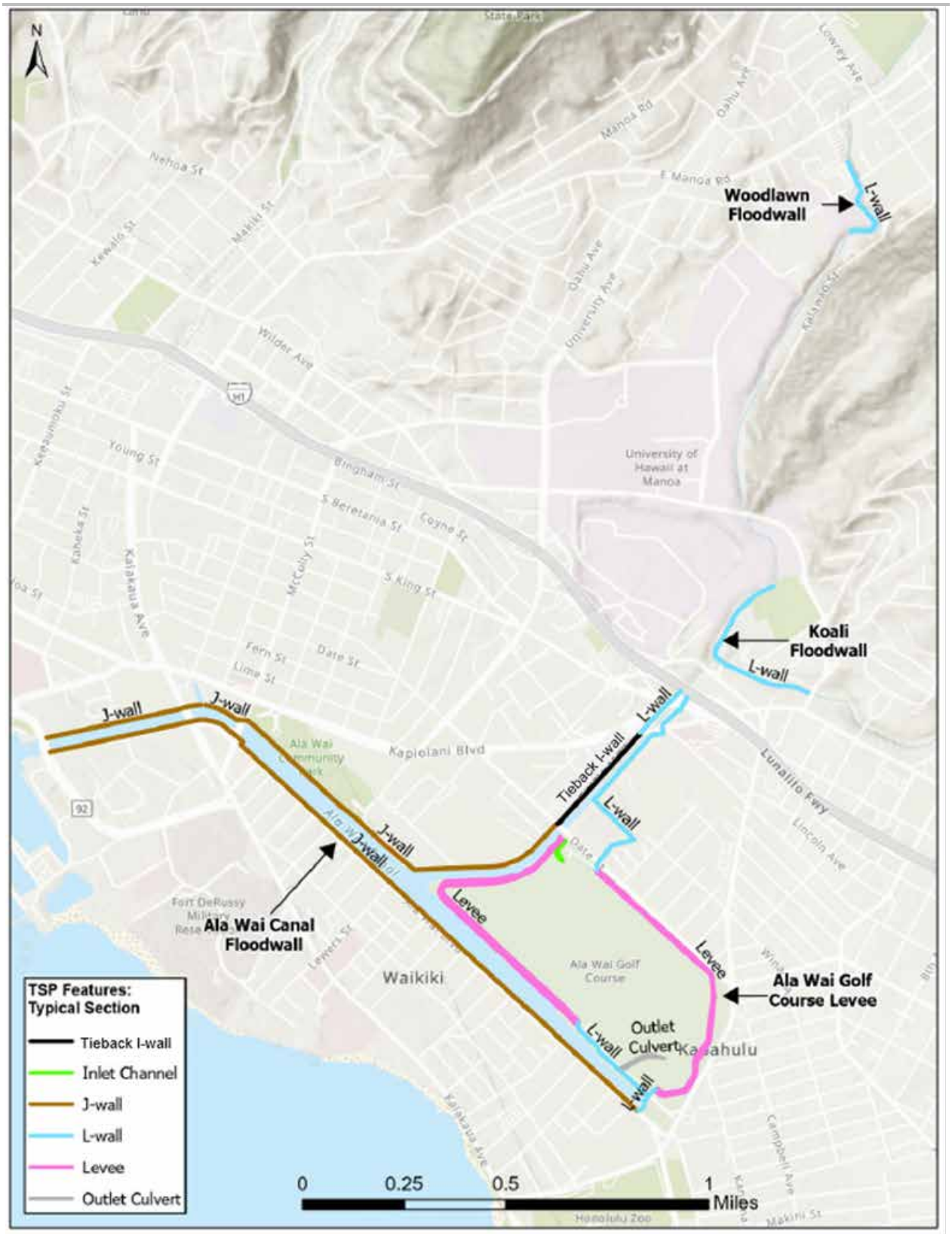

Figure 11-3: Conceptual Diagram of Alternative 5.3

Ala Wai Flood Risk Management GR Study - Management Measure Tracking Spreadsheet

last updated: September 30, 2022

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
1	Flap gates on storm drains	Ala Wai Canal	During high tide Ala Wai Blvd. between Kalakaua and the cul de sac ending at Ala Moana Blvd. floods. Ala Wai canal in this area needs flap gates to keep Ala Wai Canal water from flooding storm drains and flooding streets.	Gates	Retained	Provision, modification, and/or maintenance of drainage systems to capture and convey interior runoff in urban areas is a non-Federal responsibility and therefore cannot be included in a recommendation made as a result of this general reevaluation report. However, this study can make modifications to natural stream channels or previously modified natural waterways that help reduce backup within adjacent drainage systems. Flap gates will be considered for all streams/areas that meet this criteria.
2	Elevate canal walls	Ala Wai Canal	Increase canal capacity by elevating the existing canal floodwalls	Floodwall/Berm	Screened Out	Components and concepts of this measure are included in #193. This measure will be screened out for redundancy.
3	Deepen the canal	Ala Wai Canal	Excavate to deepen the existing canal and stabilize existing floodwalls.	Channel Modification	Screened Out	Dredging to the maintenance elevation is encouraged for the City to maintain consistently. Deepening the canal further than the maintenance elevation is generally not recommended due to the stability of canal walls and slope stability. Increasing storage of the canal can technically reduce flooding but not without instability of the structural components of the bridges and canal walls. The integrity of the canal walls as-is would not withstand excavation - only replacing with an entirely new system would. Further analysis is needed to determine the stability of bridge pier and footings. See measure 5.
4	Deepen canal for periodic pump drainage	Ala Wai Canal	Dig existing walls deeper to turn the canal into a periodic pump drainage to address inundation by all three sources of flooding	Channel Modification	Screened Out	Digging the existing walls deeper is not recommended due to their strucutral integrity. Pumping the canal in its entirety to increase storage capacity is not recomended due to stability of the existing canal walls. Hydrostatic pressure is likely needed for structural stability. Technical analysis needed to determine structural stability of bridge piers and footings. See measures 5 and 197.
5	Deepen the canal, replace canal walls with higher flood protection	Ala Wai Canal	Dredge canal down to its original depth of 15' to 25', and replace the degraded infrastructure with new canal walls that are set for greater flood protection	Channel Modification	Retained	The integrity of the canal walls as-is would not withstand greater dredging efforts than maintence dredging - only replacing with an entirely new system would. Further analysis is needed to determine the appropriate wall height, the stability of bridge pier and footings, and the optimal depth that balances slope stability and flood storage. Other considerations include dredged material contamination. Upon hydraulic analysis, dredging the canal to its original design depth can reduce flood risk. However, a more appropriate canal design depth/cut will be evaluated considering canal wall stability, bridge piers, and the level of contamination below the current dredged depth. This measure will be retained until a conclusive impact to water surface elevation can be made with appropriate assumptions.
6	Widen canal	Ala Wai Canal	Widen the canal to provide greater flow and storage capacity.	Channel Modification	Screened Out	Widening the canal for the entire length would require extensive real estate acquisitions with significant costs. Widening the eastern end of the canal would reduce the real estate acquisition costs, but did not provide more flood storage. The capacity of the canal is ultimately driven by tidal influence. Expanding canal storage through the use of floodwalls and/or utilizing existing storage areas along the canal (e.g., golf course, Ala Wai Community Park) are more efficient and are considered elsewhere.
7	Dredge Ala Wai Canal to original depth	Ala Wai Canal	Dredge canal down to its original depth of 15' to 25' since current dredging only goes down to 12'.	Channel Modification	Screened Out	Dredging to the maintenance elevation is encouraged for the City to maintain consistently. Deepening the canal further than the maintenance elevation is generally not recommended due to the stability of canal walls and slope stability. Increasing storage of the canal can technically reduce flooding but not without instability of the structural components of the bridges and canal walls. The integrity of the canal walls as-is would not withstand excavation - only replacing with an entirely new system would. Further analysis is needed to determine the stability of bridge pier and footings. See measure 5.
8	Dredge Manoa-Palolo	Lower Watershed	Dredge the Manoa-Palolo channel	Channel Modification	Screened Out	The Manoa-Palolo Canal is currently dredged to its design depth. Dredging further would impact canal wall stability and provide no additional benefit to the surrounding communties due to the tidal influence (below Date Street) and steep channel slope (above Date St). No further dredging is recommended.
9	Canal clean ups	Ala Wai Canal	Involve the community to conduct regular clean ups	Debris Management	Screened Out	Organizing clean-ups is outside the scope of the current study. Community involvement for clean ups after construction is a possibility; however, those initiatives those initiatives need to be initiated by other entities.
10	Effective Microorganisms (EM) to eliminate sludge	Ala Wai Canal	Use "genki balls" to clean up and eliminate sludge in the canal. These healthy microorganisms work to digest sludge in the canal which will help not only to evacuate water from the canal quicker, but also restore the ecosystem and reduce frequency for dredging.	Water Quality	Screened Out	Sludge eliminated by the genki balls would have to be extensive enough to reduce flood risk in order to be justified under the current study. Genki balls would eliminate the organic matter within the canal, which only makes up a small portion of material within the canal. Genki balls as a standalone measure would not provide enough reduction in material to increase storage capacity of the canal and reduce flood waters. Genki balls could be incorporated into a separate effort focused on ecosystem restoration.
11	Oysters to clean the canal	Ala Wai Canal	Use oysters as filters to clean the canal waters.	Water Quality	Screened Out	Improving water quality is outside the scope of this project. Oyster filters could be incorporated into a separate effort focused on ecosystem restoration.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
12	Debris management	Watershed Wide	Better manage the debris that ends up in the canal	Debris Management	Screened Out	Debris management will likely be most effective when utilized in conjunction with other measures (e.g., combined storage/debris management basins, structural modifications to bridges) (see measure #96). Channel clearing and modification can be incorporated into the study. However, long-term clearing programs or periodic stream cleanups cannot be included in a recommended plan as it is outside of the authority of USACE to partner in ongoing maintenance efforts. The study can include the recommendation to develop or re-evaluate a comprehensive debris management plan (see response to measure #188). This measure will be screened out for redundancy as components and concepts of this measure are seen in measure #96.
13	Submersible pumps	Ala Wai Canal	Use underwater pumps to create a lower profile pumping station	Pumps	Screened Out	Components and concepts of this measure are included in #197. This measure will be screened for redundancy.
14	Miter gates	Ala Wai Canal	Use several smaller radius miter gates to minimize visual impacts (to be used in conjunction with pump station)	Gates	Screened Out	Components and concepts of this measure are included in #197 and #196. Pump and gate design will be determined based on land use and inflow, following USACE regulations and best practices. This measure will be screened for redundancy.
15	Lowered gate structure	Ala Wai Canal	Use a lowered structure underwater that could be raised in an event instead of a miter dam. (to be used in conjunction with pump station)	Gates	Screened Out	Components and concepts of this measure are included in #197 and #196. Pump and gate design will be determined based on land use and inflow, following USACE regulations and best practices. This measure will be screened for redundancy.
16	Retractable flood barriers	Ala Wai Canal	Relocate pump station to the golf course. Use a series of retractable flood barriers that would allow for 4 rowing lanes (44' wide) across the width of the canal.	Gates	Screened Out	Components and concepts of this measure are included in #197 and #196. Pump and gate design will be determined based on land use and inflow, following USACE regulations and best practices. This measure will be screened for redundancy.
17	Prevent bulky refuse from clogging streams	Watershed Wide	Some people experiencing houselessness/homelessness are living near the streams and disposing of large, bulky items there. Discarded items include air conditioners, refrigerators, carpets and clothing; these block the canal and prevent water and debris from flowing freely down the stream. Locations identified: Woodlawn Bridge, Dole Street Bridge, Lower Waahila Ridge, Kanewai Park, St. Louis Heights Bridge, Kapiolani behind Service Station, Kaimuki High School, Date St, etc.	Debris Management	Screened Out	Managing houselessness/homelessness is outside the scope of the USACE feasibility authority; however, debris management can be included within the design of other project features. See measure #96. See response to measure #188 that addresses long-term debris management.
18	Pump via conduits	Ala Wai Canal	Pump flood waters via pipes, conduits or microtunnels to harbor instead of using high walls	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #20 and 197. This measure will be screened out for redundancy.
19	Change canal floor slope	Ala Wai Canal	Change the floor slope of the canal to push water out quicker; excavate to 25' deep at the Ala Moana bridge	Channel Modification	Screened Out	Dredging to the maintenance elevation is encouraged for the City to maintain consistently. Deepening the canal further than the maintenance elevation is generally not recommended due to the stability of canal walls and slope stability. The integrity of the canal walls as-is would not withstand excavation - only replacing with an entirely new system would. However, dreding at strategic locations, as opposed to the entire canal, can be investigated. Further analysis is needed to determine the stability of bridge pier and footings. Further analysis also needed to determine the sensitivity of the canal slope to reducing flood elevations during a storm event. This measure includes concepts and components that are included in measure #5. This measure will be screened out for redundancy, as the slope and depth of the canal will be investigated in the same fashion.
20	Microtunnel through Waikiki	Ala Wai Canal	Several microtunnels along the canal (i.e. under Paoakalani Ave, Ohua Ave, Liliuokalani Ave, Kanekapolei St, Nohonani St, Lewers St, Kalaimoku St, etc.), going under Waikiki and straight out to the ocean to increase conveyance	Tunnel/Conduit	Screened Out	Microtunnels (or system of bypasses under Waikiki) was found to not have significant flood risk management impacts after extensive hydraulic modeling efforts. This measure will be screened from further consideration.
21	2nd outlet on east end of canal (open canal)	Ala Wai Canal	Open up the east end of the canal with an open system extending down Paki Ave and makai through Kapiolani Park	Channel Modification	Retained	Identified as a priority for modeling. All possible options for daylighted and underground 2nd outlets will be explored. Minimizing property acquisitions would reduce costs. Likely to have significant water quality and environmental effects.
22	2nd outlet on east end of canal (underground)	Ala Wai Canal	Extend the canal underground with a box culvert running beneath Paki Ave down Kapahulu Ave. or Monsarratt Ave.	Tunnel/Conduit	Screened Out	Components and concepts of this measure are similar to those in measure #21. All possible options for daylighted and underground 2nd outlets will be explored. This measure will be screened out for redundancy.
23	East canal buried pipe system	Ala Wai Canal	Put a buried pipe system with a two way pump on the east end of the canal. During storms the pump can evacuate water from the canal or as regular maintenance the pump can reverse to bring fresh sea water to help circulate the canal. 30 cfs of seawater can accomplish both reduced sedimentation and improved water quality.	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #22. The improvement to water quality with reverse pumping is a consideration that will not impact flood risk, but secondary water quality benefits associated with this and other flood risk management measures can be captured as part of the documentation of comprehensive benefits. This measure will be screened out for redundancy.
24	Tunnel for additional outlet through Waikiki	Ala Wai Canal	Tunnel under Waikiki at Fort Derussy or through an underground pipe starting at the MP-canal confluence and shooting straight out to sea.	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #20 and #22. The location and size of a second outlet will be determined by environmental and engineering analyses. This measure will be screened out for redundancy.
25	Underwater pipes in canal	Ala Wai Canal	Use underwater pipes laid on the floor of the canal to redirect floodwaters directly to the harbor. These pipes could redirect flows directly from Makiki or the Manoa-Palolo straight out to sea without entering the Ala Wai canal.	Tunnel/Conduit	Screened Out	Underwater pipes laid on the canal floor would not provide increased conveyance for Makiki or Manoa-Palolo as stated. Instead, other measures will be considered to bypass water from those streams directly to the harbor via tunnels or existing storm sewers. Pipes laid on the canal floor will reduce capacity within the canal. The measure will be screened as other measures with more effective conveyance will be explored.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
26	Canal sluice gates	Ala Wai Canal	Design sluice gates to account for storm surge and high tides to prevent backflow through manhole covers	Gates	Screened Out	Sluice gates specifically to address coastal flooding is outside the scope of this study; however, flap gates to prevent backflow from elevated water surfaces within the canal has been identified as a separate measure, see #1.
27	Floodwalls on Waikiki side of canal only	Ala Wai Canal	Build floodwalls only on the Waikiki side of the canal. Do not build floodwalls on the Moiliili side of the canal.	Floodwall/Berm	Screened Out	Placing floodwalls on only one side of the canal could induce damages on the other side. This study seeks to reduce flood risk for all areas in a cost-effective and environmentally conscious way. Therefore, measures seeking to implement floodwalls adjacent to the canal would consider both sides. Floodwalls are considered a Tier 2 measure for modeling purposes. Modeling of storage features needs to occur prior to modeling this measure in order to assess an accurate water volume. See measure #193.
28	Submersible pump & gate at canal mouth	Ala Wai Canal	Submersible pumps and floodgate at Ala Moana Bridge. Excavate entire canal to 25' deep from Kapahulu to harbor. Pre-pump canal ahead of a storm. Smaller submerged pumps at Manoa confluence to push water towards harbor. Build a dam under McCully and/or Kalakaua bridges with pump station.	Pumps	Screened Out	Pumping the canal ahead of a storm to max capacity is not recomended due to stability of the existing canal walls. Hydrostatic pressure is likely needed for structural stability. New canal walls, functioning as floodwalls are being considered in measure #193. Further analysis is needed to determine the appropriate wall height, the stability of bridge pier and footings, and the optimal depth that balances slope stability and flood storage. Pump and gate as a standalone measure, as to not drain the canal ahead of a storm, will be carried forward for further consideration under #196 and 197.
29	Mauka canal floodwall	Ala Wai Canal	Raise mauka canal wall so it is the same height as the Waikiki wall. This floodwall would need to extend past Iolani School up to the Date St. bridge	Floodwall/Berm	Screened Out	Components and concepts of this measure are included in #193. This measure will be screened out for redundancy.
30	Pump & Gate at canal mouth	Ala Wai Canal	Pump and gate at Ala Moana Bridge. Pre-pump to drain canal ahead of a storm for additional storage capacity. Pump gates can hold back storm surge up the canal, as well as facilitate pump down and out of the canal against high tide conditions. A pump gate can also ease the cleaning/dredging of the canal without using dredge (use bulldozer instead with drained canal).	Pumps	Screened Out	Pumping the canal ahead of a storm to max capacity is not recomended due to stability of the existing canal walls. Hydrostatic pressure is likely needed for structural stability. Pump and gate as a standalone measure, as to not drain the canal ahead of a storm, will be carried forward for further consideration under #196 and 197.
31	Dam at canal mouth	Ala Wai Canal	Replace high wall ideas on either side of the Ala Wai canal with a dam at the end of the canal where it exits by Ala Moana Blvd. (at the narrow opening after Ala Moana Blvd between the Waikiki Yacht Club and the Prince Waikiki Hotel). Force the water to exit from the Ala Wai water channel but not enter from the ocean into the Ala Wai canal. Secondly, water from high rain days could be diverted with above ground pipes away from the Ala Wai canal.	Dam	Screened Out	A dam at the mouth of the canal near the harbor would need considerably higher canal walls for greater storage and a pump system. The intent of this measure is captured under #193 and 196.
32	Retention or Detention pond	Ala Wai Canal	Implement retention or detention pond or a constructed wetland at Ala Wai Community Park.	Wetland/Floodplain	Screened Out	A detention structure at the Community Park will be considered as part of a floodwall system for the canal. The park itself would not provide enough storage for above or below ground storage as the area is already subject to flooding. Components of this measure will be included in measure #193. A detention structure at the park will be screened as stated. A wetland will not provide flood risk reduction for future watershed conditions due to sea level rise. The park is naturally a floodplain and adding wetland features will only reduce localized runoff for very frequent storm event, i.e. typical rain showers. A wetland feature at the park will have no impact to runoff and storage for larger storm events. A wetland will be screened from future consideration.
33	Redesign of Ala Wai Community Park	Ala Wai Canal	Redesign the Ala Wai Community Park into a flood park with wetlands and taro patches. Redesign areas of the park for community access and visitor education.	Wetland/Floodplain	Screened Out	Components and concepts of this measure are included in measure #32. This measure is screened out for redundancy.
34	Detention basin for mauka drainage storage	Ala Wai Canal	There are a number of drainage system outfalls that either run through the Ala Wai Community Park or along its perimeter (drainage systems coming down Isenberg or University for example). Reengineer the baseball fields to use as detention basins serving these drainage systems. Perhaps rerouting the section of shared use path that runs along the canal to the mauka side of the baseball fields and double as a berm.	Detention	Screened Out	Components and concepts of this measure are included in measure #32. This measure is screened out for redundancy.
35	Pump station on golf course	Ala Wai Canal	Put pump station on the Ala Wai golf course if one is needed.	Pumps	Screened Out	Components and concepts of this measure are included in #197. This measure will be screened for redundancy.
36	Underground pump station	Ala Wai Canal	Build pump station partially underground for less visual impact.	Pumps	Screened Out	Components and concepts of this measure are included in #197. This measure will be screened for redundancy.
37	Octopus Plan	Ala Wai Canal	Put pump station on the Ala Wai golf course and pipe the intakes from critical locations and outtakes directly to the harbor.	Pumps	Screened Out	The performance expectation of 1 pump managing all systems of the octupus plan is not efficient and provides little redundancy in an emergency. However, the components and concepts of this measure are included in #66 and #197. This measure will be screened for redundancy.
38	Golf course debris basin	Ala Wai Canal	Create a debris basin at the golf course as a first flush before entering the canal	Debris Management	Screened Out	A debris basin may be included in the design of a larger, more comprehensive flood risk management feature at the golf course that also incorporates flood storage (see measure #39), but is not be considered as a standalone measure.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
39	Golf course detention basin - excavation	Ala Wai Canal	Excavate the golf course to increase storage capacity	Detention	Retained	Identified as a priority for modeling. Modeling of the golf course area will seek to identify the optimal solution, including how/where to divert water from, extent of additional storage needed to reduce flood risk, and potential for application of natural and nature-based measures either as stand-alone measures or in conjunction with structural components. Detention will include the impacts to sea level rise and groundwater infiltration.
40	Golf course detention basin - berms	Ala Wai Canal	Utilize the entire golf course with higher berms for increased storage capacity	Detention	Screened Out	Components and concepts of this measure are included in measure #39. This measure is screened out for redundancy.
41	Golf course wetlands	Ala Wai Canal	Convert the golf course to wetlands. See Bea Aglibot's "A Unified Landscape: Reconnecting the Ala Wai Watershed to Ancient Waikīkī" which can be found here on ScholarSpace: https://scholarspace.manoa.hawaii.edu/handle/10125/55834	Wetland/Floodplain	Screened Out	Components and concepts of this measure are included in measure #39. This measure is screened out for redundancy.
42	Manoa-Palolo reroute through golf course	Ala Wai Canal	Divert the Manoa-Palolo into the golf course; construct golf course as a wetland with native plants to clean the water before exiting into the canal.	Bypass	Screened Out	Components and concepts of this measure are included in measure #39. This measure is screened out for redundancy.
43	Ala Wai Canal flow through system	Ala Wai Canal	Reroute the Manoa-Palolo from Date St. into the golf course, with an open or closed channel along the north and east boundaries of the golf course, connecting to the east end of the Ala Wai canal. This will help flush and circulate the east end of the canal, also reducing the health risk of bacteria	Bypass	Screened Out	Components and concepts of this measure are included in measure #39. The benefits to water quality can be captured as part of the documentation of comprehensive benefits. This measure is screened out for redundancy.
44	Divert floodwaters to golf course	Ala Wai Canal	Intercept the floodwaters upstream and divert them to the golf course for storage	Bypass	Screened Out	Components and concepts of this measure are included in measure #39. This measure is screened out for redundancy.
45	Golf course underground parking structure	Ala Wai Canal	Create an underground parking structure at the golf course that connects to Waikiki and can be used as flood storage.	Detention	Screened Out	Water table along the canal is high; an underground structure on the golf course will require additional floodproofing which will not have as much economic benefits as an above ground structure where floodproofing is not required. This measure is screened from further consideration since above ground storage provides sufficient flood risk management benefits.
46	Create a community park	Ala Wai Canal	Turn the golf course into a flood park that's usable for the community ("Ala Wai Park") or reinvent it as a cultural park that doubles as a detention basin.	Detention	Screened Out	Components and concepts of this measure are included in measure #39. This measure is screened out for redundancy.
47	Excavate and rearrange golf course	Ala Wai Canal	Excavate mauka side of golf course to accept mauka surface run-off and use that side as a driving range and run-off detention basin. Put a 12' wall on makai side and pump station built to transfer water from it to a much larger golf course detention basin with a 12' wall around it.	Detention	Screened Out	Components and concepts of this measure are included in measure #39. This measure is screened out for redundancy.
48	Delta at Manoa-Palolo confluence with wetlands	Ala Wai Canal	Turn Ala Wai golf course into a lagoon park (Ala Wai Lagoon Park) to absorb storm surges. Construct a delta at the junction of Manoa-Palolo and the Ala Wai Canal for silt and debris capture. This would function to filter stream debris before entering the canal and the golf course would act as a sponge to absorb storm surge and flooding.	Wetland/Floodplain	Screened Out	Components and concepts of this measure are included in measure #38 and #39. This measure is screened out for redundancy.
49	Install silt dams	Watershed Wide	Build silt dams in all accessible gullies. The silt dam is composed of local rock from the immediate stream bed, encased in wire fencing. The rushing water is slowed as it goes through the dam, the gravel and dirt drop out behind the dam, the water has more time to penetrate subsoil and rock - replenishing the fresh water lens.	Grade Control Structure	Screened Out	Components and concepts of this measure are included in measure #68. This measure is screened out for redundancy.
50	Series of silt berm/dams	Watershed Wide	Build a series of low rock (under 6' high) silt berm/dams that direct floodwaters into the natural basin of the valley head. In essence, this creates a relatively dry basin to detain water only during flooding events. The shallow, bowl-like existing topography (with some excavation) could be used as an advantage to allow the waters to spread out and slowly either be absorbed into the water lens or make a more controlled exit into the valley below. Silt dams also use the existing rocks in the valley and avoid bringing in materials from outside. They can hold back some of the soil that normally ends up in the Ala Wai and ocean beyond. This way, the stream beds are unaltered, the water is given room to expand, and provides a more natural way for water to be "guided." The concept is based on the 'auwai of a Hawaiian lo'i, on a much larger scale.	Grade Control Structure	Screened Out	Components and concepts of this measure are included in #49. This measure is screened out for redundancy.
51	Stream restoration	Palolo	Stream restoration opportunities and/or hybrid reintroductions of pool-riffle run stream conditions	Channel Naturalization	Screened Out	Components and concepts of this measure include naturalization (#147), grade control structures (#67 & #157), and fishponds (#94). This measure will be screened out for redundancy.
52	Hausten Ditch conduit	Ala Wai Canal	Put a conduit that goes under the Hausten Ditch - the water could flow to the Ala Wai Park detention basins	Tunnel/Conduit	Screened Out	Concepts of this measure are include in #66. This measure will be screened out for redundancy.
53	Kaimuki High Detention Basin	Ala Wai Canal	Utilize Kaimuki High School's football field	Detention	Retained	This measure will be considered as a part of the Ala Wai Canal floodwall as extended upstream of Date Street on the Manoa-Palolo Canal or as a levee/floodwall in the playing fields of the high school to protect the community and school behind the levee, as a standalone measure.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
54	Streamside walking path	Ala Wai Canal	Construct a nice streamside walking path adjacent to Kaimuki High School	N/A	Screened Out	All measures must be designed to reduce flood risk. A walking path as a stand-alone measure that does not alter flood risk could not be included under the current study authority. However, recreational components can be incorporated into measures that do reduce flood risk (e.g., walking path along elevated berm) and could be considered as a part of those measures.
55	Subsurface Kanewai Tunnel	Manoa	Subsurface tunnel from Kanewai Community Park to the harbor using gravity flow	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #66 (SWIFT Tunnels). Each tunnel investigated in the Manoa subbasin will incorporate land use, environmental impacts, and inflow to determine the location and size of tunnels. This measure will be screened for redundancy.
56	Kanewai detention & bypass conduit	Manoa	Detention basin at Kanewai Community Park and a conduit that bypasses Manoa-Palolo and Ala Wai canal. The conduit inlet would begin at the detention basin's low flow outlet. The conduit could be laid either along the stream/canal bed or sides, and the conduit outlet located at the Ala Wai boat harbor, using gravity flow. With conduit located alongside the stream/canal, it can serve as a dual purpose flood barrier (berm) with a raised bike path and sidewalk on top.	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #173 and #55. This measure will be screened out for redundancy.
57	Kanewai Detention basin	Manoa	Use Kanewai as a detention basin (preference for underground detention)	Detention	Screened Out	Components and concepts of this measure are included in measure #173. This measure will be screened out for redundancy.
58	Kanewai bypass to Golf Course	Manoa	Intercept the water near Kanewai and pipe or via underground tunnels convey the flood waters to the Ala Wai Golf course so that a detention basin is not needed at Kanewai.	Bypass	Screened Out	Components and concepts of this measure are included in #55 and 38. This measure will be screened out for redundancy.
59	Kapiolani Park detention basin	Lower Watershed	Divert water to Kapiolani Park for additional flood storage	Detention	Retained	Kapiolani Park as a multi-purpose detention may be feasible. Since gravity flow is insufficient to the park from the canal, a pump would be needed. Pump capacity, placement, and cost will be factors in its viability moving forward within the study process. Park storage capacity may be limited due to the shallow groundwater table.
60	Berm around Iolani and Ala Wai Elementary Schools	Ala Wai Canal	Put in a berm along Laau St, along Hihiwai St., wrap around the Ala Wai elementary playground (makai direction), and connect to a floodwall along the canal. This would provide protection to Iolani School, Ala Wai Elementary school, and the mauka side neighborhoods (the Manoa-Palolo overtopped in the past). Utilize the green spaces (softball field, dog park, playground) outside the line of protection for additional storage capacity.	Floodwall/Berm	Screened Out	Components and concepts of this measure include floodwalls/berms along the Ala Wai Canal (#193) and redesigning green spaces along the canal for additional storage or wetlands (#32). The alignment of the floodwall/berm system along the canal would be finalized during design phase and will take into account the schools. This measure will be screened out for redundancy.
61	Nature based approach to integrate recreation	Watershed Wide	Use nature based approach that integrates recreation into reserved flood areas (when not flooded). This can enhance this project as a community asset. Maybe tie into Lei of Parks idea (system of paths and bike lanes linking the City's regional and local parks).	Wetland/Floodplain	Screened Out	Recreational components can be incorporated into a flood risk management plan and can potentially be cost shared with the local sponsor. These opportunities will be pursued as appropriate within this study. The components and concepts of this measure are included in #94. This measure will be screened out for redundancy.
62	Sponge city	Watershed Wide	Urban development system that absorb, store, infiltrate, and purify rainwater. Examples include interconnected greenways and waterways, contiguous open green spaces, green roofs, porous design interventions and drainage systems, water savings, and recycling initiatives. Look at flood mitigation outside the US such as China, Singapore: https://earth.org/sponge-cities-could-be-the-answer-to-impending-water-crisis-in-china/ or https://www.youtube.com/watch?v=GsBDpp08kwE	Impervious Surface Reduction	Screened Out	Sponge City costs about $15-22 million for each square kilometer, which is equivalent to $750M-$1.1B for the 50 sq. km. of the Ala Wai watershed. This concept is ultimately screened out for redundancy as the components and concepts of reducing impervious surfaces is captured under measure #104.
63	Makiki Stream conduit	Makiki	Put a conduit that goes under the Makiki Stream and divert the water directly out to the harbor	Tunnel/Conduit	Screened Out	This alignment as proposed poses risks and difficulties during construction, such as pumping and a cofferdam during a storm event as well as side slope stability of the existing retaining wall during placement of the new conduit under the stream. This measure will be screened from further consideration. The team will focus on other measures along Makiki Stream, such as modifying the stream's entry angle (#64) or using existing infrastructure to divert water (#130).
64	Modify Makiki Stream entry angle	Makiki	Modify the angle that the Makiki Stream enters the canal to minimize additional head on the water trying to exit near McCully. The current stream outflow has less than a 90 degree angle, increasing the chance to produce higher water level with backwater during a flood, accumulate sediment, higher cost on channel wall maintainers, etc.	Channel Modification	Screened Out	The Makiki stream angle is not the main source of flooding for much of the lower watershed. Localized flooding may occur at the confluence for certain storm sizes due to the extreme angle of the stream into the canal, but main source of flooding is dictated by the tide levels at this location. The channel will be considered for modification where possible. Additionally, modifying the angle of the stream entry would require acquiring a significant amount of real estate. This measure will be screened from further consideration. The results from this analysis informed the screening for similar channel modifications suggested elsewhere within the tracker.
65	Forest management	Upper Watershed	Manage the forest above Waiakeakua and along Waihi. The forest is changing and becoming increasingly degraded by pigs and invasive plants and trees, thus reducing the resiliency of the watershed to major flooding events. We should look at the watershed as a whole starting at the top where the majority of the rainfall is and the natural systems in place that may be improved to mitigate flooding.	Reforestation	Retained	Wildlife management for invasive pigs is outside the USACE authority for this study and cannot be further considered. Modeling is being conducted to quantify the extent to which forest management reduces downstream flood risk. Modeling is ongoing and this measure will be retained until a conclusive decision can be made.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
66	SWIFT tunnels	Watershed Wide	Two 12' diameter subsurface tunnels (~40' under) from Manoa and Palolo shooting straight out to sea using gravity flow	Tunnel/Conduit	Retained	The SWIFT tunnels are retained for further consideration, unless noted otherwise. There are several considerations that the team will investigate including updating costs to include real estate acquisition, preliminary engineering and design, construction management, and inflation, as well as environmental impacts that freshwater will have on the aquatic environment. The technical team will re-evaluate the inlet and outlet structures and determine a comprehensive conceptual design that is a standalone measure, separate from the original design by OCEANIT, which complimented the former USACE design. For more information on the original tunnel concept see the November 2020 public meeting presentation video at: https://www.oceanit.com/project/ala-wai/
67	Install baffling in streams	Watershed Wide	Install baffling in the streams to slow the water down.	Grade Control Structure	Screened Out	Components and concepts of this measure are included in measure #68. This measure is screened out for redundancy.
68	Check dams	Manoa	Construct check dams in Manoa to slow the water down ahead of areas prone to flooding	Grade Control Structure	Screened Out	After modeling the Manoa stream, there are very few areas that have the channel capacity for induced water surface elevations as a result of check dams or other grade control structures. The area between Woodlawn Bridge to the Jakuan Tea House was evaluated for grade control structures. This measure was intended to dampen the peak flow and increase attenuation for smaller storm events. The impacts of the grade control structure were localized, minimal for even small storm events, and negligible to the overall system. Similar results were found throughout the entire basin. Grade control structures and other similar measures to slow water such as baffling and silt dams will not be considered for further evaluation.
69	Kahaloa Bridge widening	Manoa	Widen the Kahaloa bridge to allow a larger volume of storm water drainage runoff feeding into Manoa Stream just above the bridge.	Bridge Modification	Screened Out	Components and concepts of this measure are included in measure #118. This measure is screened out for redundancy.
70	Drop structure	Manoa	Install a “falls” just before the bridge at Woodlawn Drive to help push the silt and debris past the bridge to prevent future floods.	Grade Control Structure	Screened Out	Falls upstream of Woodlawn Bridge would increase water surface elevations upstream of the bridge. If the falls are intended to increase velocity in order to move debris downstream, the team recommends reducing the sedimentation through debris catchments and regular maintenance.
71	Woodlawn Bridge bypass box culvert	Manoa	Create a bypass box culvert that traverses around both bridge abutments and exit into the existing stream channel on the south side of Woodlawn Drive. As an added precaution the catch basin and the drain pipes along Woodlawn Drive number and sizes could be increased.	Bypass	Screened Out	Hydraulic modeling determined that any additional bridge bypass or bridge modification at this location would not reduce flood impacts due to the volume of water and low terrain elevation on the right bank of the stream. Other flood risk management features are being explored in this area, including a floodwall, a bypass, and a channel modification.
72	Manoa Stream Dredging	Manoa	Annually dredging Manoa Stream from where the stormwater drainage ditch feeds into the stream from the Woodlawn Street drainage to the end of the stream area at the end of the Manoa Valley District Park	Channel Modification	Screened Out	Components and concepts of this measure are included in measure #168 (Channel modification). Maintenance following construction will be a non-Federal responsibility. See response to measure #188 that addresses long-term debris management. This measure will be screened out for redundancy.
73	Kahaloa Dr. stream modification	Manoa	Slow down or reduce the volume of water flowing at Kahaloa Dr. where a stormwater drainage ditch feeds into Manoa Stream. (historically a flood area)	Channel Modification	Screened Out	The stormwater ditch above Kahaloa Drive does not meet the minimum flow requirements of 800 cfs at a 10% AEP event. However, improvements to Manoa Stream could help to reduce backwater effects at the stormwater ditch. Components and concepts of Manoa Stream channel modification are included in measure #168. This measure will be screened out for redundancy.
74	Kahaloa Ditch entry angle modification	Manoa	Modify the angle that the drainage ditch upstream of Kahaloa Drive enters into the Manoa Stream. The sharp 90 degree bend creates a backwater effect inundating the homes surrounding that area.	Channel Modification	Screened out	The stormwater ditch above Kahaloa Drive does not meet the minimum flow requirements of 800 cfs at a 10% AEP event. However, improvements to Manoa Stream could help to reduce backwater effects at the stormwater ditch. Components and concepts of Manoa Stream channel modification are included in measure #168. This measure will be screened out for redundancy.
75	Subsurface Manoa Park Tunnel	Manoa	Subsurface tunnel from Manoa Valley District Park to the harbor using gravity flow	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #55 and 66. This measure will be screened out for redundancy.
76	Manoa Park Detention Basin	Manoa	Use Manoa Valley District Park as a detention basin (like Randolph Basin in Tucson) to capture peak flooding above Lowrey Ave and slow release to watershed below.	Detention	Screened Out	Components and concepts of this measure are included in measure #172. This measure will be screened out for redundancy.
77	SWIFT tunnels with flood gate & pump	Watershed Wide	SWIFT tunnels in Manoa and Palolo combined with a flood gate and pump at the Ala Moana bridge. Use 100% of the canal for detention. During this time all storm water will be pumped to the ocean via SWIFT or pipes. We can maintain a 0' MSL until the peak flows hit the Ala Wai Canal. Flood gates can be a series of small miter gates in 25-30' sections. Should sea level rise occur we can add a lock system to one of them for recreation passage in the future.	Tunnel/Conduit	Screened Out	SWIFT tunnels are under consideration and are Tier 3 for modeling priority - See response for measure 66. Other pipes/bypasses from the canal to the ocean are also under consideration - See response for measures 20, 196, & 197. Pumping the canal to 0' MSL is not recomended due to stability of the existing canal walls. System can only be considered if canal walls are replaced due to their degraded integrity.
78	Upper watershed conduit to Golf Course	Watershed Wide	Intercept flood waters upstream (Manoa and/or Palolo) via pipes, conduits, or microtunnels to the Ala Wai Golf Course detention area.	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #66, 55, 161, and 39. This measure will be screened out for redundancy.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
79	SWIFT tunnels with additional intake and pump	Watershed Wide	Same as SWIFT Tunnels but with additional intake in McCully utilizing a pump to drain the low-lying area (this would require the Manoa SWIFT tunnel to run directly below McCully)	Tunnel/Conduit	Screened Out	SWIFT tunnels under consideration and are Tier 3 for modeling priority - See response for measure 66. Provision, modification, and/or maintenance of drainage systems to capture and convey interior runoff in urban areas is a non-Federal responsibility and therefore cannot be included in a recommendation made as a result of this general reevaluation report. However, this study can make modifications to natural stream channels or previously modified natural waterways that help reduce backup within adjacent drainage systems. Pump can also be justified if additional flow into the system causes induced flooding at McCully. Components and concepts of this measure are captured in #66 and 80. This measure will be screened out for redundancy.
80	Add a pump to the storm drainage system in McCully-Moiliili	Lower Watershed	Add a pump to the storm drainage system in McCully and other areas that pooling occurs (at the "bottom of the bowl").	Pumps	Retained	Provision, modification, and/or maintenance of drainage systems to capture and convey interior runoff in urban areas is a non-Federal responsibility and therefore cannot be included in a recommendation made as a result of this general reevaluation report. However, this study can make modifications to natural stream channels or previously modified natural waterways that help reduce backup within adjacent drainage systems. Pump can also be justified if additional flow into the system causes induced flooding at McCully.
81	Divert floodwaters to underground karsts	Lower Watershed	Divert floodwaters to the existing karsts that run under Moiliili and connect with the ocean.	Bypass	Screened Out	Very technically challenging due to the unpredictable nature of karst features and the possibility that increased water flows could cause flooding or sinkholes elsewhere.
82	Natural lined streams	Palolo	Remove the concrete channelization and revert the streams back to its natural state. This will help to slow the water down.	Channel Naturalization	Screened Out	Components and concepts of this measure are included in #147. This measure will be screened out for redundancy.
83	Taro cultivation at Anuenue	Palolo	Taro cultivation in this area could be expanded. (Potential to slow water down?)	Reforestation	Screened Out	Components and concepts of this measure are included in measure #94. This measure will be screened out for redundancy.
84	Mitigate stream bank erosion	Palolo	Address stream bank erosion on probate properties, caused by upper stream concrete walls increasing stream velocity and creating waterfall effect into dirt stream; stream boulders have redirected storm stream flow into eroding private properties. Stream is owned by Chaminade/Marianist Community and does have funding for equipment and redesigning of flow that has changed over the decades.	Debris Management	Screened Out	Addressing stream bank erosion is generally outside of the USACE authority for flood risk management studies. However, USACE does have other authorities through which stream bank erosion can be addressed (i.e., Section 14 Continuing Authorities Program).
85	Palolo Park Detention basin	Palolo	Use Palolo Valley District Park for above ground or underground storage.	Detention	Screened Out	Upon re-assessing this measure, after input from a community member to adjust the inlet location above Ahe St, the detention pond was determined to not provide sufficient flood risk management impacts to the communities affected by flooding. Model results indicated localized water surface reductions within the channel and negligible water surface reductions in the overbanks (within the neighborhood) for a short distance downstream of the detention basin. This measure will be screened from further consideration. Adjacent publicly owned land was also considered for storage as a channel modification or overflow ditch. Similar results to the above description were identified for the channel modification adjacent to Palolo Valley District Park as well.
86	Underground detention - parking lots	Watershed Wide	Excavate beneath existing parking lots to create underground detention basins.	Detention	Screened Out	Above ground storage solutions are of the highest priority. The amount of storage available above ground is generally greater than storage capacity available under ground for cost-effective solutions. Additionally, the karst subsurface conditions pose challenges for underground storage. The cost required for real estate and construction methods are generally much higher for under ground storage solutions. All storage solutions under parking structures have been determined to have insufficient storage for flood risk management. This measure will be screened from further consideration.
87	Underground detention - fields	Watershed Wide	Excavate beneath existing parks and open green spaces to create underground detention basins	Detention	Screened Out	Above ground storage solutions are of the highest priority. The amount of storage available above ground is generally greater than storage capacity available under ground for cost-effective solutions. Additionally, the karst subsurface conditions pose challenges for underground storage. The cost required for real estate and construction methods are generally much higher for under ground storage solutions. One park site is retained until further analysis is complete at the Kanewai Community Park (#181). This measure will be screened for redundancy.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
88	Manage mountain erosion	Upper Watershed	Additional debris is created by erosion of the mountain sides. The loose debris created by the slides will flow in to the drainage streams during periods of heavy rain and possibly create dams that will flood neighborhoods not identified as high flood risk.	Debris Management	Screened Out	Addressing landslides/erosion is outside of the scope of the USACE study authority; however, debris management may be possible if incorporated within other flood mitigation features.
89	Green and Complete Streets	Watershed Wide	Green and complete streets along University Ave. to provide multi-benefit community improvements including flood water management, vegetation and shade trees, environmental enhancement to support walking, biking, safe access to schools, etc.	Impervious Surface Reduction	Screened Out	The City of Honolulu is committed to the Complete Streets Law since 2012. Please refer to the City website on progress since the program was adopted. This measure will be screened out for redundancy as well, as concepts to reduce runoff are included in measure #104.
90	UH practice fields detention basin	Manoa	Pipe floodwaters to the UH practice fields for additional storage	Detention	Screened Out	This measure poses technical challenges with drilling through a mountain to pipe water in, grading, and associated costs of excavation. This area is associated with karst geology, resulting in additional challenges and risks.
91	Remove invasive trees that cause debris	Upper Watershed	Remove invasive albizia trees that have shallow roots and branches that break easily, and cause much of the debris and clogged bridges downstream.	Reforestation	Screened Out	Modeling to assess potential problem areas for debris buildup will be completed first. Specific debris management measures will then be identified. Components and concepts of this measure are included in #65. This measure will be screened out for redundancy.
92	Remove invasive plants for better groundcover	Upper Watershed	Remove invasive plants such as miconia and mule's foot fern that increase runoff and prohibits groundwater absorption. Miconia has a long history of promoting erosion, runoff, and reduces aquifer recharge in the South Pacific. Miconia is considered one of the 100 worst invasive species in the world. Replace invasive species with native plantings that can enhance recharge and reduce runoff.	Reforestation	Screened Out	Components and concepts of this measure are included in #65. Modeling will be conducted to quantify the extent to which forest management reduces downstream flood risk. This measure will be screened out for redundancy.
93	Manage feral pigs	Upper Watershed	Manage or remove feral pigs that uproot trees and cause erosion and debris downstream. Install pig fencing.	Reforestation	Screened Out	Wildlife management is outside of the USACE study authority. Debris management has been identified as a separate measure, see #96. See response to measure #188 that addresses long-term debris management.
94	Traditional Hawaiian resource management practices	Watershed Wide	Utilize traditional Hawaiian resource management practices like loko ia, loi kalo, and fishponds for sediment retention and flood mitigation.	Wetland/Floodplain	Screened Out	Traditional practices were considered for flood risk management, such as wetlands creation and invasive species removal. Wetlands creation can include lo'i kalo and reconnecting the waterways of the lower watershed. However, it was determined that these features did not reduce flood risk in the lower watershed. The golf course and other candidates for wetlands creation are generally floodplains by nature - adding wetland features will only reduce localized runoff for very frequent storm event, i.e. typical rain showers. A wetland feature will have no impact to runoff and storage for larger storm events. A wetland will be screened from further flood risk management consideration. Invasive species removal is captured under measure #65. Grade control structures were also considered and can include fishponds and rock check dams for flood risk and habitat creation. However, these measures did not provide reduced flood risk for any frequency events where there was capacity in the stream. These measures will be screen from further consideration.
95	Increase governmental funding	Watershed Wide	Increase funding across local, state, and federal sources to cumulatively work to improve coverage of forest restoration, invasive species control, and other green infrastructure projects. Increase collaboration between government entities.	Reforestation	Screened Out	Increasing funding across local, state, and federal sources is outside the scope of USACE's study authority.
96	Debris basins	Upper Watershed	Install debris basins to collect debris in the upper watershed before it clogs up the Ala Wai canal.	Debris Management	Screened Out	Debris catchment structures were evaluated throughout the watershed within the main stream channel and were determined to increase flood risk. Therefore, catchment structures will be screened from the evaluation as a standalone measure, but will be considered during the design of recommended flood risk management features, e.g. bypasses, drainage structures, etc. This study will consider options to reduce the impact of flooding due to buildup of debris by considering modifications to stream channels and structures such as bridges. Recommendations may also be made to address the root causes of debris buildup such as invasive species control, restoration of native plantings, and setbacks.
97	Bridge bypass and debris	Upper Watershed	Spot treatment to low spots along the streams - debris screening and emergency bypasses or spillways for each bridge in the valleys so that the waters don't raise and erode neighboring properties.	Bypass	Retained	Flood risk management measures within the selected plan will include debris catchment/deterent features to prevent the buildup and blockage of debris. Bridge modifications and bypasses are also being explored.
98	Detention basins	Upper Watershed	Detention basins in government lands in mauka conservation districts if the City will maintain it. There is not enough width and depth in the existing flood channels to accommodate a large flood.	Dams	Screened Out	Previous hydraulic modeling has shown detention basins within the upper watershed to be relatively ineffective at reducing downstream flooding--both extent and depth. Previous modeling indicates that the benefits of these detention basins are localized due to significant inflow sources throughout the watershed--a pattern expected to occur for all flood events. The cost of the detention basins, as described in both the feasibility and validation reports, are higher than features that more effectively reduce downstream flood risk. The combination of high costs and low benefits is indicative of a potentially low benefit-to-cost ratio; thus, it is unlikely that the detention basins would be economically justified. Furthermore, dams would present an incremental risk to the downstream community and would have significant environmental impacts to environmental resources within the conservation districts.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
99	Reduce waterfront hotels for green pathways	Lower Watershed	Reduce the number of coastal hotels along Waikiki beach and create green pathways from the Ala Wai and open space where water can flow from mauka to makai.	Impervious Surface Reduction	Screened Out	The study will consider nonstructural measures, such as acquisition and relocation. See measure #184. Relocations must follow standards set forth under the The Uniform Relocation Assistance and Real Property Acquisition Act. Relocation of coastal properties within Waikiki would be very costly, especially with the real estate constraints within the watershed.
100	Flood zone construction requirements	Lower Watershed	Require new buildings in Waikiki to be built resilient to floods (e.g. open ground level and permeable surfaces)	Nonstructural	Screened Out	Changing local community zoning regulations is outside the scope of USACE's study authority. However, as part of the study USACE can make recommendations related to zoning for local communities to implement.
101	Storage tunnels	Watershed Wide	Utilize large, deep vertical tunnels to store stormwater throughout the watershed.	Detention	Screened Out	Concepts of this measure are included in #66. Given the highly karst subsurface, drastic slope variability, and limited open space for vertical tunnel construction, this measure will be screened from further consideration.
102	Diversion tunnels	Watershed Wide	Construct tunnels that can serve as a dual purpose to convey floodwaters in large storm events and can also be used as transportation (or other utility) infrastructure.	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #66 and are similar to #45. Consequently, this measure is being screened from further considertion as a stand-alone measure. The team will consider multiuse functionality in the design, if a tunnel is justifiable; however, transportation features would be considered betterments and could not be cost shared with the federal government.
103	Replicate Tokyo's water discharge tunnel system	Watershed Wide	Replicate Tokyo's water discharge tunnel system	Tunnel/Conduit	Screened Out	A system that mirrors Tokyo's water discharge system (approximately $3B to construct) is likely not to be justified as costs are likely to exceed benefits. Components and concepts of this measure are included in #66.
104	Reduce hardcover and impervious surfaces	Watershed Wide	Limit and reduce hardcover in the urban environment that increase runoff. Remove impervious surfaces and replace with porous surfaces.	Impervious Surface Reduction	Screened Out	Modeling indicates that although this measure would help reduce surface water runoff, the minimal reductions in downstream flood risk are not enough to justify the initial and ongoing maintenance costs. It should also be noted that permeable pavement could present maintenance challenges for the City.
105	Educate homeowners of proper disposal	Watershed Wide	Educate homeowners on proper disposal of cuttings and logs	Nonstructural	Screened Out	Educating community members of their role in reducing flood risk is incorporated in measure #186. This includes proper disposal of debris/trash and stream maintenance. This measure will be screened out for redundancy.
106	Educate homeowners of stream maintenance responsibilities	Watershed Wide	Educate homeowners who live along the stream of their responsibility to properly maintain the stream within their property	Nonstructural	Screened Out	Educating community members of their role in reducing flood risk is incorporated in measure #186. This includes proper disposal of debris/trash and stream maintenance. This measure will be screened out for redundancy.
107	Increase maintenance funding	Watershed Wide	Use the State's portion of what they committed to the project ($120M) towards maintenance and programs to get rid of the causes of debris.	Debris Management	Screened Out	Increasing funding across local, state, and federal sources is outside the scope of USACE's study authority. This study will consider options to reduce the impact of flooding due to buildup of debris by considering modifications to stream channels and structures such as bridges, as well as measures that address the root causes of debris buildup such as invasive species control, restoration of native plantings, and setbacks.
108	Replicate Kaori Sanctuary for watershed restoration	Watershed Wide	Look to replicating the Karori Sanctuary near Wellington, NZ as a model of a successful watershed restoration project to implement in the Ala Wai watershed ecosystem. The project would involve removing all of the invasive alien species such as the Albizia, the wild pigs, the alien stream species such as the armored catfish, etc. and then replanting with species that are more compatible with the native Hawaiian watershed ecosystem, stabilizing the stream banks with native plants, fencing the entire upper watershed so that the wild pigs once removed from the area cannot re-invade the area, etc. This is the source of the problems that impacts everything else downstream into the canal down into Waikiki. Addressing issues up mauka will mitigate much of the larger issues faced today in the lower watershed.	Reforestation	Screened Out	This study will assess the ability of natural and nature-based measures, including many of those listed here (i.e., non-native species management, watershed management), to reduce downstream flood risk. The team will model and assess the efficacy of these measures using approved technical approaches. However, the study authority is limited with respect to stream bank stabilization (see notes on measure 84) and wildlife management (see notes on measure 93). Components and concepts of this measure are included in #65. This measure will be screened out for redundancy.
109	Develop a plan for clearing & maintaining the forest and streams	Watershed Wide	Develop a plan for clearing and maintaining the forest and streams. The plan can include increased frequency of maintenance, and will need to be updated for future conditions.	Reforestation	Screened Out	Concepts of this measure are included in #65 (forest management). Channel clearing and modification can be incorporated into the study. However, long-term clearing programs or periodic stream cleanups cannot be included in a recommended plan as it is outside of the authority of USACE to partner in ongoing maintenance efforts. The study can include the recommendation to develop or re-evaluate a comprehensive debris management plan (see response to measure #188). This measure is screened out for redundancy.
110	Clear overgrown vegetation	Watershed Wide	Clear the overgrown vegetation from the streams.	Debris Management	Screened Out	Channel clearing and modification can be incorporated into the study (see measure #96 and 168). However, USACE would not be engaged in long-term operation and maintenance. A debris management plan can be recommended, such as in measure #188. This measure will be screened out for redundancy as components and concepts of this measure are seen in the previously mentioned measures (#96, 168, and 188).
111	Natural retention areas	Watershed Wide	Plant trees, mulching areas, large underground retention areas (storage tanks). A way of controlling volume of stormwater. Our current infrastructure is concrete, which doesn't allow for water to naturally percolate into aquifer. Green infrastructure would retain, restore, possibly filter water to a more manageable degree.	Detention	Screened Out	Concepts of this measure are included in #104, #86, and #87, which address reduction of impervious surfaces and underground detention. This measure is screened out for redundancy.
112	Create wetland terraces	Watershed Wide	bring the 'aina back to its natural state – bring back the lo'i and flooded wetland terraces, return water to the aquifers	Wetland/Floodplain	Screened Out	Components and concepts of this measure are included in measure #94. This measure will be screened out for redundancy.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
113	Put laws in place for water retention	Watershed Wide	Put laws into place to mandate homeowners retain water on their property for use at a later time, e.g. rain barrels, rain gardens, bioswales.	Nonstructural	Screened Out	Changing local community regulations and laws is outside the scope of the USACE study. The study could make recommendations for nonstructural measures, including rain barrels; however, participation would not be mandatory.
114	Incorporate traditional use and practices	Watershed Wide	Request for considerations for traditional use and practices to be incorporated within the redesign and improvements of the Ala Wai. For example the retention at the golf course presents an opportunity to reconnect the history of Waikiki and its sprouting fresh water that sustained kalo fields up until the construction of the canal and full-fledged sale of Waikiki to the business interests of large, primarily foreign land owners. Preserve the rights of present and future generations in the waters of the state to include Maoli rights and practices, such as kalo cultivation.	Wetland/Floodplain	Screened Out	This study focuses on flood risk management, incorporating traditional use and practices will be considered as part of the Section 106 process. Components and concepts of this measure are included in measure #94. This measure will be screened out for redundancy.
115	Establish a Special Drainage and Urban Forest District	Watershed Wide	The whole urbanized Ala Wai Watershed above the canal needs to explicitly become a part of the solution. The city should establish and landowners should support a "Special Drainage and Urban Forest District", analogous to the Special Districts established in the 1970s for Diamond Head, Waikiki, the State Capitol area, Chinatown, etc. These were established to preserve green open space, views and historic structures. Runoff has substantially increased by added urbanization in the middle reaches the past 100 years. Most recently the situation has been exacerbated by the proliferation of "monster houses" that literally roof and pave most of their property, adding runoff to the storm drains along with other issues. Typically they replaced much smaller houses surrounded by gardens. It seems like "Forest restoration" limited to the mauka conservation zone.	Nonstructural	Screened Out	Establishment of such a district is outside the USACE study scope. However, components of this measure, such as reduction of impervious surfaces and hardcover, are included in #104.
116	Netherlands approach to flood mitigation	Watershed Wide	Follow approaches done in the Netherlands, using a holistic approach to address flooding. https://www.earthmagazine.org/article/dutch-masters-netherlands-exports-flood-control-expertise/ Space can be allocated to safely accommodate flooding. Dikes and other obstructions are removed, and flood channels and floodplains are broadened and deepened.	Channel Modification	Screened Out	Components and concepts of this measure are included in measures that investigate wetlands (#94), natural floodplains, and channel modifications (#168, #146, #5, etc.). The final recommended plan will be holistic in nature. This measure will be screened out for redundancy.
117	Improve existing stormwater drainage system	Watershed Wide	Make improvements to the existing stormwater drainage system, such as increasing conduit size or adding additional drainage in areas prone to flooding	Tunnel/Conduit	Screened Out	Provision, modification, and/or maintenance of drainage systems to capture and convey interior runoff in urban areas is a non-Federal responsibility and therefore cannot be included in a recommendation made as a result of this general reevaluation report. However, this study can make modifications to natural stream channels or previously modified natural waterways that help reduce backup within adjacent drainage systems. This study will also be considering modification of existing storm systems as a means for underground bypass channels, see #134.
118	Bridge modification	Watershed Wide	Modify by raising or widening bridges that act as choke points, such as the bridges at Woodlawn Drive, Kahaloa, Lowery, East Manoa, and Kapiolani Blvd.	Bridge Modification	Retained	All pinch points within the system will be investigated for bridge modfication to increase conveyance. This measure will be retained until more conclusive flood risk management impacts at specific locations are identified, screened, or retained.
119	Convert excess water from liquid to steam	Ala Wai Canal	Change the excess water from liquid to steam by having a small opening in the canal at the height that you don't want the water to go above, and to have this on the Mauka side of the canal. The opening would be small, 2'x2', with a metal grate on the opening like graph paper to prevent fish or other animals from entering and the water would lead to a big stove top like structure with holes in the ground above it leading to the surface to let out the steam. The device would heat up, either automatically by using sensors, or by a switch, so if the water gets too high, the device will heat the water that comes in, turn it to steam, and lower the water in the canal. It would have to be on the Mauka side so the steam can be released without anyone near it so no one gets hurt.	N/A	Screened Out	Measure is not technically feasible and poses a safety risk to the community and the environment.
120	Implement permeable pavement	Watershed Wide	Replace impervious pavement with permeable pavement on roads throughout the watershed to help with aquifer recharge.	Impervious Surface Reduction	Screened Out	Components and concepts of this measure are included in measure #104. This measure will be screened out for redundancy.
121	Regular maintenance at high risk areas	Watershed Wide	DFM should be adequately funded to provide full-time dedicated maintenance at all flood risk areas. For example, in Manoa, the Woodlawn Bridge often builds up with debris, plants growing on dirt and "silt bars" as does under the Kahaloa Bridge, despite it being concrete padded several years ago. Also, existing debris catchments such as that behind Palolo Elementary are not well maintained.	Debris Management	Screened Out	Increasing funding across local, state, and federal sources is outside the scope of USACE's study authority. However, there maybe a way to address debris within the design of other project features (#96) or with the recommendation of the development of a long-term debris management plan (see response to measure #188).
122	Early flood warning system	Watershed Wide	Early flood warning system to alert communities of impending floods	Nonstructural	Screened Out	Components and concepts of this measure are included in #185. This measure will be screened out for redundancy.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
123	Green space for detention to reduce TMDLs	Watershed Wide	C&C of Honolulu's Dept of Environmental Services (ENV) has programs in place to reduce TMDLs in critical watersheds to meet stormwater permit conditions with the State Dept of Health/EPA. Consider maximizing the use of available green/park spaces to develop storm water detention/regulation (e.g. when drainage networks are adjacent to parks and can be readily redirected). ENV can work in collaboration with the CORPS for small win-wins.	Detention	Screened Out	Detention will be investigated at various green spaces within the watershed. The main purpose, however, is not to reduce TMDLs - it is to reduce flood risk to the community as per the study authorization. Detention (such as measures #172, 173, 138, and85) and debris basins (such as measure #96) could inherently result in mutliple benefits such as reducing TMDLs. This measure will be screened out for redundancy, as all green spaces are being explored for detention.
124	Loi kalo and ahupuaa system	Watershed Wide	consider the Lo'i kalo and ahupuaa system	Wetland/Floodplain	Screened Out	Components and concepts of this measure are included in measure #94. This measure will be screened out for redundancy.
125	Do nothing	Watershed Wide	Let it flood and federal government continues to provide funds to assist in clean-up efforts	No Action	Retained	
126	Basement parking structure detention	Watershed Wide	Convert or create basement parking structures within the watershed into underground detention (multiuse underground parking)	Detention	Screened Out	Above ground storage solutions are of the highest priority. The amount of storage available above ground is generally greater than storage capacity available under ground for cost-effective solutions. Additionally, the karst subsurface conditions pose challenges for underground storage. The cost required for real estate and construction methods are generally much higher for under ground storage solutions. All storage solutions for basement parking have been determined to have insufficient storage for flood risk management. This measure will be screened from further consideration.
127	Subsurface Woodlawn Tunnel	Manoa	Subsurface tunnel from Woodlawn Bridge to the harbor using gravity flow	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #55 and 66. This measure will be screened out for redundancy.
128	Berm around Innovation Center	Manoa	Build a berm in the parking lot of the Innovation Center to capture overflow waters from Manoa Stream and divert water back into stream downstream of Woodlawn Bridge	Floodwall/Berm	Screened Out	Components and concepts of this measure are included in #71 and #175. The design of the detention area (i.e. storage volume and berm height) will be based on the amount of storage needed to reduce waters overtopping the bank at Woodlawn Bridge. A bypass at the bridge will also be explored. This measure will be screened out for redundancy.
129	Increase stream capacity	Manoa	Widen the stream or build floodwalls to increase stream capacity near the Woodlawn Bridge	Channel Modification	Screened Out	Increasing capacity of the channel with a modification or with floodwalls is captured under measure 168 and 176, respectively. This measure will be screened out for redundancy.
130	Piikoi Bypass	Makiki	Utilize or upgrade existing storm sewer to route water from Kanaha Stream to Ala Moana Park	Bypass	Retained	The analysis from measure #134 will help determine sizing and number of culverts needed to upgrade the existing storm sewer system. The technical team will continue to determine the best layout, inlet, and outlet connections for this concept.
131	Pensacola Bypass	Makiki	Utilize or upgrade existing storm sewer to route water from Kanaha Stream to Ala Moana Park	Bypass	Screened Out	Components and concepts of this measure are included in measure #130. Upgrading the existing storm sewer system to convey flow to Ala Moana Park will be based on infrastructure, utilities, and conveyance efficiency. This measure has been screened out for redundancy.
132	Ke'eaumoku Bypass	Makiki	Utilize or upgrade existing storm sewer to route water from Kanaha Stream to Ala Moana Park	Bypass	Screened Out	Components and concepts of this measure are included in measure #130. Upgrading the existing storm sewer system to convey flow to Ala Moana Park will be based on infrastructure, utilities, and conveyance efficiency. This measure has been screened out for redundancy.
133	Young Bypass	Makiki	Utilize or upgrade existing storm sewer to route water from Makiki Stream to Ala Wai Harbor	Bypass	Screened Out	This measure has been screened out after determining that this culvert has an indirect route to the harbor and is downstream of much of the modeled flooding. The Piikoi Bypass (measure #130) has more conveyance and would have a more direct route to Ala Moana Park where flows would discharge.
134	Makiki Tunnel System	Makiki	Tunnel System with Storage (can outlet to harbor and/or release with pumps); Inflow from Kanaha at Makiki District Park	Tunnel/Conduit	Retained	Each tunnel investigated will incorporate land use, environmental impacts, and inflow to determine the location and size of tunnels. Results from the analysis will also help determine sizing of upgrading existing infrastructure (see measure #130), if viable.
135	Stevenson Middle School Playing Fields Detention Pond	Makiki	Approximately 14 ac-ft of storage near Kanaha Stream headwater	Detention	Screened Out	Screened out since measure would provide engineering challenges with the drastic elevation change between the stream and the playing fields.
136	Roosevelt High School Football Fields Detention Pond	Makiki	Approximately 6 ac-ft of storage near Kanaha Stream headwaters	Detention	Screened Out	Screened out since measure would provide engineering challenges with the drastic elevation change between the stream and the playing fields.
137	Archie Baker Park Detention Pond	Makiki	Approximately 1 acre of surface; Unsure of depth for storage due to terrain; Near Makiki Stream headwaters	Detention	Screened Out	Screened out since measure unlikely to capture significant floodwaters. Additional engineering challenges with the drastic elevation change between the stream and the park.
138	Makiki District Park and Tennis Courts Detention Pond	Makiki	Approximately 13 ac-ft of storage at confluence of Kanaha and Makiki Streams	Detention	Retained	Modeling efforts have deemed this measure to be technically feasible and efficient. This measure will be carried forward in the study process.
139	Cartwright Neighborhood Park Detention Pond	Makiki	Approximately 5 ac-ft of storage near Makiki Stream, downstream of confluence with Kanaha	Detention	Screened Out	Screened out due to limited storage space and challenges with inlet/outlet connections due to distance from stream.
140	Central Union Church Lot Detention Pond	Makiki	Approximately 2.8 ac-ft of storage east of Makiki Stream, downstream of confluence with Kanaha	Detention	Screened Out	Screened from consideration since unlikely to be effective due to small storage size and distance from stream.
141	Washington Middle School Detention Pond	Makiki	Approximately 1.5 ac-ft of storage east of Makiki Stream, downstream of confluence with Kanaha	Detention	Screened Out	Screened from consideration since unlikely to be effective due to small storage size, distance from the stream, and existing flooding in the vicinity.
142	Punahou School Detention Pond	Makiki	Approximately 22 ac-ft of storage east of confluence with Kanaha and Makiki Stream	Detention	Screened Out	Due to location and elevation changes in this area, storage in this location is unlikely to be effective.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
143	Daylight streams	Makiki	Daylight streams at constrictions - will need hydraulic results to identify pinch points	Channel Naturalization	Retained	The hydraulic modeling has determined the potential need and benefit to convert underground culverts to daylighted streams in order to increase conveyance of the system. Further considerations for this measure include real estate acquisition and infrastructure impacts.
144	Ala Moana Park Underground Storage	Makiki	Underground Storage in conjunction with Bypass measure; storage not expected to be an efficient measure otherwise	Detention	Screened Out	This measure is screened out due to the technical complexity of underground storage in an area with high buoyant forces. However, the team will include above ground storage in conjunction with a bypass to retain water and mitigate for induced flooding at the tidally influenced downstream outlet, if said measure of a bypass (#130) is retained.
145	Modify bridges	Watershed Wide	Modify bridges at constrictions - will need hydraulic results to identify pinch points	Bridge Modification	Screened Out	Components and concepts of this measure are included in measure #118. This measure is screened out for redundancy.
146	Palolo Channel Modification	Palolo	Deepen or widen channel to provide more within-bank storage; can be used in conjunction with channel naturalization	Channel Modification	Screened Out	Modeling results indicate that channel modification along Palolo Stream near Palolo Valley District Park has a negligible reduction in flood risk to the local and downstream neighborhood. This measure is screend from further evaluation.
147	Palolo Channel Naturalization	Palolo	Return channel to a more natural state by removing concrete and adding natural slope material. This measure will likely be in conjunction with channel deepening, upstream detention and/or bridge modification to offset increased water elevations. Naturalization will reduce velocities and dampen peak flow.	Channel Naturalization	Screened Out	Naturalizing the channel along Palolo stream would cause higher water surface elevations in an area that already has flooding. Naturalizing would reduce conveyance in order to maintain proper side slopes for natural material. To maintain conveyance, extensive real estate would be required. This measure is screened from further evaluation.
148	Ali'iolani Elementary School Detention Pond	Palolo	Approximately 0.7 ac-ft of storage southeast of Palolo Stream	Detention	Screened Out	Screened from consideration since unlikely to be effective due to small storage size and distance from stream.
149	William P. Jarrett Middle School Detention Pond	Palolo	Approximately 0.7 ac-ft of storage near Palolo downstream of the Pukele and Waiomao confluence	Detention	Screened Out	Screened from consideration since unlikely to be effective due to small storage size and difference in elevation between the stream and play fields.
150	Pālolo Valley District Park Detention Pond	Palolo	Approximately 15 ac-ft of storage near Palolo downstream of the Pukele and Waiomao confluence	Detention	Screened Out	Components and concepts of this measure are included in measure #85. This measure is screened out for redundancy.
151	Pālolo Elementary School Detention Pond	Palolo	Approximately 0.9 ac-ft of storage near Waiomao just upstream of the Pukele and Waiomao confluence	Detention	Screened Out	Screened from consideration since unlikely to be effective due to small storage size and elevation difference between the stream and the playing fields.
152	Pālolo Valley Homes Detention Pond	Palolo	Approximately 6.5 ac-ft of storage near Waiomao just upstream of the Pukele and Waiomao confluence	Detention	Screened Out	Screened from consideration due to elevation difference in elevation between the stream and potential storage area. Also potential environmental consideration with extensive removal of trees.
153	Kula Kaiapuni 'O Ānuenue Detention Pond	Palolo	Approximately 0.7 ac-ft of storage near Pukele upstream of the Pukele and Waiomao confluence	Detention	Screened Out	Screened from consideration since unlikely to be effective due to small storage size and difference in elevation between the stream and play fields.
154	Lā-'ī Rd Detention Pond	Palolo	Approximately 3 ac-ft of storage near headwaters of Pukele	Detention	Screened Out	Screened from consideration due to elevation difference in elevation between the stream and potential storage area. Also potential environmental consideration with extensive removal of trees.
155	Public Storage Parking Lot Detention Pond	Palolo	Approximately 0.5 ac-ft of storage above the confluence of the Manoa - Palolo Canal	Detention	Screened Out	Screened from consideration since unlikely to be effective due to small storage size.
156	City Mill Parking Lot Detention Pond	Palolo	Approximately 0.7 ac-ft of storage above the confluence of the Manoa - Palolo Canal	Detention	Screened Out	Screened from consideration since unlikely to be effective due to small storage size
157	Palolo Stilling Basin(s)	Palolo	Stilling Basin to dissipate energy and reduce velocities from channelized stream - will need hydraulic results to identify areas of high velocities with minimal upstream impacts	Grade Control Structure	Screened Out	Palolo stream does not have capacity for stilling basins or other grade control structures. Any structure that will slow down water will also increase water surface elevations in an area that already floods. This measure is screened from further consideration.
158	Permeable Pavement System at Public Storage Parking Lot	Palolo	Replace parking lot with permeable pavement to reduce direct runoff above the confluence	Impervious Surface Reduction	Screened Out	Components and concepts of this measure are included in measure #104. This measure will be screened out for redundancy.
159	Permeable Pavement System at City Mill Parking Lot	Palolo	Replace parking lot with permeable pavement to reduce direct runoff above the confluence	Impervious Surface Reduction	Screened Out	Components and concepts of this measure are included in measure #104. This measure will be screened out for redundancy.
160	Permeable Pavement System at Pālolo Hongwanji Mission	Palolo	Replace parking lot with permeable pavement to reduce direct runoff	Impervious Surface Reduction	Screened Out	Components and concepts of this measure are included in measure #104. This measure will be screened out for redundancy.
161	Palolo Tunnel System	Palolo	Tunnel System with Storage (can outlet to ocean using gravity); Inflow from Waiomao and Pukele at confluence (2/3 of system flow); Additional basin inflow does not have ideal entrance location	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #66 (SWIFT Tunnels). Each tunnel investigated in the Palolo subbasin will incorporate land use, environmental impacts, and inflow to determine the location and size of tunnels. Detention at Palolo District Park is being investigated first to reduce flows within the Palolo stream. This measure will be screened out for redundancy.
162	St. Louis High School Football Field Underground Storage	Palolo	Underground detention structure below playing fields of the school; storage capacity not yet determined	Detention	Screened Out	Due to location and elevation changes in this area, storage in this location is unlikely to be effective and costs are likely to exceed benefits.
163	Pālolo Valley District Park Underground Storage	Palolo	Underground detention structure below park; storage capacity not yet determined	Detention	Screened Out	Components and concepts of this measure are included in measure #85. This measure is screened out for redundancy.
164	Public Storage Parking Lot Underground Storage	Palolo	Underground detention structure below parking lot; storage capacity not yet determined	Detention	Screened Out	Components and concepts of this measure are included in #86. This measure will be screened out for redundancy.
165	City Mill Parking Lot Underground Storage	Palolo	Underground detention structure below parking lot; storage capacity not yet determined	Detention	Screened Out	Components and concepts of this measure are included in #86. This measure will be screened out for redundancy.
166	Woodlawn Bridge Modification	Manoa	Raise bridge to prevent debris buildup	Bridge Modification	Screened Out	Components and concepts of this measure are included in measure #118. This measure is screened out for redundancy.
167	Woodlawn Drive Bypass	Manoa	Capture overflow water from Woodlawn Drive and return to stream	Bypass	Retained	A bypass at Woodlawn Drive bridge will be considered as a standalone measure and in combination with other measures at Woodlawn Drive.
168	Manoa Channel Modification	Manoa	Deepen/Widen channel to provide more within-bank storage	Channel Modification	Retained	Channel modification along Manoa Stream near Woodlawn has been retained. Other areas along Manoa are still under consideration.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
169	Manoa Channel Naturalization at Bridge Highway near E Manoa Rd	Manoa	Return channel to a more natural state by removing concrete and bridge highway; replace with natural slope material	Channel Naturalization	Screened Out	Components and concepts of this measure are included in #170. This measure will be screened out for redundancy.
170	Manoa Channel Naturalization below Manoa Valley District Park	Manoa	Return channel to a more natural state by removing concrete and adding natural slope material. This measure will likely be in conjunction with channel deepening, upstream detention and/or floodwalls. Naturalization will reduce velocities and dampen peak flow at Woodlawn.	Channel Naturalization	Screened Out	Naturalizing the channel between Manoa Park and Woodlawn Bridge would cause higher water surface elevations in an area that already has flooding. Naturalizing would reduce conveyance in order to maintain proper side slopes for natural material. To maintain conveyance, extensive real estate would be required.
171	Manoa Channelization	Manoa	Channelize the stream to reduce peak flows at Woodlawn	Channel Modification	Screened Out	Channelizing would adversely impact natural stream habitat, will increase flows, and will reduce response time from peak rainfall to peak flood.
172	Manoa Valley District Park Detention Pond	Manoa	Approximately 33.5 ac-ft of storage on the right bank of Manoa Stream	Detention	Retained	Modeling efforts have deemed this measure to be technically feasible and efficient. This measure will be carried forward in the study process.
173	Kanewai Detention Pond	Manoa	Approximately 4.5 ac-ft of storage on the right bank of Manoa Stream	Detention	Screened Out	Modeling considered type and amount of storage needed, where/how to get water to the basin, and where/how to outlet the water (i.e., directly back to channel, conduit to harbor or golf course). Considerations also included the community floodwall and the nearby school. It was determined that above ground storage at Kanewai did not provide the anticipated flood risk reduction. This measure will be screened from further evaluation. Underground storage at Kanewai Park is being considered under measure #181.
174	University of Hawaii Practice Fields Detention Pond	Manoa	Approximately 19 ac-ft of storage on the right bank of Manoa Stream near UH	Detention	Screened Out	This measure poses technical challenges with drilling through a mountain to pipe water in, grading, and associated costs of excavation. This area is associated with karst geology, resulting in additional challenges and risks.
175	Manoa Innovation Center Floodplain/Parking Lot Storage	Manoa	Use natural floodplain/parking lot to contain flood waters and store water	Detention	Screened Out	Floodplain storage is already utilized by local interior drainage and overbank flooding. No additional capacity is available. This measure has been screened out. Other measures will be explored in the Woodlawn Bridge area.
176	Woodlawn Bridge Floodwall	Manoa	Floodwall (permanent or deployable) at Woodlawn Drive Bridge vicinity to contain water to channel	Floodwall/Berm	Retained	This measure increases channel conveyance and will be evaluated in combination with channel modifications, bridge modification, bypasses, and detention.
177	Koali Rd Floodwall	Manoa	Floodwall along left bank of Manoa Stream, downstream of Kanewai Community Park to protect community from upstream peak flows	Floodwall/Berm	Retained	This measure will be retained with the understanding of the current community floodwall at Kanewai Park. Considerations include space availability, bedrock, and existing channel retaining wall loadings.
178	University of Hawaii Deployable Floodwall	Manoa	System of deployable floodwall around the UH Campus	Floodwall/Berm	Screened Out	A system of deployable floodwalls around the campus may cause higher water surface elevations in neighboring communities. Instead, the team will focus on the source of flooding at Woodlawn bridge. However, non-structural measures will be considered on a structure-by-structure basis (measure #184).
179	Permeable Pavement System at Manoa Marketplace Parking Lot	Manoa	Replace parking lot with permeable pavement to reduce direct runoff contributing to flows down Woodlawn Drive	Impervious Surface Reduction	Screened Out	Components and concepts of this measure are included in measure #104. This measure will be screened out for redundancy.
180	Manoa Tunnel System	Manoa	Tunnel System with Storage (can outlet to ocean using gravity); detention basin and tunnel from Manoa Valley District Park; approx. 2/3 of flow is in the system at this location; Additional basin inflow does not have ideal entrance location	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #55 and 66. This measure will be screened out for redundancy.
181	Kanewai Underground Storage	Manoa	Underground detention structure below park; storage capacity not yet determined	Detention	Retained	This measure will be further evaluated given that above ground storage at Kanewai Community Park (#173) did not provide sufficient flood risk management benefits. Below ground storage is considerably more expensive than above ground. The team is actively working on developing storage capacity calculations and cost estimates for this measure.
182	Manoa Marketplace Underground Storage	Manoa	Underground detention structure below parking lot; storage capacity not yet determined	Detention	Screened Out	Components and concepts of this measure are included in #86. This measure will be screened out for redundancy.
183	State Land of Kalaepohaku Ridge Underground Detention	Manoa	Large underground storage tank on the embankment of the Kalaepohaku Ridge	Detention	Screened Out	Real Estate aquisition and engineering challenges to use the base of a mountain side as storage. The team will consider other storage options within this basin.
184	Physical non-structural measures	Watershed Wide	Nonstructural measures are permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding. Measures can include elevation, relocation, acquisition, dry flood proofing, or wet flood proofing.	Nonstructural	Retained	Potential for nonstructural measures (e.g., elevation, floodproofing, relocation, flood warning systems) will be assessed once economic models are finalized.
185	Flood Warning System	Watershed Wide	Flood Warning Systems alert citizens in flood prone areas of impending high water, giving the opportunity to evacuate damageable property and themselves from flood-prone areas.	Nonstructural	Retained	
186	Risk Communication/Education	Watershed Wide	Risk Communication develops and uses educational tools such as presentations, workshops, hand-outs, and pamphlets to communicate flood risk and flood risk reduction measures.	Nonstructural	Retained	
187	Emergency Preparedness Plans	Watershed Wide	Develop and maintain a flood emergency preparedness plan that identifies hazards, risks and vulnerabilities, and encourages the development of local mitigation. Plans should include the community's response to flooding, location of evacuation centers, evacuation routes, and flood recovery processes.	Nonstructural	Retained	

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
188	Debris Management Plan	Watershed Wide	A comprehensive debris management plan that outlines a strategy to efficiently and effectively remove and dispose of debris on a maintenance schedule or after a storm would reduce blockages at constrictions in rivers and therefore reduce flood levels at those constrictions.	Debris Management	Screened Out	Maintenance of privately-owned portions of each stream is the responsibility of the individual landowner(s). The City and County of Honolulu Department of Facility Maintenance is responsible for maintaining portions of each streams that flows onto public property. This study will consider options to reduce the impact of flooding due to buildup of debris by considering modifications to stream channels and structures such as bridges, as well as measures that address the root causes of debris buildup such as invasive species control, restoration of native plantings, and setbacks. This study will not include long term dredging, maintenance, or periodic stream cleanups as a part of the recommended plan as it is outside of the authority of the Corps to partner in ongoing maintenance efforts. However, the study can include the recommendation to develop or re-evaluate a comprehensive debris management plan.
189	Ala Wai Canal Tunnel	Ala Wai Canal	Underground tunnel to outlet into the ocean; serves as a second outlet to the canal	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #20 and 22. This measure will be screened out for redundancy.
190	Paki Ave Bypass	Ala Wai Canal	Utilize existing storm sewer system along Paki Ave as a bypass for Ala Wai Canal waters; Outfall is away from the highly traveled beach and tourist area; Existing outfall near Tahitienne Condos of Honolulu	Bypass	Screened Out	Utilizing or upgrading the existing storm sewer infrastructure to a larger and appropriate culvert size did not provide adequate flood risk management impacts in or around the Ala Wai Canal during the hydraulic modeling analysis. This measure will be screened from further consideration.
191	Leahi Ave Bypass	Ala Wai Canal	Utilize existing storm sewer system along Leahi Ave as a bypass for Ala Wai Canal waters; Outfall is away from the highly traveled beach and tourist area; Existing outfall near Tahitienne Condos of Honolulu	Bypass	Screened Out	Concepts and components of this measure are included in measure #190. The final layout will be coordinated with the City and will be determined based on available capacity and existing infrastructure. This measure will be screened out for redundancy.
192	H1 Underground Storage System	Lower Watershed	Series of underground detention basins along the H1 highway	Detention	Screened Out	The amount of storage needed to contain flood waters is not achieveable with the limited space along or under the highway. Underground storage along the H-1 interstate could also adversely affect structural stability for the highway foundation/piers.
193	Ala Wai Canal Floodwall System	Ala Wai Canal	Series of new floodwalls on the left and right banks of the Ala Wai canal and M-P canal; design considerations could include road closure structures and access for the canoes; deployable/passive system, glass system to keep viewshed, or aesthetically acceptable (e.g. lava rock wall) design will be considered.	Floodwall/Berm	Retained	This measure will be modeled with the understanding of flow regimes and sea level rise at the canal.
194	Manoa-Palolo Diversion Structure	Lower Watershed	Diversion structure downstream of the Date Street bridge that diverts flows for a design storm to the Ala Wai Golf Course; In combination with berms around the golf course to increase storage.	Detention	Screened Out	Components and concepts of this measure are included in measure #39. This measure is screened out for redundancy.
195	Ala Wai Golf Course Berm	Ala Wai Canal	Berms in strategic locations to increase above-ground flood storage; can be used in combination with diversion structure	Floodwall/Berm	Screened Out	Components and concepts of this measure are included in measure #39. This measure is screened out for redundancy.
196	Ala Wai Canal Surge Barrier	Ala Wai Canal	Surge barrier/Flood gates to reduce impacts from tide and increase storage in canal; pump station in conjunction with floodwalls along canal to increase storage capacity	Gates	Retained	Placement, size, and type of flood gates will be determined based on inflow, channel geometry, flood storage, and waterway usage. A surge barrier will not be evaluated due to its intended use of storm surge protection. Analyses have determined that storm surges do not historically relate to inland rain events for this watershed. However, floodgates in conjunction with floodwalls and a pump station will still be evaluated to address riverine flooding.
197	Ala Wai Canal Pump Station(s)	Ala Wai Canal	Pump or system of smaller pumps along the canal to reduce standing water or used in conjunction with floodwalls/berms to increase storage capacity	Pumps	Retained	Placement, size, and type of pump will be determined based on inflow and land use, including interior drainage impacts due to flood risk management features part of the selected plan.
198	Ala Wai Canal Deepening	Ala Wai Canal	Dredge canal to an appropriate depth to increase storage capacity and maintain slope/structural integrity	Channel Modification	Screened Out	Dredging to the maintenance elevation is encouraged for the City to maintain consistently. Deepening the canal further than the maintenance elevation is generally not recommended due to the stability of canal walls and slope stability. Increasing storage of the canal can technically reduce flooding but not without instability of the structural components of the bridges and canal walls. The integrity of the canal walls as-is would not withstand excavation - only replacing with an entirely new system would. Further analysis is needed to determine the stability of bridge pier and footings. See measure 5.
199	Cool Ala Wai	Ala Wai Canal	Plan includes forest restoration in upper watershed; converting golf course to wetlands on the lower 2/3 and residential housing on the upper 1/3; gate structures at the golf course inlet and Manoa-Palolo to control the flow of water into the canal; gate structure at mouth of canal to address sea level rise and storm surge; mimic the Singapore Marina Barrage for urban reservoir design, https://www.youtube.com/watch?v=4WA2sR6pBRo	Wetland/Floodplain	Screened Out	Rezoning residential housing is outside the scope of this project. Individual components of this plan have been addressed in other measures within this spreadsheet. See measures #65 for forest management, #39 for wetlands and diversion structure at the golf course, and #196 for gate structure at the mouth. This measure is screened out for redundancy.
200	Portable flood barriers	Watershed Wide	Portable flood barriers, https://www.youtube.com/watch?v=dQjqFPKh01s	Floodwall/Berm	Screened Out	In the simulation (video), they were able to divert flood waters (ankle-deep) across 6 meters within 5 minutes. This system can hold back water up to 0.5 meters in height. The flashy nature of the watershed would not provide much time for crews to set up these barriers, let alone safely. It may provide protection for more frequent (smaller) storm events but would not provide a viable solution for flood greater than 1.5 ft. This is a great option for individual homeowners or businessowners. These structures, however, do not meet USACE requirements for structural integrity or safety.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
201	Palolo diversion channel	Palolo	The water from the Palolo Valley should go straight into the Ocean parallel to Kapahulu Avenue and be decoupled from the Manoa-Palolo Canal (that is a major old design mistake that exacerbates the current risk of flooding).	Channel Modification	Screened Out	Decoupling of the river system to a daylighted stream parallel to Kapahulu would require extensive land/property acquisition and would have negative impacts to the marine and nearshore environment. The team will investigate other means to reduce flood risk, such as tunnels (#161), detention (#85), bypasses, and channel deepening (#146).
202	Ala Wai Green	Ala Wai Canal	A bio-diverse, multi-function natural resource park. The Ala Wai Green would occupy the ewa 2/3 of the closed golf course. Restore the former wetlands and serve as a natural retention basin for the collection of rainwater from the valleys in a complex of reservoirs, ponds, and waterways. Debris, soil runoff and pollutants from upstream would be removed after passing through a series of gates and a multi-stage filtration system before entering into the Ala Wai canal.	Wetland/Floodplain	Screened Out	Components and concepts of this measure are included in measure #38 and #39. This measure is screened out for redundancy.
203	Overflow ditches parallel to the Ala Wai Canal	Ala Wai Canal	Construct overflow ditches parallel to the Ala Wai Canal (see diagram) on the Mauka (Mountain) side. Within the ditch, construct water jets at the bottom and sensors along the walls of the ditch. A grill would cover the ditch for safety and some sort of screen to prevent debris from falling into the ditch. Prior to the storm, screens would be removed to allow maximum over flow water to enter the ditches.	Detention	Screened Out	This measure as described would not be an ideal solution, although innovative. The sensors, jets, and ditches would need a high level of continuous maintenance for efficiency. Removing debris grates prior to the storm would not work as intended because of the high volume of debris that passes during a storm event. The debris could also cause damage to the sensors and jets. Additionally, there are safety concerns of having a maintenance crew removing grates prior to a storm given the extreme flashy nature of flood events in the basin. The concept of ditches to increase storage will be carried forward as part of detention measures #32 & #39. The concept of ditches as part of conveyance measures are carried forward under #20, 21, 22, and 55. The concept of pumps (jets) to push water out or remove stagnant water will be carried forward within measure #197.
204	Filter Strips	Ala Wai Canal	Filter strips that reduce erosion and nitrate contaminates for high rainfall event. (Potentially use Kernza plant)	Water Quality	Screened Out	Best management practices, such as filter strips, to reduce runoff and improve water quality are outside the USACE study authority. However, natural and nature-based flood risk management measures will be evaluated, which can also improve water quality and reduce erosion as secondary benefits. See measure #94 for incorporating traditional practices in a flood risk management solution.
205	Kalawahine Reservoir	Makiki	Existing ponding basin located on Kapahu and Anianiku St. (Kapo'opo'o and Kanahā Stream)	Detention	Screened Out	Kalawahine Reservoir is an active project. The land is reserved for construction of a 2MG reservoir for water supply by the Board of Water Supply. The nearby ponding basin cannot be used for storage, as it will not provide meaninful storage to reduce flood risk downstream.
206	Palolo floodwalls	Palolo	Raise existing floodwalls higher to contain more water	Floodwall/Berm	Screened Out	Floodwalls along Palolo stream would require extensive real estate acquisition and easements from properties along the channel. The construction and real estate costs of this measure greatly outweigh the damages reduced. This measure is screened from further evaluation.
207	City Mill culvert	Palolo	Utilize the culvert next to City Mill to slow down or detain water; culvert is 15' deep in this area.	Detention	Screened Out	Utilizing or upgrading the existing storm sewer infrastructure to a larger and appropriate culvert size did not provide adequate flood risk management impacts in or around Palolo Stream during the hydraulic modeling analysis. This measure will be screened from further consideration.
208	Palolo pipe within culverts	Palolo	Lay a pipe within the existing culverts to evacuate water directly out to sea	Tunnel/Conduit	Screened Out	Under a similar analysis to measure #207, adding, utilizing, or upgrading the existing storm sewer infrastructure to a larger and appropriate culvert size did not provide adequate flood risk management impacts in or around Palolo Stream during the hydraulic modeling analysis. This measure will be screened from further consideration.
209	Redetention	Watershed Wide	2 or more detention basins in series	Detention	Screened Out	Redetention can increase storage in a system or series of detention ponds. However, fo this watershed, there was not a particularly viable location with ample space and appropriate elevation change that would support redetention. This measure will be screened from futher analysis.
210	Berm around all schools	Watershed Wide	Build a 3 ft tall berm around all schools: Iolani School, Ala Wai Elementary, Noelani Elementary, and Hokulani Elementary	Floodwall/Berm	Retained	This measure will be considered after evaluating the residual risk to the schools and surrounding vulnerable communities. Berms around Iolani School and Ala Wai Elementary will be evaluated as part of a floodwall system for the canal (#193). Kaimuki High School is also being considered under measure #53. Non-structural measures will also be considered on a structure-by-structure basis.
211	SWIFT tunnels with outlet at harbor	Watershed Wide	SWIFT tunnels in Manoa and Palolo that outlet into the harbor instead of the ocean. This outlet will be dual functioned as a pier/loading dock for canoe paddlers.	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #66, #55, and #161. Recreational use of the project will be coordinated with the City. This measure will be screened out for redundancy.
212	Makiki SWIFT Tunnel	Makiki	SWIFT tunnel from Roosevelt High School down Piikoi to the Ala Wai Harbor. Another alternative location could be near Nehoa St and Makiki St.	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in measure #134. This measure will be screened out for redundancy.
213	Modify Palolo Stream entry angle	Palolo	Modify the angle that the Palolo Stream intercepts the Manoa Stream with a diverter or other channel modification. The 90 degree angle disrupts Manoa stream flow.	Channel Modification	Screened Out	The results from the Makiki entry angle analysis (measure #64) has determined that the efficiency of this type of channel modification doesn not reduce flooding near the confluence of streams. Considerations for screening also include real estate acquisition. This measure will be screened from further consideration.
214	Kalaimoku St Bypass	Ala Wai Canal	Utilize existing storm sewer system along Kalaimoku St. down Saratoga Rd. as a bypass for Ala Wai Canal waters (above a certain elevation); Can consider other existing storm utilities perpendicular to the canal	Bypass	Screened Out	Components and concepts of this measure are included in measures #20 and #22. This measure will be screened out for redundancy.

Tracking #	Measure Name	Basin	Description	Type	Status	Notes/Rationale
215	Happy Valley Underground Stormwater Storage	Ala Wai Canal	Multifunctional underground storm water detention beneath Ala Wai Golf Course; Flood waters can be repurposed. Hong Kong's Happy Valley Underground Stormwater Storage Scheme: https://www.dsd.gov.hk/EN/Files/Technical_Manual/technical_papers/DP1201.pdf	Detention	Screened Out	Components and concepts of this measure are included in measure #45 and #126. This measure is screened out for redundancy. Flood water repurposing after a storm is outside the scope of this project but will be coordinated with the City and other government offices for multidisciplinary collaboration.
216	University of Hawaii Tunnel	Manoa	Pipe floodwaters from the UH dormitory basketball court area to the Ala Wai Golf Course or out to the harbor	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #55. This measure will be screened out for redundancy.
217	St. Louis School Tunnel	Palolo	Pipe floodwaters from Palolo Stream near the St. Louis School football field to the Ala Wai Golf Course or out to the harbor	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #66. This measure will be screened out for redundancy.
218	Manoa Park Tunnel	Manoa	Pipe floodwaters from Manoa Stream near Manoa Valley District Park to the Ala Wai Golf Course or out to the harbor	Tunnel/Conduit	Screened Out	Components and concepts of this measure are included in #55. This measure will be screened out for redundancy.
219	Floodgate and bypass or floodgate and pump at Makiki Confluence	Makiki	If floodwalls around the canal are necessary, include a floodgate with bypass or a floodgate with pump at the Makiki Stream confluence to reduce backup to interior drainage along Makiki Stream.	Pumps	Screened Out	This measure will be considered as part of the Ala Wai Canal Floodwall (#193), and as standalone measures near the canal as described in measure #196 (floodgate) and #210 (pumps). This measure will be screened for redundancy.
220	Underground Parking structures along waterways	Ala Wai Canal	Construct underground parking structures along the canal which can be used for flood protection. A parking structure next to Iolani could be used by the school and replace and supplement existing parking along the canal.	Detention	Screened Out	Components and concepts of this measure are included in measure #126. This measure is screened out for redundancy.
221	Waihi Stream detention	Manoa	Create runoff holding facilities along Waihi Stream (near Paradise Park) that could also generate power for C&C as well as potable water.	Detention	Screened Out	Components and concepts of this measure are included in measure #98. This measure will be screened out for redundancy.
222	Biofilter floodwaters for potable water	Watershed Wide	Biofilter floodwaters from parks and open green spaces and use as potable water via Board of Water Supply. Use the energy in daily runoff to pump water into neighborhood water towers; partner with large apartment buildings by funding pumps and holding tanks of potable water in exchange for maintenance in perpetuity.	Water Quality	Screened Out	Detention will be investigated at various green spaces within the watershed. Detention could inherently result in mutliple benefits, including improving water quality and aquifer recharge. Flood water repurposing after a storm is outside the scope of this project but will be coordinated with the City and other government offices for multidisciplinary collaboration. This measure will be screened out for redundancy, as all green spaces are being explored for detention. This includes but is not limited to measures #172, #173, #138, and #85.
223	Enclose canal and build Rail atop canal	Ala Wai Canal	Completely enclose the Ala Wai from Kalakaua all the way to the University of Hawaii and run the rail from Ala Moana to UH on the surface of the enclosed canal.	N/A	Screened Out	This measure was screened because it would have negative implications to flood risk and debris, in addition to life safety. Restricting the canal reduces flood capacity and increases water surface elevations upstream of the enclosed portion. It creates the perfect conditions for debris build-up, which would be difficult to maintain and will exacerbate flooding. In addition, enclosing the canal reduces access to the stream for emergency responders in the event of an emergency or safety threat. Finally, construction of a light rail system is outide the scope and authority of the current USACE study.

Ala Wai Canal Flood Risk Management General Reevaluation Study

Plan Formulation Tracker Workbook

December 2022

Note: The Plan Formulation Tracker is the successor to the Management Measure Tracking Spreadsheet. The intent of this tracker is to share the latest proposed array of alternative plans, to provide an overview of the progression of alternatives through the plan formulation process, and to provide insight into the technical process. A proposed final array of alternatives is contained within this workbook which was identified using standard agency practices and analyses. Public input is welcome and will be accounted for before finalizing the final array of alternatives.

Should you have any questions about the Plan Formulation Tracker, please email AlaWai@honolulu.gov or contact us through the project website at https://www.honolulu.gov/alawai/contact.html

PLAN FORMULATION TRACKER WORKBOOK OVERVIEW

TRACKER UPDATED:	December 8, 2022

PAGE BORDER COLOR	DESCRIPTION
Workbook Explanation	Blue-colored pages are informational and explain various parts of this workbook.
Alternative Retained	Alternative pages in green indicate that this alternative is proposed to be retained.
Alternatives to be Removed	Alternative pages in amber indicate that this alternative will be removed from the array (i.e., dropped from further consideration).

PAGE NAME	PAGE NO.	DESCRIPTION
Workbook Overview	1	A description of all pages contained within this workbook.
Glossary of Alternatives	2	A list of alternatives with descriptions. The proposed final array of alternatives is identified on this page.
How to Read Alternative Tabs	3	An explanation on how to read the Alternative Formulation Progression pages.
Alternative 0	4	An overview of the alternative formulation progression of the No Action Plan.
Alternative 1	5	An overview of the alternative formulation progression of the Storage Plan.
Alternative 2	2A - 6	An overview of the alternative formulation progression of the Conveyance Plan.
	2B - 7	
	2C - 8	
Alternative 3	9	An overview of the alternative formulation progression of the Tunnel Plan.
Alternative 4	10	An overview of the alternative formulation progression of the Natural and Nature-Based Plan.
Alternative 5	11	An overview of the alternative formulation progression of the Hybrid plan.
Definition of Measures	12	A list of measures that were considered when formulating alternatives with definitions. This page also indicates whether measures have been retained or screened.

GLOSSARY OF ALTERNATIVES

ALTERNATIVE	DESCRIPTION	RETAINED
Alternative 0	No action plan.	✓
Alternative 1	A plan that focuses on reducing flood risk throughout the watershed by increasing storage.	✓
Alternative 2A	A plan that focuses on reducing flood risk throughout the watershed by increasing conveyance using existing infrastructure.	
Alternative 2B	A plan that focuses on reducing flood risk throughout the watershed by increasing conveyance using floodwalls at various locations.	✓
Alternative 2C	A plan that focuses on reducing flood risk throughout the watershed by increasing conveyance using a second outlet for the Ala Wai Canal.	
Alternative 3	A plan that focuses on reducing flood risk throughout the watershed by implementing subsurface tunnels.	
Alternative 4	A plan that focuses on reducing flood risk throughout the watershed by using natural and nature-based features, with an emphasis on watershed management.	
Alternative 5	A plan that focuses on reducing flood risk throughout the watershed by utilizing various cornerstones from other plans. This is the hybrid alternative.	✓

Identifies which alternative is being examined within this sheet.

ALTERNATIVE X - EXAMPLE PLAN

Indicates whether the alternative has been retained or will be screened out. If the alternative has been retained, the latest iteration of alterantive formulation is identified. If the alternative will be screened out, a brief explanation is provided.

STATUS: Retained in the final array of alternatives (Alternative X.2)

Second alternative formulation iteration of Alternative X.

MEASURES	ALTERNATIVE X.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE X.2	JUSTIFICATION FOR CHANGE
Measure #1	✓	Cornerstone. Increases storage in the watershed to reduce flood risk.	✓	
Measure #2	✓	This measure works in conjunction with Measure #1.	✓	
Measure #3	✓	Reduce localized impacts from peak flows.		Measure was screened due to lack of effectiveness in reducing water surface elevations.

A list of measures that were included within this alternative during at least one of the alternative formulation iterations.

This identifies the alternative formulation iteration and which measures were included for that iteration. For example, "Alternative X.1" indicates that this was the first formulation iteration for Alternative X. The progression of alternative formulation is presented from left to right, from the oldest to the newest, respectively.

Disclaimer: Alternative X is not a real alternative and is being used for demonstrative purposes only.

This explains the justification for initially including a measure as part of the

If measures are added or removed after a previous alternative formulation iteration, this explains why.

ALTERNATIVE 0 - NO ACTION PLAN

STATUS:	Retained in the Final Array of Alternatives (Alternative 0).

MEASURES	ALTERNATIVE 0	JUSTIFICATION FOR INITIAL INCLUSION
Do nothing	✓	No action plan is required to be part of the array of alternatives.

ALTERNATIVE 1 - STORAGE PLAN

STATUS: Retained in the Final Array of Alternatives (Alternative 1.4).

MEASURES	ALTERNATIVE 1.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE 1.2	JUSTIFICATION FOR CHANGE	ALTERNATIVE 1.3	JUSTIFICATION FOR CHANGE	ALTERNATIVE 1.4	JUSTIFICATION FOR CHANGE
Makiki District Park Detention	✓	Cornerstone. Increase storage to reduce flood risk in Makiki subbasin.	✓		✓		✓	
Kanaha Floodwall	✓	This measure works in conjunction with Makiki District Park Detention to reduce flood risk in the Makiki subbasin.	✓		✓		✓	
Manoa Valley District Park Detention	✓	Cornerstone. Increase storage to reduce flood risk in Manoa subbasin.	✓		✓		✓	
Ala Wai Golf Course Detention	✓	Cornerstone. Increase storage to reduce flood risk in Ala Wai subbasin.	✓		✓		✓	
Kapiolani Park Detention Basin			✓	Potential opportunity identifed to increase storage in Ala Wai subbasin. Added as cornerstone.		Measure screened due to lack of effectiveness in reducing water surface elevations and concerns associated with an existing high ground water table, historic resources, and economic viability.		
Kaimuki High School Berm/Floodwall	✓	Increase storage and reduce flood risk in lower watershed.	✓		✓		✓	
Daylight Makiki Stream			✓	Identified potential measure to enhance flood risk reduction in Makiki subbasin.	✓			Measure screened out due to lack of effectiveness substantially reducing water surface elevations in the Makiki subbasin. Analyses show an estimated high cost and a lack of capturable economic and life safety benefits across all flood frequencies.
Woodlawn Bridge Floodwall	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.	✓		✓		✓	
Koali Road Floodwall	✓	Reduce impacts from peak flows around Manoa-Palolo confluence.	✓		✓		✓	
Woodlawn Channel Modification	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.		Measure screened due to lack of effectiveness in reducing water surface elevations in Lower Manoa.				
Woodlawn Bridge Modification	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.		Measure screened due to lack of effectiveness in reducing water surface elevations in Lower Manoa.				
Woodlawn Drive Bypass	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.		Measure not expected to compliment cornerstone goal of increasing storage and was removed from this alternative.				
Ala Wai Canal Floodwall	✓	Reduce overbank flooding from the Ala Wai Canal.		Removed from alternative due to analyses estimating high costs and the need to identify the National Economic Development (NED) Plan.				
Palolo Valley District Park Detention	✓	Increase storage to reduce flood risk in Palolo subbasin.		Measure screened due to lack of effectiveness in reducing water surface elevations in Palolo and downstream, in the lower watershed.				
Pumps/other structures (flap gates)	✓	Minimum facility needed for design		Removed from this alternative since these are ancillary features in combination with floodwalls.				
Nonstructural to reduce residual risk	✓	Can be used in lieu of structural measures to reduce flood risk.	✓		✓		✓	

ALTERNATIVE 2A - CONVEYANCE (USING EXISTING INFRASTRUCTURE) PLAN

STATUS: Screened out due to lack of effectiveness at reducing flood risk throughout the watershed. All cornerstone measures were screened out individually; therefore, the alternative is screened out.

MEASURES	ALTERNATIVE 2A.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE 2A.2	JUSTIFICATION FOR CHANGE
Piikoi Bypass	✓	Cornerstone. Increase conveyance to reduce flood risk.		Screened out due to lack of effectiveness in reducing water surface elevations.
Woodlawn Drive Bypass	✓	Cornerstone. Increase conveyance to reduce flood risk.		Screened out due to lack of effectiveness in reducing water surface elevations.
Palolo Culverts	✓	Cornerstone. Increase conveyance to reduce flood risk.		Screened out due to lack of effectiveness in reducing water surface elevations.
Waikiki Bypass	✓	Cornerstone. Increase conveyance to reduce flood risk.		Screened out due to lack of effectiveness in reducing water surface elevations.
Paki Ave Bypass	✓	Cornerstone. Increase conveyance to reduce flood risk.		Screened out due to lack of effectiveness in reducing water surface elevations.
Kanaha Floodwall	✓	Reduce overbank flooding from the Kanaha Ditch/Makiki stream.	✓	
Daylight Makiki Stream	✓	Reduce overbank flooding from the Makiki stream.	✓	
Manoa Valley District Park Detention	✓	Reduce overbank flooding from the Manoa stream.	✓	
Woodlawn Bridge Floodwall	✓	Reduce overbank flooding from the Manoa stream.	✓	
Koali Road Floodwall	✓	Reduce impacts from peak flows around Manoa-Palolo confluence.	✓	
Ala Wai Canal Floodwall	✓	Reduce overbank flooding around the Ala Wai Canal.	✓	
Dredge Ala Wai Canal	✓	Deepen channel to increase conveyance.	✓	
Dredge Manoa-Palolo Canal	✓	Deepen channel to increase conveyance.	✓	
Palolo Channel Modification	✓	Reduce overbank flooding from the Palolo stream.	✓	
Pumps/other structures (flap gates)	✓	Minimum facility needed for design.	✓	
Nonstructural to reduce residual risk	✓	Can be used in lieu of structural measures.	✓	

ALTERNATIVE 2B - CONVEYANCE (USING FLOODWALLS) PLAN

STATUS: Retained in the Final Array of Alternatives (Alternative 2B.3).

MEASURES	ALTERNATIVE 2B.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE 2B.2	JUSTIFICATION FOR CHANGE	ALTERNATIVE 2B.3	JUSTIFICATION FOR CHANGE
Kanaha Floodwall	✓	Cornerstone. Increase conveyance to reduce flood risk.	✓		✓	
Woodlawn Bridge Floodwall	✓	Cornerstone. Increase conveyance to reduce flood risk.	✓		✓	
Koali Road Floodwall	✓	Cornerstone. Increase conveyance to reduce flood risk.	✓		✓	
Ala Wai Canal Floodwall	✓	Cornerstone. Increase conveyance to reduce flood risk.	✓		✓	
Woodlawn Drive Bypass			✓	Opportunity identified to increase conveyance in Manoa stream.		Measure screened due to lack of effectiveness in reducing water surface elevations in Lower Manoa.
Waikiki Bypass	✓	Divert water from Ala Wai Canal to ocean to reduce flood risk in Ala Wai subbasin.		Measure screened due to lack of effectiveness in reducing water surface elevations in the Ala Wai subbasin.		
Ala Wai Canal Tunnel (2nd Outlet)	✓	Increase conyeance to reduce flood risk in the Ala Wai subbasin.		Measure screened due to lack of effectiveness in reducing water surface elevations in the Ala Wai subbasin in combination with analyses estimating high project costs.		
Makiki District Park Detention			✓	Storage location works in conjunction with the Kanaha Floodwall.	✓	
Dredge Ala Wai Canal	✓	Deepen channel to increase conveyance		Measure screened out due to analyses estimating high project costs in addition to environmental concerns and wall stability concerns.		
Dredge Manoa-Palolo Canal	✓	Deepen channel to increase conveyance		Measure screened. The M&P Canal is already dredged to the design depth and flood risk reduction benefits are expected to be minimal from further dredging.		
Pumps/other structures (flap gates)	✓	Minimum facility needed for design	✓		✓	
Nonstructural to reduce residual risk	✓	Can be used in lieu of structural measures.	✓		✓	

ALTERNATIVE 2C - CONVEYANCE (2ND OUTLET) PLAN

STATUS: Screened out due to analyses estimating high project cost. There are also environmental concerns and economic viability concerns.

MEASURES	ALTERNATIVE 2C.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE 2C.2	JUSTIFICATION FOR CHANGE	ALTERNATIVE 2C.3	JUSTIFICATION FOR CHANGE	ALTERNATIVE 2C.4	JUSTIFICATION FOR CHANGE
Daylight Ala Wai Canal (2nd Outlet)	✓	Cornerstone. Increase conveyance in the Ala Wai subbasin.	✓		✓			Measure screened out due to analyses showing high project costs in addition to environmental concerns and economic viability concerns.
Kanaha Floodwall	✓	Contain water within Kanaha Ditch/Makiki stream	✓		✓		✓	
Makiki District Park Detention			✓	Measure added to work in conjunction with the Kanaha Floodwall to help reduce flood risk in the Manoa subbasin.	✓		✓	
Woodlawn Bridge Floodwall	✓	Contain water within Manoa stream	✓		✓		✓	
Woodlawn Channel Modification	✓	Contain water within Manoa stream	✓			Measure screened due to lack of effectiveness in reducing water surface elevations in Lower Manoa.		
Koali Road Floodwall	✓	Protect local community from peak flows	✓		✓		✓	
Ala Wai Canal Floodwall	✓	Contain water within the Ala Wai Canal	✓		✓		✓	
Pumps/other structures (flap gates)	✓	Minimum facility needed for design	✓		✓		✓	
Nonstructural to reduce residual risk	✓	Can be used in lieu of structural measures.	✓		✓		✓	

ALTERNATIVE 3 - TUNNEL PLAN

STATUS: Screened out. Tunnels did not reduce/remove enough water from the system to eliminate damages.The tunnel alternative would still need floodwalls and other measures as well, which is not likely to be economically justified as a system.

MEASURES	ALTERNATIVE 3.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE 3.2	JUSTIFICATION FOR CHANGE	ALTERNATIVE 3.3	JUSTIFICATION FOR CHANGE	ALTERNATIVE 3.4	JUSTIFICATION FOR CHANGE	ALTERNATIVE 3.5	JUSTIFICATION FOR CHANGE	ALTERNATIVE 3.6	JUSTIFICATION FOR CHANGE
Makiki Tunnel	✓	Cornerstone. Reduce flood risk using tunnels.	✓			Measure screened out due to analyses showing high project costs and lack of capturable flood risk reduction benefits.						
SWIFT Tunnel (Manoa)	✓	Cornerstone. Reduce flood risk using tunnels.	✓		✓		✓		✓			Measure screened out due to analyses showing high project costs and lack of capturable flood risk reduction benefits.
SWIFT Tunnel (Palolo)	✓	Cornerstone. Reduce flood risk using tunnels.		Measure screened out due to analyses showing high project costs and lack of capturable flood risk reduction benefits.								
Woodlawn Bridge Floodwall	✓	Reduce overbank flooding from the Manoa stream.	✓		✓		✓		✓		✓	
Ala Wai Canal Floodwall	✓	Reduce overbank flooding from the Ala Wai Canal.	✓		✓		✓			Measure removed from the alternative. High costs for both the floodwalls and tunnel would likely not produce an economically viable plan.		
Ala Wai Golf Course Detention									✓	Added to reduce flood risk in the Ala Wai subbasin after floodwalls were removed from this alternative.	✓	
Piikoi Bypass							✓	Measure added in lieu of Makiki Tunnel measure to reduce flood risk in the Makiki subbasin.		Measure screened due to lack of effectiveness in reducing water surface elevations in Makiki and analysis showing high project cost.		
Pumps/other structures (flap gates)	✓	Minimum facility needed for design	✓		✓		✓			Removed since these are ancillary features in combination with floodwalls.		
Nonstructural to reduce residual risk	✓	Can be used in lieu of structural measures	✓		✓		✓		✓		✓	

ALTERNATIVE 4 - NATURAL AND NATURE-BASED FEATURES (NNBF) PLAN

STATUS: Screened out due to lack of effectiveness at reducing flood risk. Analysis showed a level of flood risk reduction benefits at frequent events, but not at less frequent events. Watershed management will be recommended as a best practice.

MEASURES	ALTERNATIVE 4.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE 4.2	JUSTIFICATION FOR CHANGE	ALTERNATIVE 4.3	JUSTIFICATION FOR CHANGE	ALTERNATIVE 4.4	JUSTIFICATION FOR CHANGE
Watershed Management	✓	Cornerstone. Reduce flood risk using natural and nature-based features.	✓		✓			Measure screened due to lack of effectiveness at reducing flood risk. While there is some benefit, it is not expected to be enough to justify this measure.
Makiki District Park Detention	✓	Increase storage to reduce flood risk in Makiki subbasin.	✓		✓		✓	
Kanaha Floodwall	✓	The Kanaha Floodwall works in conjunction with the Makiki District Park Detention to reduce flood risk in the Makiki subbasin.	✓		✓		✓	
Manoa Valley District Park Detention	✓	Reduce overbank flooding from the Manoa stream and increase local storage.	✓		✓		✓	
Woodlawn Bridge Floodwall	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.	✓		✓		✓	
Koali Road Floodwall	✓	Reduce impacts from peak flows around Manoa-Palolo confluence.	✓		✓		✓	
Palolo Valley District Park Detention	✓	Increase storage in Palolo subbasin.		Measure screened due to lack of effectiveness in reducing water surface elevations in Palolo and downstream in the lower watershed.				
Dredge Manoa-Palolo Canal	✓	Dredge canal to increase conveyance.		Measure screened. The M&P Canal is already dredged to the design depth and flood risk reduction benefits are expected to be minimal.				
Kaimuki High School Berm/Floodwall	✓	Increase storage and reduce flood risk in lower watershed.	✓		✓		✓	
Ala Wai Golf Course Detention	✓	Increase storage in the lower watershed.	✓		✓		✓	
Ala Wai Canal Floodwall	✓	Reduce overbank flooding around the Ala Wai Canal.	✓			Measure removed from alternative to emphasize natural and nature-based features and for National Economic Development (NED) plan identification purposes.		
Piikoi Bypass	✓	Reduce flood risk in Makiki subbasin by routing flows from Kanaha Stream to Ala Moana Park.		Measure screened due to lack of effectiveness in reducing water surface elevations in Makiki and analysis showing high project cost.				
Woodlawn Drive Bypass	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.	✓		✓		✓	
Woodlawn Channel Modification	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.	✓			Measure removed from alternative because it is not necessary to implement with the Woodlawn Drive Bypass in place.		
Palolo Channel Modification	✓	Reduce overbank flooding from the Palolo stream.		Measure screened due to lack of effectiveness in reducing water surface elevations in Palolo.				
Daylight Makiki Stream			✓	Potential to enhance flood risk reduction in Makiki subbasin.	✓		✓	
Pumps/other structures (flap gates)	✓	Minimum facility needed for design.	✓		✓		✓	
Nonstructural to reduce residual risk	✓	Can be used in lieu of structural measures.	✓		✓		✓	

ALTERNATIVE 5 - HYBRID PLAN

STATUS: Retained in the Final Array of Alternatives (Alternative 5.4).

MEASURES	ALTERNATIVE 5.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE 5.2	JUSTIFICATION FOR CHANGE	ALTERNATIVE 5.3	JUSTIFICATION FOR CHANGE	ALTERNATIVE 5.4	JUSTIFICATION FOR CHANGE
Manoa Valley District Park Detention	✓	Cornerstone. Reduce flood risk using various cornerstones from other plans.	✓		✓		✓	
Woodlawn Drive Bypass	✓	Cornerstone. Reduce flood risk using various cornerstones from other plans.	✓		✓			Measure screened due to lack of effectiveness in water surface elevations in Lower Manoa.
Ala Wai Canal Floodwall	✓	Cornerstone. Reduce flood risk using various cornerstones from other plans.	✓		✓		✓	
Woodlawn Bridge Floodwall	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.	✓		✓		✓	
Koali Road Floodwall	✓	Reduce impacts from peak flows around Manoa-Palolo confluence.	✓		✓		✓	
Makiki District Park Detention	✓	Increase storage to reduce flood risk in Makiki subbasin.	✓		✓		✓	
Kanaha Floodwall	✓	The Kanaha Floodwall works in conjunction with the Makiki District Park Detention to reduce flood risk in the Makiki subbasin.	✓		✓		✓	
Palolo Channel Modification	✓	Reduce overbank flooding from the Palolo stream.		Measure screened due to lack of effectiveness in reducing water surface elevations in Palolo.				
Piikoi Bypass			✓	Potential opportunity identified to reduce flood risk in Makiki subbasin.		Screened out due to lack of effectiveness in reducing water surface elevations.		
Ala Wai Golf Course Detention			✓	Potential opportunity identified to reduce flood risk using detention in conjunction with floodwalls.	✓		✓	
Dredge Ala Wai Canal			✓	Potential opportunity to reduce flood risk in lower watershed. Compliments Ala Wai Canal floodwall.		Measure screened due analyses showing high cost in addition to environmental concerns and wall stability concerns.		
Woodlawn Channel Modification					✓	Opportunity to implement this measure instead of Woodlawn Drive Bypass.		Measure screened due to lack of effectiveness in reducing water surface elevations in Lower Manoa.
Pumps/other structures (flap gates)	✓	Minimum facility needed for design.	✓		✓		✓	
Nonstructural to reduce residual risk	✓	Can be used in lieu of structural measures.	✓		✓		✓	

DEFINITION OF MEASURES

MEASURE	Measure #	DEFINITION	Retained
Ala Wai Canal Floodgate	**196**	Floodgate (not surge barrier) with pumps located at the mouth of canal for the purpose of addressing local runoff. This measure was analyzed for implementation into an alternative but was determined to not be able to operate (ramp up) at the rate that flooding is expected to occur in near the canal. The measure included a pump system that was not economically feasible for the anticiapted flow.	
Ala Wai Canal Floodwall	**193**	Floodwall system along the Ala Wai Canal (Mauka and Makai) that may extend up the Manoa-Palolo canal and Makiki Stream.	✓
Ala Wai Canal Tunnel (2nd Outlet)	**22**	Eastern end of canal will be extended via subsurface tunnel as a second outlet to the ocean.	
Ala Wai Golf Course Detention	**39**	Design the Ala Wai Golf Course to include berm features for increased storage near the canal.	✓
Berm around schools	**210**	A berm around schools within the watershed will be considered after evaluating the residual risk to the schools and surrounding vulnerable communities. Berms around Iolani School and Ala Wai Elementary will be evaluated as part of a floodwall system for the canal (#193). Kaimuki High School is also being considered under measure #53. Non-structural measures will also be considered on a structure-by-structure basis (#184).	✓
Bridge bypasses and debris screening	**97**	Flood risk management measures within the selected plan will include debris catchment/deterent features to prevent the buildup and blockage of debris.	✓
Daylight Ala Wai Canal (2nd Outlet)	**21**	Eastern end of canal will be extended via daylighting as a second outlet to the ocean.	
Daylight Makiki Stream	**143**	Increasing conveyance and reducing restrictions along Makiki Stream by opening up culverts via daylighting.	
Do nothing	**125**	No action.	✓
Dredge Ala Wai Canal	**5**	Ala Wai Canal will be dredged to its design depth or acceptable level of dredging, considering environmental impacts, slope stability, and structural integrity of the canal walls.	
Dredge Manoa-Palolo Canal	**8**	Dredge Manoa-Palolo Canal to increase storage and conveyance from Palolo and Manoa.	
Kaimuki High School Berm/Floodwall	**53**	This measure will be considered both as an extention of the Ala Wai Canal floodwall on the Manoa-Palolo Canal and as a levee/floodwall in the playing fields of the Kaimuki High School to protect the community and school behind the levee, as a standalone measure.	✓
Kanaha Floodwall	**224**	Floodwall on the Kanaha Stream where water jumps bank due to low terrain and flows towards Lower Makiki and Ala Moana.	✓
Kanewai Underground Storage	**181**	A detention basin (underground and above ground) at the Kanewai Community Park was explored. This measure was analyzed for implementation into the alternative but was determined to not be feasible. Above ground storage did not provide significant flood management. Below ground detention provided less benefits than that of above ground. A combination of below and above ground was also explored, and was determined to not be feasible due to the forces involved.	
Kapiolani Park Detention Basin	**59**	Divert water to Kapiolani Park for additional flood storage.	
Koali Road Floodwall	**177**	Floodwall along the Manoa and Palolo Streams along Koali Rd, downstream of Kanewai Park.	✓
Makiki District Park Detention	**138**	Makiki District Park multi-purpose detention pond.	✓
Makiki Tunnel	**134**	Subsurface tunnel diverting water from the headwaters of the Makiki Stream to the harbor or ocean.	
Manoa Valley District Park Detention	**172**	Manoa Valley District Park multi-purpose detention pond.	✓
Waikiki Bypass	**20**	Utilize existing storm sewer system or add bypasses from the Ala Wai Canal through Waikiki to the ocean to increase conveyance.	
Nonstructural Measures	**184**	Nonstructural measures are permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding. Nonstructural measures can also include non-physical flood risk management, such as emergency preparedness plans, risk communication and education, and flood warning systems.	✓
Paki Ave Bypass	**190**	Utilize existing storm sewer system along Paki Ave as a bypass for Ala Wai Canal waters.	
Palolo Channel Modification	**146**	Deepen or widen channel to provide more within-bank storage; can be used in conjunction with channel naturalization.	
Palolo Culverts	**207**	Bypass from Palolo Stream along Kapahulu Ave to Waikiki Wall outfall by upgrading existing storm sewer infrastructure with a double barrel culvert.	
Palolo Valley District Park Detention	**85**	Palolo Valley District Park multi-purpose detention pond.	
Piikoi Street Bypass	**130**	Bypass from Kanaha Stream down Piikoi Street to Ala Moana Park by upgrading/utilizing existing storm sewer infrastructure.	
Pumps/other structures (flap gates)	**80**	Pumps and other structures, such as flap gates on storm drains, that are needed to reduce interior drainage impacts from other measures within the alternative, such as floodwalls. Minimum facility required to implement certain measures.	✓
SWIFT Tunnel (Manoa)	**66**	Subsurface tunnel diverting water from the headwaters of the Manoa Stream to the harbor or ocean.	
SWIFT Tunnel (Palolo)	**66**	Subsurface tunnel diverting water from the headwaters of the Palolo Stream to the harbor or ocean.	
Watershed Management	**65**	Watershed Management includes removing invasive species and replanting with native species to restore the canopy and root system; controlling ungulate to reduce destruction of vegetation by wild/feral animals; and reducing hardcover/non-porous surfaces in the urban environment to decrease runoff. This measure will be recommended as a best practice.	
Woodlawn Bridge Floodwall	**176**	Floodwall along Manoa Stream at Woodlawn Drive bridge.	✓
Woodlawn Bridge Modification	**118**	Modify the bridge at Woodlawn Drive to increase conveyance.	
Woodlawn Channel Modification	**168**	Channel modification along Manoa Stream near Woodlawn Drive bridge.	
Woodlawn Drive Bypass	**167**	Bypass of Manoa Stream at Woodlawn Drive by constructing new inlet and upgrading/utilizing existing storm water infrastructure.	

US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix B—Hydrology and Hydraulics

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ADDENDUM A Ala Wai Canal Flood Risk Management Study, Final Feasibility Study Report with Integrated Environmental Impact Statement, Appendix A Hydrology and Hydraulic Engineering (2017 Feasibility Study, H&H Appendix)

ADDENDUM B Hydrology Report, Ala Wai Canal Modeling Effort (2021 Validation Study)

ADDENDUM C Hydraulics Report, Ala Wai Canal Modeling Effort (2021 Validation Study)

ADDENDUM D December 6-8 , 2021 Rainfall Event on Ala Wai Watershed

ADDENDUM E Watershed Measures Analysis Flow Summary

1. Introduction

This Ala Wai Flood Risk Management (FRM) General Reevaluation Study is authorized as a traditional flood risk management study to determine potential mitigation measures that can address flooding damages as a result of watershed runoff from high-precipitation events. The objective of the Ala Wai Canal FRM Project is to reduce riverine flood risks in the Ala Wai Watershed.

The study authority is Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970, as amended. The study authorization is the Supplemental Appropriations of the Bipartisan Budget Act of 2018 (Public Law 115-123). The project would protect metropolitan Honolulu, the University of Hawaii, and Waikiki, Hawaii's economic center for tourism. The population at risk includes approximately 65,000 residents and an additional 200,000 transient visitors to the watershed daily (tourists, workers, students, etc.).

1.1. Frequency Storm nomenclature

Evaluations of consequences and benefits are based upon design storm amounts which, based upon statistical analysis of historical precipitation events and distributions, have a probable chance of being exceeded in any given year. The events are thus termed as having an annual exceedance probability, or AEP, often as a percentage. Using this nomenclature is deemed to more clearly emphasize the likelihood of an event occurring as a probability as opposed to a frequency or cycle; e.g., the terminology for what was commonly referred to as the "100-year" event can be misconstrued as only occurring once in 100 years, while in fact the event that has a 1 in 100 (or 1%) chance of happening each year and does not typically occur in a one-hundred-year cycle. To the extent feasible, effort has been made to refer to storm events used in the analysis relative to their percentage AEP, but for clarity, Table 1-1 is provided to demonstrate the equivalency of events, regardless of terminology used.

Table 1-1: Equivalent Frequency Terms

99% AEP	0.99 AEP	"1 Year Event"
50% AEP	0.5 AEP	"2 Year Event"
20% AEP	0.2 AEP	"5 Year Event"
10% AEP	0.1 AEP	"10 Year Event"
5% AEP	0.05 AEP	"20 Year Event"
2% AEP	0.02 AEP	"50 Year Event"
1% AEP	0.01 AEP	"100 Year Event"
0.5% AEP	0.005 AEP	"200 Year Event"
0.2% AEP	0.002 AEP	"500 Year Event"

1.2. Study History

The Ala Wai Flood Risk Management project started as a Feasibility Study in 2017 and is documented in "Ala Wai Canal Flood Risk Management Study O'ahu, Hawai'i Final Feasibility Study Report with integrated Environmental Impact Statement Appendix A – Hydrology and Engineering (2017)". The results of the Feasibility study were questioned due to the uncertainty associated with the 1D steady state hydraulic model that was used.

A Post-Feasibility study was initiated to update the steady state 1D HECRAS model from the previous study with 2D areas for the overland areas and to switch to unsteady flow to improve the accuracy of the model. Once the updated model was updated and calibrated, the features from the Feasibility Study tentatively selected plan (TSP) were input to determine their impact and then modifications to the features were evaluated. Information on that can be found in the "Ala Wai Flood Risk Management Project, Honolulu, Hawaii, Engineering Documentation Report, July 16, 2020" which led to changes in the authorized project based on the updated hydrologic and hydraulic engineering ("H&H") assumptions (1D/2D Unsteady State hydraulic model).

A Validation study to reexamine the project justification, economics, and environmental effects from modifications to authorized project features as described in the 2017 Feasibility Report. The H&H analyses and results are documented in the "Ala Wai Flood Risk Management Project, Honolulu, Hawaii, Validation Report, Appendix A - Hydrology and Hydraulic Analysis, March 25, 2021". The validation study only focused on the 1% annual exceedance probability (AEP), and the study led to no recommended plan.

This General Reevaluation Study is set to look at all flood events and is not constrained to assessing only the 1% AEP flood event for measures which would reduce flooding.

1.3. Hydrologic and Hydraulic Modeling History

The Ala Wai Watershed has been modeled for multiple studies, and there have been numerous versions of hydrologic and hydraulic models constructed for those studies. A more detailed summary of these legacy HEC-HMS and HEC-RAS models can be found in the 2017 Feasibility Study H&H (Addendum A) and in the 2021 Validation Study H&H Appendix, which is included as Addendums B (the Hydrologic Report) and C (the Hydraulic Report) to this Appendix.

1.3.1. Validation Study - Summary of MMC Hydrologic Analysis:

As detailed in Addendum B, the validation study revisited the original hydrologic without-project existing conditions analysis performed in the original Feasibility study. Aside from the realignment of watershed breakpoints to facilitate incorporation of results into the hydraulic modeling, the effort focused on examining and frequency flows, revised through use of the HEC Watershed Analysis Tool (HEC-WAT) Monte-Carlo Analysis tool to randomly select predefined storm templates to apply frequency precipitation on the watershed model. After 60,000 iterations and definition of the uncertainty bounds, the HEC-Statistical Software Package (HEC-SSP) was used to analyze the iteration results and select the maximum peak discharges. A balanced hydrograph shape was applied to the peak flows, and these revised frequency hydrographs were incorporated into the HEC-RAS model (described in more detail below).

1.3.2. Validation Study - Summary of MMC Hydraulic Analysis:

The USACE Modeling, Mapping, and Consequences (MMC) Production Center updated the 1D, steady state hydraulic model developed during the feasibility phase modeled in HEC-RAS version 4.1.0 and advanced it to a 1D/2D unsteady state model with 1D analysis in the stream channels and 2D flow in the overbank areas using HEC-RAS version 5.0.7. The more notable changes to the HEC-RAS model included addition of 2D storage areas in overbanks, incorporation of new terrain data, use of unsteady flow hydrographs, and recalibration to historic storms. A detailed description of the Validation Study model update can be found in Addendum C. A summary of the changes is listed below.

Update model to most recent published version (HEC-RAS Version 5.0.7).
Modify Geometry to include 2-dimensional (2D) areas for the overbanks where needed.
Review bridges, tunnels, and other existing features in previous model.
Incorporate new terrain data and modify in areas where new features will be added.
Incorporate land cover data for 2D roughness values.
Update model to unsteady flow which is needed for 2D modeling.
Re-link model to new HEC-HMS flows as discussed in the Hydrology section.
Calibrate and validate updated model to the 2004, 2006, and 1967 events.
Creation of alternative geometries for project features.
Routing of 100-year frequency with different modified geometries.
Compiling a final report for inclusion with the hydraulics updates.

A single without project geometry was brought forward for the final frequency and uncertainty routings. That was used for the FWOP model runs in the Validation Study. That is also the geometry that was utilized as a base model for this GRR Study.

1.4. Ala Wai Watershed

1.4.1. Watershed Overview

The Ala Wai Watershed study area is 19 square miles and extends from the ridge of the Ko'olau Mountains to the nearshore waters of Mamala Bay and includes drainages of Manoa, Palolo, Maikiki, McCully, Moiliili, and Waikiki Streams. The Manoa and Palolo streams join to form the Manoa-Palolo Canal. The Manoa-Palolo Canal, Makiki Stream, and three low lying drainage areas empty into the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands, thus allowing development of the Waikiki district. The Ala Wai Watershed study area is shown in Figure 1-1.

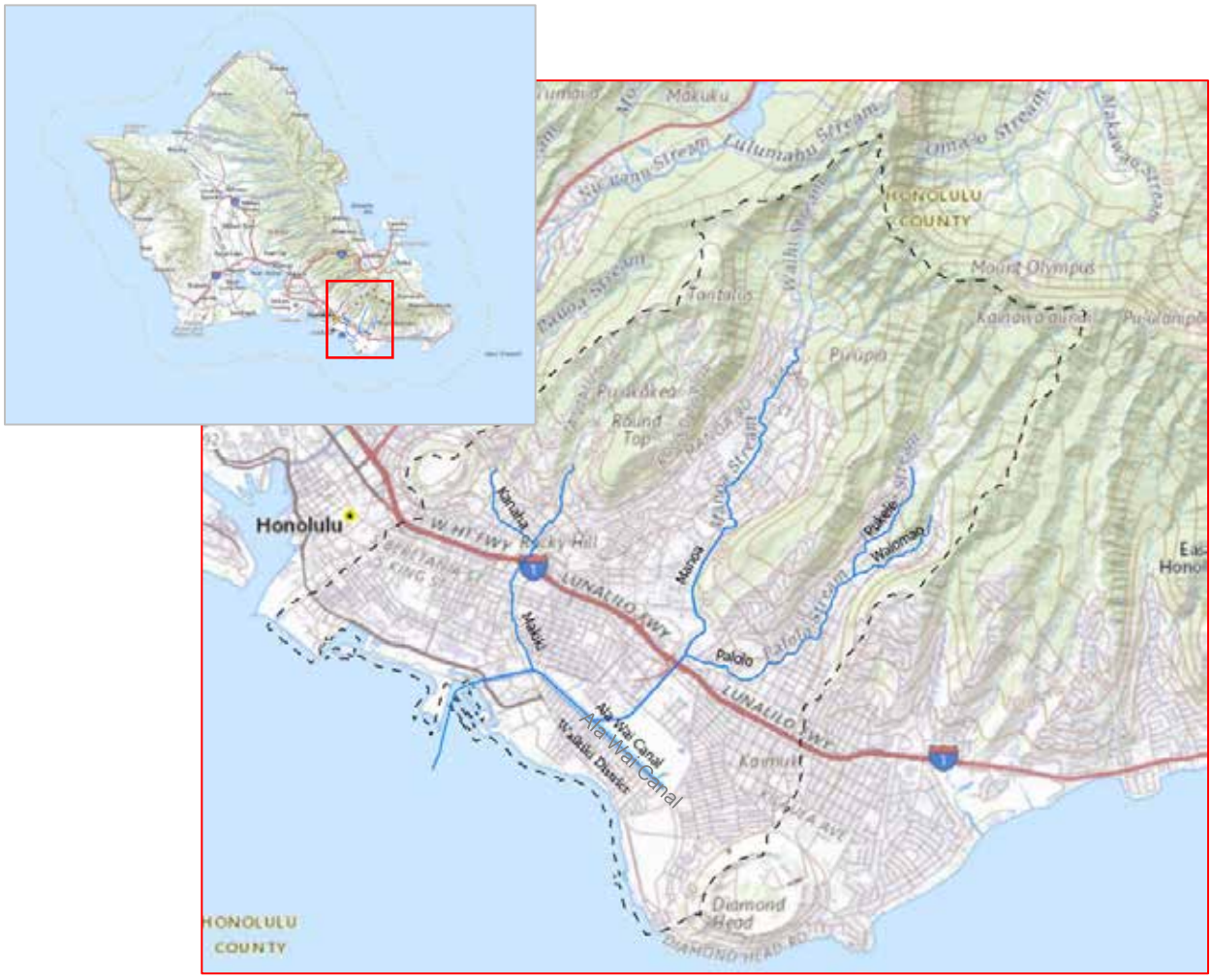


Figure 1-1: Location of Ala Wai Watershed, O‘ahu Hawai’i

The upper reaches of the basin are very steep and rocky and incised into the Ko’olau Volcano. This portion of the watershed ranges from 40 to approximately 2400 feet in elevation [1]. The Makiki and Manoa basins typically receive more than 160 inches of rain annually, while the Palolo valley receives less. The lower portion of the basin is much less steep and is extremely urbanized. Significant portions of the lower watershed are impervious surfaces, with sewer system drainage actively directing most of the runoff in less intense events. The drainage area encompassing Ala Wai Canal and Waikiki receives about 30 inches of annual rainfall. High-Intensity rainfall on steep slopes of the small drainage basin can produce very flashy flood events in the lower basin. Time to peak is usually less than 1 hour and even for large intense storms, the rise and recession of the flood hydrograph usually occurs with 6 hours.

[1] Unless otherwise specified, elevations herein are in feet referencing Local Mean Sea Level (LMSL), Tidal Epoch 1983-2001 (commonly referenced by midpoint date as LMSL 1992).

1.4.2. Historical Context and Weather Phenomenon

The Ala Wai canal overtopped and previously flooded Waikiki during the November 1965 and December 1967 storms, as well as during the passage of Hurricane Iniki in 1992. In October 2004, a storm flooded Manoa Valley, causing $85M in damages to the University of Hawai'i, including the loss of irreplaceable documents in one of the libraries. Additional flooding occurred in March 2006 as part of an extended rain event caused by a developing La Niña pattern (NOAA National Weather Service, 2006). La Niña cycles tend to amplify and extend the winter wet season, creating above normal rainfall and frequency of thunderstorms (Bravender, 2011). Hurricanes have not historically posed a significant threat of headwater flooding from long duration, intense precipitation. Due to the location of the Hawaiian Islands in the Pacific relative to a high-pressure feature to the northeast, large storms are usually deflected or weakened before they approach the region. Cooler waters also play a role in weakening tropical systems that track through the area (Puleo, 2020).

Kona lows are more typical storm events affecting the watershed and the Hawaiian Islands generally. The word "kona" is Hawaiian for "leeward" which means the side of an island that is usually sheltered from prevailing trade winds and associated rainfall; the trade winds typically come from the northeast to east-northeast. Kona lows are subtropical storms that occur during the cool season in the north central Pacific. Historically kona lows bring abundant moisture from the southwest which can produce significant precipitation in multiple forms (e.g., rain, snow, hail) in short time periods, leading to flash flooding and other related storm damages (Mossison & Businger; NOAA NESDIS, 2021).

The Hawaiian Islands are also subjected to extreme astronomical tidal events. King Tides are the highest tides of the year caused by the moon's orbit bringing it closer to Earth than at other times of the year. In the Hawaiian Islands, this generally occurs in July and August and again in December and January in conjunction with new moons and full moons, such that the gravitational forces of the sun and moon are compounded. The timing of these extreme water level events can be anticipated through the use of tidal predictions, yet their impacts can have devastating consequences for coastal inhabitants, particularly when combined with severe weather or high wave events (University of Hawai'i).

2. Hydrology

2.1. Review of MMC model

For this reevaluation effort, H&H Project Delivery Team (PDT) members reviewed the background modeling and the most recent hydrologic model updates conducted by the MMC as part of the Validation study (See paragraph 1.2.1 above). This review affirmed the methodology performed in this most recent analysis as appropriate or exceeding that necessary for the purposes of a establishing the baseline existing conditions, future-without-project (FWOP) conditions and screening of potential mitigation measures and alternatives. The ability to further calibrate the model was limited by minimal gage data for the few significant historical storm events that have affected the watershed. Any additional calibration effort would have required repeating the HEC-WAT Monte Carlo simulation and data processing with minimal (if any)

expected change to peak discharges but would have potential significant schedule impacts. It was determined that the Validation Study results were appropriate for the General Reevaluation Study.

2.2. December 2021 Kona Low

An unusual December storm was experienced throughout Hawaii on 6-8 Dec 2021. See also Section 1.3.1 for background on this phenomenon. The following is an excerpt from National Weather Service (NWS) report on the event:

> "A strong kona low developed northwest of the main Hawaiian Islands and produced heavy rainfall and strong winds over many areas of the state. The main rain band hit the Big Island first on Sunday, December 5, then shifted slowly westward across the island chain over the next two days. Rainfall totals were greatest over the southeastern flank of the Big Island, the south- and west-facing slopes of Haleakala, and most of Oahu,…"
> (https://www.weather.gov/hfo/konaLowDec2021)

At the request of the local sponsor for use in communication with local media, the H&H PDT examined gage records, published frequency information, and prior study information to assign an estimate of the return frequency for this event. It should be noted that this analysis exclusively focused on the Ala Wai watershed (Manoa, Palolo and Makiki subbasins) and may not be representative of other portions of Oahu or Hawaii. Based on both a precipitation frequency analysis and flow frequency analysis of gages within the basin, the storm event can be characterized as approximately a 20% AEP (commonly referred to as a “5-year”) event. Analysis of five precipitation gages and six discharge gages was performed in order to gain an overall understanding of the storm event and the watershed response, given that any individual result can be highly localized and not reflective of the overall event. Based upon the analysis of the precipitation gauges, the event 24-hour totals were generally consistent across the entire watershed, ranging from 7.79 inches to 8.89 inches. (See also Addendum D to this Appendix for more details on this event.)

Based upon available news reports and social media posts, with additional documentation by local PDT personnel, street flooding was the primary impact. Flooding also damaged the Iwilei Power Substation and an underground transmission cable, which is located just northwest of the watershed boundary, causing a power outage that affected much of the metropolitan area. Several water rescues also occurred, and other non-flooding damages (such as downed trees and mudslides) were observed. Precipitation and associated damages appear to be slightly greater in the Makiki watershed than the Palolo and Manoa watersheds. The general range in precipitation frequency is consistent with the runoff frequency estimates. When considering both sets of data, characterization of the storm overall as a 0.20 annual exceedance probability (“5-year”) event is a good estimate. The reports of primarily street flooding and minimal other damages also seems consistent with the estimated annual exceedance probability. See Addendum D for an expanded discussion of this event and the analysis conducted.

3. Hydraulic Model

As described in Section 1.2.2, the MMC updated a HEC-RAS model of the Ala Wai Watershed was updated to a 1D/2D unsteady model for the Validation Study using HEC-RAS version 5.0.7. That version of the hydraulic model went through DQC and an ATR. Due to the complex nature of the system and the model, it was determined that the General Reevaluation Study would use the base model from the Validation Study and only update the model to account for major changes due to new data available and to update the model to HEC-RAS version 6.2.

The Validation Study used USGS Lidar Data, Diffusion Wave equations in the 2D areas due to the mostly steep terrain and the gravitational forces, and channel data from the previous 1D hydraulic models.

The Validation Study model was updated utilizing HEC-RAS version 6.2, to incorporate new terrain data for more accurate flow conveyance and mapping (2019 Lidar of Ala Wai Canal), validated hydrologic parameters and methodology, verified and modified hydraulic structures based on site visits, validated the model with the DEC 2021 Kona Low, incorporated interannual variability into sea level rise assumptions for downstream boundary conditions, and analyzed coincident tidal and riverine flooding/sensitivity in the lower watershed.

3.1. Hydraulic Model Setup

The Ala Wai Watershed hydraulic model includes the Ala Wai Canal, the Makiki Stream, the Kanaha Stream, the Manoa Stream, the Palolo Stream, the Pukele Stream, and the Waiomao Stream. The unsteady flow model incorporates 1D channels with 2D overbank area. All significant structures were included in the model, including bridges, culverts, and inline structures. Some of the longer culverts were converted to lidded cross sections to allow more cross-sections over longer lengths which increased stability. Some of the natural channel drop structures are modeled as inline structures, but some were represented by cross sections to increase stability. It should be noted that the MMC modified the downstream extent of the model to extended into the ocean so that the downstream boundary condition does not unintentionally force potential errors in the canal. Figure 3-1 shows the HEC-RAS Geometry Schematic.

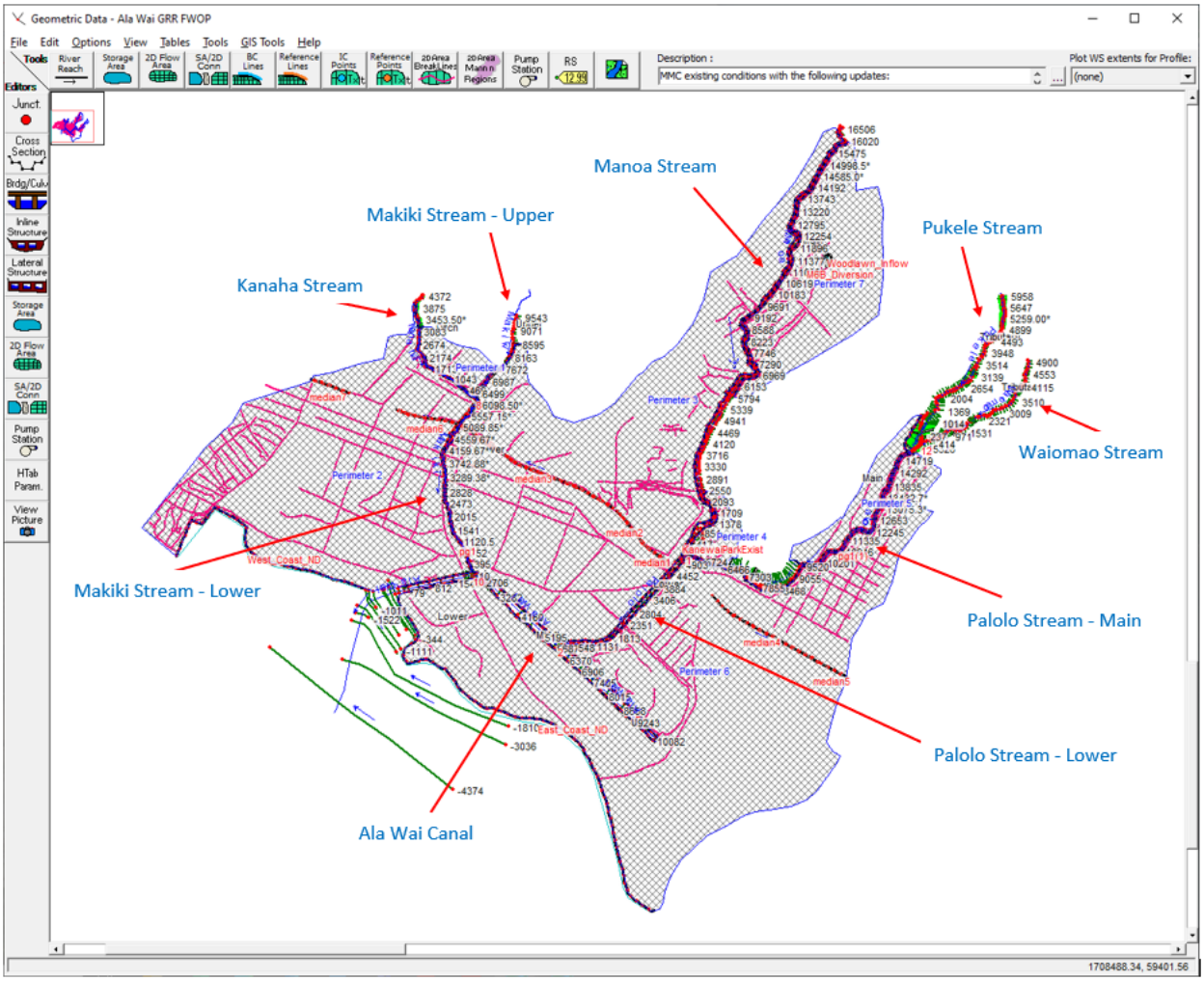


Figure 3-1: HEC-RAS Geometry Schematic

3.1.1. HEC-RAS Study Reaches

The Makiki Stream portion of the HEC-RAS model starts from the confluence with the Ala Wai Canal to a point approximately 2.0 miles upstream and includes the Kanaha Ditch Tributary from its confluence with Makiki Stream to a point approximately 0.8 miles upstream.

The Manoa Stream reach extends from the confluence with Manoa-Palolo Drainage Canal upstream about 3.1 miles to the point where the Waihi and Waiakeakua Stream tributaries meet. The Manoa Stream channel is mostly natural with some segments modified by concrete channel or stream bank hardening.

The Palolo Stream Main reach extends upstream approximately 1.9 miles from the confluence with the Manoa-Palolo Drainage Canal. Upstream of Palolo Stream, the Pukele Stream and Waiomao Stream tributaries were modeled, extending 1.1 and 0.9 miles upstream. The Palolo Stream Main reach channel is mostly confined to one large concrete channel with a few segments composed of natural channels.

The Manoa-Palolo Drainage Canal is called the Palolo Stream Lower reach in the model and extends about 0.9 miles from the Ala Wai Canal to the confluence of the Manoa and Palolo Stream. This canal consists of a modified channel with segments of natural bed and banks, but mostly hardened stream banks.

The Ala Wai Canal section is modeled using three reaches from the mouth of the to the Makiki Stream confluence (Lower), from Makiki Stream to the Manoa-Palolo Drainage Canal confluence (Middle), and from the Manoa-Palolo Drainage Canal confluence to the upstream end (Upper). The Ala Wai Canal channel has a natural bottom with hardened banks and has tidal influence.

3.1.2. MMC Model Base Terrain

Topographic data for the hydraulic model is primarily based on airborne light detection and ranging (LIDAR) data. The terrain used for this study was generated from 3 different data sources. The terrain data included SHOALS (Scanning Hydrographic Operational Airborne LiDAR Survey) data for the bathymetric coastal waters, LiDAR that was originally collected prior to February 21, 2007 by Airborne1, and bathymetric survey data for the Ala Wai Canal that was conducted by Oceanit on May 12, 2008. The airborne LiDAR data was collected, processed, and verified by Oceanit and their sub consultants in late 2006 and early 2007. The LiDAR data has an accuracy of 45 cm (1.5 ft) horizontal, 37 cm (1.2 ft) vertical and was processed with 1 ft horizontal point spacing. Datum of data is NAD 1983 HARN projected into Stateplane_Hawaii_3_FIPS_5103_Feet horizontal and mean sea level vertical.

The higher quality terrain was also modified to remove some bridge decks that were not properly removed so that water could move freely in these areas. In addition, the channel data from the existing HEC-RAS cross-sections was used to burn-in channel bathymetry in the terrain to provide improved mapping for the channels.

3.1.3. Ineffective Flow

The cross-sections are mostly contained to the channel extents for most areas, so ineffective areas were not necessary for most of the modeled cross-sections. However, any ineffective areas that were used in the previous model where the full cross-sections were retained (i.e. upper reaches of Kanaha, Makiki, Pukele, and Waiomao), the ineffective areas were preserved. In addition, some ineffective areas located around bridges and within the new reduced cross-section footprint, were also preserved.

3.1.4. Manning's "n" Roughness

The Manning’s n-values in the HEC-RAS hydraulic model were determined based on-site visits conducted by personnel from MMC, HEC, and POH for the different reaches for the Validation Study. The site visits were conducted 6-8 November 2018. Due to the lack of calibration data throughout the watershed, the roughness was estimated based on a consensus of several senior hydraulic engineers that participated in the site visits to ensure reasonable values were used for the channels. Since the 1D cross-sections were only used to model the channel portion, a composite ‘n’ value was used for the entire channel portion which would include the sides of the channels.

The range of Manning’s n-values used can be roughly characterized by channel description. Natural stream channels with minimal vegetation in the channel, steep banks, trees and brush

on banks, and bottoms consisting of gravels, cobbles, and few large boulders were given values from 0.04 to 0.08. Natural channel sections that were uniform and contained smooth graveled beds were given a value of 0.028. The Ala Wai Canal was given an n-value of 0.03. Lined or concrete channels were given a value of 0.022 to 0.025. For concrete lined channels on the Palolo, the roughness was estimated to be approximately 0.022 due to the aged concrete, exposed aggregate, and steepness. For Makiki, concrete lined channels were given a value of 0.025 due to the sedimentation, plant growth along the wall, and the rougher side walls that were made with lava stone. The majority of overbank areas in mixed urban areas or overland flow areas were given values of 0.07 to 0.125. The overbank values varied based on the land use type in the overbank. For example, overbank cross-sections that intersected open park areas had a lower value compared to those that more vegetation or higher density of buildings.

The roughness of the 2D areas were based on the 2011 Coastal Change Analysis Program (C-CAP) Land Cover for Oahu. The land cover data was supplemented with building footprints from a 2009 dataset from the National Geospatial-Intelligence Agency (NGA). Manning’s roughness for some land cover fields were estimated using values from Zhang, K & Yuepeng, L. 2017 “Transition of the Coastal and Estuarine Strom Tide Model to an Operational Model for Forecasting Storm Surges” Florida International University. Figure 3-2 shows the values used for the 2D land cover data. More information on the Manning's "n" values in the model can be read in the Validation Study Hydraulic Engineering Report.

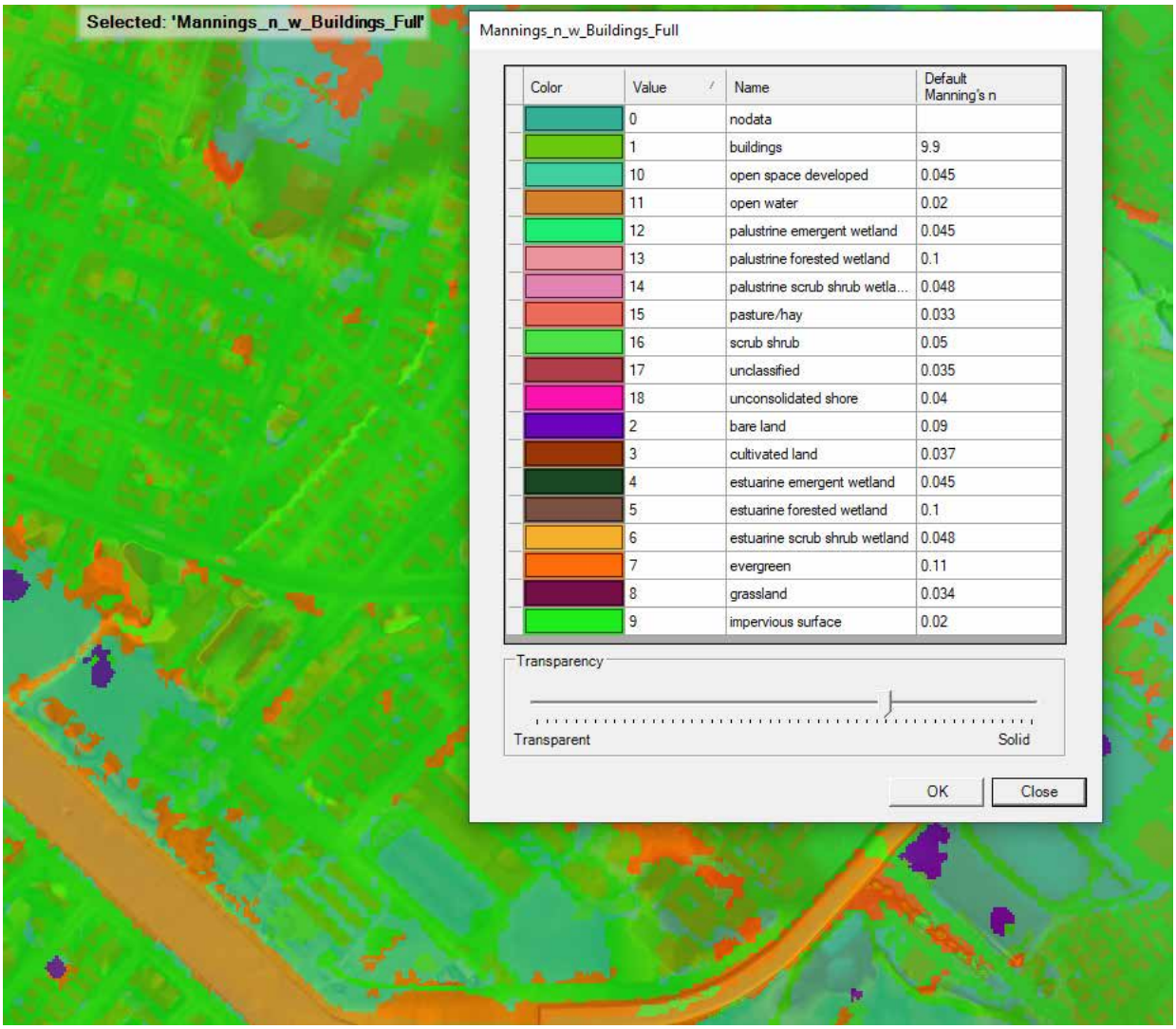


Figure 3-2: Manning's "n" Layer in RAS Mapper

3.1.5. Lateral Structures

The base MMC hydraulic model has lateral structures that utilize both 2D equations and weir equations, with weir coefficients set for both. During the alternative modeling, it was discovered that when using culverts in lateral structures, HEC-RAS switches to always use the weir equation, even if 2D equations are selected. HEC says this is intentional and not a bug as adding culverts imposes another boundary condition on the lateral structure that is not compatible with the 2D equations. The software fix will likely be to grey out the 2D equation button when culverts are added, but that won't take effect until HEC-RAS v 6.4 or later. HEC recommends using the weir equation for lateral structures when flow goes through critical depth (such as flow overtopping a floodwall).

As the existing base MMC model uses lateral structures to represent ground elevations to connect cross section overbank ground elevations to the 2D area ground elevations, the issue of flow going through critical depth and the need for lateral structure weir equations is not seen as a critical concern by the H&H modeling team as the flow is generally not going through a drop and critical depth. After some investigation and trial runs, it was determined by the H&H modeling team that the existing FWOP geometry would not be changed, and the lateral structures would be modeled using both the 2D equations (when representing ground elevations) and weir equations.

For the With Project alternatives modeling, all lateral structures that are being used as floodwalls, whether or not there are culverts, will use the weir equations with a weir coefficient of 2.0 to represent the structure and that the flow is going through critical depth when it flows over the top. All of the lateral structures that are not modified as part of a floodwall measure, but represent the ground elevation, will be kept the same as the FWOP with 2D equations. As the floodwall measures are creating a different hydraulic condition, the difference of weir equations for the lateral structures as floodwalls is justified.

3.1.6. Boundary Conditions

As Section 2.1 describes, a review of the Validation Study Hydrologic Analysis was conducted, and it was determined that the hydrograph inputs from the Validation Study were still appropriate for this GRR Study. The DSS file of the finalized HEC-WAT balanced hydrographs from the Validation Study was used for the GRR Study.

As the hydrologic analysis did not need to be updated, all of the model inflow hydrographs stayed the same as the Validation Study except for the downstream boundary conditions for the Ala Wai Canal. That downstream boundary conditions analysis is described below in Section 3.5 Downstream Boundary Conditions. A full write up of the HEC-RAS unsteady flow boundary conditions used in the MMC model can be found in the Validation Study Hydraulic Modeling Report located in Addendum C, but a table of the hydrologic inflows into the hydraulic model can be seen below in Table 3-1. These inputs match the Validation Study boundary conditions for without project conditions. The GRR study uses these inflows for both the future without project conditions and for the with project conditions.

Table 3-1: HEC-RAS Boundary Conditions - Unsteady Flow Hydrologic Inputs

HEC-RAS				HEC-HMS	
River	Reach	River Station(s)	Type	Element Name	Type
Ala Wai	Upper	10082	Flow Hydrograph	JA1	FLOW
Kanaha	Ditch	4372	Flow Hydrograph	K2A	FLOW
Manoa	Main	16506	Flow Hydrograph	JUNCTION-5	FLOW
Pukele	Tributary	5958	Flow Hydrograph	JP1	FLOW-COMBINE
Waiomao	Tributary	4900	Flow Hydrograph	P2	FLOW
Ala Wai	Upper	9724 - 6370	Uniform Lateral inflow	A6?W3	FLOW
Ala Wai	Middle	5687 - 5195	Lateral Inflow Hydr.	A4	FLOW
Ala Wai	Middle	4676 - 4160	Lateral Inflow Hydr.	RA1	FLOW-COMBINE
Ala Wai	Middle	5195 - 2513	Uniform Lateral inflow	A2	FLOW
Ala Wai	Lower	812 - 440	Lateral Inflow Hydr.	A8	FLOW
Ala Wai	Lower	1188 - 79	Uniform Lateral inflow	W1	FLOW
Kanaha	Ditch	4278 - 200	Uniform Lateral inflow	K2B	FLOW
Makiki	Upper	7760 - 7672	Lateral Inflow Hydr.	K3	FLOW
Makiki	Lower	4716 - 3176	Uniform Lateral inflow	K5	FLOW
Manoa	Main	16458 - 11951	Uniform Lateral inflow	M3	FLOW
Manoa	Main	12795 - 11112	Uniform Lateral inflow	M4	FLOW
Manoa	Main	10968 - 10871	Lateral Inflow Hydr.	WOODLAWN SEWERSYSTEM	FLOW
Manoa	Main	11039 - 9501	Uniform Lateral inflow	M7	FLOW
Manoa	Main	10429 - 10309	Lateral Inflow Hydr.	M8	FLOW
Manoa	Main	9192 - 9116	Lateral Inflow Hydr.	M9	FLOW
Manoa	Main	8871 - 7734	Uniform Lateral inflow	M10	FLOW
Manoa	Main	7653 - 6241	Uniform Lateral inflow	M11	FLOW
Manoa	Main	2891 - 2831	Lateral Inflow Hydr.	M12	FLOW
Manoa	Main	1807 - 1765	Lateral Inflow Hydr.	M13	FLOW
Manoa	Main	1230 - 1107	Lateral Inflow Hydr.	M14	FLOW
Palolo	Main	15440 - 14412.3*	Lateral Inflow Hydr.	P5	FLOW
Palolo	Main	15134 - 9709	Uniform Lateral inflow	P6	FLOW
Palolo	Main	9520 - 5525	Uniform Lateral inflow	P7	FLOW
Palolo	Lower	4352 - 4233	Lateral Inflow Hydr.	A3	FLOW
Pukele	Tributary	3514 - 237	Uniform Lateral inflow	P4	FLOW
Makiki	Upper	9543	Flow Hydrograph	K1	FLOW
Makiki	Lower	6279.67*	Uniform Lateral inflow	K4	FLOW
Makiki	Lower	3062 - 203	Uniform Lateral inflow	K6	FLOW
Ala Wai	Lower	-4374	Stage Hydrograph	known WSEL = 3.22 ft (2080) or 2.43 ft (2030)	
2D	Perimeter 7	Woodlawn_Inflow		WOODLAWN	FLOW-LOCAL
2D	Perimeter 7	M6B_Diversion		WOODLAWN SEWERSYSTEM	FLOW-DIVERSION
2D	Perimeter 2	West_Coast_ND		s = 0.001	
2D	Perimeter 6	East_Coast_ND		s = 0.001	

3.2. Updates to MMC Model

This GRR study utilized the Validation MMC model as a base, with updates made based on updated capabilities of the modeling software, updated terrain and survey data, observed data and measurements, and updates to evaluated future conditions sea level rise and interannual variability.

The HEC-RAS hydraulic model was updated to run in HEC-RAS version 6.2, as there were some significate changes to the modeling software between HEC-RAS version 5.0.7 and 6.2.

New terrain data was incorporated into the modeling terrain for more accurate flow conveyance and mapping using new Lidar of the Ala Wai Canal and the immediate overbank from 2020 and post dredge Bathymetric survey data from 2021.

Observations and field measurements were taken while on a project site visit, and some changes were made to the model, especially a change to the Manoa Palolo Canal to add in the H1 West Bound off ramp pier located just downstream of the H1 interstate and upstream of King Street.

The hydraulic model was verified to the December 2021 Kona Low flooding to increase confidence of within-bank flows.

The hydrologic inflows used in the Validation Study were directly used in the GRR study. Due to the changes listed above, the minimum flows that were used in the Validation Study for model stability had to be increased for the GRR study. While these minimum flows are required for the numerical modeling, they do add some uncertainty to the modeled results, especially for the lower, more frequent flood flows. While all of the minimum flows were less than the 50% AEP event peak flood flows, this does overestimate the volume of flood water for the smaller, more frequent flood events. This becomes minimal impact for the larger flood events.

And finally, the future conditions sea level rise to include interannual variability was evaluated, a correlation analysis between the NOAA coastal gage and the USGS riverine gages was conducted, and a sensitivity analysis of tidal events on the lower watershed was conducted in order to determine the most appropriate downstream boundary conditions.

3.2.1. New Survey/Terrain Data

As part of the 2020 Ala Wai Canal Flood Risk Management Project's Topographic Survey/Mapping, Geotechnical, and Sediment Sampling Data Collection effort completed by contract from Sam O. Hirota, Inc (Hirota 2020), an updated lidar DEM terrain of the Ala Wai Canal was created. The project extents from this data collection effort is shown in Figure 3-3. That updated lidar data was used to update the Ala Wai Watershed terrain.

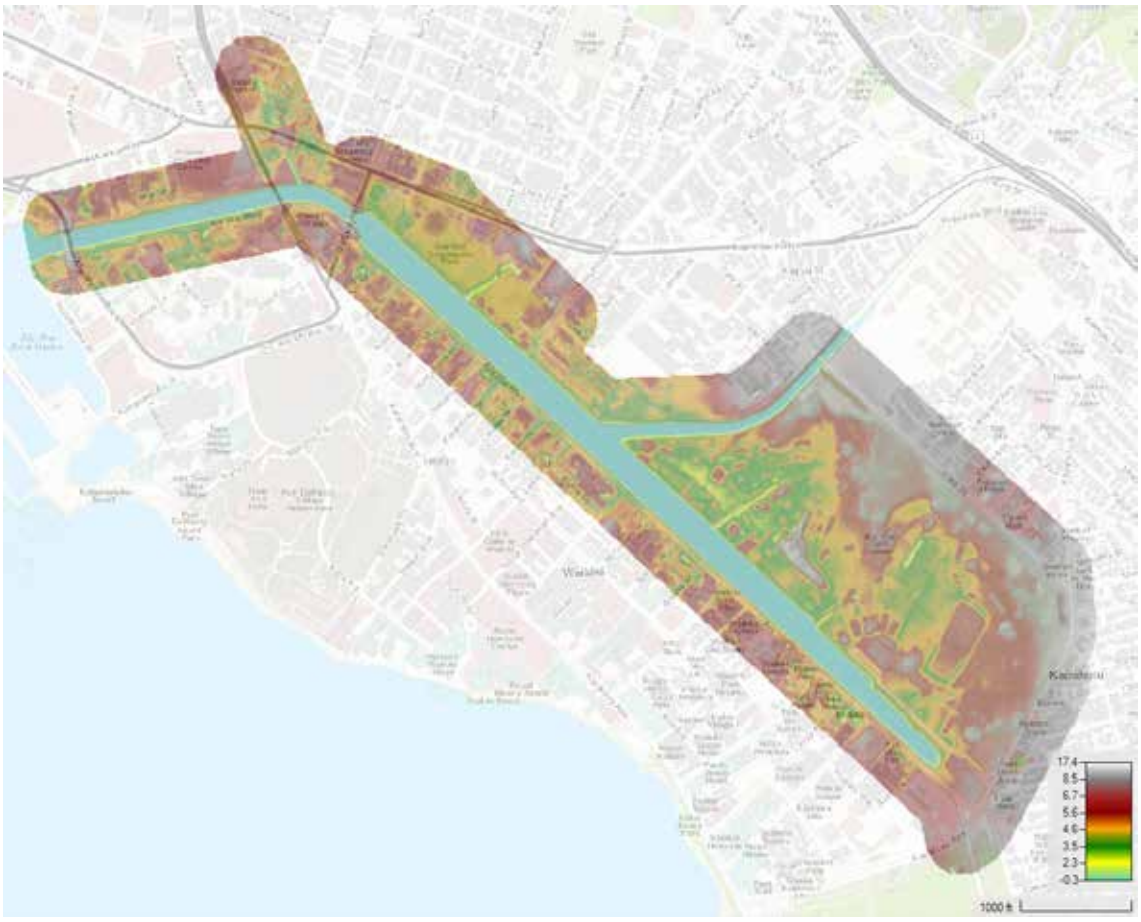


Figure 3-3: Hirota's 2020 Topographic Survey/Mapping Project Extent

The State of Hawaii Department of Land and Natural Resources dredged the Ala Wai Canal in 2021. As part of that effort, a post dredging topographic survey of the Canal was conducted (DLNR 2021). See Figure 3-4 for the extents of the bathymetric survey. That updated bathymetric data was used to update the Ala Wai Watershed terrain.

Figure 3-4: DLNR Post-Dredge Survey Extents (black area)

To incorporate these two new data sets into the HEC-RAS terrain data, the two new terrain layers, the Hirota 2020 Lidar terrain and the post dredge survey terrain, along with the existing terrain layers, the channel terrain and the base LiDAR terrain. The post dredge survey terrain was set as the top priority, followed by existing channel terrain dataset, followed by the Hirota Lidar, and then finally the base LiDAR terrain. HEC-RAS created a tiled terrain dataset using all the provided terrain datasets. You can see the MMC terrain data in Figure 3-5 and the updated terrain in Figure 3-6.

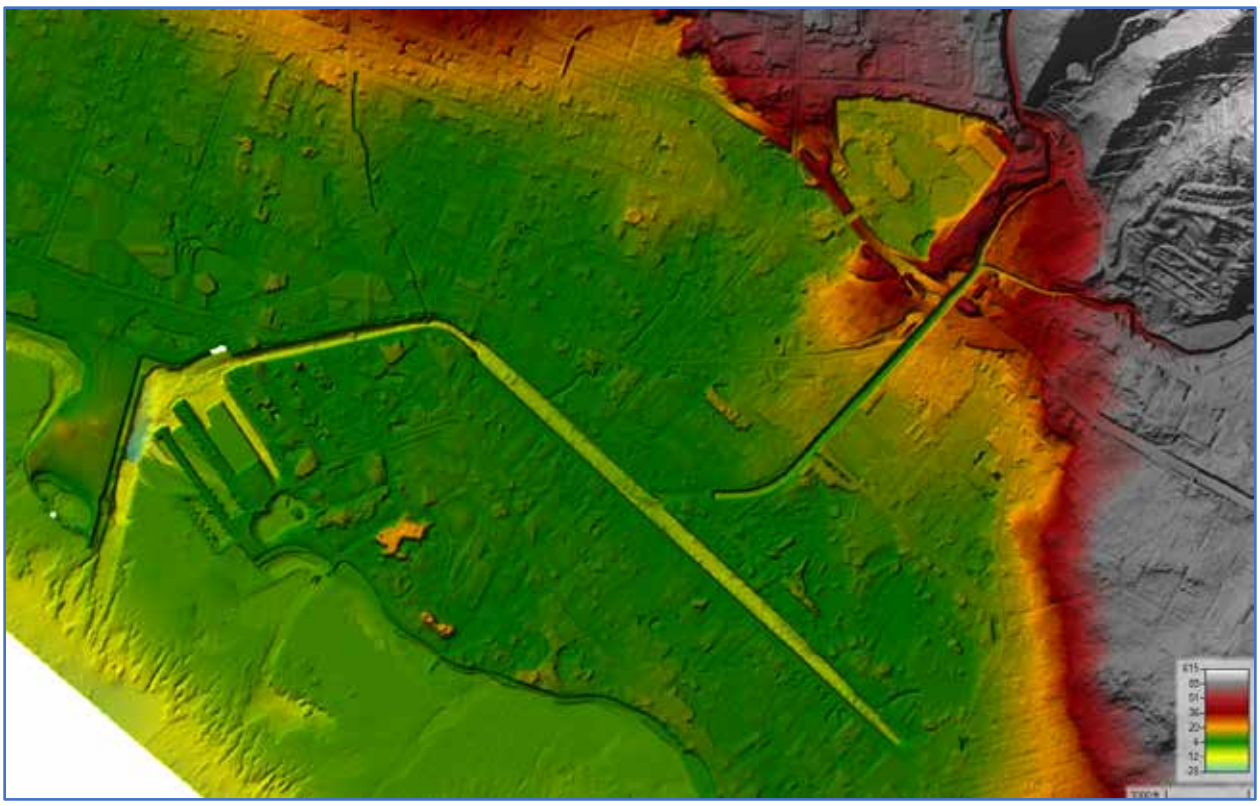


Figure 3-5: Terrain Data used in the MMC HEC-RAS Model

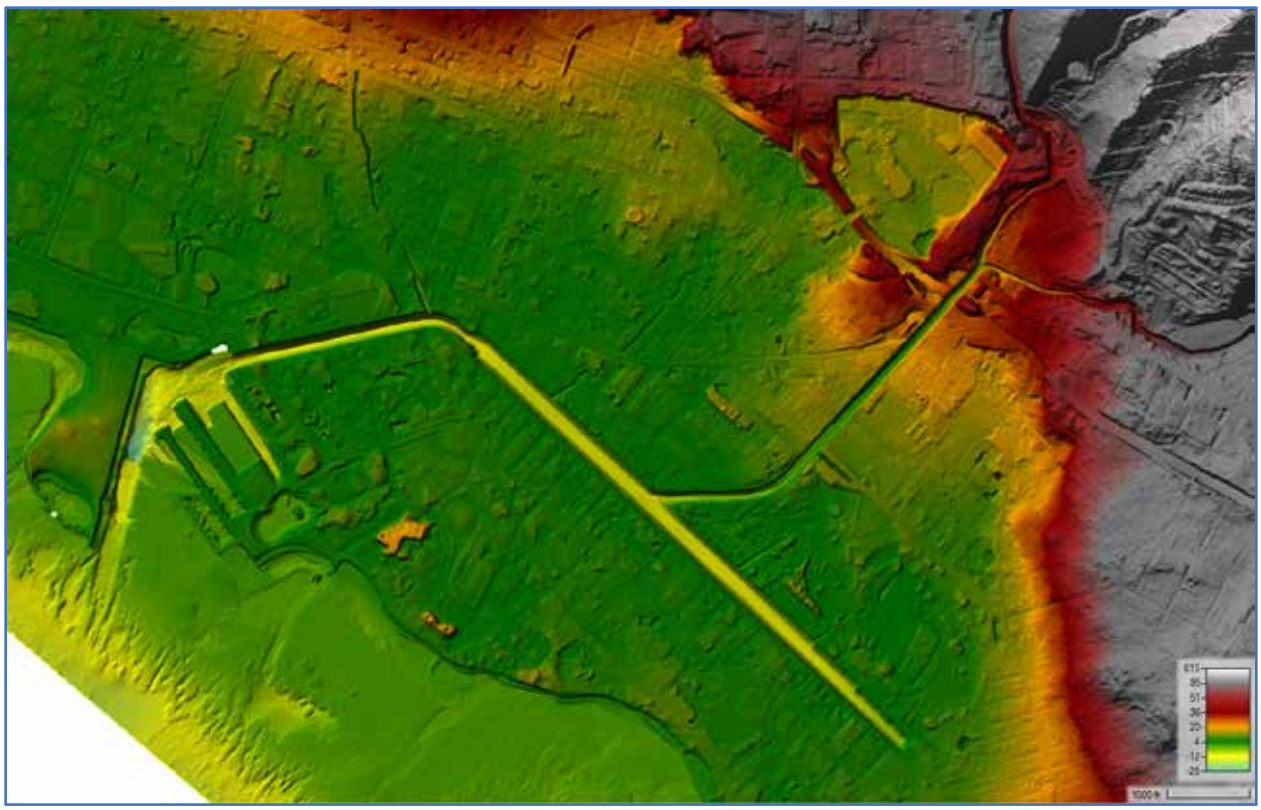


Figure 3-6: Terrain Data used in the Updated HEC-RAS Model

The only changes to the terrain data is near the Ala Wai Canal, but those changes due to the new data available after the Validation Study made some big changes in the Ala Wai cross sections and in the lower 450 feet of the Makiki Stream. An example of that change for the Ala Wai Canal in shown in Figure 3-7, and an example of the change in terrain for the lower Makiki Stream is shown in Figure 3-8.

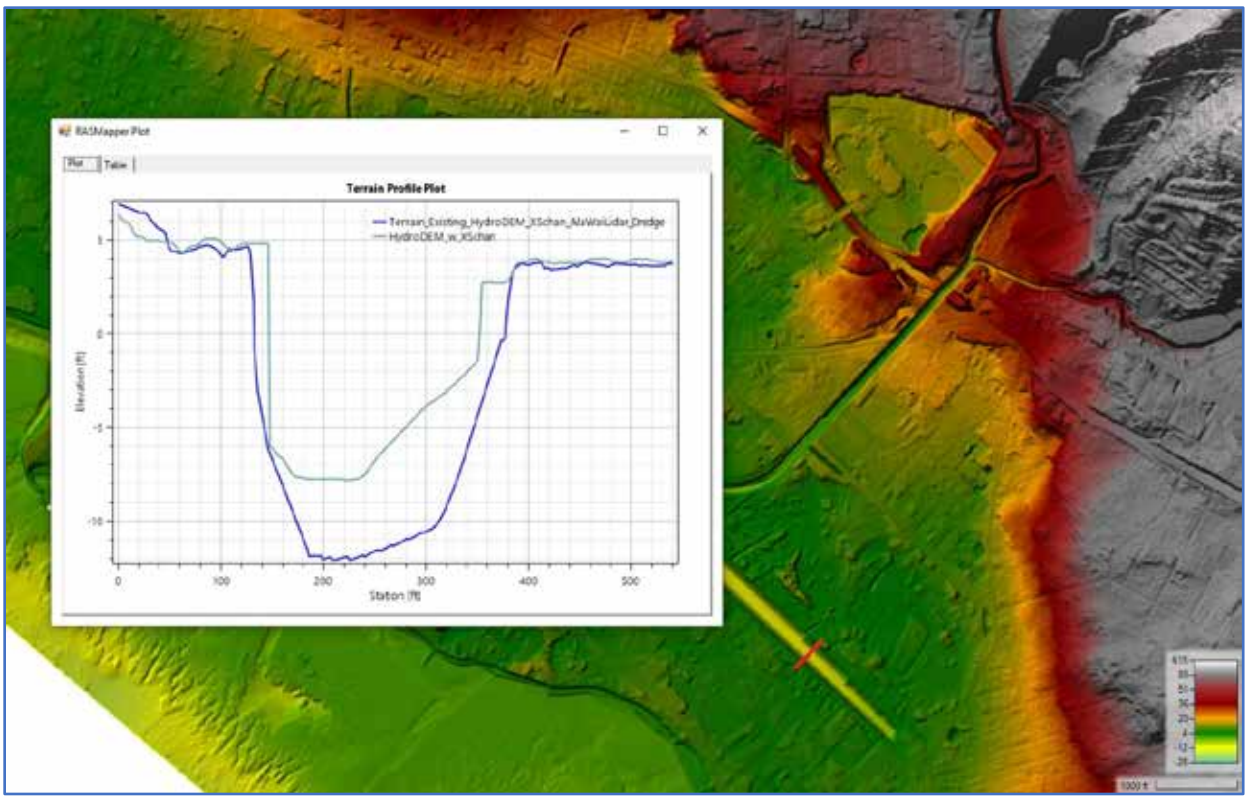


Figure 3-7: Example of Terrain Difference on the Ala Wai Canal, the cyan line is from the Validation Study terrain and the dark blue line from the modified terrain.

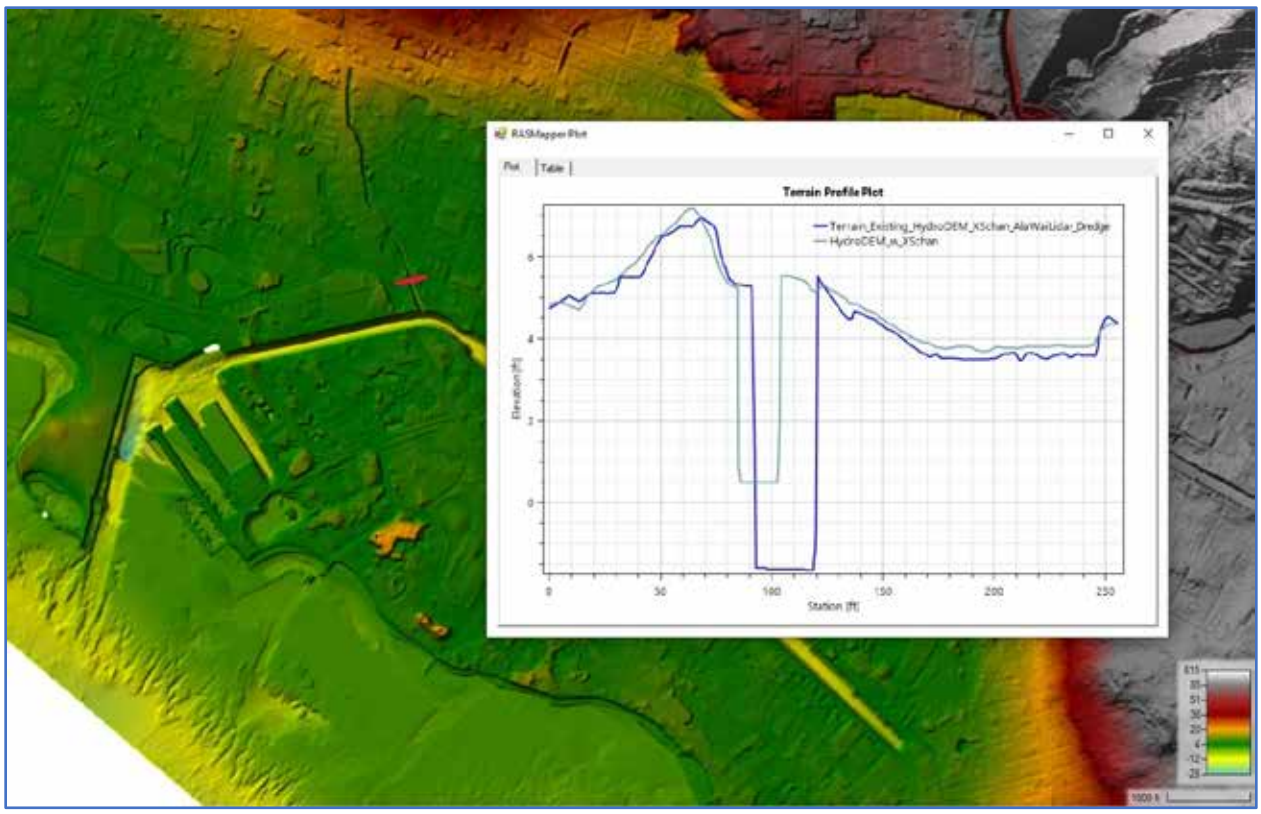


Figure 3-8: Example of Terrain Difference on the Makiki Stream near the Confluence with Ala Wai Canal, the cyan line is from the Validation Study terrain and the dark blue line from the modified terrain.

The updated Lidar data along the Ala Wai Canal and the updated post dredge survey bathymetric data was used to modify the canal, as they were the best available data provided and they collaborated the fact that the modeled canal width of the Ala Wai Canal was off by over 30 feet in the upper sections and the model was off near McCully Bridge; the decision to use the post dredge bathymetric data was coordinated with the PDT with no objections. There is some risk associated with using the surveyed post dredge bathymetric data, however. There is a gradual reduction of depth and associated conveyance area in the canal as time goes on due to sediment buildup before the next dredging occurs. A sensitivity of the post dredge survey channel vs the MMC model channel representing a large sediment buildup was conducted to see the possible range of water surface elevations that can occur during the canal sediment cycle of filling up, and then dredging again. For the modeled future without project 10% AEP flood with full sedimentation in the canal, there is up to a 0.5 foot increase to the Upper Ala Wai Canal water surface elevations, and for the modeled future without project 1% AEP flood with full sedimentation in the canal, there is up to 1.5 foot of increase due to sediment. It is assumed that the canal will continue to be dredged, as needed, for sediment maintenance. Sedimentation of the Ala Wai Canal will be a risk factor during the Risk Assessment and during PED phase.

3.2.1.1. Model Updates due to Updated Terrain/Survey

After the Ala Wai Watershed existing conditions terrain data was updated with the two new data sources, the HEC-RAS hydraulic model was updated to more accurately represent flow conveyance and overland flooding near the Ala Wai Canal. A list of the changed made are shown below:

Ala Wai Canal channel geometry updated from the 2020 Hirota Lidar and the 2021 DNLR post dredge survey. This changed the modeled channel width from 220 ft to actual 250 ft in some reaches. The following bridges were also updated:

- Modified Ala Mona Blvd Bridge based on the 2020 Hirota survey.
- Modified Kalakaua Ave Bridge based on the 2020 Hirota survey.
- Modified McCully Ave Bridge based on the 2020 Hirota survey.

Manoa Palolo Canal near the Ala Wai Canal confluence updated from the 2020 Hirota Lidar and the 2021 DNLR post dredge survey.

Makiki Canal near the Ala Wai Canal confluence updated from the 2020 Hirota Lidar. This changed the modeled channel width from 20 ft to 28-32 ft in the lower 450 feet of the reach.

Makiki Canal Ala Wai Prominade bridge added from the 2020 Hirota Lidar and survey. Bridge added as cross section with lids for model stability.

Multiple breaklines added to refine the 2D mesh.

3.2.1.2. Terrain Updates for Alternatives

The terrain for some measures were modified to include some of the proposed structures such as the Makiki District Park Detention Basin and the Manoa Detention Basin. During the screening of measures, other detention basins were also added into those terrain files. The Makiki and Manoa Detention Basins were included in the three alternatives modeled. The detention basin terrain was produced by the detention basin designers from the PDT. They provided the updated terrain from their CAD software. To incorporate this into the HECRAS terrain data, the detention basin terrain was selected as additional terrain data along with the channel terrain data, the Ala Wai post dredge channel terrain data, the Hirota 2020 Lidar data, and the base LiDAR terrain. The detention basins were set as top priority, followed by the two channel terrain datasets, the Hirota Lidar, and then finally the LiDAR terrain. HEC-RAS created a tiled terrain dataset using all the provided terrain datasets.

3.2.2. Site Visit

The technical team conducted a site visit 21–24 March 2022 for the Ala Wai Canal General Reevaluation Study. The project managers (Eric Merriam, LRP and Cindy Acpal, POH), hydraulic engineer (Shelley Tule, LRE), structural engineer (Kathy Sitko, LRC), geotechnical engineer (Samantha Schardein, LRL), and civil engineer (George Uku, LRN) visited critical areas within the Ala Wai watershed to provide the technical engineering team an opportunity to

see the study area, collect additional data required for upcoming technical analyses, and visit potential measure locations.

The team assessed the channels and bridges in the Makiki subbasin, taking numerous photos and measurements. Along the Kanaha Stream, the team specifically took measurements of the Kewalo Street bridge where the model shows a low point. The model was verified with the field measurements. Along the lower Makiki Stream, the team also noted that community members placed additional concrete blocks on the floodwall, extending its height in the area upstream of Fern Street. Several measurements were taken at the Fern Street bridge. After much discussion, it was determined that those additional concrete blocks would not be included in the model as they were not engineered, and no survey of elevations or extents were available.

The team also assessed many bridges along the Manoa-Palolo Canal. The hydraulic engineer noticed that large rocks had been deliberately piled under the Kapiolani Blvd. bridge, which could have potentially affected the hydraulic model. As the large rocks were taken from the same general cross section of the river, though, no loss of conveyance was estimated, and the model was not changed. The hydraulic engineer also noted a large bridge pier for the H-1 westbound off ramp (located upstream of the King Street bridge) that was not in the existing model. Measurements were taken in the field, and the pier was added to the hydraulic model.

3.2.3. 2D Equations: Diffusion Wave vs Full Momentum

The Validation Study used Diffusion Wave equations in the 2D areas due to the mostly steep terrain and the gravitational forces and for model stability. This General Reevaluation Study investigated the need to update the 2D area to the Full Momentum Equations, especially as the updated version of HEC-RAS now allows for not just the Full Momentum (original) equations, but the more stable Full Momentum (stricter) equations.

As it applies to this model in general, per the HEC-RAS 2D User's Manual, there are potentially a few situations where the Full Momentum equation may offer more accuracy over the Diffusion Wave equation:

1. Highly Dynamic Flood Waves – Local acceleration and convective acceleration terms lacking in the Diffusion Wave equations are important to model rapidly rising flood waves accurately. Given the terrain of the region this is exactly what we see (i.e., rapidly rising flood waves) thus the Full Momentum equation may give a better representation of overland flooding.
2. General Wave Propagation Modeling – The Full Momentum equation will provide more accuracy on wave propagation due wave run-up on floodwalls, berms, etc. within the 2D areas.
3. Detailed Velocities and Water Surface Elevations at Structures – The Full Momentum equation will provide better detail around buildings.

The other situations listed in the HEC-RAS 2D User's Manual where the Full Momentum equations are preferred do not appear to be as applicable to this model:

4. Abrupt Contractions and Expansions – As this is a combined 1D/2D model, most inline structures are modeled in 1D.
5. Flat Sloping River Systems – The terrain has a high degree of slope in the upper to middle areas and flattens as you approach the coast. However even the flatter areas of the model appear to exceed the definition of very flat (less than 1 ft/mi slope).
6. Tidally Influenced Conditions – The d/s boundary on the Ala Wai canal is held at a constant elevation for this model.
7. Super Elevation around Bends – As this is a combined 1D/2D model all the river channels are modeled in 1D.
8. Mixed Flow Regime – As this is a combined 1D/2D model all the river channels are modeled in 1D.

The Full Momentum equation can provide more accurate velocities around buildings and more accurate arrival times of flood waves, so there was a need to investigate those equations. We need confidence in is where is it flooding, and once we have confidence in that then measures can be added to the model to restrict water to the channel to lessen overland flooding. Given

this, a comparison of the area inundated, and depth of inundation should be sufficient in determining whether the Full Momentum equations offers a more accurate solution.

For comparison, a 1% AEP FWOP simulation was completed using the Diffusion Wave equation, Full Momentum Equation (original) equation, and Full Momentum (stricter) equation with everything else held constant.

Table 3-2 below provides a summary of resulting volume errors by 2D Area when run with both Diffusion Wave and both sets of Full Momentum equations with all else held constant, such as time step and 2D slicing. It should be noted that minor changes were made to the FWOP model runs since these test runs but the sensitivity analysis is still applicable.

Table 3-2: Diffusion Wave vs Full Momentum Volume Errors by 2D Area

Volume Accounting for 2D Flow Areas in Acre Feet					
	Diffusion Wave	Full Momentum (original)		Full Momentum (stricter)	
2D Area	Percent Error	Percent Error	Increase (Decrease)	Percent Error	Increase (Decrease)
Perimeter 1	0.146	0.1925	0.04650	0.1005	(0.04550)
Perimeter 2	0.2754	0.5155	0.24010	0.05244	(0.22296)
Perimeter 3	28.71	0.2123	(28.49770)	0.04279	(28.66721)
Perimeter 4	2.567	1.282	(1.28500)	1.299	(1.26800)
Perimeter 5	0.002444	0.003592	0.00115	0.002539	0.00010
Perimeter 6	18.31	5.408	(12.90200)	0.002767	(18.30723)
Perimeter 7	0.03866	0.000892	(0.03777)	0.000379	(0.03828)

The Full Momentum (stricter) equation does show a decrease in volume error (with one exception) compared to the Diffusion Wave equation.

The graphs below show the difference between the Diffusion Wave and SWE-ELM Full Momentum (original) equations and the Diffusion Wave and SWE-EM Full Momentum (stricter) equations, for maximum computed flow and WSEL along the Palolo. As can be seen, the Full Momentum simulations are generally within 1 ft of the Diffusion Wave for most of the reach. This is seen in the additional reaches as well. The exceptions (above 1 ft) are occurring primarily near junctions and inline structures. These differences could be a result of overland flow transfer back into the 1D reaches from the 2D areas, where the Full Momentum equations provide more accuracy in this transfer than the Diffusion Wave.

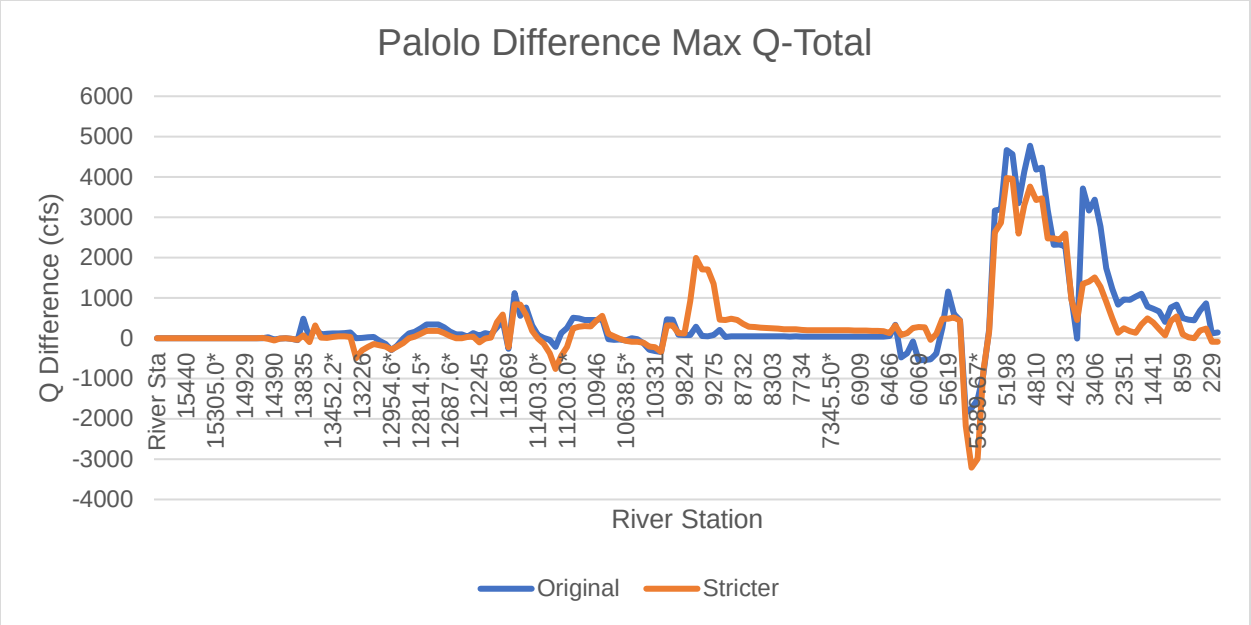


Figure 3-9: Difference of Max Discharge from Diffusion Wave vs Full Momentum SWE-EM (Stricter in orange) and SWE-ELM (Original in blue) on Palolo

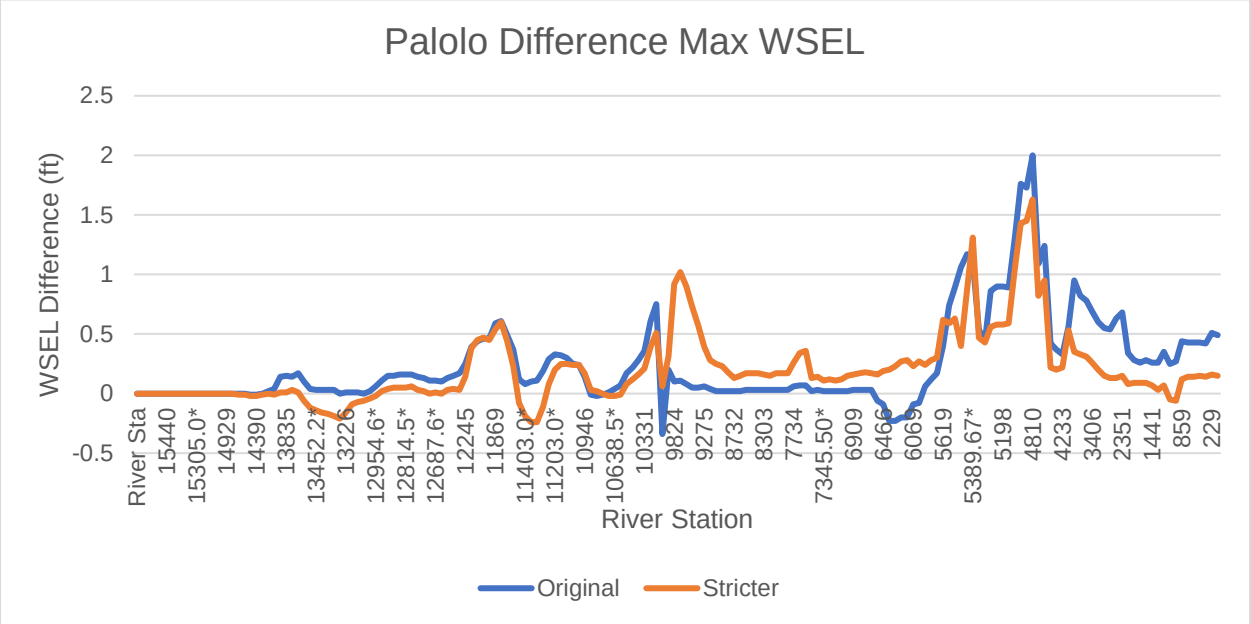


Figure 3-10: Difference of Max WSEL from Diffusion Wave vs Full Momentum SWE-EM (Stricter in orange) and SWE-ELM (Original in blue) on Palolo

Looking at inundation area of both the Diffusion Wave and SWE-ELM Full Momentum (original) equations in Figure 3-11 and the Diffusion Wave and SWE-EM Full Momentum (stricter)

equations in Figure 3-12, there are similar results, but you do see a slight increase in inundation in a few locations for both the SWE-ELM Full Momentum (original) equations (shown in pink) and the SWE-EM Full Momentum (stricter) equations (shown in green) approaches.

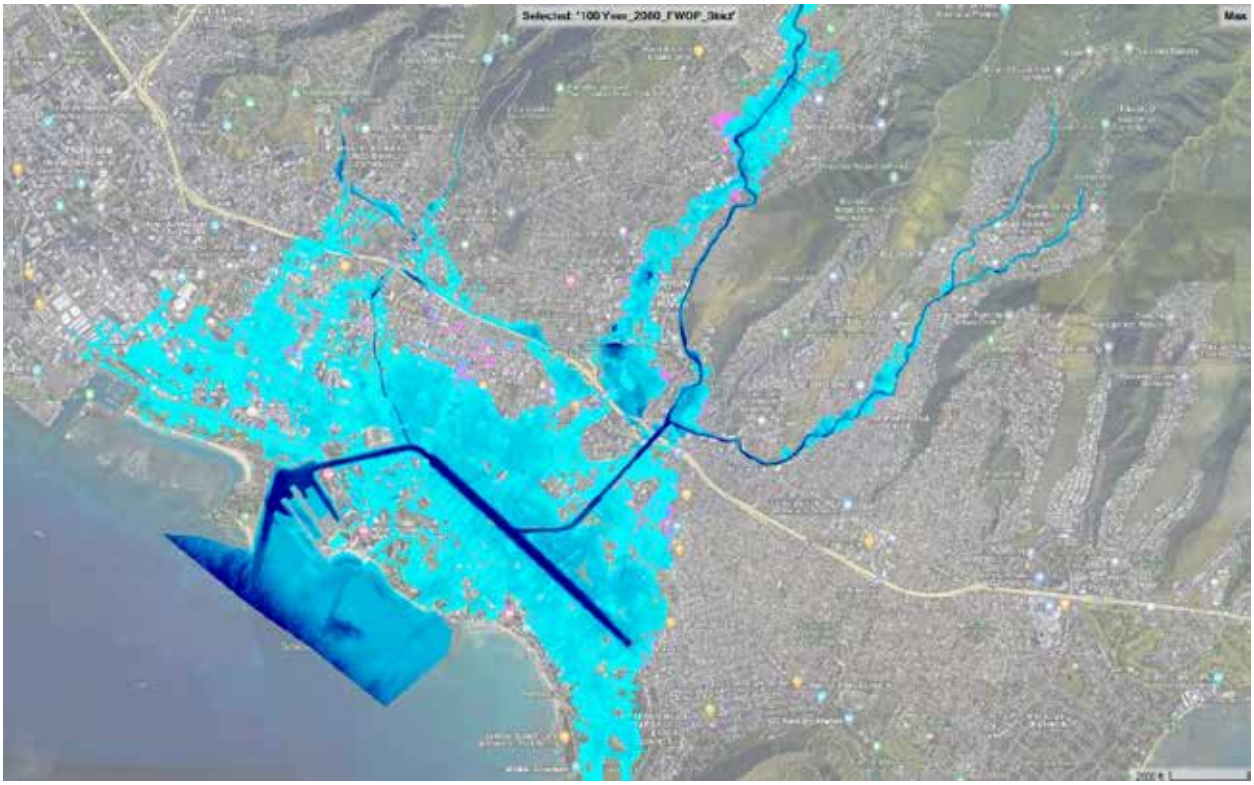


Figure 3-11: Inundation with Diffusion Wave (the blue areas) vs SWE-ELM Full Momentum (original) Equations (additional areas in pink).

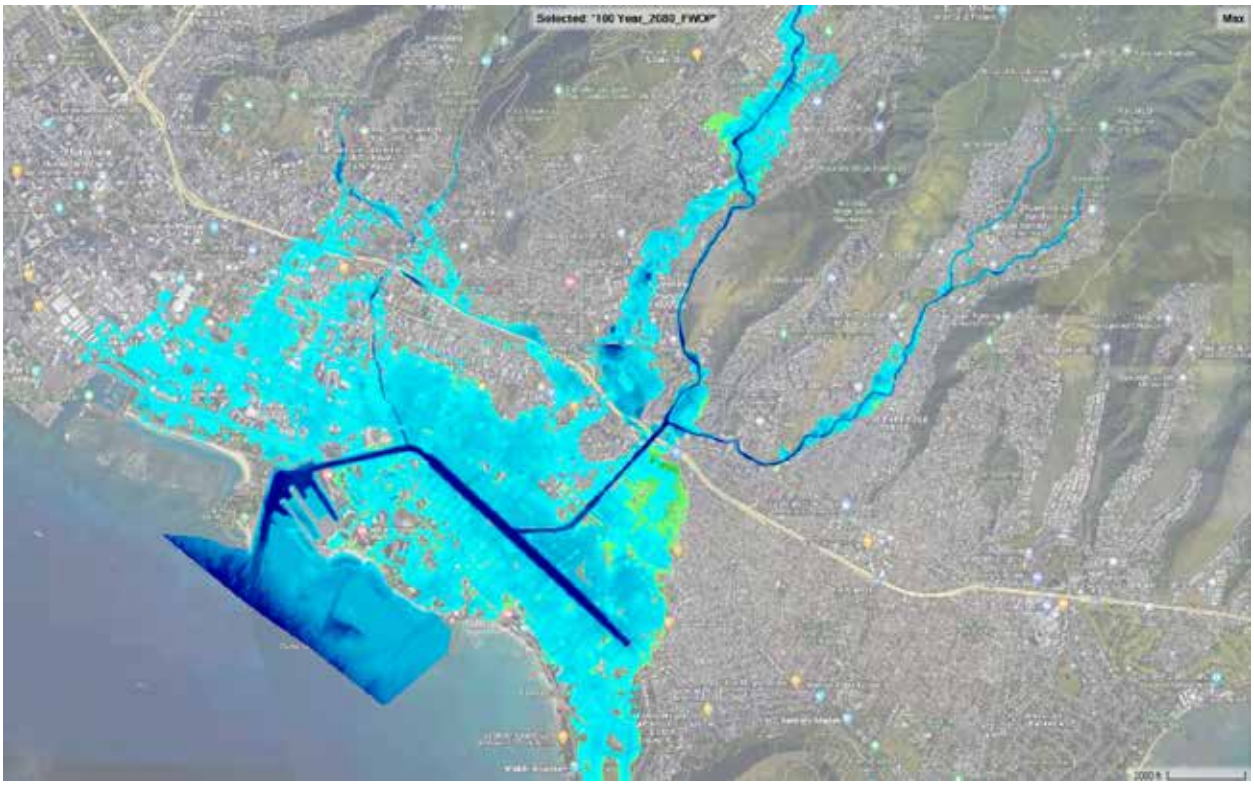


Figure 3-12: Inundation with Diffusion Wave (the blue areas) vs SWE-EM Full Momentum (stricter) Equations (additional areas in green).

Looking at inundation depth, the Full Momentum equations are generally within +/- 1 ft of the Diffusion Wave for both the SWE-ELM Full Momentum (original) equations, shown in Figure 3-13, and the SWE-EM Full Momentum (stricter) equations, shown in Figure 3-14, with orange/green areas <= 1 ft difference.

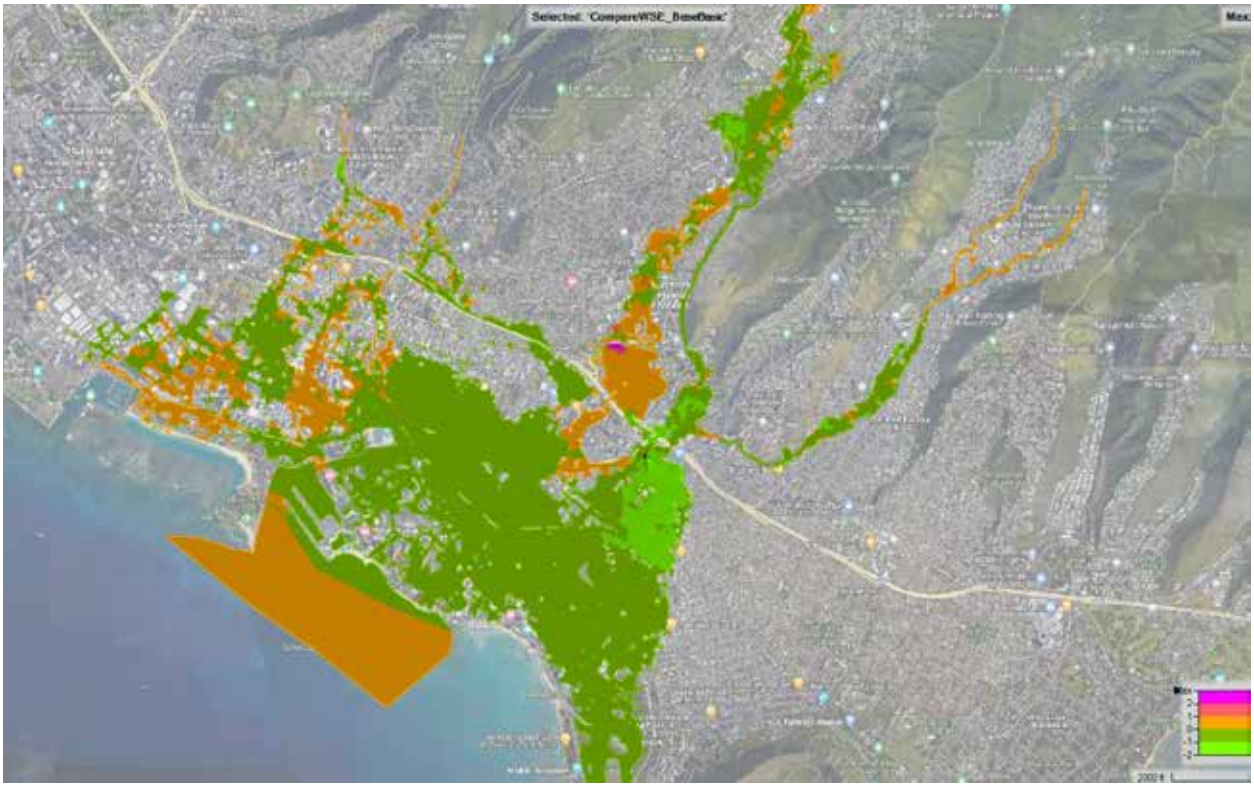


Figure 3-13: Change in inundation depths for Diffusion Wave vs SWE-ELM Full Momentum (original). The orange/green areas show <= 1 ft difference in depths.

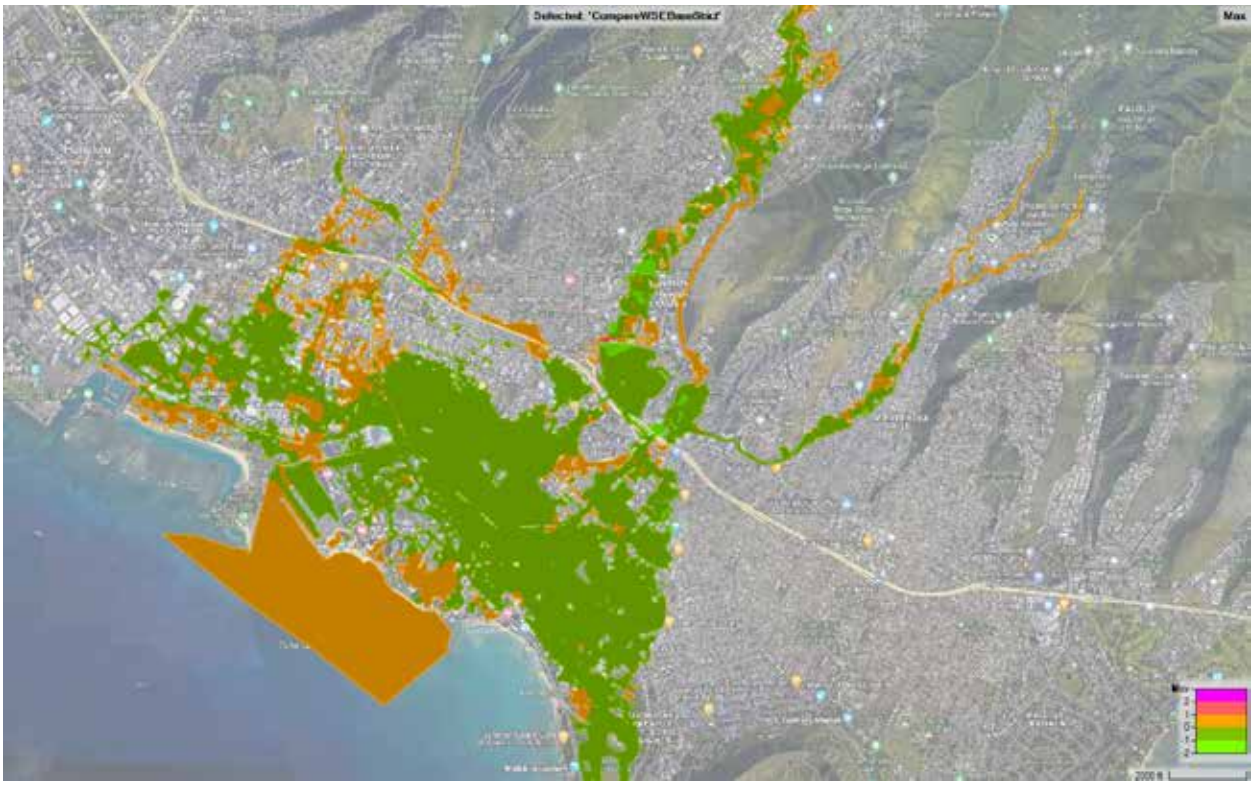


Figure 3-14: Change in inundation depths for Diffusion Wave vs SWE-EM Full Momentum (stricter). The orange/green areas show <= 1 ft difference in depths.

An area of excessively high differences was noted between the Diffusion Wave and SWE-ELM Full Momentum (original) equations in the Kaimuki High School region. This appears to be a result of some instability in the SWE-ELM Full Momentum (original) model for this 2D area. Figure 3-15 below compares the hydrograph for a cell within this region, clearly showing the instability in the SWE-ELM Full Momentum (original) equations, but stability for the SWE-EM Full Momentum (stricter) equations.

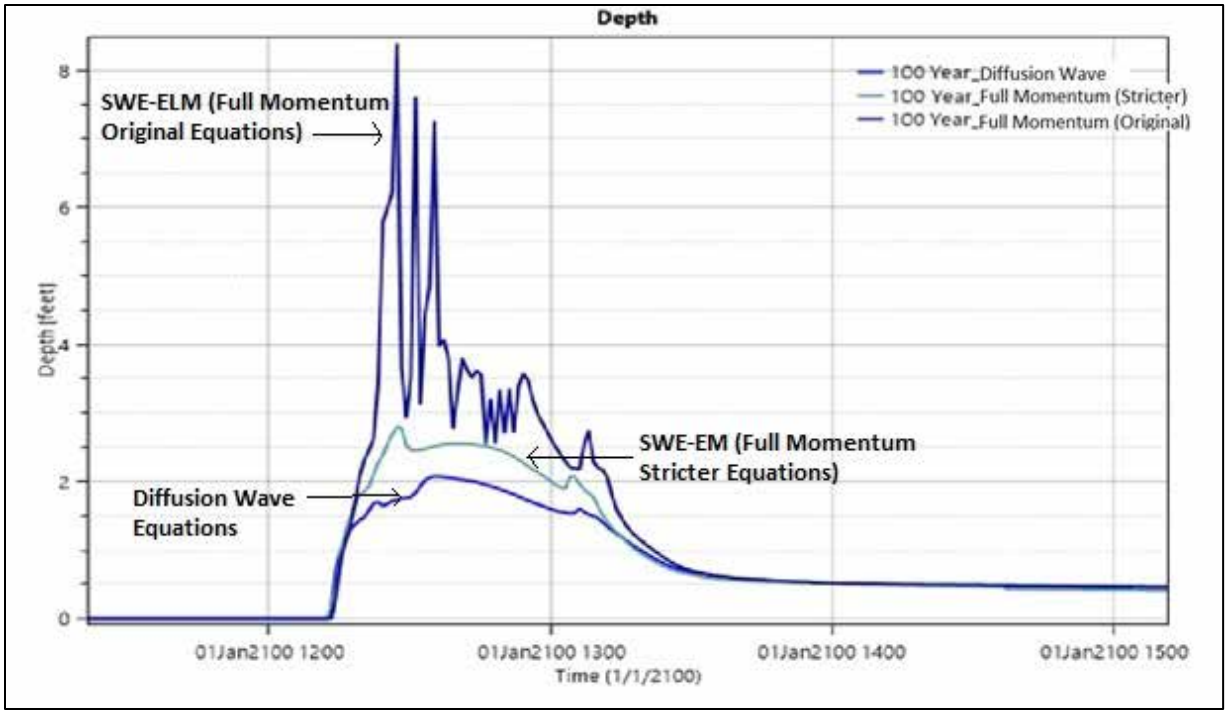


Figure 3-15: Hydrograph from a 2D cell in the Kaimuki High School Region with large WSEL Differences in the Diffusion Wave and SWE-ELM Full Momentum (original) Equations vs SWE-EM Full Momentum (stricter) Equations

The water surface elevations in the 1D channels were also quickly looked at. The SWE-ELM Full Momentum (original) equations results in much higher WSELs than the Diffusion Wave in some areas, and there were more errors in the higher flood events. The SWE-EM Full Momentum (stricter) equations produced similar WSELs as the Diffusive Wave equations. `

Based on these general observations, there was a need to use the SWE-EM Full Momentum (stricter) equations for the purpose of this study. The instability and increased volume errors shown in the 2D areas using the SWE-ELM Full Momentum (original) equation, which were the only Full Momentum equations available in the older versions of HEC-RAS, explains why the Validation Study used the Diffusion Wave Equations. The Full Momentum (stricter) equation available now appear to provide a more accurate and stable solution in the 2D areas, and while not significantly more so than the Diffusion Wave, enough that the model was converted. This, however, did increase the model run times significantly.

3.3. Model Update Comparison

The Validation Study made huge changes to the hydraulic model by converting from the Feasibility Study 1D model to a 1D/2D model, so the report documented the change in water surface elevations for the 1% AEP flood event in a few select locations. With the changes made to the hydraulic model for this GRR study, a quick comparison of the results to the Validation Study was made at the same location and using the same table as reference, but with adding the GRR model results. See Table 3-3 below.

Table 3-3: WSEL for the 1% AEP at Select Locations between the Feasibility, the Validation, and the GRR Studies

HEC-RAS Reach	Cross-Section ID	Cross-Section ID		1% AEP Event (100 year) - Without-Project				
Name	Original Modeling	New 1D/2D Model	Location Description	2017 Feasibility WSEL (ft)	2020 Validation 1D/2D Model WSEL (ft)	Difference Validation to Feasibility (ft)	2023 GRR 1D/2D Model WSEL (ft)	Difference GRR to Validation (ft)
Ala Wai Lower	1477	1188	Convention Center	3.62	4.74	1.12	5.07	0.33
Ala Wai Middle	4847	4676	Boat Launch	7.41	7.34	-0.07	7.36	0.02
Ala Wai Upper	8015	8015	Ka'iulani/ Golf Course	8.27	7.55	-0.72	7.53	-0.02
Kanahā Ditch	1874	1874	Bend u/s Liholiho	72.54	74.16	1.62	74.01	-0.15
	3005	3004	d/s Nehoa	78.59	79.58	0.99	79.25	-0.33
Kanahā Split	1393.96	N/A		43.01	N/A	N/A	N/A	N/A
Makiki Lower	1719	1667	Fern	7.35	12.43	5.08	12.59	0.16
	4325	4301	Beretania	33.87	38.62	4.75	38.63	0.01
Makiki Upper	6606	6606	u/s of confluence	71.57	69.84	-1.73	68.47	-1.37
	9666	9543	u/s extent Makiki	178.4	173.18	-5.22	173.30	0.12
Mānoa Stream Main Reach	948	948	Kanewai	38.5	37.33	-1.17	38.82	1.49
	5461	5461	Pamoa Rd	116.77	118.03	1.26	119.18	1.15
	8367	8367	Manoa Marketplace	153.24	154.69	1.45	155.38	0.69
	9032	9032	E. Manoa Rd Bridge	163.52	161.30	-2.22	162.91	1.61
	10309	10309	Manoa Park	173.34	174.50	1.16	174.84	0.34
	13136	13136	Poelua St.	211.44	211.05	-0.39	212.56	1.51
	15753	15753	Pawale Pl.	260.72	261.85	1.13	263.49	1.64
Pālolo Lower	1813	1813	Golf Course	7.4	9.28	1.88	9.25	-0.03
	3406	3406	Kaimuki	13.19	15.90	2.71	15.67	-0.23

3.4. Calibration/Validation

3.4.1. Existing MMC Calibration

There have been only 3 significant flood events in the observed record, and these events (the 1967, 2004, and 2006 storms) were used as best as possible for calibration during the Validation Study. Observed flows were not available in the detail needed to calibrate an unsteady model, so the HEC-HMS model was used to route the rainfall from those events and provide inflows into the model. It should be noted that only the Manoa-Palolo portion of the basin was available for the 2006 event. See the Validation Study Hydrologic Report for this study to find more details on the HEC-HMS calibration for these 3 events.

Previous modeling on Manoa Stream (Oceanit, 2008b) was calibrated to the 2004 flood event on Manoa Stream. Previous modeling of the Ala Wai Canal (U.S. Army Corps of Engineers, 2001 and 2005) was calibrated to the limited data of the 1967 event on Palolo Stream and Manoa-Palolo Drainage Canal. At the time of the Validation study, the Makiki and Kanaha Streams did not have any calibration or gaged data to aid in calibration or model comparison but as they are mostly concrete lined channels, the n-values were deemed stable. Calibrated n-values are assumed to also account for any sediment or debris “bulking” during those storm events.

The Ala Wai Watershed contains several active and inactive USGS Stream Gages, but the data during the historic flood events was only reported on a daily interval. Due to the relatively rapid rise and fall of the flood wave (typically the flood wave passes within a few hours) the daily stage and/or discharge data was not adequate for calibration. However, Appendix A2 of the 2017 Feasibility Report (see Addendum A) did provide some comparison data for three of the USGS stream gage stations in effect during those events. There was at least one difficulty with the data which was that the gages are operated using a gage datum that does not correspond to a known datum (e.g. mean sea level) and so for the previous study an approximation of the gage datum had to be made to compare with the HEC-RAS model datum (i.e. LMSL). As stated in the Appendix A2 of the feasibility report, the approximation was made based on information provided by the USGS at their gage locations and the elevation data of the nearest HEC-RAS model cross-section. The Appendix A2 states that it was estimated for the feasibility 1D modeling that the conversion had a 1-foot error and that an additional difference of +/- 0.7 foot would result from model error and USGS rating curve error. The discharge value comparison from Appendix A2 is based on common discharge values from the station rating curves and the HEC-RAS model results at that location. The results from the 2020 Validation Study showed that the water surface elevations compared relatively closely with those of the previous study and are within the expected error of +/- 1.7 feet. In addition to that limited data, some qualitative comparisons were made to ensure that the model was producing reasonable results, and that can also be found in the Validation Study Hydraulic Report in Addendum C.

3.4.2. Calibration

As the MMC hydraulic model from the Validation study was used as our base model, and there were almost no changes to the set n-values and channel debris that was used to calibrate the model for the Validation Study, it was assumed that the model would still calibrate to acceptable levels for this GRR update. The qualitative reviews of the 2004 storm extents from the Validation Study still hold for this model.

The updated GRR hydraulic model was verified by looking at the best data currently available: the USGS rating curves for 4 gages in the modeling extents. The USGS rating curves were entered into the 0.2% AEP flood event for the FWOP model, so that the full extent for the curves could be compared to modeled output.

Two of these gages, the Manoa Stream at Woodland USGS gage 16241600 and the Pukele Stream gage 16244000, have actual surveyed in gage datum elevations, so converting their gage stage vs discharge rating curves into an elevation vs discharge rating curve was easy and accurate. For these two locations, the current USGS rating curve was utilized as the new survey elevation was available to update those easily and accurately. According to an email from USGS Field Operations Chief in Honolulu, the provisional gage datum elevation for Manoa at Woodlawn gage is 135.44 ft msl with a shift-adjusted rating curve, point of zero flow is at 2.49 ft gage datum, so a shift-adjusted gage datum of 137.93 msl (May, 2022). The gage datum elevation for Pukele gage is 344.78 ft msl. The Pukele elevation is posted to the USGS station webpage, but the Manoa at Woodlawn elevation is considered preliminary and was received from coordination with USGS personal.

The other two gages, the Makiki Stream at King Street USGS gage 16238000 and the Manoa-Palolo Canal at Moiliili USGS gage 16247100, have estimated gage datum elevations from topo. As referenced in the above section, the Validation Study estimated what those gage datum elevations were, created elevation vs discharge rating curves for those. Those derived rating curves from the Validation Study were used for these two gages.

The Makiki Stream at King Street observed (estimated) rating curve and the modeled rating curve for that cross section, Makiki Lower RS 3062, is shown below Figure 3-16. The lower portion of the rating curves match well, especially considering the estimate of the gage datum. While the upper portion of the rating curves deviate quite a bit over an elevation of about 13.5 ft msl, investigation into the model results showed that this cross section is under backwater influence from the Philip Street bridge for the large flows.

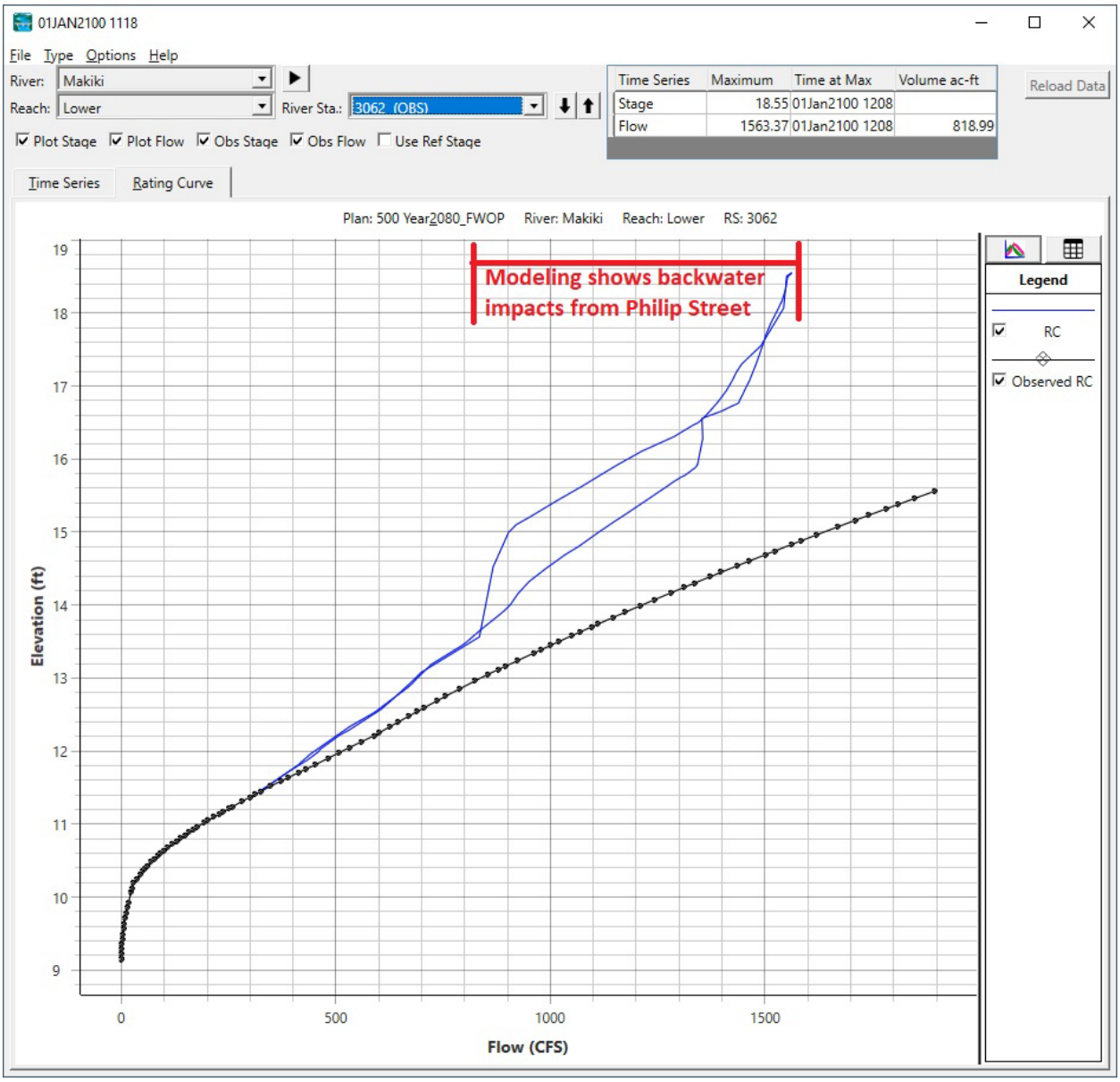


Figure 3-16: Makiki Stream at King Street Modeled vs Observed Rating Curve

The Manoa-Palolo Canal at Moiliili observed (estimated) rating curve and the modeled rating curve for that cross section, Palolo Lower RS 3201, is shown below in Figure 3-17. The rating curves match well, especially considering the estimate of the gage datum.

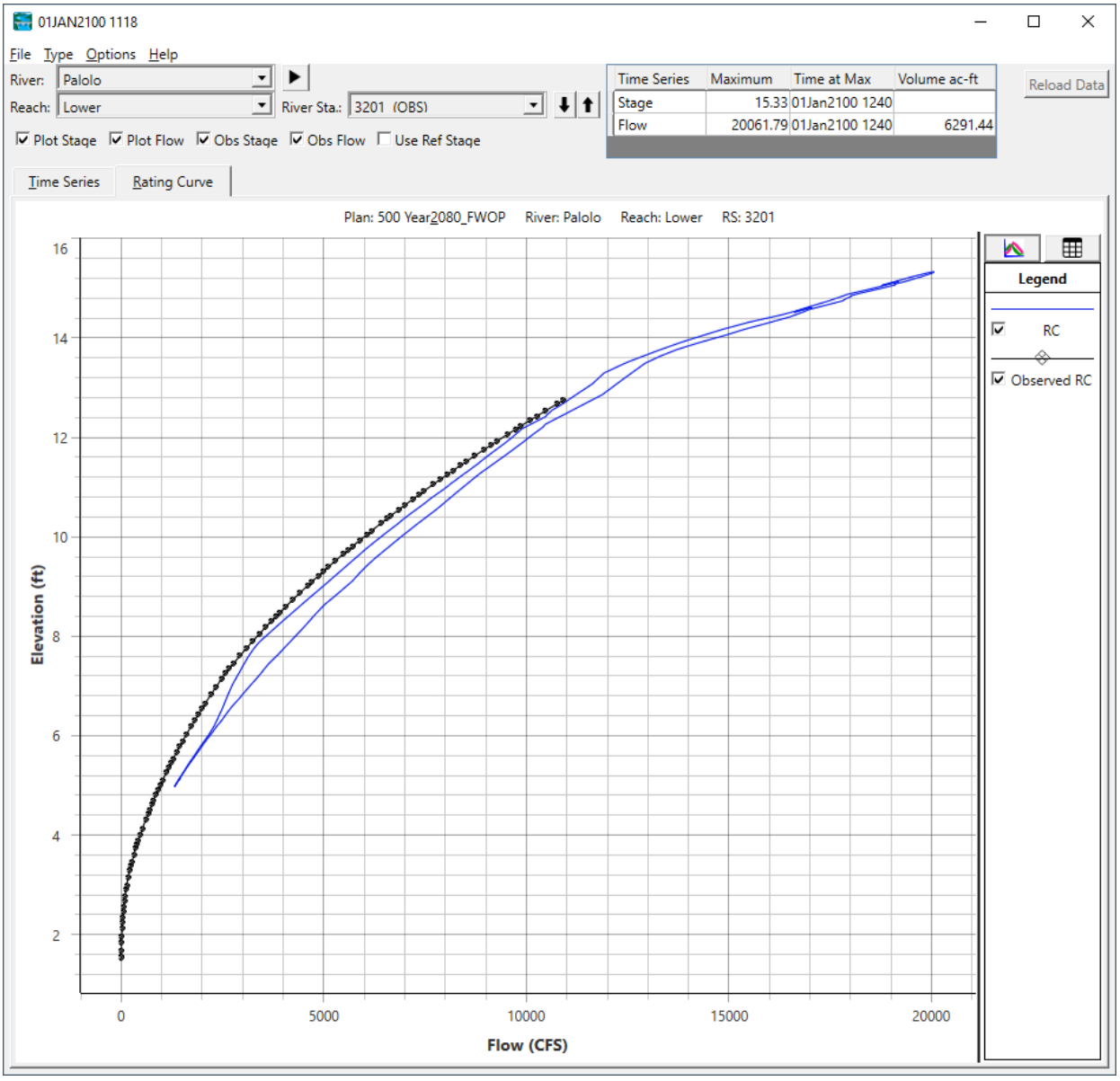


Figure 3-17: Manoa-Palolo Canal at Moiliili Modeled vs Observed Rating Curve

The Manoa Stream at Woodlawn observed (calculated) rating curve and the modeled rating curve for that cross section, Manoa Main RS 8016, is shown below in Figure 3-18. The rating curves match quite well for the entire stretch of the USGS rating curve. The updated GRR model rating curve extends beyond the USGS rating curve and shows the results of all the overland flooding that occurs at Woodlawn and flow leaving the channel.

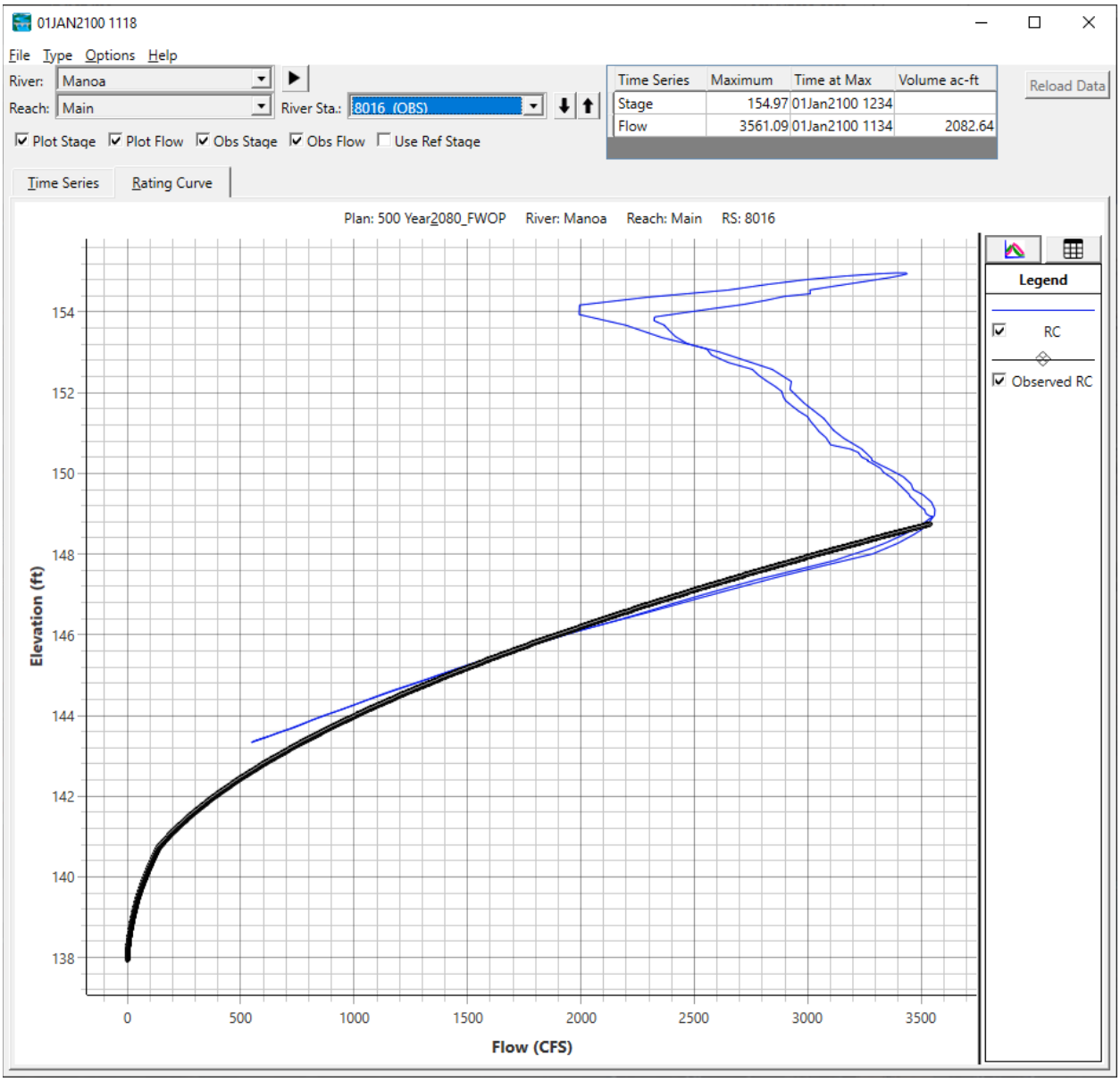


Figure 3-18: Manoa Stream at Woodlawn Modeled vs Observed Rating Curve

The Pukele Stream observed (calculated) rating curve and the modeled rating curve for that cross section, Pukele Tributary RS 3406, is shown below in Figure 3-19. The rating curves match well for the upper portion of the USGS rating curve. The updated GRR model rating curve starts a little higher due to the base flow needed to get the model to run stable in the steep slopes of the upper watershed, and the updated GRR modeled rating curve extends beyond the USGS rating curve.

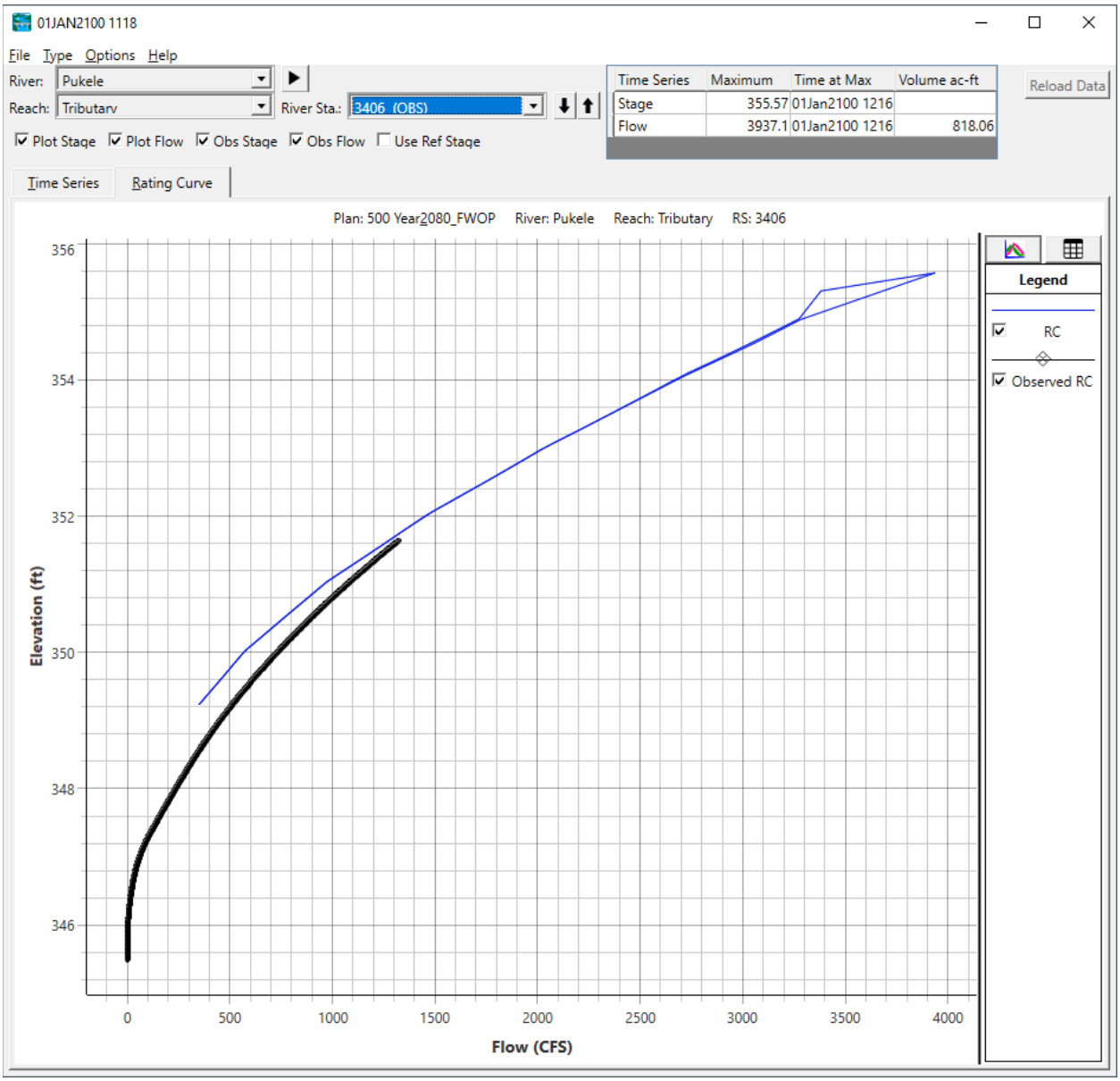


Figure 3-19: Pukele Stream Modeled vs Observed Rating Curve

From this analysis, the updated GRR hydraulic model was deemed appropriate for use in the Ala Wai Watershed Flood Study.

3.4.3. December 2021 Kona Low Validation

The model was validated with the December 2021 Kona Low storm event. The event was approximated as about a 20% AEP (5 year) flood event, which is approximately the channel

design capacity of most of the rivers in the Ala Wai basin. The discharges that were calculated from the HEC-HMS model run using the precipitation from this event, which are described in Section 2.2 above, were input and run with the current version of the Ala Wai HEC-RAS model.

The model matched the observed flood data collected, some photos and measured flood depths, throughout the model, even the lower Makiki Stream flood area. The flood elevations in the 2D area matched photos/observed flood depths in the areas where some data existed, especially near Fern Street in the McCully/Moiilili neighborhood near the Makiki Stream. The model does show slightly more overland flow going down the two-dimensional area south of Kanaha Stream than actually occurred, but that is because for the 20% AEP event, some flood waters would be captured through the storm sewers, which is not accounted for in the current HEC-RAS model version. The model is expected to be better calibrated for the 10% AEP (10 year) and larger flood events, where storm sewers would be at full capacity and not impact modeling results and where the minimum baseflows required for model stability would have much less of an impact.

3.5. Downstream Boundary Conditions

As a watershed that drains to the ocean, sea level becomes the tailwater condition that affects the capacity of fluvial channels to drain. The variation of sea level over the lifetime of the project must be understood to ensure project performance will provide the predicted benefits and minimize overall project costs. This discussion focuses on the analysis performed to select an appropriate tailwater condition that will be used in modeling of fluvial flood events and mitigation measures for such events.

Multiple alternative levels of analysis exist which may be necessary to determine the appropriate coincident probability of a fluvial storm occurring with any given sea level:

1. The Simplest: Begin with a correlation analysis of a tidal gage and an inland gage (with tidal influence). Plot the events on a flow-frequency vs tide-frequency chart to determine IF there is a correlation and, if one exists, what that correlation is. If there is no correlation, choose an appropriate tide level to use as your downstream boundary condition. Choose either the Mean Higher-High Water (MHHW) or "King Tide", whatever the correlation and tide level sensitivity indicates is appropriate.

2. The Safe: If the above correlation determines there IS a correlation of tidal events with inland storms, develop a table of runs for tidally influenced boundary conditions and fluvial/inland influenced boundary conditions, incorporating the correlation findings, e.g. a 20% AEP inland storm with a 99% AEP tide level, a 4% AEP tide level with a 50% AEP inland storm, etc. The results should be included in a mixed populations joint-probability analysis (EM1110-2-1415 Ch 10). This analysis will result in a frequency curve that includes the effects of tide levels and water surface runoff.

3. The Complex: A full coincident probability analysis is required if there is a large contribution of flooding from tidal events (i.e. a strong correlation). This is especially true for a Coastal Storm Risk Management Study. This analysis includes running every tide level

frequency event against every inland storm frequency event, and running every inland storm against every tide frequency. The results are then analyzed within HEC-SSP to create a comprehensive frequency curve that incorporates the full suite of possibilities.

The PDT began with the "simplest" analysis to examine the potential for correlation between available tidal gage data and inland gage data, with expectation of progressing to more complex analyses if a correlation was found.

3.5.1. Historical Hydrologic Data Availability

There are six active streamflow gages in the watershed. The Manoa-Palolo Drainage Canal at Moiliili gage has a continuous peak streamflow record of 53 years. It has experienced major flooding on three occasions since 1967. The Pukele Stream gage, in the headwaters of the Palolo Stream, has a peak streamflow record of 69 years, with the last local storm event in 1930. The Waihi Stream gage and Waiakeakua Stream gage, in the headwaters of the Manoa Stream, have discontinuous peak streamflow records dating back to 1915. The remaining two gages have limited streamflow data: Makiki Stream at King Street has 12 years of peak streamflow data while Manoa Stream at Woodlawn Drive has only 8 years of data. Of the six gages, four have associated flood stages with the NWS as seen in Table 3-4 and Figure 3-20.

Table 3-4: National Weather Service flood stages in relation to historic peak stages at USGS gages in the Ala Wai Watershed

Manoa Stream at Woodlawn

Flood Stages (ft)	
Major Flood Stage	12.9
Flood Stage	8

Date	Stage
12/13/2011	12.86
8/26/2015	11.14
7/20/2014	10.2
9/13/2018	9.75
8/29/2017	9.1
10/30/2018	8.4
5/28/2013	7.52
1/4/2020	6.89

Pukele Stream near Honolulu

Flood Stages (ft)	
Major Flood Stage	7.8
Flood Stage	5

Date	Stage
1/16/1921	10.4
12/13/2011	7.43
12/30/1960	6.16
2/4/1965	6.16
11/18/1927	5.926
9/12/2018	5.84
5/14/1963	5.77
2/27/1935	5.7
11/14/1965	5.7
8/25/1982	5.7
5/12/1977	5.496
1/8/1980	5.38
11/17/1948	5.37
3/2/1939	5.35
7/24/2016	5.32
10/28/1936	5.2
2/3/1979	5.2
5/12/1960	5.18
4/30/1932	5.08
1/4/1943	5.02
7/20/2014	4.98
8/26/2015	4.93

Makiki Stream at King St.

Flood Stages (ft)	
Major Flood Stage	9
Flood Stage	8

Date	Stage
10/30/2004	9.34
7/24/2016	8.95
8/28/2018	7.28
8/24/2015	7
2/28/2004	6.99
10/11/2019	6.88
5/2/2011	6.453
2/11/2017	6.36
12/13/2011	6.12
2/13/2019	5.9
7/20/2014	5.46
3/10/2013	5.13

Waihi Stream near Manoa

Flood Stages (ft)	
Major Flood Stage	10.4
Flood Stage	6.5

Date	Stage
4/11/1930	7.75
11/19/1927	7.66
2/4/1965	6.58
5/14/1963	6.26
3/26/1951	6.15
7/20/2014	6.14
5/16/1927	6.13
12/30/1960	6.13
12/18/1967	5.94
3/5/1958	5.89
4/30/1932	5.87
11/17/1948	5.86
1/4/1943	5.82
11/29/1954	5.71
3/5/2012	5.71
11/14/1965	5.56
10/1/1930	5.47
5/12/1960	5.38
10/30/2004	5.37
4/19/1977	5.32
5/23/1978	5.13
1/12/1953	4.99

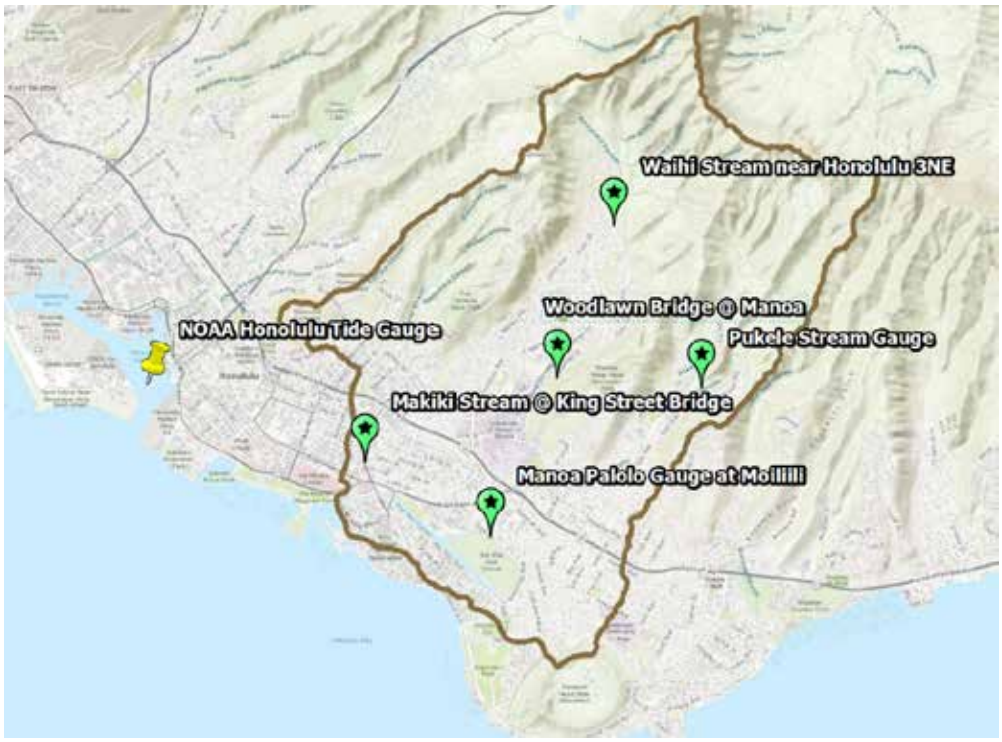


Figure 3-20: Gage locations relative to Ala Wai Watershed

Based upon available records, there is no significant trend in historic streamflow in the major tributaries to the Ala Wai canal, the Makiki Stream and Manoa-Palolo canal. See Figure 3-21 and Figure 3-22, below for annual peak discharges for the available period at these two gages respectively. With the exception of the historic events described in Section 1.3.2, peak discharges have remained generally constant.

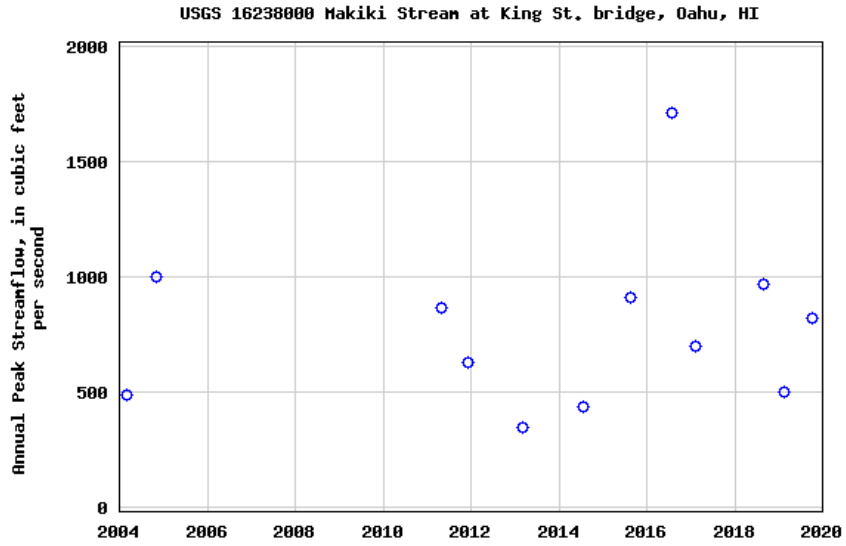


Figure 3-21: Annual Peak Discharge, Makiki Stream at King Street (USGS)

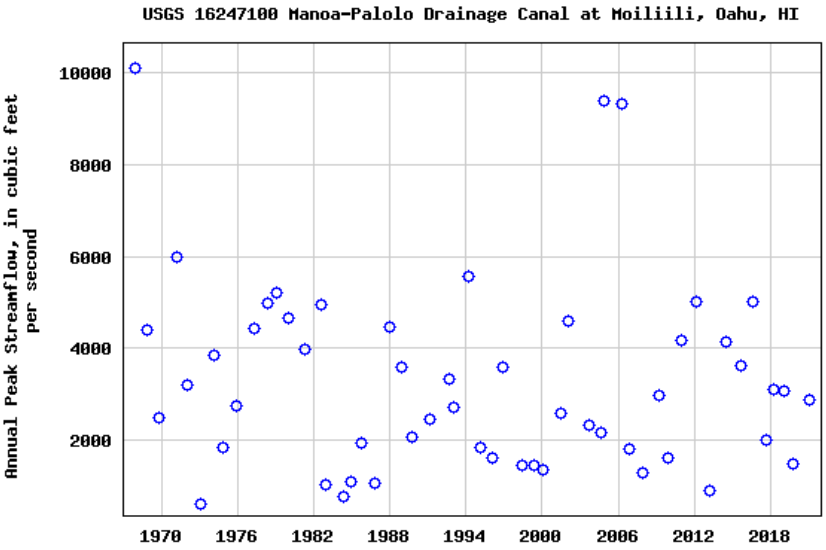


Figure 3-22 Annual Peak Discharge, Manoa-Palolo Canal (USGS)

Based upon global trends, it is anticipated that the frequency of the extreme storm events and droughts will likely increase in the future. Runoff magnitude of extreme events may also increase. Overall future Hawaiian precipitation totals will be either slightly drier or experience little change (State of Hawaii, n.d.). As the global trends of increased air and ocean temperatures promote the spread of invasive species, which generally decrease canopy and increase imperviousness, higher discharges and flashier flood events are expected to occur in future storms, contributing to greater damages and life safety risks (Giambelluca T. , 2012).

While the focus of this study is on riverine flooding, the future trends of sea level rise due to climate change should be noted, as tidally-influenced waters can impact the downstream study area. Sea levels around Hawai'i have risen 10 inches since 1950 and are rising faster at about one inch every four years (SeaLevelRise.ORG, n.d.). Based upon current models, Hawai'i will experience the highest rates of sea level rise on the planet, partially due to the gravitational effects disproportionately affecting the tropical Pacific (Tetra Tech and the State of Hawaii DLNR, 2017). An analysis of sea level change relative to assumptions necessary for this study are discussed further below.

Stationarity, or the assumption that the statistical characteristics of hydrologic time series data are constant through time, enables the use of well-accepted statistical methods in water resources planning and design in which future conditions rely primarily on the observed record. However, recent scientific evidence shows that—in some places, and for some impacts relevant to the operations of the U.S. Army Corps of Engineers—climate change and human modifications of the watersheds are undermining this fundamental assumption, resulting in non-stationarity. Using the gage at Manoa-Palolo Canal with 53 years of continuous data, the USACE Non-Stationarity Detection Tool did not find evidence of non-stationarity and did not find a monotonic trend in stationary flow records (USACE Non-stationarity Detection Tool). This finding will allow the USACE to assume stationarity in hydrologic analyses moving forward. Additional information regarding the non-stationarity analysis is included in Appendix H on Climate Change Analysis. It is noted that the small watershed size and rapid time to peak may affect the recording of true peak values used in this analysis, with unknown effects on the analysis of long-term trends.

3.5.2. Tidal-Fluvial Assessment

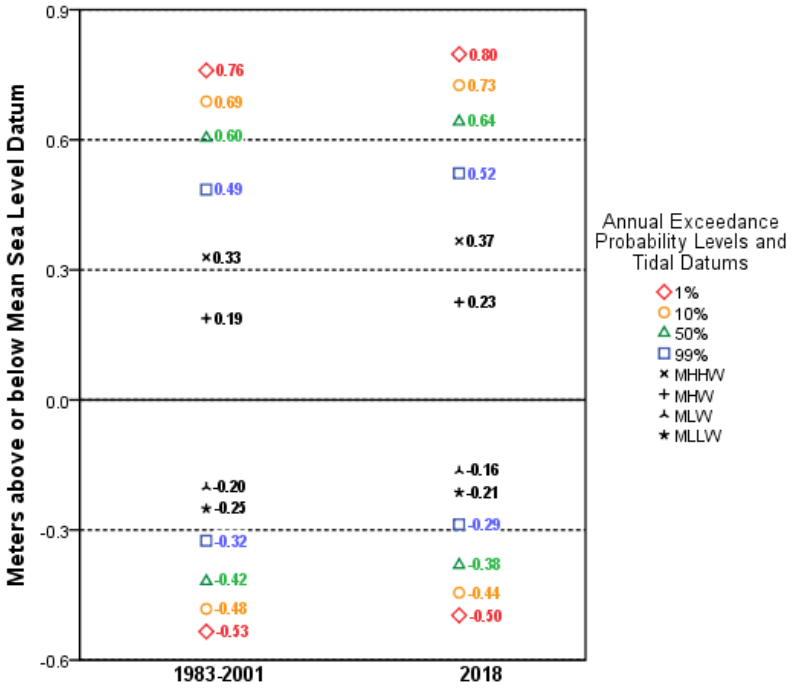
To run the unsteady hydraulic model of the Ala Wai Canal and its tributaries with a set of hypothetical events, boundary conditions are established for the upstream reaches and the mouth of the Ala Wai Canal. It was necessary to perform an assessment to establish the coincident still water level that might be expected to occur during an inland rainfall event.

For this assessment, the fluvial gages at Manoa-Palolo Drainage Canal at Moiliili (USGS 16247100) and Makiki Stream at King St. bridge (USGS 16238000) were used to compare historical fluvial events with the coincident still water level data from the NOAA tidal gage at Honolulu (ID: 1612340). The Manoa-Palolo and Makiki gages are the most downstream gages on these primary tributaries to the Ala Wai Canal, each being approximately 0.6 miles upstream from their respective confluence with the canal. For the Manoa-Palolo gage, annual peak data is available from 1967-2021, but detailed (15-minute) discharge records are only available from October 1, 1999, to present. For the Makiki gage, annual peak values are available for the 2004

and 2005 Water Years, and for the period of 2011-2020, with more detailed data available from February 2010 to present.

The Honolulu tidal gage was chosen as the best comparable site to the Ala Wai watershed, being the closest tidal gage to the Ala Wai canal site approximately 2 miles from the mouth, and it is located within the Honolulu Harbor, creating similar tidal conditions to the mouth of the Ala Wai canal which empties into the Kahanamoku Lagoon. The Honolulu tide gage has monthly maximum and minimum elevation records beginning in 1927 and hourly verified values since 1921. The only other gage on Oahu is on the opposite (windward) side of the island, therefore would experience different coastal flow conditions, in addition to being distant to the Ala Wai watershed. The Honolulu gage, being very close in proximity and having very similar coastal geometry is deemed the best available information and suitable as a proxy to the mouth of the Ala Wai canal that is the downstream boundary for the HEC-RAS model. It is acknowledged that minor differences may occur in the immediate vicinity of the Ala Wai Canal that are not perfectly represented by the Honolulu tide gage used to approximate the real tide elevations occurring at the downstream boundary. However, no wave models or additional data are currently available to quantify the relative differences that may occur between the proxy gage and the project site. It is expected that the differences are small and impose only a minimal risk of error in the potential determination of the downstream boundary condition. Therefore, circulation and/or wave modeling is deemed unnecessary given the suitability of the available gage data in such close proximity to the project.

NOAA has also published frequency still water level elevations for the 99%, 50%, 10% and 1% AEP events (also known as Extreme Water Levels, EWL) based upon the long historic record of the Honolulu gage from 1905-2010 as shown in Figure 3-23 (note that column labeled “2018” are “projected exceedance probability levels and tidal datums assuming continuation of the linear historic trend” and is not used here) (Zervas, 2013). Additional event AEPs are also listed as part of the USACE Sea Level Calculator output for the Honolulu gage included as both metric and English units for reference, shown in Table 3-5. Per NOAA documentation, the data set of historical values used to determine the EWL values included storm tides, equal to the “combination of the astronomical tide, the storm surge, and limited wave setup caused by breaking waves,” but excluding wave runup. The published EWL values were used to interpolate estimated AEP for still water level elevations that occurred during the approximate time of the flood events recorded by the fluvial gages.



Source: https://tidesandcurrents.noaa.gov/est/stickdiagram.shtml?stnid=1612340

Figure 3-23: NOAA Exceedance Probability Levels and Tidal Datums for the gage at Honolulu, HI (1612340)

Table 3-5: USACE Sea Level Calculator output for the gage at Honolulu, HI from 1905-2007 (1612340)

		Elevation (m-LMSL)	Elevation (ft-LMSL)
Tidal Datum	HAT	0.6	1.96
	MHHW	0.33	1.08
	MHW	0.19	0.62
	MSL	0	0
	MLW	-0.2	-0.66
	MLLW	-0.25	-0.82
	NAVD88	NaN	NaN
Extreme Water Level	1% AEP (100 Yr)	0.76	2.49
	2% AEP (50 Yr)	0.74	2.43
	5% AEP (20 Yr)	0.71	2.34
	10% AEP (10 Yr)	0.69	2.26
	20% AEP (5 Yr)	0.66	2.16
	50% AEP (2 Yr)	0.6	1.97
	99% (1 Yr)	0.49	1.61
	Monthly	NaN	NaN

Source: https://cwbi-app.sec.usace.army.mil/rccslc/slcc_calc.html

To determine correlation between extreme water level and peak surge events, an analysis compared the non-tidal residual (NTR) from the Honolulu tide gage to the Makiki and Manoa-Palolo stream gage flows. The hourly Honolulu data gage was de-trended by: (1) subtracting the predicted tide from the observed water level ("residual"), (2) Long-term sea level rise (1.5 mm/yr for Honolulu Harbor) was removed from the residual for the time series relative to the 1992 base year, and (3) Seasonal variability as documented by the NWS for the Honolulu gage (https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=1612340) was also subtracted to complete the NTR calculation. The 15-minute stream gage values were converted to hourly data for comparison to these NTR values. Peak over threshold values were manually selected for the stream gages; 1000 cfs and 350 cfs were set as the thresholds for peak flows for the Manoa-Palolo and Makiki stream gages respectively based upon inspection of the values and historical annual peaks. A reciprocal Peak Over Threshold analysis was also performed by inspecting the NTR values and selecting all peaks greater than 0.599 meters, equivalent to two standard deviations above the mean NTR value. Assistance was also received from the Engineering Research and Development Center (ERDC), who performed a separate comparison of threshold values utilizing a statistical package, Storm Simulation Stochastic Simulation Technique (SST), to validate the manually selected data. SST was also used to evaluate the sensitivity of certain parameters such as the coincidence time used to establish the independence of instances above the threshold value as well as the threshold value itself, and calculate statistical correlation measurement between the peak discharges and NTR.

Table 3-6 presents the results of this statistical comparison and relative sensitivity analyses performed by ERDC utilizing the statistical package. SST utilizes observations or simulations from extreme storm events in the form of a partial duration series (PDS) to simulate multiple sequences or life cycles of storm activity and their corresponding responses. The Kendall rank correlation coefficient ("Kendall's τ" or "Kendall's Tau) is a non-parametric measure of relation-ships between two sets of data, where the resulting value of the analysis varies from 0 to 1, wherein 0 means no relationship and 1 is a perfect relationship. The p-value is the measure indicating the level of significance for the hypothesis test that the Kendall's τ is an accurate representation of the correlation.

Table 3-6 Statistical results of correlation analysis

Station	Paired Values Source	Variable	Threshold Q (CFS)	Threshold NTR (m)	Lambda (events / year)	Coincidence Time (days)	Kendall's Tau τ	p-value
Makiki	Manual	Q	350		3.0	2	0.044	0.733
Makiki	SST	Q	149		4.7	1	0.037	0.657
Makiki	SST	Q	155		4.4	1	0.041	0.635
Makiki	SST	Q	149		4.7	2	0.049	0.560
Makiki	SST	Q	155		4.4	2	0.050	0.566
Makiki	Manual	NTR		0.6	13.6	2	0.023	0.645
Makiki	SST	NTR		0.616	2.2	1	0.118	0.260
Makiki	SST	NTR		0.382	8.4	1	0.015	0.824
Makiki	SST	NTR		0.616	2.2	2	0.187	0.073
Makiki	SST	NTR		0.382	8.4	2	0.013	0.846
Manoa-Palolo	Manual	Q	1000		3.2	2	0.045	0.582
Manoa-Palolo	SST	Q	1330		1.5	1	0.018	0.868
Manoa-Palolo	SST	Q	281		8.6	1	0.072	0.121
Manoa-Palolo	SST	Q	1330		1.5	2	0.061	0.564
Manoa-Palolo	SST	Q	281		8.6	2	0.089	0.056
Manoa Palolo	Manual	NTR		0.600	11.4	2	0.035	0.449
Manoa-Palolo	SST	NTR		0.616	2.2	1	0.240	0.019
Manoa-Palolo	SST	NTR		0.382	8.4	1	0.016	0.767
Manoa-Palolo	SST	NTR		0.616	2.2	2	0.250	0.015
Manoa-Palolo	SST	NTR		0.382	8.4	2	0.015	0.782

As indicated in Table 3-5, the maximum Kendall's τ value is 0.250 for one scenario relating the high NTR to Manoa-Palolo discharges, but it does not exceed the typical value of 0.3 typically preferred as in indication of correlation between parameters. However, this scenario and similar τ value of 0.240 were calculated using a high NTR threshold resulting in the average events per year being 2.2 which is likely too extreme. The more likely scenarios (having events per year of 8.4) achieved a Kendall's τ less than 0.02 and a high p-value greater than 0.75, suggesting no dependence between the peak flows and the NTR. Because the NTR and peak stream flows are considered independent, no bivariate analysis on these parameters was deemed necessary.

For the common period of record for the Honolulu and Manoa-Palolo gages since 1967, of the 51 recorded annual peak values with corresponding tidal records, 12 of those events had recorded daily maximum still water levels that exceeded a 99% AEP elevation. See Figure 3-17. Of those 12 events, the highest daily still water level value had approximately a 59% AEP, with the remaining 11 events ranging from approximately 70% AEP to 99% AEP. The remaining 39 events all had maximum daily elevations less than the 99% AEP event. Conversely, the monthly maximum Honolulu gages were compared to the available flow data for the Manoa-Palolo gage available starting in 1999. In that period, 27 still water level events exceeded the 99% AEP value, but of those events, only 7 flood events occurred that exceeded the 99% AEP discharge, with the greatest flow having an AEP of approximately 70%.

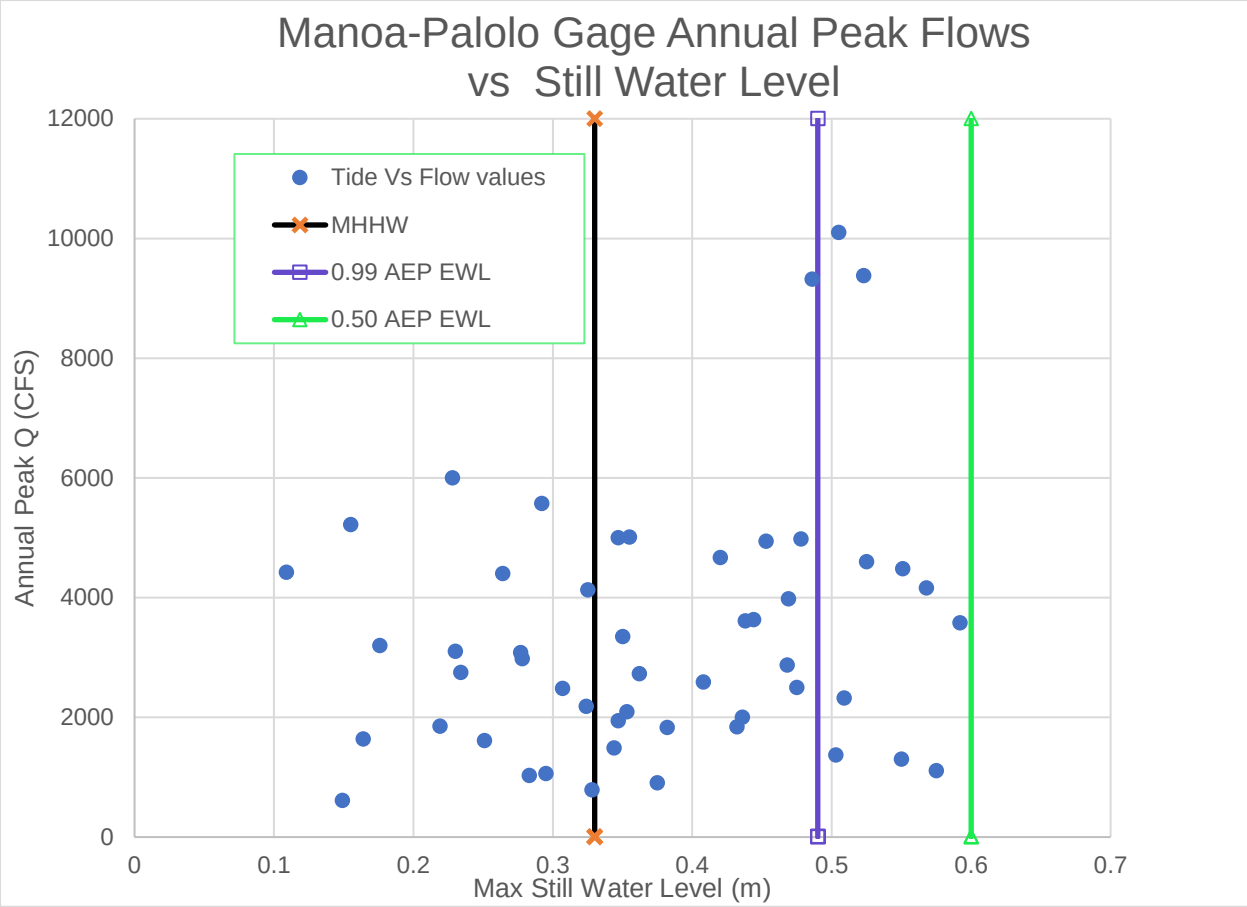


Figure 3-24: Manoa-Palolo Gage Annual Peak Flows vs Honolulu Gage Still Water Level

Performing a similar analysis of Makiki gage flow data, only 10 annual peaks were available for comparison to the Honolulu tide data. See Figure 3-21. Of those 10 events, 2 events had maximum daily still water levels that exceeded the 99% AEP, with the maximum having an AEP of approximately 69% and the other having an approximately 94% AEP. Of the 18 tidal events that exceeded the 99% AEP height that occurred within the period of record of the Makiki gage, only 2 events had discharges that exceeded the 99% AEP discharge, with the maximum having an approximately 53% AEP and the other having approximately a 66% AEP.

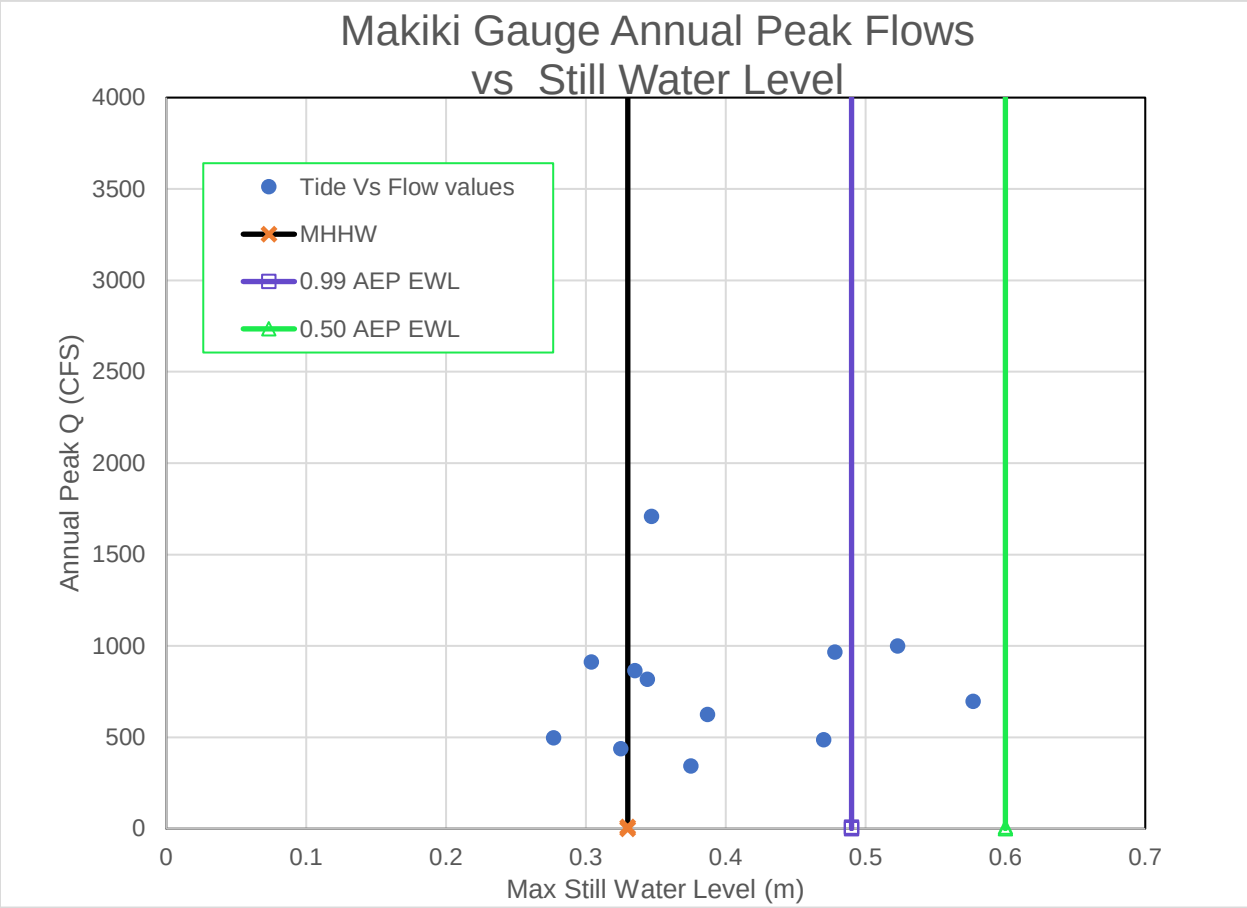


Figure 3-25: Makiki Gage Annual Peak Flows vs Still Water Level

It must be acknowledged that the above analysis omits the potential influence of waves that may occur in the immediate vicinity of the Ala Wai Canal that are not perfectly represented by the Honolulu tide gage used to approximate the real tide elevations occurring at the downstream boundary. No wave models or additional data are currently available to quantify the relative differences that may occur between the proxy gage and the project site. Due to the close proximity of the Honolulu tide gage to the project and similarity of hydrodynamic conditions (i.e., as both are in a protected harbor/lagoon), it is expected that the differences are small and impose only a minimal risk of error in the potential determination of the downstream boundary condition. Per the supporting documentation for the Honolulu tide gage and the methods for

determining the EWL, it states: "The extreme levels measured by the CO-OPS tide gages during storms are called storm tides, which are a combination of the astronomical tide, the storm surge, and limited wave setup caused by breaking waves" (NOAA, n.d.). Therefore, wave setup is at least somewhat partially considered in the statistical analysis determining the EWL value. Based upon local experience by POH personnel, waves are not observed to propagate into the Ala Wai Canal. As will be described later, the steepness of the watershed and the major tributaries limit the relative influence of the downstream boundary elevation, therefore the risk is deemed to be low that error created by omitting this wave component in the analysis will affect the outcome of screening and economic analysis of upstream mitigation measures. The risk may remain for evaluation of mitigation measures in the coastal floodplain, primarily measures at the Ala Wai canal.

The effects of tropical storms on inundation risk were not analyzed in the study based on the low occurrence rate in the historical hurricane records. A search of internet records indicates that the damages caused by Hurricane Iniki were attributed to coastal flooding caused by storm surge and wind damage and not attributable to heavy rainfall on the upland watersheds, which is generally consistent with the understanding that hurricanes that do make landfall on the Hawaiian Islands move too quickly over the relatively small watersheds to have time to drop large amounts of rainfall. It is acknowledged that Hurricane Lane did produce large amounts of rainfall as it slowly followed a track south of the islands but did not make landfall and no records of significant observed storm surge were found (Beven II & Wroe, 2019). Hydrometeorological Report (HMR) 39, a National Weather Service product examining the Probable Maximum Precipitation in the Hawaiian Islands (1963) also concluded “(1) the potential for extreme rains in hurricanes that affect the Hawaiian Islands is no greater than in some other types of cyclones, for example extreme kona storms. … (2) Storm types other than hurricanes because of their frequency are much more likely to produce the extreme rains.” Previous hurricane modeling studies considering the Honolulu – Waikiki area indicate storm surge is an isolated risk. In addition to this, as stated by Kennedy in the SWAN-ADCIRC documentation,

> *“The Waikiki (J) region of Honolulu, which has a very high concentration of tourists and large hotels, could experience flooding up to several kilometers inland for the strongest storms. This flooding would come not only from the ocean side, but through the Ala Wai Canal, which was created in 1928 to drain the low-lying areas that are now Waikiki. Wave runup computed with a bare earth assumption is predicted to penetrate significantly inland over much of this area, but would be limited by the large, strong buildings in this highly developed region. However, even in this worst case scenario, it must be noted that the flooding depths would be relatively small, and would only exceed 1 m at locations quite close to the shore. Tsunami inundation zones in this region are also large, but are less than still water surge inundation limits.”*

A study by the University of Hawaii (Li, Yamazaki, Roeber, Cheung, & Chock, 2018) also performed an analysis using a probabilistic approach to map coastal flood hazards including estimated effects of SLC and storm intensification and mapped resultant inundation maps for the 0.2%, 0.5%. and 1% events, which showed that the primary mode of flooding in Waikiki is from surge pushing up the Ala Wai canal and not from wave setup and runup. Significant coastal storm flooding does not occur until very low probability events. As such, further effort to

perform a hurricane track modeling to determine the associated wave and water levels is deemed beyond the scope of this effort since it is a fluvial flood risk study.

Based upon this examination of the relative concurrence of high runoff flows and high tide events, no relationship is apparent between these two phenomena. The majority of high runoff events occur when tidal elevations are less than the 99% AEP elevation: for the Manoa-Palolo watershed, 39 of 51 events (76%) occurred when still water levels were less than the 99% AEP EWL, and for the Makiki watershed 8 of 10 events (80%) that data was available for occurred when still water levels were less than that value. Although some events were observed greater than the 99% AEP levels, they were limited in number, and all were more frequent than a 50% AEP event, with the difference between the 50% AEP and 99% AEP EWL only being 0.11 m (0.36 ft or 4.33 inches). For the purposes of this project, the PDT has agreed that using the 99% AEP event still water level (adjusted for future sea level change) as the downstream model boundary condition would be representative, if not conservative, when evaluating the effects of various mitigation measures and scenarios.

3.5.3. Sea Level Trends

3.5.3.1. Sea Level Change

Global sea level change (SLC) is often caused by the global change in the volume of water in the world's oceans in response to three climatological processes: 1) ocean mass change associated with long-term forcing of the ice ages ultimately caused by small variations in the orbit of the earth around the sun; 2) density changes from total salinity; and most recently, 3) changes in the heat content of the world's ocean, which recent literature suggests may be accelerating due to global warming. Global SLC can also be caused by basin changes through such processes as seafloor spreading. Thus, global sea level, also sometimes referred to as global mean sea level (GMSL), is the average height of all the world's oceans.

Relative (local) SLC (RSLC) is the local change in sea level relative to the elevation of the land at a specific point on the coast. RSLC is a combination of both global and local SLC caused by changes in estuarine and shelf hydrodynamics, regional oceanographic circulation patterns (often caused by changes in regional atmospheric patterns), hydrologic cycles (river flow), and local and/or regional vertical land motion (subsidence or uplift).

Figure 3-19 shows historical relative sea level change (RSLC) at Honolulu for 1911-2022 as presented by the USACE Sea Level Tracker. Several metrics for sea level are presented: the monthly mean sea level (light blue), 5-year moving average (orange), and 19-year moving average (dark blue). It is apparent that over long time scales (19 years) mean sea level is steadily increasing. However, over shorter time scales mean sea level may increase or decrease (USACE ER 1100-2-8162, EP 1100-2-1). The monthly mean sea level (light blue) appears to go up and down every year capturing the seasonal cycle in mean sea level. The 5-year moving average (orange) captures the interannual variation (2 or more years) of sea level.

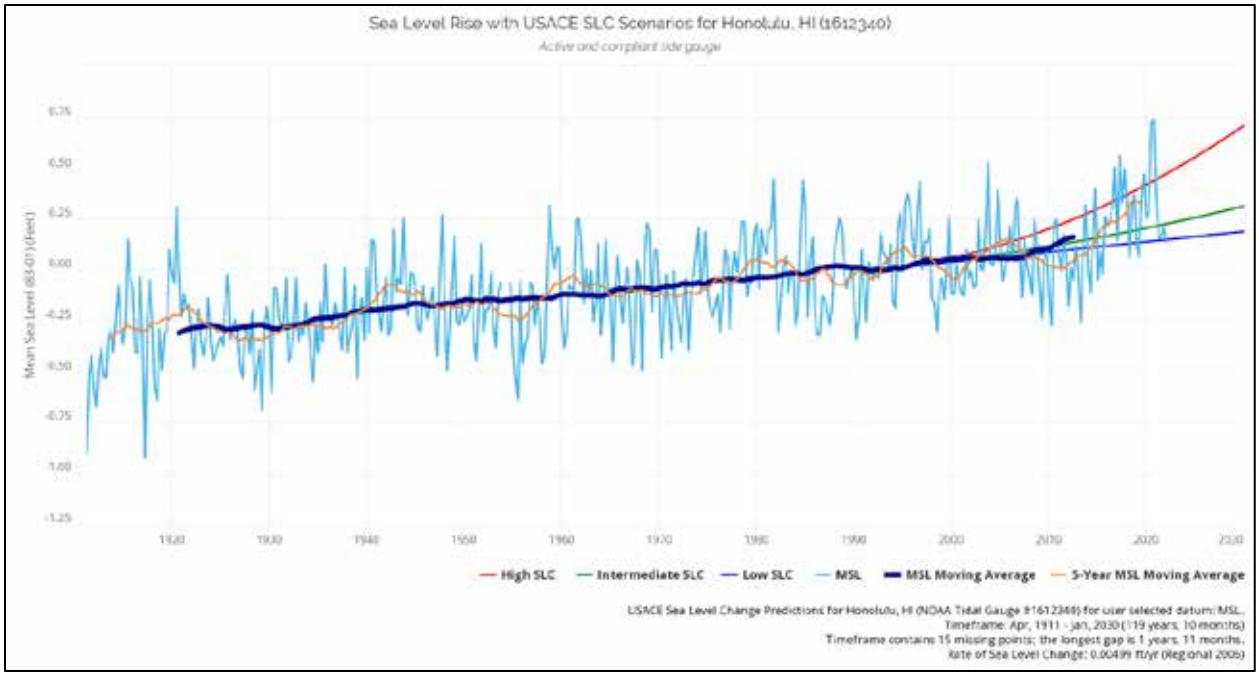


Figure 3-26: Historic Relative Sea Level Change 1911-2022 (US Army Corps of Engineers, n.d.)

To incorporate the direct and indirect physical effects of projected future sea level change on design, construction, operation, and maintenance of coastal projects, USACE has provided guidance in the form of Engineering Regulation, ER 1110-2-8162 (USACE, 2019). ER 1110-2-8162 provides both a methodology and a procedure for determining a range of sea level change estimates based on global sea level change rates, the local historic sea level change rate, the construction (base) year of the project, and the design life of the project. The analysis must include a baseline or "low" rate that is based on an extrapolation of the historical tide gage rate, equivalent to the RSLC, and intermediate and high rates that include future acceleration of GMSL. Historic RSLC for this study of 1.55 mm/yr (0.00492 ft/yr) is based on NOAA tidal records at the nearby Honolulu, HI gage. The "intermediate" and "high" scenarios are based on historic global sea level change and estimates developed by the National Research Council (NRC) for an Intermediate estimate (NRC Curve I), and a High estimate (NRC Curve III) representing the maximum expected sea level change.

All three scenarios are projected from the base year starting in 1992 (the midpoint of the current National Tidal Datum Epoch of 1983-2001). The Intermediate and High SLC projections use the following eustatic sea level rise (sea level change due to glacial melting and thermal expansion of sea water) equation:

$$E(t) = 0.0017t + bt^2$$

where E(t) is the eustatic sea level rise (in meters); t represents years from 1992; and b is a constant equal to 2.71E-5 (NRC Curve I), and 1.13E-4 (NRC Curve III) for the "intermediate" and "high" scenarios respectively. This equation assumes a global mean sea level change rate of +1.7mm/year.

For the purposes of this analysis, the construction base year of this flood risk management project is estimated to be the year 2030 and will have a 100-year design life and 50-year economic life. provides the estimated SLC values for these three scenarios.

Like Figure 3-22, Figure 3-23 represents the same trends but is focused on the period since 1980. Based upon examination of the historical trends for the Honolulu gage, it is apparent that the 19-year average and 5-year averages indicate a distinct trend of higher MSL than the historic rate. The 5-year MSL moving average trend shows greater amplitude than the 19-year MSL moving average, but it is also apparent that 5-year average oscillates about the computed Intermediate SLC curve and at times the 5-year moving average is near the High SLC curve. Although the 19-year average appears to trend higher in recent years, it too shows some oscillation about the Intermediate SLC curve. For the purposes of defining the future boundary conditions for modeling, it is anticipated that the Intermediate SLC curve will be the most appropriate.

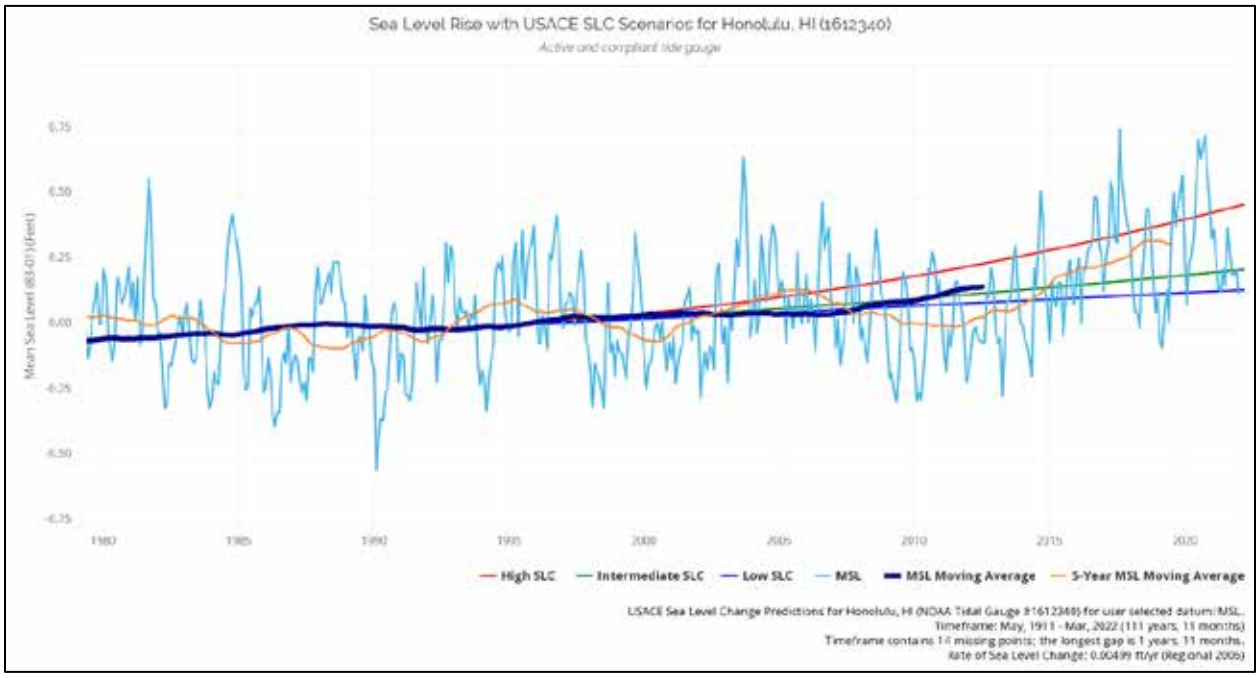


Figure 3-27: Historic Relative Sea Level Change 1980-2022 (US Army Corps of Engineers, n.d.)

3.5.3.2. Interannual Variability (IAV)

In addition to the SLC trends, the interannual variation of water surface elevations (WSEL) is "caused by irregular fluctuations in coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents. The interannual variation for many Pacific stations is closely related to the El Niño Southern Oscillation (ENSO)," (NOAA, 2022) the climate phenomenon in the Pacific Ocean evidenced by alternating periods of ocean warming and high air pressure in the western Pacific (El Niño) and cooler sea temperatures accompanied by lower air pressure in the western Pacific (La Niña) (L'Heureux, 2014). For the Honolulu gage, the IAV has been determined to be as much as 0.15 meters (0.49 feet). See Figure 3-24. The drivers for

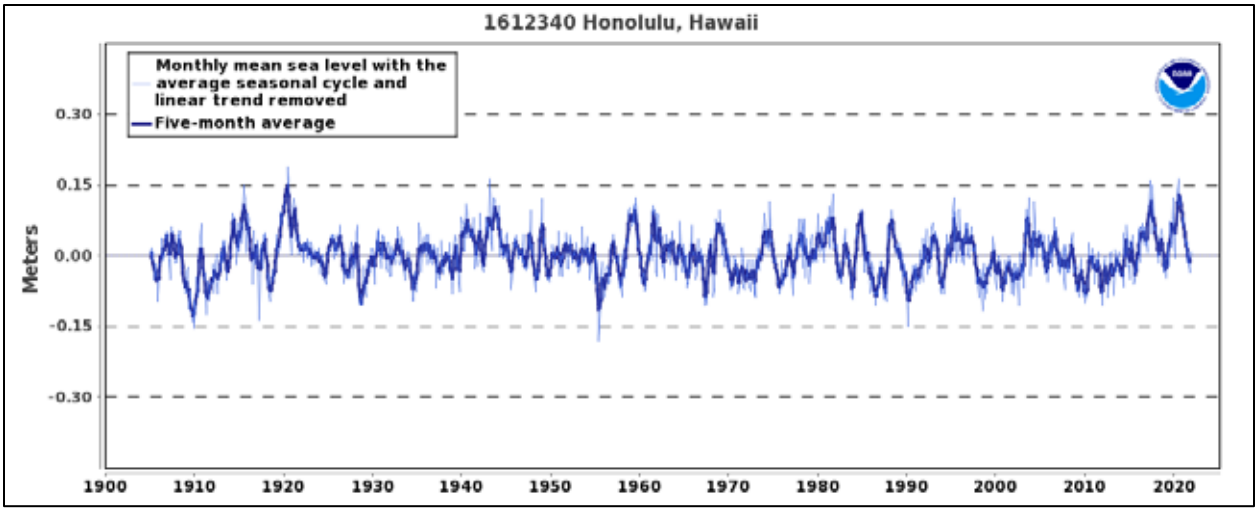


Figure 3-28: Interannual Variation of Monthly Mean Sea Level and the 5-Month Running Average at the Honolulu Gage (NOAA, 2022)

interannual variation are independent from the other factors that contribute to still water level trends (gravitational oscillation, storm surge, etc.), indicating that the average season cycle and linear sea level trends are not included. Therefore, IAV must be added to the overall estimation of future SLC and will be reflected within the downstream boundary conditions assumptions.

3.5.3.3. Selected Future Sea Level

Based upon the discussion above, it is concluded that definition of the future sea levels for the purposes of modeling the fluvial runoff boundary conditions will be best defined by the 99% AEP extreme water level that has been adjusted to include the anticipated SLC according to the Intermediate SLC curve and include the potential impacts of IAV. A summary of the computed values for the project economic life (2080) and 100-year adaptation horizon (2130) is shown in Table 3-6 and shown in Figure 3-25. For comparison purposes only, the 99% AEP EWL was added to the High Curve and included in this table.

It is noted that the linear combination of the various water level components introduces some uncertainty as the complex interaction of these components is unknown and could potentially be non-linear. Further research is warranted to better define the interactions and influences of each individual component in SLC.

Table 3-7: Computed SLC estimates (feet, LMSL 1992)

Year	USACE Low	USACE Intermediate	USACE High	USACE Int + EWL (99% AEP)	USACE High + EWL (99% AEP)	USACE Int + EWL (99% AEP) + IAV
1992	0.00	0.00	0.00	1.61	1.61	2.10
2030	0.20	0.33	0.72	1.90	2.33	2.40
2035	0.23	0.39	0.89	1.97	2.49	2.46
2040	0.23	0.43	1.08	2.03	2.69	2.53
2045	0.26	0.52	1.31	2.10	2.92	2.59
2050	0.30	0.59	1.54	2.17	3.15	2.66
2055	0.33	0.66	1.77	2.26	3.38	2.76
2060	0.33	0.75	2.07	2.33	3.67	2.82
2065	0.36	0.82	2.33	2.43	3.94	2.92
2070	0.39	0.92	2.62	2.53	4.23	3.02
2075	0.39	1.02	2.95	2.62	4.56	3.12
2080	0.43	1.12	3.31	2.72	4.92	3.22
2085	0.46	1.21	3.67	2.82	5.28	3.31
2090	0.49	1.35	4.04	2.92	5.64	3.41
2095	0.49	1.44	4.43	3.05	6.04	3.54
2100	0.52	1.57	4.86	3.15	6.46	3.64
2105	0.56	1.71	5.28	3.28	6.89	3.77
2110	0.59	1.80	5.74	3.41	7.35	3.90
2115	0.59	1.94	6.20	3.54	7.81	4.04
2120	0.62	2.10	6.69	3.67	8.30	4.17
2125	0.66	2.23	7.22	3.81	8.83	4.30
2130	0.69	2.36	7.74	3.97	9.35	4.46

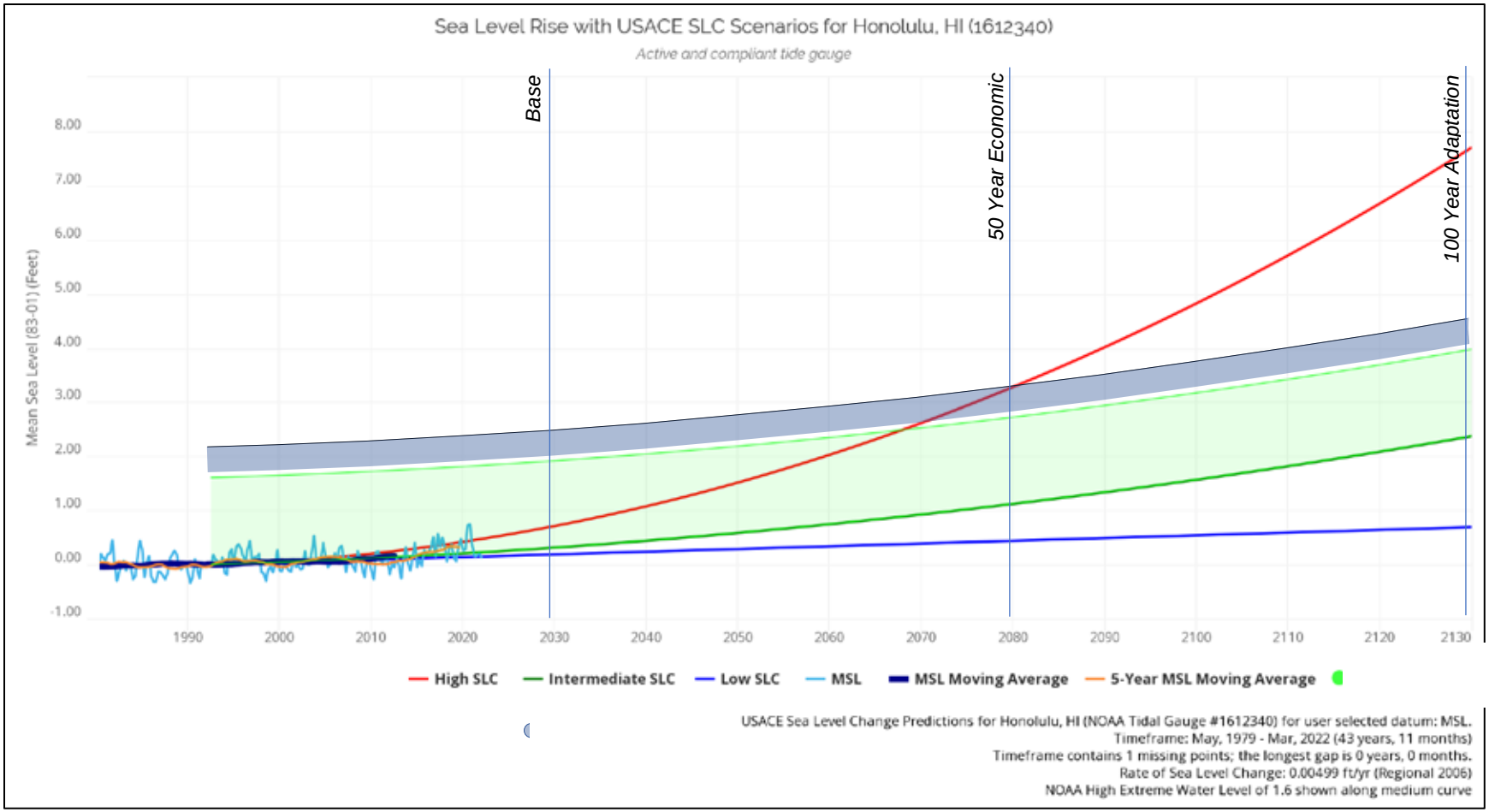


Figure 3-29: USACE Sea Level Tracker 1980-2130 including estimated Future Project Boundary Conditions

3.5.4. Sensitivity Analysis of Tidal Influence

A sensitivity analysis of the downstream boundary conditions demonstrates the tidal influence was run on the calibrated HEC-RAS hydraulic model of the Ala Wai Watershed to determine the present and future “without project” WSEL for multiple scenarios, in compliance with USACE policy.

The following sensitivity analysis was completed using the NOAA gage at Honolulu Harbor. Three still water level elevations were used for the sensitivity analysis: the Mean Higher-High Water (MHHW), the 99% AEP EWL (1-year), and the 50% AEP (2-year) EWL, with a focus on the 99% and 50% AEP extreme water levels because of the results of the tidal-fluvial analysis discussed in Section 3.5.2. From the sea level trends assessment in Section 3.5.3, the intermediate sea level rise (SLR) curve was the focus for the sensitivity analysis of the extreme water levels, but the low and high sea level rise curves were also compared for the 2080 FWOP 99% AEP EWL. A full table of the model runs completed for the sensitivity analysis is shown in Table 3-7.

Table 3-8: Sensitivity Analysis Model Runs

	Still Water Level Scenario	Downstream Boundary Stage (ft LMSL 1992)	Runoff AEP
2030 (Intermediate Curve)	MHHW + IAV + SLR	1.90	50%
	MHHW + IAV + SLR	1.90	10%
	99% AEP EWL + IAV + SLR	2.43	50%
	99% AEP EWL + IAV + SLR	2.43	10%
	99% AEP EWL + IAV + SLR	2.43	5%
	50% AEP EWL + IAV + SLR	2.79	50%
	50% AEP EWL + IAV + SLR	2.79	10%
2080 (Intermediate Curve)	MHHW + IAV + SLR	2.69	50%
	MHHW + IAV + SLR	2.69	10%
	99% AEP EWL + IAV + SLR	3.22	50%
	99% AEP EWL + IAV + SLR	3.22	10%
	99% AEP EWL + IAV + SLR	3.22	5%
	50% AEP EWL + IAV + SLR	3.58	50%
	50% AEP EWL + IAV + SLR	3.58	10%
2080 (High & Low Curves)	99% AEP EWL + IAV + Low SLR	2.53	10%
	99% AEP EWL + IAV + High SLR	5.41	10%
2130 (Intermediate Curve)	99% AEP EWL + IAV + SLR	4.46	50%
	99% AEP EWL + IAV + SLR	4.46	10%
	99% AEP EWL + IAV + SLR	4.46	5%

The MHHW, the 99% AEP (1-year), and the 50% AEP (2-year) EWL elevations, including interannual variability and the 2080 FWOP intermediate sea level, were modeled for the 50% AEP (2 year) and 10% AEP (10 year) fluvial flood events. See Figure 3-23 for the scenarios on the Ala Wai Canal lower reach and the Makiki Stream for the 50% AEP (2 year) fluvial flood and Figure 3-24 for the scenarios on the Makiki Stream for the 10% (10 year) fluvial flood. See

Figure 3-25 for the scenarios on the Ala Wai Canal lower and middle reaches and the Manoa-Palolo Canal for the 50% AEP (2 year) fluvial flood, and see Figure 3-26 for the scenarios on the Manoa-Palolo Canal for the 10% AEP (10 year) fluvial flood.

Based on the model results in Figure 3-23-Figure 3-26, the tidal influence does not go upstream of the Phillip Street Bridge on the Makiki Stream or the Date Street Bridge on the Manoa-Palolo Canal. Figure 3-27 shows the inundation mapping for the 10% AEP (10 year) fluvial flood with the MHHW, 99% AEP, and 50% AEP EWLs, including IAV and the intermediate sea level rise curve. These inundation boundaries for the 10% AEP fluvial flood and downstream boundaries correspond to the same profiles shown in Figure 3-24 and Figure 3-26. Figure 3-28 is a close-up of Figure 3-27 showing just the area of tidal influence.

Increases in WSEs are expected due to the sea level rise in the tidal area of study at the downstream boundary condition. The increase in still water level elevations causes an increase in flooding for future without project conditions (FWOP) in the tidal area. The intermediate sea level rise curves show an increase of 0.79 feet over the 50-year project life (2030 to 2080), which would impact the Ala Wai Canal area of the project. While the sea level trend analysis showed that the intermediate curve would be appropriate for the future without project run scenarios, a sensitivity analysis was performed to compare all three SLR curves in the study area. The 99% AEP EWL with interannual variability was analyzed with varying sea level rise curves (low, intermediate, and high) for the 10% AEP fluvial flood event for the FWOP 2080 scenarios. See Figure 3-29 for the Ala Wai Canal lower reach and the Makiki Stream and Figure 3-30 for the Ala Wai Canal lower and middle reach and the Manoa-Palolo Canal. Based on the model results in Figure 3-29 and Figure 3-30, the sensitivity between sea level rise curves is negligible as far down as Fern Street on the Makiki Stream and does not go upstream of the Date Street Bridge on the Manoa-Palolo Canal.

The 99% AEP (1 year) EWL, compounded with interannual variability and the intermediate sea level rise curves, for the existing without project 2030, FWOP 2080, and FWOP 2130 conditions were analyzed with 50% AEP (2 year), 10% AEP (10 year), and 5% (20 year) fluvial storm event. See Figure 3-31 for the Ala Wai Canal lower reach and the Makiki Stream and Figure 3-32 for the Ala Wai Canal lower and middle reach and the Manoa-Palolo Canal. These model runs show that the impact of sea level rise using the intermediate SLR curve for the without-project conditions from the base year of 2030 to the FWOP 2080 and FWOP 2130 lifespan all have about the same tidal zone of influence for the 50% AEP (2 year), 10% AEP (10 year), and 5% AEP (20 year) fluvial floods. These results are largely in part due to the Phillip Street and Date Street bridge constrictions as well as the steep channel slope on the mauka side (mountain side) of the canal. Tidal flooding within the downstream study area becomes less influential as the inland storm events increase in magnitude. Since the tidal impact does not propagate upstream of Phillip Street on the Makiki Stream or Date Street on the Manoa-Palolo Canal, it was determined that sensitivity runs on larger fluvial flood events was not required.

From the sensitivity analysis, it has been determined that the tidally influenced flooding does not go beyond the Phillip Street Bridge on the Makiki Stream and the Date Street on the Manoa-Palolo Canal for future unimproved conditions due to the steep bed slopes and topographic characteristics of the overbanks.

In support of Climate Preparedness and Resilience analyses (see Also Appendix H), to fully understand extreme possible scenarios and considering the Future With Project Conditions, a comparison was made including for downstream boundary elevations of 99% AEP EWL and 1% EWL equal to 5.41 feet and 6.3 feet respectively (including interannual variability and referencing the High Sea Level Rise Curve). Elevations were compared near the downstream end of the canal upstream of the Makiki Canal mouth, as shown in Figure 3-40 and further defined in Table 3-9. A comparison of the inundation extents for the 99% EWL and 1% EWL events described above combined with the 5% fluvial storm event is shown in Figure 3-41 and Figure 3-42.

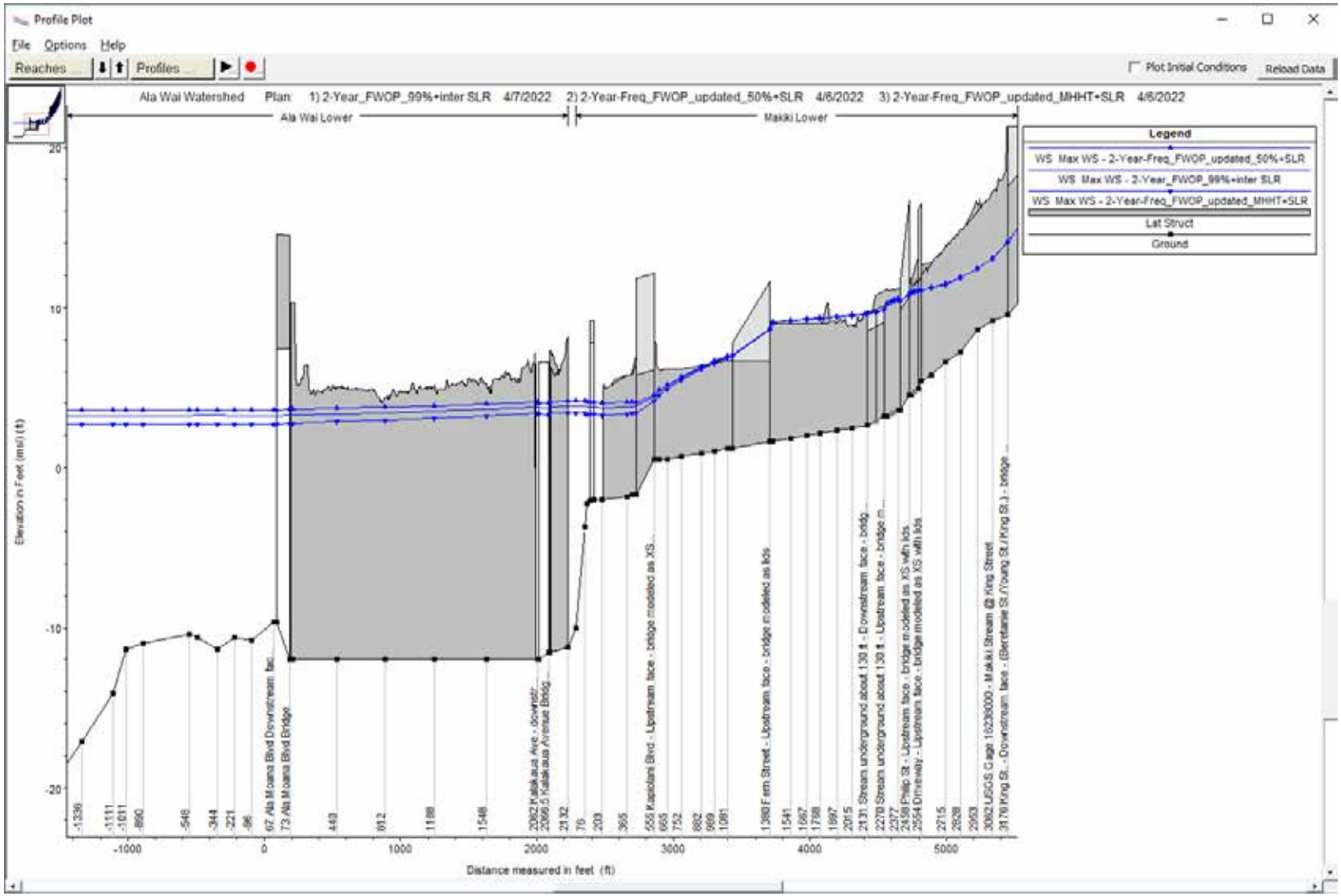


Figure 3-30: FWOP 2080 condition with 50% AEP (2 year) fluvial flooding with the MHHW, 99% AEP (1 year) and 50% AEP (2 year) EWL with IAV and the Intermediate Sea Level Rise Curves on the Ala Wai Canal Lower Reach and the Makiki Stream.

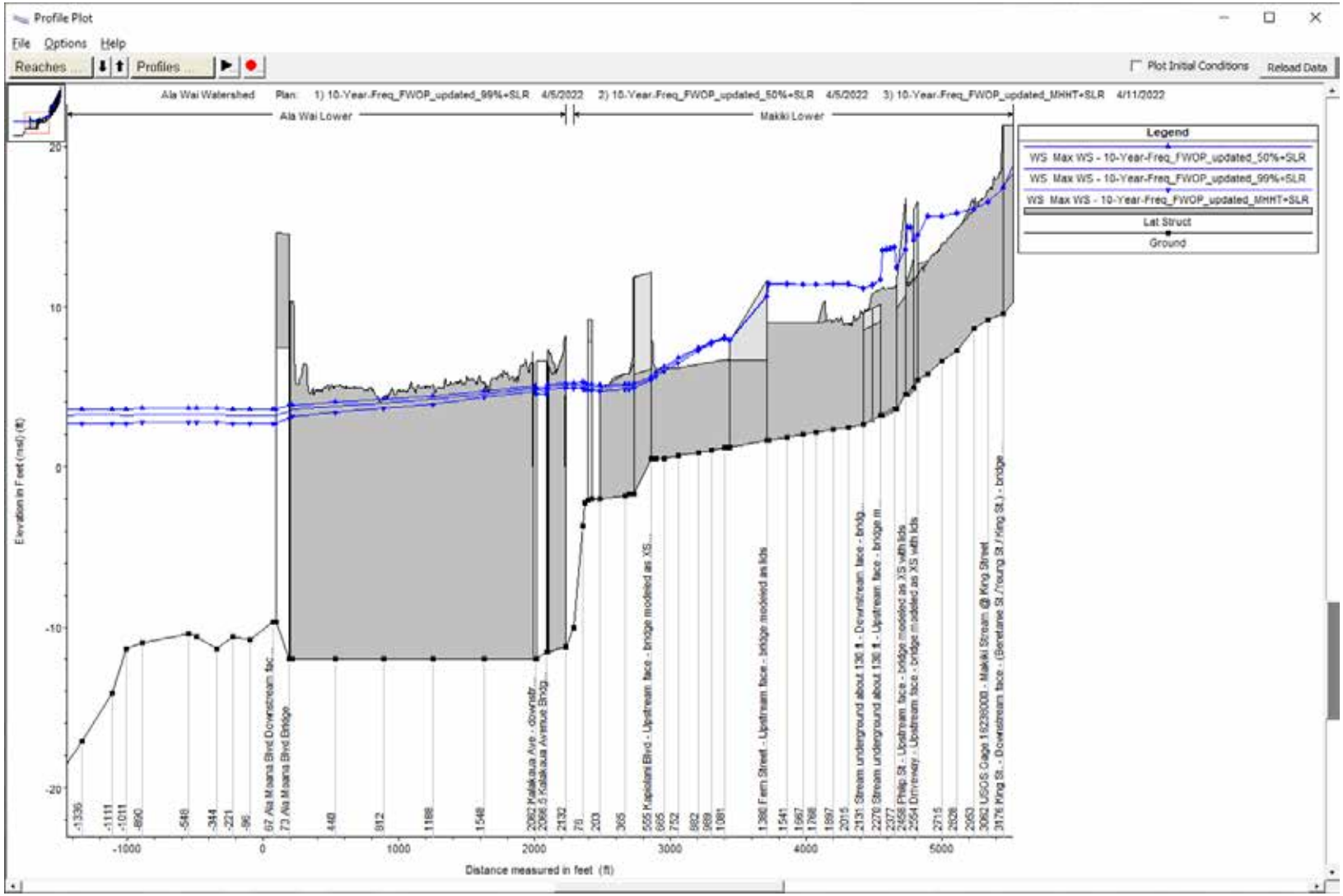


Figure 3-31: FWOP 2080 condition with 10% AEP (10 year) fluvial flooding with the MHHW, 99% AEP (1 year) and 50% AEP (2 year) EWL with IAV and the Intermediate Sea Level Rise Curves on the Ala Wai Canal Lower Reach and Makiki Stream.

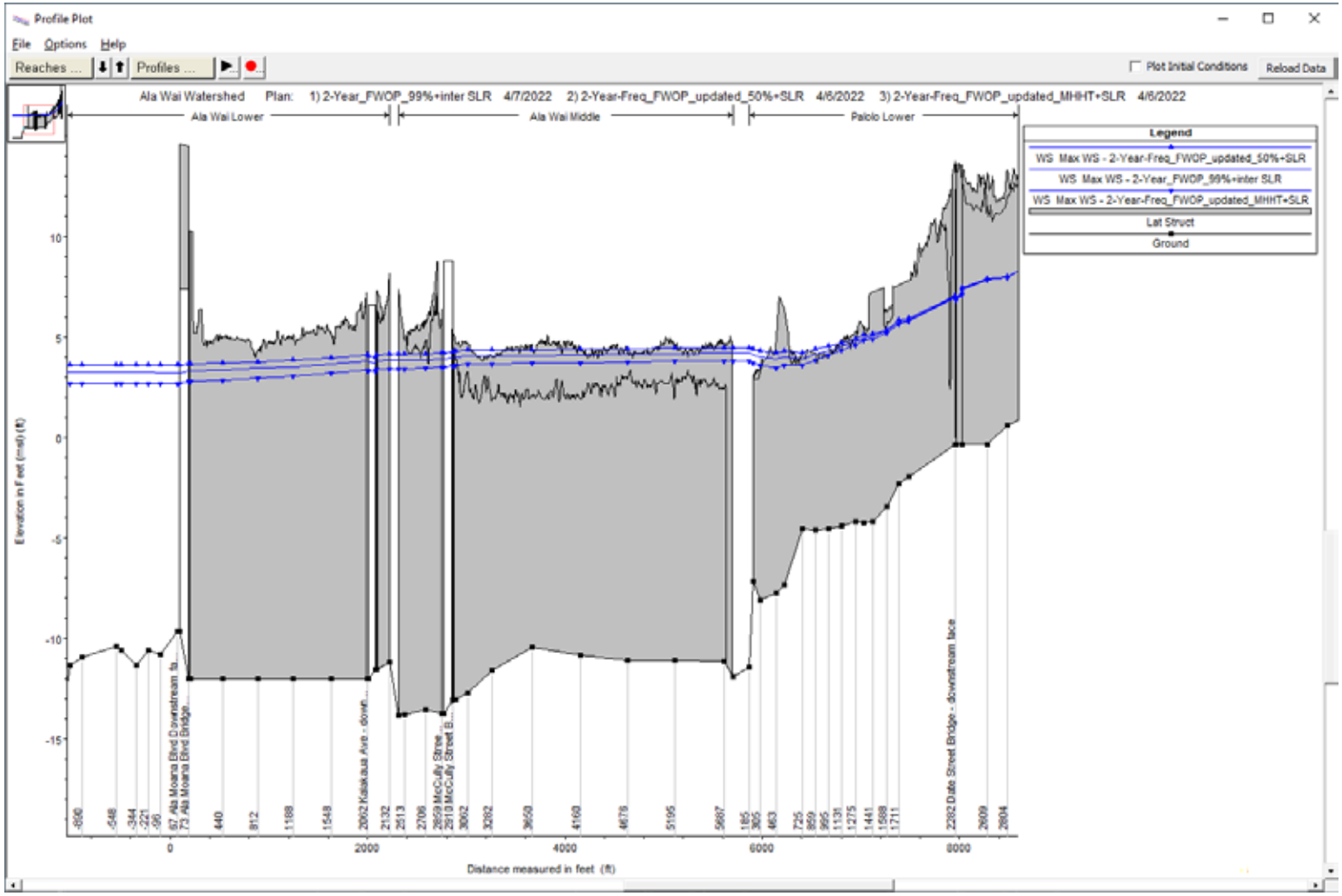


Figure 3-32: FWOP 2080 condition with 50% AEP (2 year) fluvial flooding with the MHHW, 99% AEP (1 year), and 50% AEP (2 year) EWL with IAV and the Intermediate Sea Level Rise Curves on the Ala Wai Canal Lower and Middle Reaches and the Manoa-Palolo Canal.

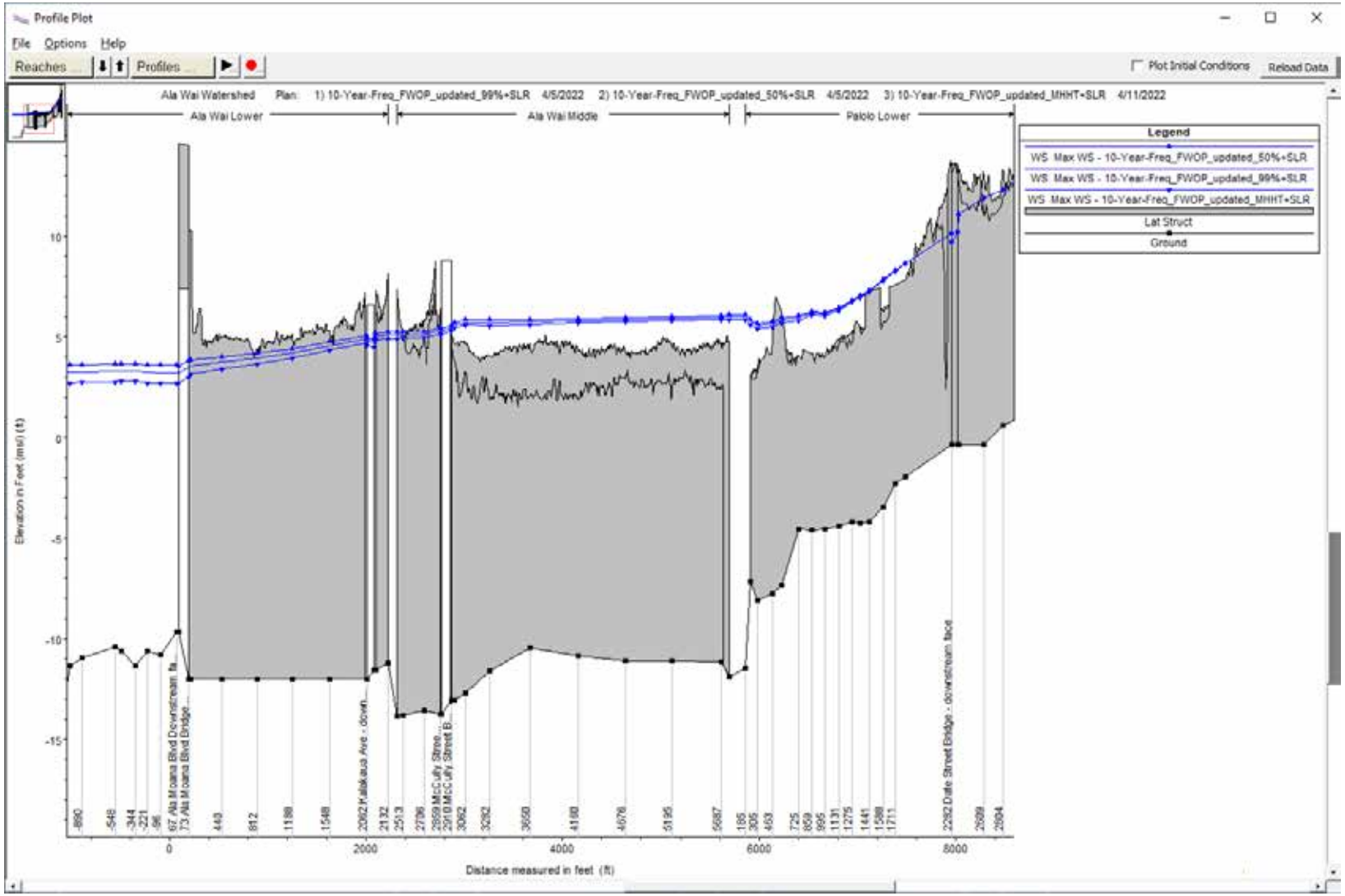


Figure 3-33: FWOP 2080 condition with 10% AEP (10 year) fluvial flooding with the MHHW, 99% AEP (1 year), and 50% AEP (2 year) EWL with IAV and the Intermediate Sea Level Rise Curves on the Ala Wai Canal Lower and Middle Reaches and the Manoa-Palolo Canal.

Figure 3-34: 2080 FWOP 10% AEP (10 year) fluvial flood with multiple boundary conditions: intermediate SLC and IAV for MHHW (cyan color), 99% AEP (1 year)(flooding beyond MHHW in blue color), and 50% AEP (2 year) (flooding beyond MHHW and 99% AEP tidal in green color). Yellow lines represent the limit of tidal impact on the Makiki Stream (Philip Street) and the Manoa-Palolo Canal (Date Street).

Figure 3-35: Close up of Figure 3-34 showing the area of tidal impact on the 10% AEP fluvial flood with the three downstream boundary conditions. Yellow lines represent the limit of tidal impact on the Makiki Stream (Philip Street) and the Manoa-Palolo Canal (Date Street).

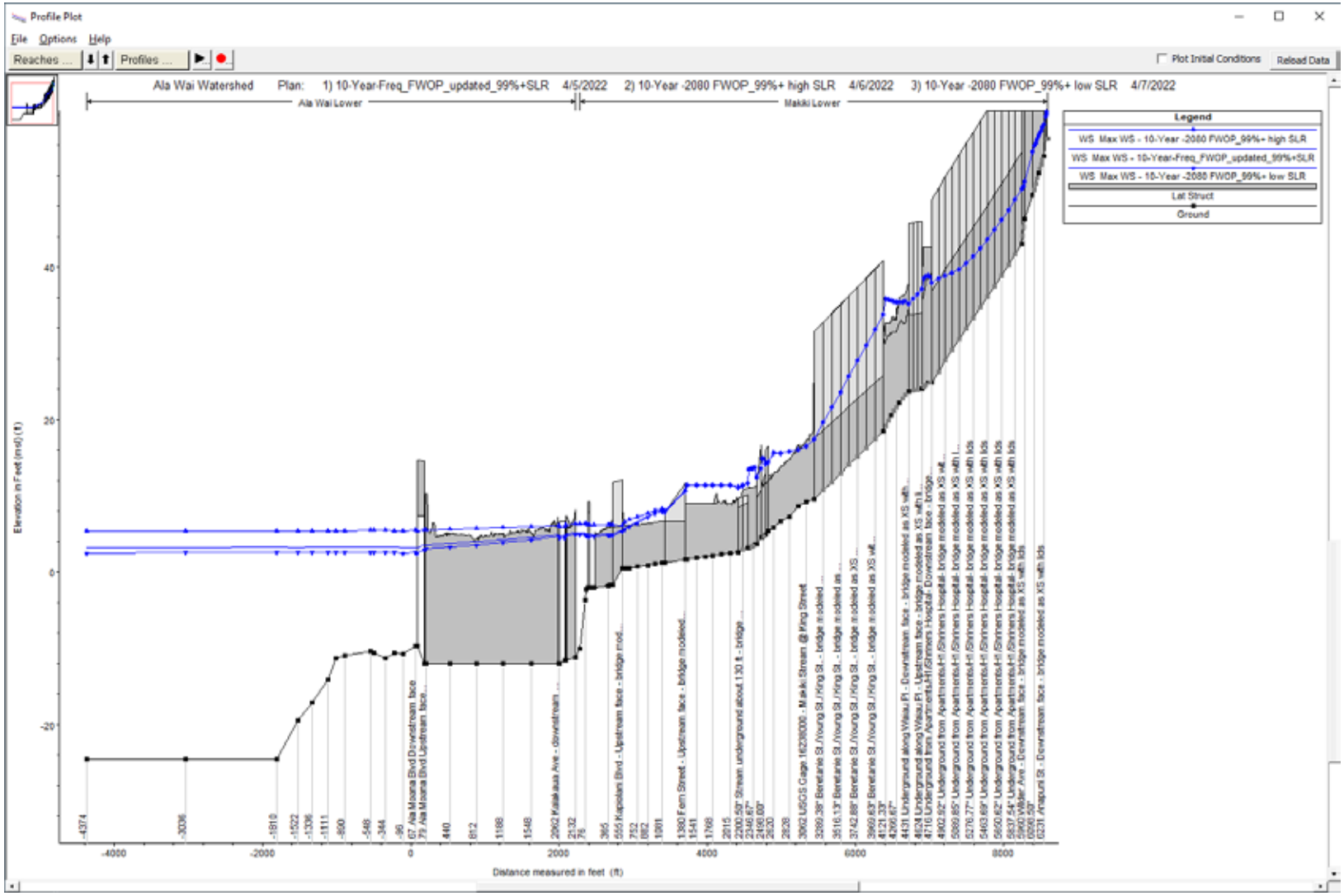


Figure 3-36: FWOP 2080 condition with the 10% AEP fluvial flood event and the 99% AEP coastal/tidal flood with IAV and with the low, intermediate, and high Sea Level Rise Curves on the Ala Wai Canal Lower Reach and the Makiki Stream.

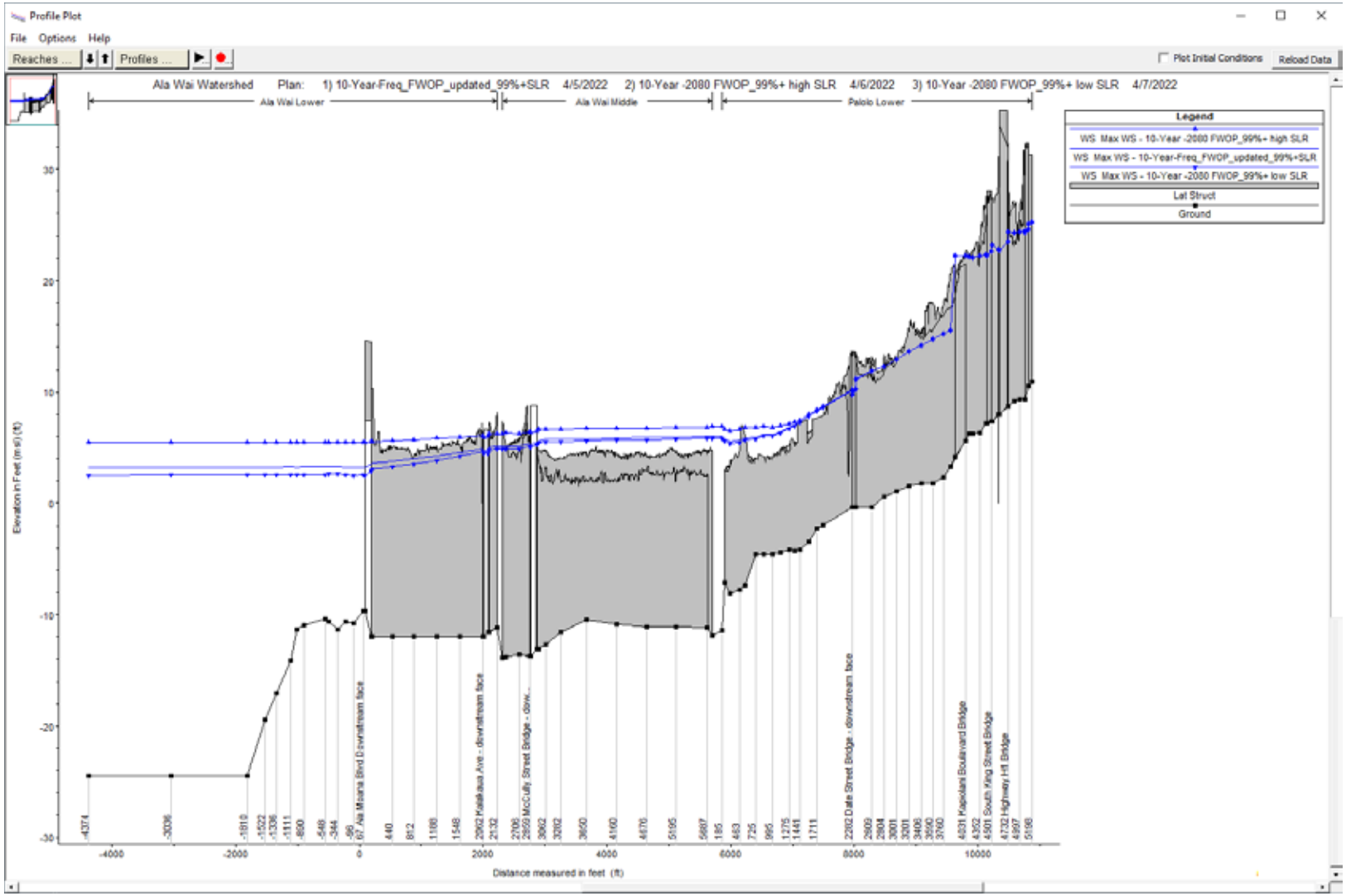


Figure 3-37: FWOP 2080 condition with the 10% AEP fluvial flood event and the 99% AEP coastal/tidal flood with IAV and with the low, intermediate, and high Sea Level Rise Curves on the Ala Wai Canal Lower and Middle Reaches and the Manoa-Palolo Canal.

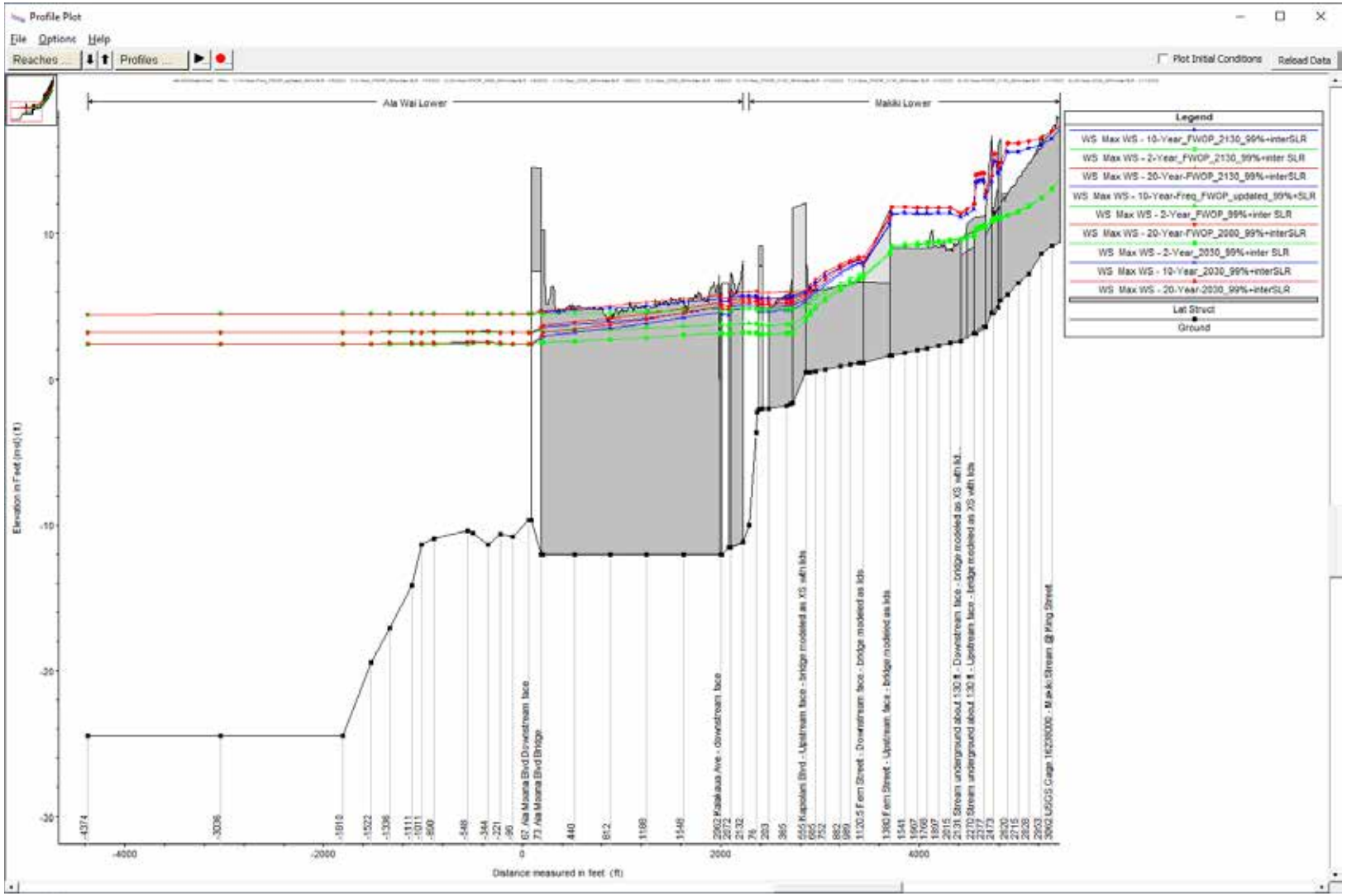


Figure 3-38: Existing without project 2030, FWOP 2080, and FWOP 2130 conditions with 50% AEP (2 year) and 10% AEP (10 year) and 5% (20 year) fluvial flooding with the 99% AEP (1 year) EWL with IAV and the Intermediate Sea Level Rise Curves on the Ala Wai Canal Lower Reach and the Makiki Stream.

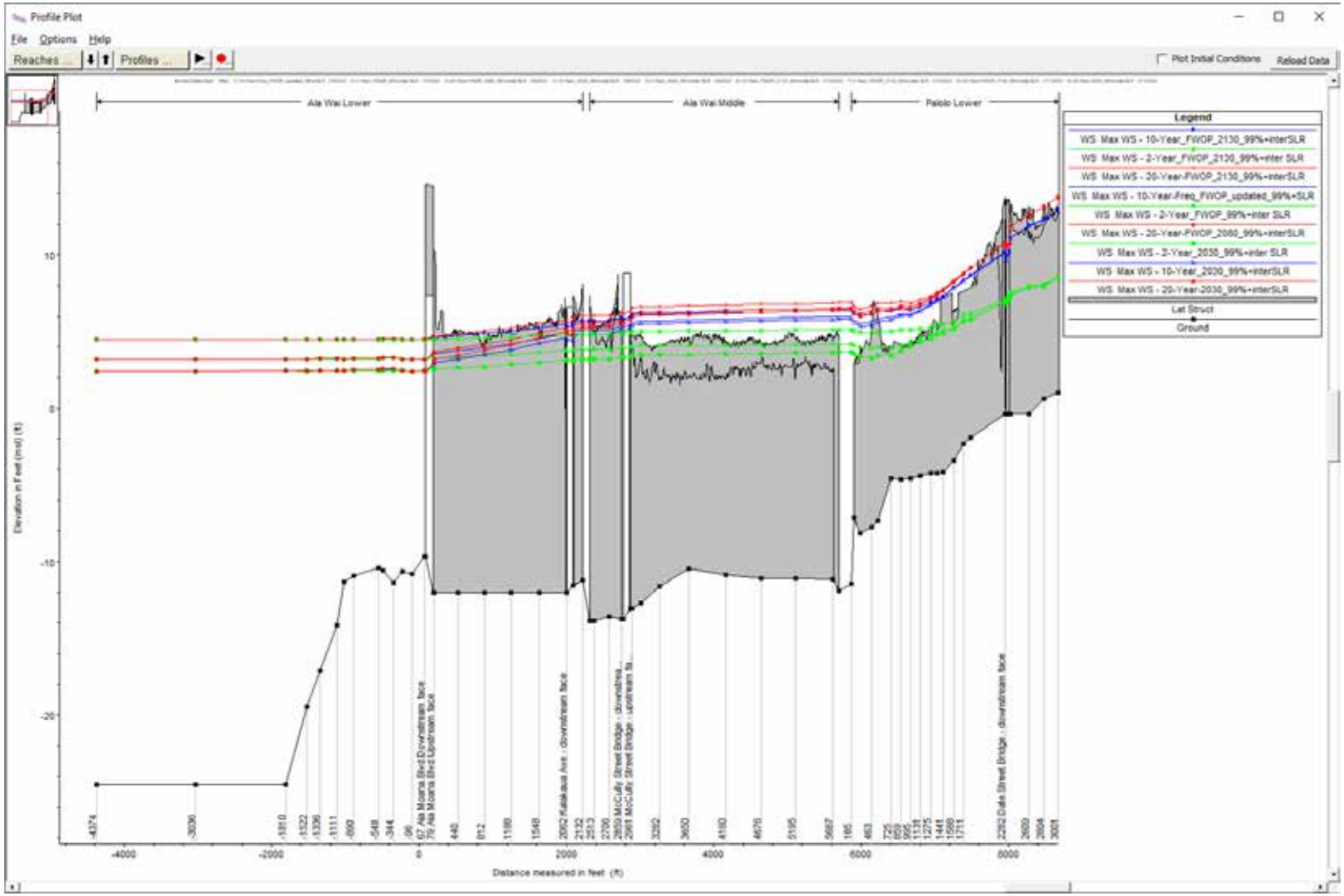


Figure 3-39: Existing without project 2030, FWOP 2080, and FWOP 2130 conditions with 50% AEP (2 year), 10% AEP (10 year), and 5% (20 year) fluvial flooding with the 99% AEP (1 year) EWL with IAV and the Intermediate Sea Level Rise Curves on the Ala Wai Canal Lower, Middle Reaches, and the Manoa-Palolo Canal

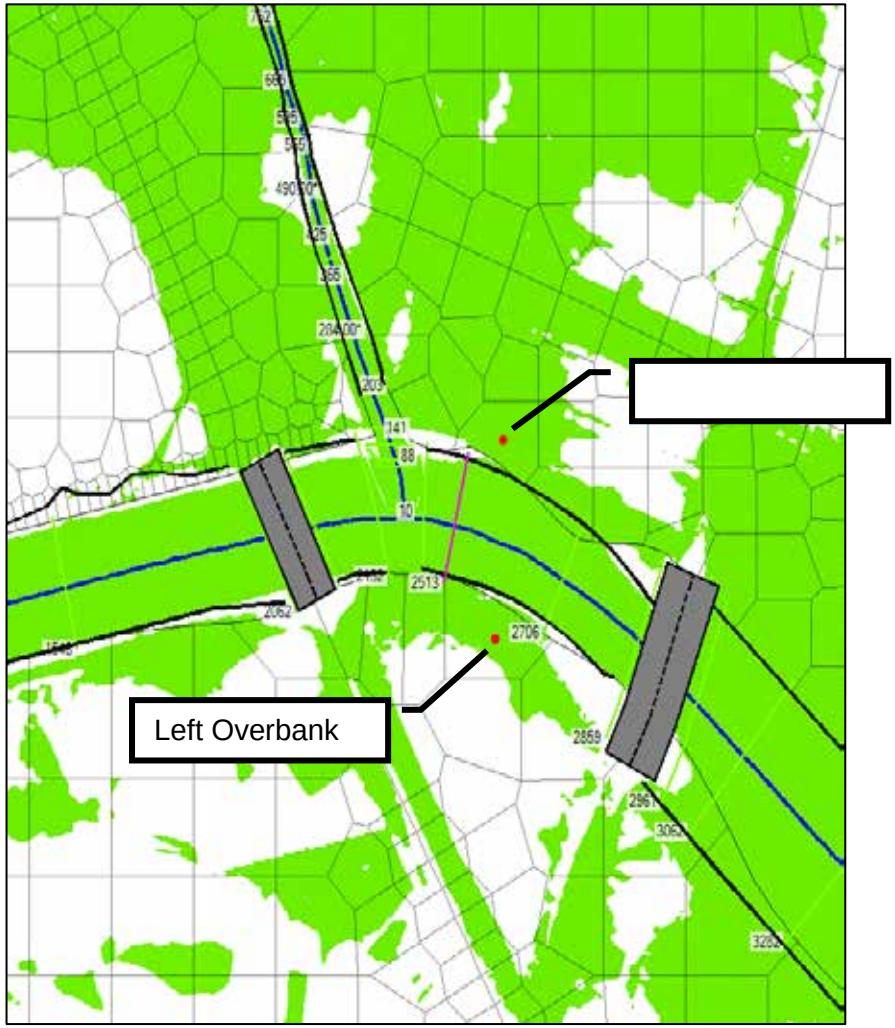


Figure 3-40 Location of comparison points for sensitivity analysis of higher tailwater conditions. Example inundation shown is 10% Fluvial Storm FWOP 2080, DS BC 3.22 (left overbank only partially inundated)

Table 3-9 Computed WSEL for combination of riverine flood scenarios and varying downstream boundary elevations for Project Economic Life (2080)

Fluvial Flood event		DS BC Elevation	XS 2513 WSEL	Left Overbank WSEL	Right Overbank WSEL
(AEP)		Feet	Feet	Feet	Feet
20%	FWOP	3.22	4.57	4.67*	5.1
10%	FWOP	3.22	5.03	5.37*	5.62
5%	FWOP	3.22	5.48	5.76*	6.04
20%	FWOP	5.41	6	6.02	6.08
10%	FWOP	5.41	6.27	6.26	6.5
5%	FWOP	5.41	6.52	6.5	6.93
20%	FWOP	6.3	6.7	6.67	6.91
10%	FWOP	6.3	6.9	6.86	7.23
5%	FWOP	6.3	7.09	7.03	7.56
20%	FWP	5.41	6.45	-	5.32
10%	FWP	5.41	6.86	-	5.77
5%	FWP	5.41	7.23	-	6.09
20%	FWP	6.3	7.17	-	5.46
10%	FWP	6.3	7.51	-	5.89
5%	FWP	6.3	7.85	-	6.19

* Partially inundated cell - Not inundated

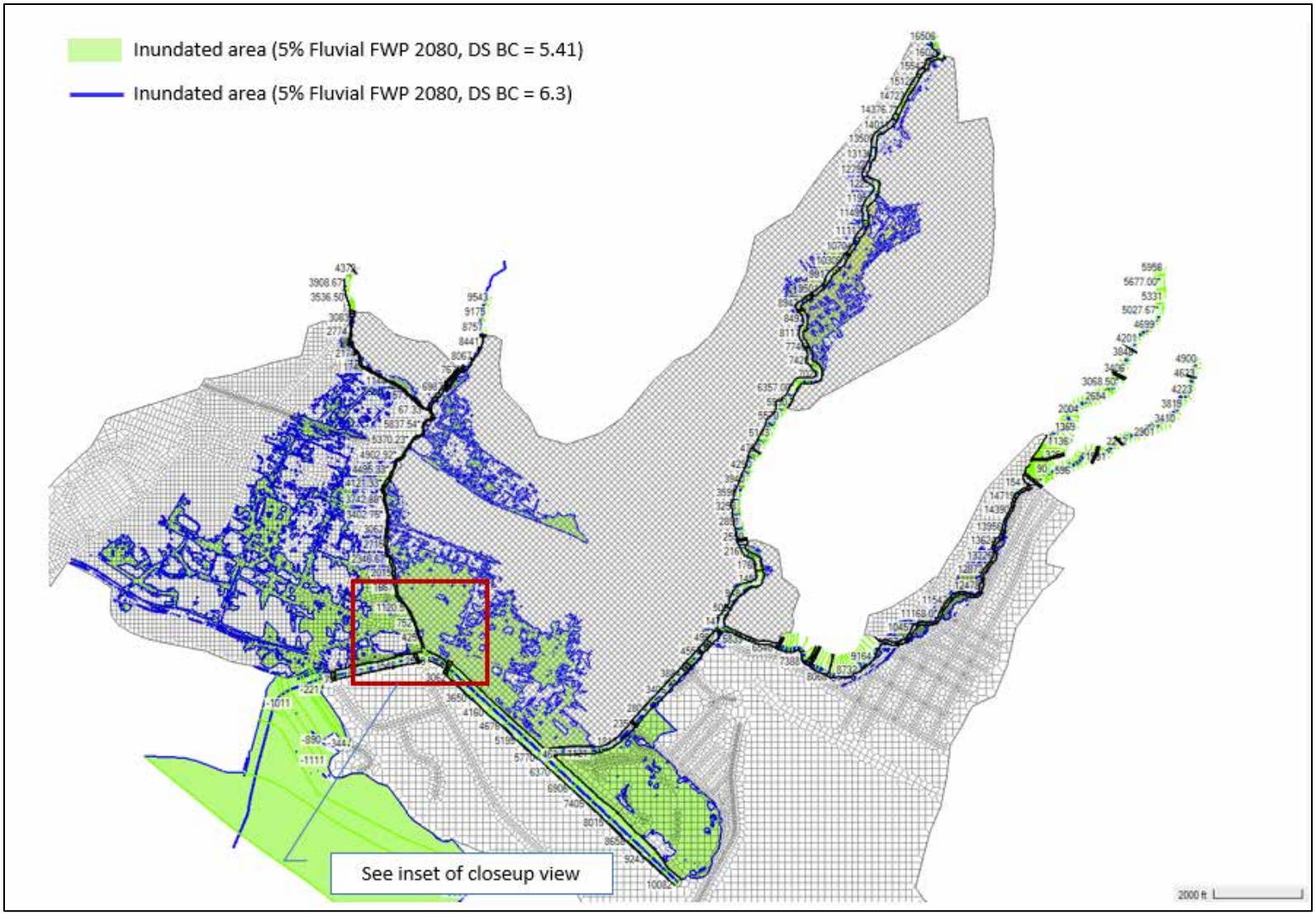


Figure 3-41 Inundation Comparison of 5% AEP fluvial storm event for FWP Conditions with of 99% AEP EWL and 1% EWL (including interannual variability and referencing the High Sea Level Rise Curve).

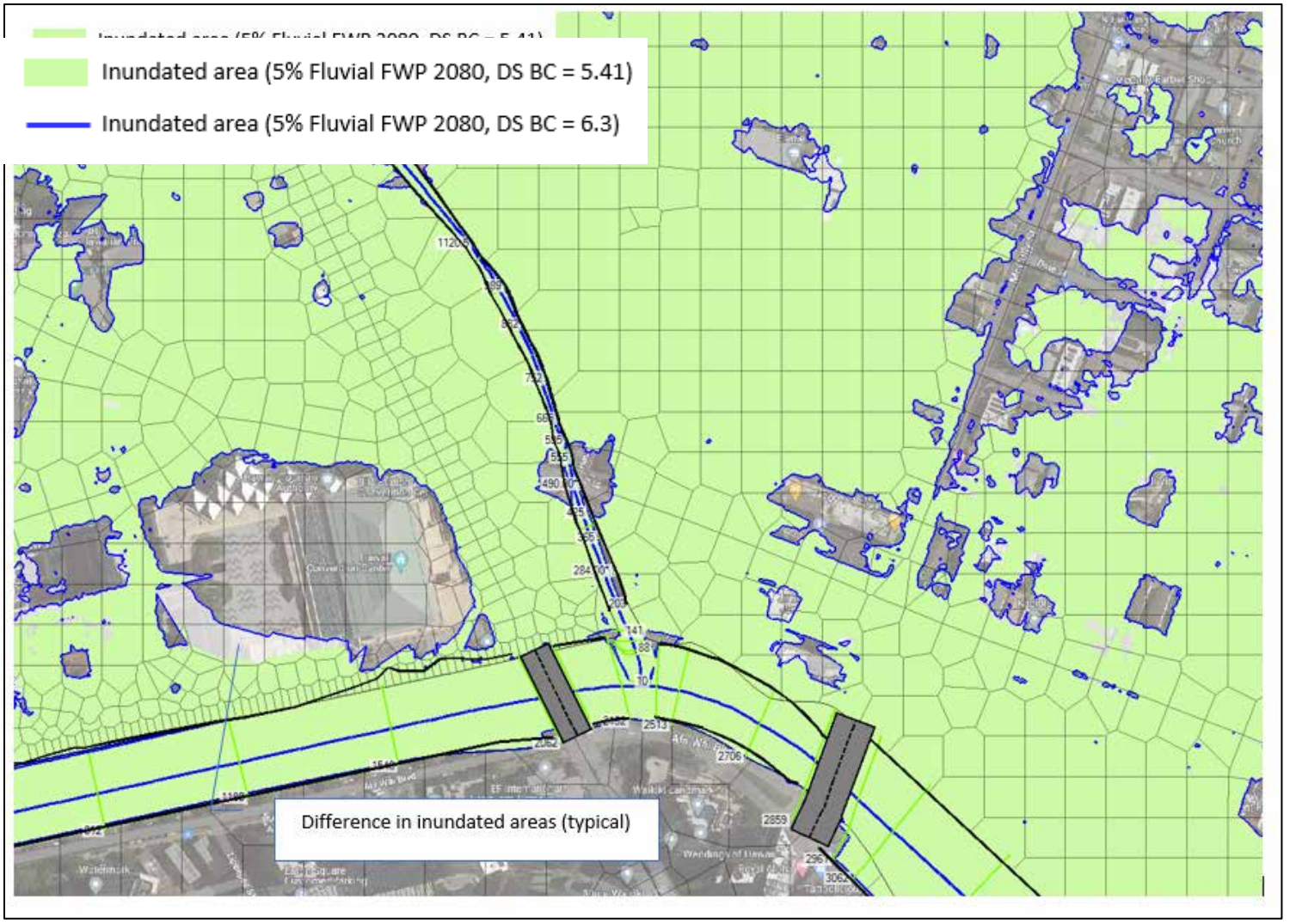


Figure 3-42 Inset view from Figure 3-41showing typical differences in inundation extents for 5% AEP fluvial storm event for FWP Conditions with of 99% AEP EWL and 1% EWL (including interannual variability and referencing the High Sea Level Rise Curve).

3.5.5. Coincident Peak Sensitivity of the Coastal Flood Elevations

A sensitivity analysis of the water surface profile for the 10% AEP riverine flood was conducted for a range of downstream coastal extreme water level elevations from the NOAA extreme elevations for the 99% AEP to the 10% AEP to follow the simplified method described in Figure 11-1 of EM 1110-2-1415 (See Figure 3-43). As the true riverine profiles lie within the range highlighted in yellow in Figure 3-40 below, which is that figure from the EM, this is a critical analysis (Blodgett, 2023).

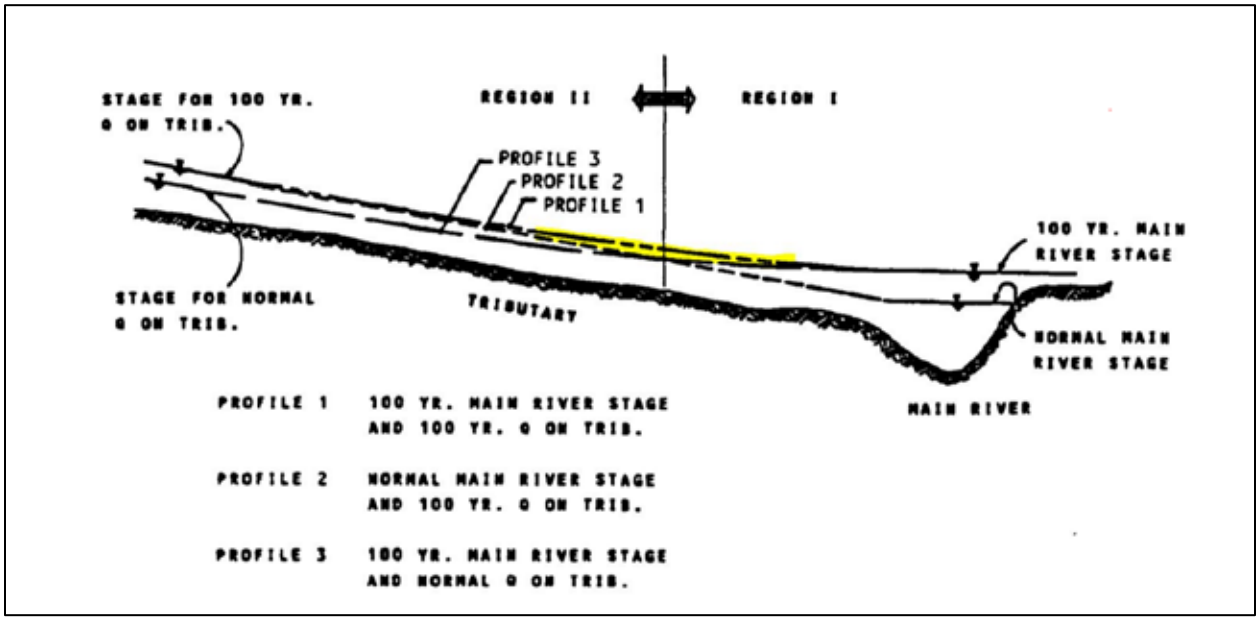


Figure 3-43: Coincident Peak Figure from EM 1110-2-1415

The sensitivity analysis was accomplished by extracting the downstream reach from the HEC-RAS 2D hydraulic model. To evaluate the 10% AEP profile, the model was executed using steady state assumptions for the range of water surface profile scenarios described in Figure Figure 3-44. The true annual exceedance probability profile lies within the range highlighted in yellow (Blodgett, 2023).

For the purposes of this analysis, the peak 10% flow was a rough estimate obtained from the Validation Study RAS 2D model. To test how a profile might be impacted under a higher floodwall condition in the Ala Wai Canal reach, the 10% AEP flow was extracted from a cross section in an upstream reach of the PED hydraulic model that was not significantly impacted by upstream channel overtopping. The results of the analysis are presented in the graphic below. The results indicate that a higher 10% AEP ocean stage was only about 1 foot higher than the 99% AEP ocean stage and did not extend very far upstream due to the steep hydraulic grade line of the riverine profile (Blodgett, 2023).

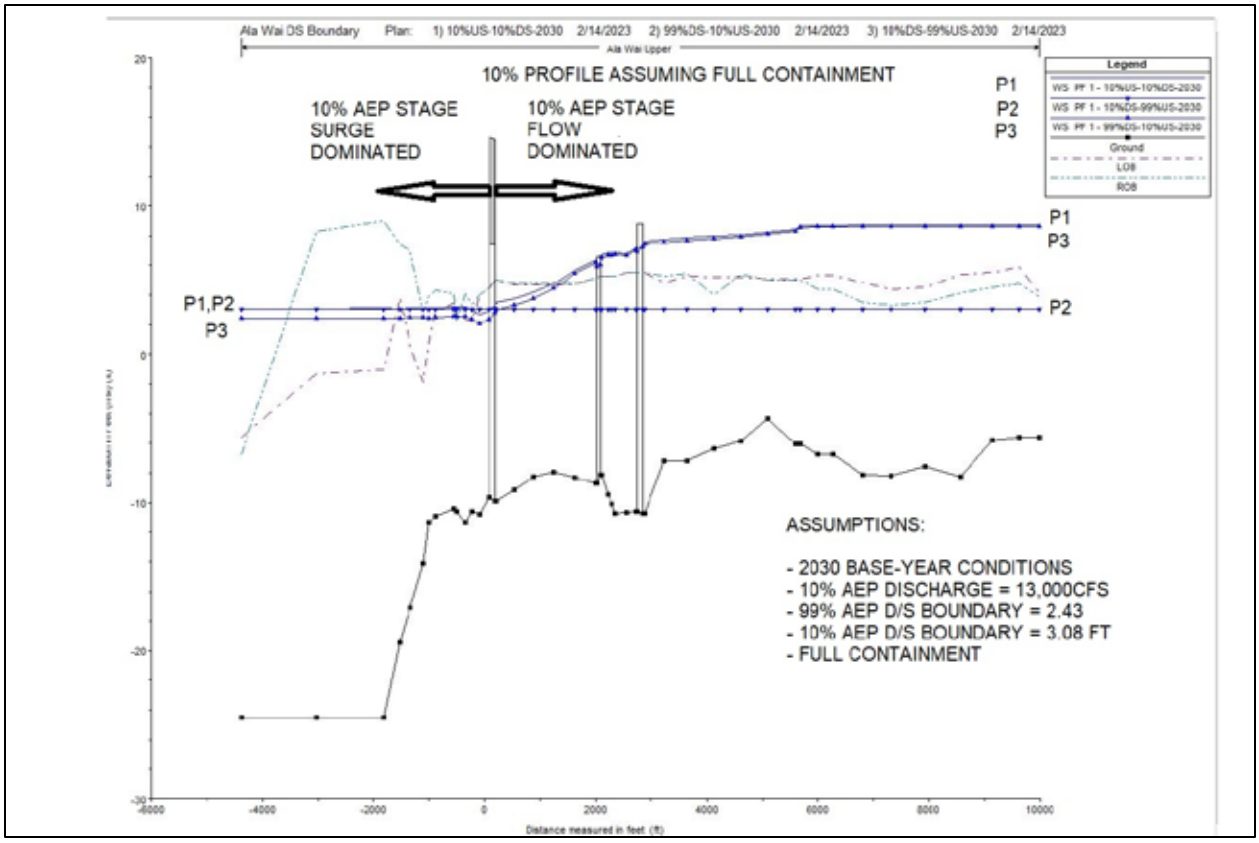


Figure 3-44: Coincident Peak on Ala Wai Canal

It was concluded that the current assumption of using the 99% AEP profile would not significantly impact the assessment of costs or benefits of the plans and was highly unlikely to impact plan selection. It was recommended that the higher downstream ocean profiles be considered during more detailed design and analysis after the TSP. it was also noted that the possibility of high velocities and potential scour in this reach could exist based on the steep riverine profiles observed in the analysis. Velocities would be even higher under a low tide condition at the downstream boundary condition (Blodgett, 2023).

3.5.6. Conclusion

The appropriate downstream boundary condition for this project was determined by assessing the tidal-fluvial relationship, historic sea level trends, tidal phenomena, and the sensitivity of the study area to varying tidal conditions. It was determined that there was not a strong relationship between fluvial events and concurrent tidal events. Therefore, joint-probability and coincident frequency analyses were not necessary, and a simplified approach to defining the base tidal elevation was adopted. As such, the majority of high runoff fluvial events occur when tidal elevations are less than the 99% AEP EWL; therefore, the 99% AEP EWL was determined as an appropriately conservative base tidal elevation to use as the downstream model boundary condition. The future sea level rate of rise was determined by analyzing historic tide levels and historic trends. As such, the Intermediate SLC curve was chosen as the most representative

rate of rise for the study area. Additionally, the future sea level includes interannual variability, since extreme water levels and seasonal tidal variation are independent of IAV. The final downstream boundary condition was determined to be the 99% AEP EWL, including the intermediate SLR and IAV, for a project economic life (2080) still water level elevation of 3.22 ft-LMSL (1983-2001 tidal epoch) and a 100-year adaptation horizon (2130) still water level elevation of 4.46 ft-LMSL (1983-2001 tidal epoch).

Per USACE policy and guidance, a sensitivity analysis was completed to validate the above assumptions. Modeling of multiple combinations of downstream boundary conditions shows that upstream water surface elevations are not sensitive to the downstream boundary condition. The tidal influence does not encroach more than 0.5 miles from the canal upstream of the Makiki and Manoa-Palolo tributaries where the streams are constricted by bridges and begin to steepen on the mauka side of the canal. It was also determined that the still water level elevation is not influential for streamflow greater than the 5% AEP event.

The downstream boundary condition of the 99% AEP EWL, including the intermediate SLR and IAV, is the most appropriate assumption when evaluating the effects of various mitigation measures and scenarios for this project.

3.6. Existing Conditions and Future Without Project Conditions Modeling Errors

Volume errors and maximum water surface elevations were evaluated, and multiple iterations of every flood profile was run with various time steps, 2D time slices, and number of allowed iterations between 1D and 2D were run to minimize the errors. All of the volume errors were less than 3% with the SWE-EM full momentum stricter equations for 2D flow. The vast majority of the volume errors were due to less flow out of the 2D perimeters than flow in. This could be due to the total simulation time run and some flow not fully leaving the 2D areas before the end of the simulations. The models were run for the full length of the input hydrographs, so if the models need to run for a longer time period, then the input hydrographs would need to be extended. This was not done due to the already very long model run times. The peak flood flows fully moved through the system, even if all water did not dissipate yet. See Table 3-10 below for the volume errors and max water surface elevation errors.

Table 3-10: Existing and Future Without Project Modeling Volume Errors and Maximum Water Surface Elevation Errors

	Existing Conditions (Base Year 2030)			Future Without Project Conditions (Year 2080)		
AEP	Overall volume accounting error (in Acre Feet)	Overall volume accounting error (as percentage)	max xsec wsel error (in feet)	Overall volume accounting error (in Acre Feet)	Overall volume accounting error (as percentage)	max xsec wsel error (in feet)
50%	-34.188	0.397	n/a	n/a	n/a	n/a
20%	-44.284	0.462	0.081	-28.595	0.337	0.081
10%	-60.779	0.650	0.085	-50.758	0.545	0.085
5%	-106.914	0.940	0.114	-89.558	0.873	0.120
2%	-158.185	1.235	0.513	-143.019	1.225	0.597
1%	-261.346	1.878	0.729	-244.304	1.911	0.729
0.50%	-320.971	2.147	1.028	-311.699	2.256	0.668
0.20%	-424.533	2.622	0.906	-406.772	2.701	0.931

4. Project Measures

4.1. Overview

The objective of the Ala Wai Canal Flood Risk Management (FRM) Project is to reduce riverine flood risks in the Ala Wai Watershed. Flooding was analyzed for 8 frequency events: the 50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% annual exceedance probability (AEP) flood events. This corresponds to the 2-year, 5-year, 10-year, 20-year, 50-year, 100-year, 200-year, and 500-year return intervals. A 24-hour rainfall event was assumed for each frequency scenario. These storm events were initially used to analyze flooding associated with existing conditions and later used to assess potential flood reduction measures. Specifically for the 1% AEP storm event, a previous study estimated that approximately 1,358 acres within the Ala Wai Watershed was affected, including over 3,200 properties at an estimated $720 million in structural damages for 2021 price levels.

The 2017 FEIS recommended an interconnected system of debris and detention structures and a flood barrier system intended to slow down floodwater as it flows towards the ocean and enhance the capacity of the Ala Wai Canal and Ala Wai Golf Course to retain peak volume of flash floods through a combination of berms, levees, and walls. Within the system, upper watershed debris and detention basins were designed to detain short duration, high intensity rainfalls in the upper watersheds at the source and to reduce and offset peak discharges to more manageable flows into the Ala Wai Canal at the base of the watershed. The lower watershed multi-purpose detention basins, floodwalls, and associated pump stations were designed to increase overall storage capacity at and around the Ala Wai Canal.

The Validation Study updated the hydrologic and hydraulic modeling, and evaluated many of the 2017 FEIS measures, along with some new and revised measures that utilized the same general flood risk reduction concepts.

Many of the concepts from the 2017 FEIS and the 2021 Validation Study were formulated into a robust list of initial flood reduction measures spread widely throughout the basin. In total, 224 measures were identified across the basin. These measures were then analyzed and screened down to a final list to be further evaluated for later use in the final alternatives. This screening effort consisted of applying engineering judgement to the effectiveness and viability of the initial measures and allowed for a final list of measures to be selected for further evaluation. The final measures are shown in Table 4-6.

4.2. Screening of Hydrologic Measures

The purpose of this investigation is to conceptually consider other proposed measures to reduce runoff from the watershed in order to mitigate increased flooding downstream. Three primary concerns were identified as contributors to increased runoff:

1. compaction of soils and destruction of vegetation by wild ungulates (hooved mammals);
2. changes to runoff and erosion characteristics by invasive plant species; and
3. increases to impervious surface area due to human development.

This discussion summarizes the conceptual, screening level evaluation of suggested measures to mitigate these concerns, with the targeted result of increasing the capacity of the soil and vegetation to absorb rainfall and decrease runoff. For the purposes of expediency as well as discussion, extreme values may be assumed based upon engineering judgement to determine whether the measure could potentially provide benefit and merit further study. Figure 4-1 shows the Ala Wai watershed, sub-basins for the hydrologic model HEC-HMS, and aerial photography. The aerial image clearly indicates the developed areas in contrast to the wooded vegetated areas.

4.2.1. Restoration of Upper Watershed Vegetation (Ungulate Control)

Populations of feral animals, particularly hooved mammals, can have significant impacts on vegetated areas. Much of the vegetated areas of Hawaii evolved without these animals prior to them being introduced by settlers (Hawai'i Conservation Alliance, 2001) "…[H]oofed animals like feral goats and pigs … compact soils, reducing their ability to absorb water. … Studies have shown approximately 20-70% of the ground in a Hawaiian rainforest converted to bare soil due to pig digging. Other grazers, such as feral cattle, deer, and goats, can completely denude a forest." (Yuen, 2021) Loss of vegetative cover reduces interception of rainfall and therefore increases runoff from storm events.

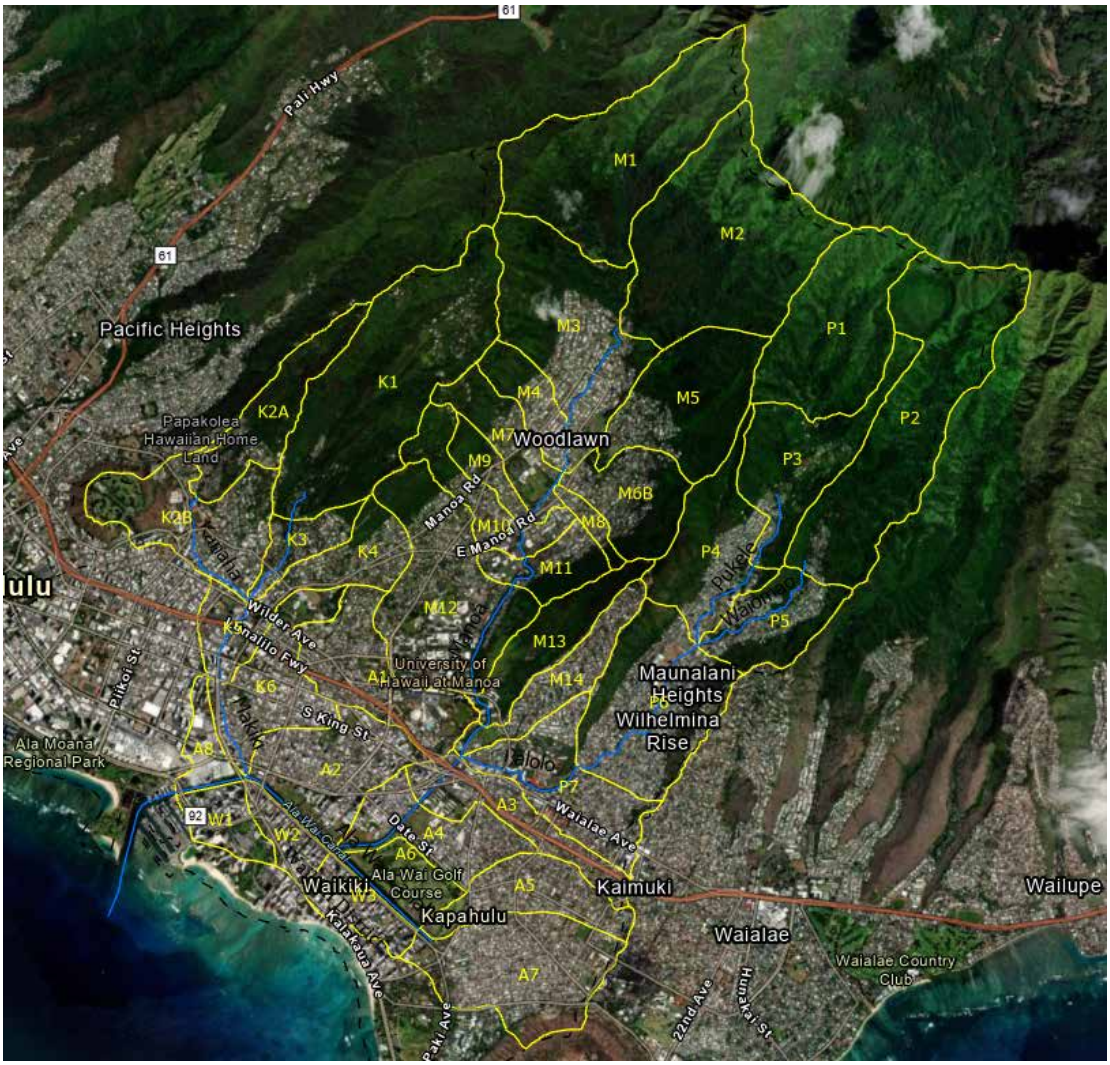


Figure 4-1 Ala Wai Watershed

The proposed mitigation in the upper watershed is to confine ungulate movements to certain areas with the installation of fences. While ungulate control efforts are planned in the upper most reaches of the watershed (indicated as gray lines in Figure 4-2 below) where the highest amounts of precipitation fall on steepest slopes, and therefore most prone to flooding (Roth, 2022), it is understood from the above reference that the problem is pervasive throughout the forested areas of the watershed. For the purposes of this examination, it is assumed that implementation of control efforts of this or similar fashion could eliminate the substantial damage caused by animals throughout the basin. The primary means of representing a change in the vegetation and compaction of soils caused is through the relative change in the Curve Number (CN), a variable utilized in the loss model created by used U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service or SCS), and used in the HEC-HMS model of the watershed. The

assumptions of CN changes are applied to all sub-watersheds that are wooded as a conservative estimate.

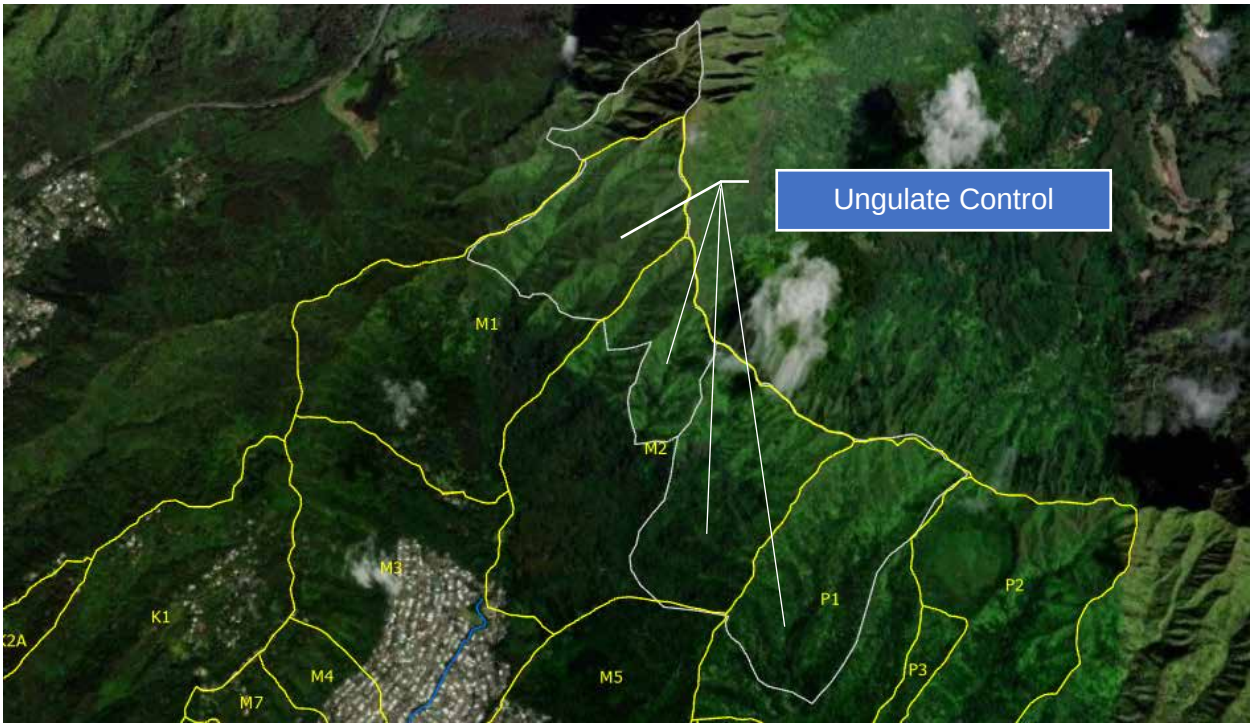


Figure 4-2 Locally planned areas for ungulate controls

The relevant parameter within the HEC-HMS model for analyzing impact of reducing watershed damage by hooved animals is the curve number (CN), which is an index of the ground surface's effectiveness at intercepting rainfall. The CN value for a sub-basin considers the average type of land use (e.g., impervious area, pasture, wooded areas, etc.,) and the relative ability of the soil types in the sub-basin to allow infiltration, as indicated by the soil type's Hydrologic Soil Group classification. The original analysis that developed the original flood hydrographs in HEC-WAT assumed CN values per NRCS TR-55 guidance for wooded areas, particularly Land uses of "Evergreen Forest" and "Scrub/Shrub" ranging from "Good" to "Fair" condition and weighted based upon the Hydrologic Soil Group classification of soils within each sub-watershed (see Figure 4-3).

Table 2-2c Runoff curve numbers for other agricultural lands 1/

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
…					
Woods. 6/	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 4/	55	70	77

Figure 4-3 Excerpt from NRCS TR-55 CN Tables

Per the NRCS WebSoilSurvey online tools, soils in the undeveloped regions of the watershed are largely soil types A, B and C (Figure 4-4). For the purposes of this conceptual analysis, the relative impact of eliminating the damage by ungulates and recovery of vegetation was approximated by decreasing the CN values for all soil types for Evergreen Forest and Scrub/Shrub by a value of 10, selected as an approximate average of the difference in CN values for "Poor" to "Good" condition of the wooded areas in the watershed. When combined with the other land uses in each subbasin, weighted by the area of each land use type, this lowered the composite CN values for the sub-areas in Table 4-1 by a range of 11-15.

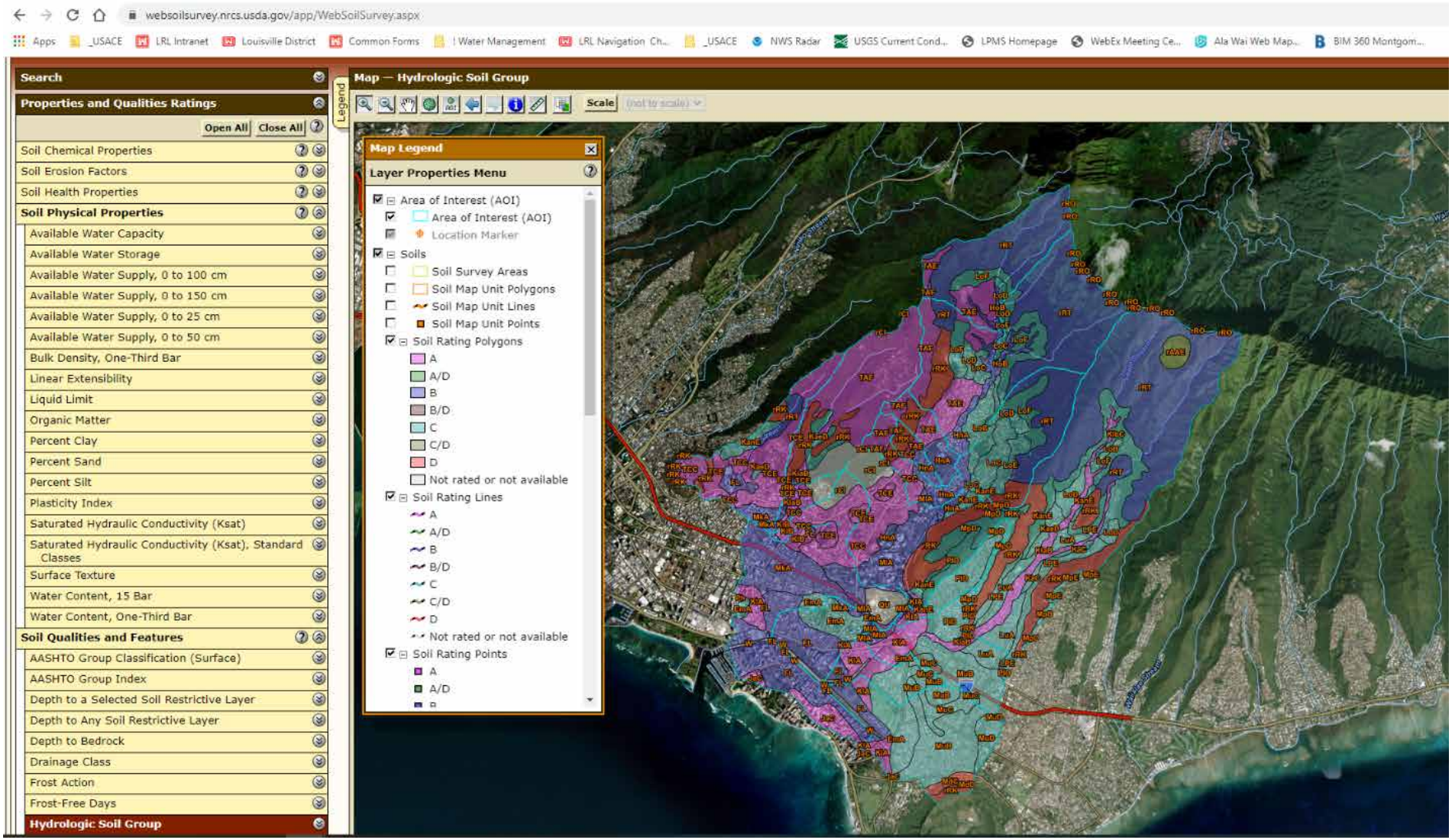


Figure 4-4 Hydrologic Soil Groups

Table 4-1 Original vs. Adjusted Curve Numbers due to Ungulate Control

Subbasin	Lower SCS Loss Coefficient (CN)	Upper SCS Loss Coefficient (CN)	Original SCS Loss Coefficient (CN)	Initial Abstraction (in.)	New CN
M1	56	61	67	0.52	46
M2	62	69	65	0.44	54
M3	62	70	72	0.52	60
M5	61	69	65.2	0.52	54
M13	64	72	72	0.52	60
P1	64	69	64	1.36	54
P2	64	70	65	1.2	55
P3	60	67	62	1.76	53
P4	70	76	72	0.77	65
K1	38	45	43.7	1.0	30

4.2.2. Restoration of Watershed through Invasive Vegetation Control

4.2.2.1. Impacts

Per information shared by the Hawaii Department of Fish and Wildlife (DOFAW) (Roth, 2022), new research is showing that when forests are protected from invasive vegetation and ungulates, they are 25% faster at infiltration (Roth, 2022). “Native forests are naturally very effective at capturing and absorbing rainwater, which reduces sedimentation and outflow” (Roth, 2022). In the damaged barren areas that are the result of the invasive vegetation or ungulate traffic, infiltration is observed to be 15 times slower, which can magnify the runoff from storm events. Additionally, the natural vegetative debris from a forest of native plants are substantially less than that of an albizia forest. When species like miconia, albizia, and angiopteris evecta (“mule’s foot fern”) dominate the canopy, the forest's understory is reduced to bare earth. Removal of invasive vegetation allows for potential recovery for all levels from groundcover to canopy (Roth, 2022).

“Miconia is a species known to promote erosion and higher rates of runoff due to its shallow roots and large leaves “ (Roth, 2022). Reduced light infiltration inhibits the growth of understory vegetation, ultimately reducing the floor to bare earth (see Figure 4-5). This increases erosion and runoff especially during intense rain events. This is compounded by Miconia’s large leaves as the raindrops are consolidating into much larger drops than the direct rainfall, accelerating erosion on the already bare ground (Roth, 2022).

Figure 4-5 Denuded forest floor below miconia (Nelson, 2020)

Mule's foot fern is a large ground-rooting ornamental fern that forms dense monotypic stands that completely displace understory species, also turning the forest floor to bare earth. Mule's foot fern readily infiltrated stream banks, contributing to increased runoff and erosion, causing increased sediment buildup in channels (Roth, 2022).

4.2.2.2. Extents

The lower reaches of Manoa and Palolo watersheds and nearly all of the Makiki watershed are dominated by non-native and invasive plants, with minimal remaining native cover. "The lower reaches of the back and Western sides of Manoa valley have the heaviest infestation of albizia and other invasive species" such as mule's foot fern and miconia (Roth, 2022). For miconia, the heaviest infestations are in the lower elevation forest (below 1,000 feet in elevation) mostly along streams from Nuuanu to the eastern side of Manoa Valley. Some of the heaviest infestations for miconia have been found in the Nuuanu/Makiki areas that contain the Makiki Trail System over to the Aihualama and Manoa Falls area, as well as in the Puu Pia area and behind Lyon Arboretum (Roth, 2022). Figure 6 and Figure 39 represent partial extents of miconia and albizia as developed from GIS data provided by University of Hawaii personnel; it is noted by the source particularly that the albizia extents are not comprehensive of the entire watershed, but rather focused on areas of ongoing removal projects.

Figure 4-6 Miconia Extent (2020) (Dube, 2021)

Figure 4-7 Albizia Extents (Davis, 2021)

4.2.2.3. Evaluation

Based upon available data above including Figure 6 and Figure 39 and potential for proliferation, the extent of invasive vegetation as a percentage of vegetative land cover is conservatively estimated as shown in Table 4-2.

Table 4-2 Undeveloped Land Cover

Sub-Basin	Percent of Undeveloped Vegetative land cover		
	as Miconia	as Albizia and Mules Foot Fern	Total for Potential Improvement
M1	33%	20%*	53%
M2	25%	50%	75%
M3	50%	20%*	70%
M4		20%*	20%
M5	10%	20%	30%
M7		40%*	40%
M9		40%*	40%
M10		40%*	40%
M12		40%*	40%
K1	10%		10%

Per Figure 4-7, the extent of Albizia in the upper Palolo sub-basin is limited, so that it is assumed that even if fully mitigated, the effect on the overall runoff characteristics of the sub-basins would be very small. As it is very high in the Palolo watershed, the impact of full mitigation to flows downstream should also be negligible. As stated in the literature, the impact of these invasive plants reduces or eliminates the undergrowth vegetation which significantly decreases the interception of precipitation and decreases the infiltration. The relevant hydrologic model parameters that represent these physical processes in the existing HEC-HMS model is the CN and the Initial Abstraction (Ia). The Initial Abstraction is defined as the initial fraction of the storm depth, after which surface excess becomes runoff, combining a number of variables related to interception, rainfall intensity, and physical absorption capabilities of the soil (Natural Resources Conservation Service). Guidance or research could not be located to quantify the effects of decreased infiltration in terms of Initial Abstraction or CN, therefore for the purposes of this preliminary investigation, judgment was used to estimate that Ia would increase by 1 inch of precipitation and CN would decrease by a value of 5. The change in CN was approximated to represent a single level change in Hydrologic Condition, (e.g., “Poor” to “Fair”, or “Fair” to “Good”) as indicated above in Figure 3. The increase in Ia of 1 inch was selected as a liberal improvement in the ability of the affected area to intercept and infiltrate before runoff would occur due to the reestablishment of understory vegetation, the roots of which tend to increase the soil porosity. The changes in the input values are summarized in Table 4-3.

Table 4-3 Model CN and Ia

Subbasin	Original SCS Loss Coefficient (CN)	Initial Abstraction (in.)	New CN	New Initial Abstraction (in.)
M1	67	0.52	62	1.5
M2	65	0.44	60	1.45
M3	72	0.52	67	1.5
M4	77	0.52	72	1.5
M5	65.2	0.52	60	1.5
M7	73	0.52	68	1.5
M10	79	0.52	74	1.5
M12	77	0.40	72	1.4
K1	43.7	1.0	38	2.0

4.2.3. Reduction in Impervious Surfaces

As discussed by the previous scenarios, the ability of the watershed soils to absorb initial rainfall directly relates to the amount of runoff from a watershed in channels and thus the potential for flooding for a particular storm. Urban development creates hard, impervious surfaces (e.g., compacted soils, paved roads and sidewalks, roofs) preventing rainfall infiltration into the soil surface, but also displaces the vegetation that normally intercepts rainfall; the vegetation has a much greater relative surface areas to intercept the rain. Over time, the resulting urban flooding that occurs due to the increased runoff has necessitated that metropolitan areas implement development restrictions limiting the amount of runoff from new construction through detention, but these designs are largely aimed at reducing the runoff from more frequent flood events. More recent programs look to increase the interception of rainfall, slow down how quickly the runoff gets to channels, and increase the amount of infiltration into the soil surface. This can occur through technologies and practices like use of vegetated “green” roofs, rain barrels or storage tanks, gravel or pervious pavements, rain gardens, removal of drainpipe connections to sewers and streams, or simply replacing hard surfaces like pavements with vegetated areas.

A high-level analysis was performed to quantify whether a large-scale program to reduce impervious area and/or improve infiltration rates would potentially change discharges.

In the more urbanized sub-basins in the watershed as represented in HEC-HMS, the Kinematic Wave model is used. The Kinematic Wave runoff model conceptually represents the sub-basin as two overland flow surfaces or “planes”, one plane representing areas that are essentially impervious with short lengths of flow, and a second plane representing pervious areas and having values representing higher infiltration capacity and resistance to flow (MacArthur & DeVries, 1993).

This method was applied to the sub-basins listed in Table 4-4, which are the most highly developed areas of the watershed. Table 4-4 shows the base model CN parameters and the expected range of CN defined in previous studies and used in HEC-WAT to develop the final frequency hydrographs representing existing conditions.

For the purposes of this analysis, an initial trial (Trial "RedImp") estimated that restoration measures would conservatively reduce the Plane 2 CN from the fully impervious assumption (CN = 98) and increase the Ia from 0.1 inch to be equivalent to the Plane 1 Lower CN and Ia previously assumed for the purposes of concept examination. The Plane 1 Lower CN is assumed to include some impervious surfaces that are not feasible to fully eliminate/mitigate or is the best CN that could be expected to be achieved based upon soil types in the sub-watershed. This analysis does not attempt to recalculate composite CN estimates for individual watersheds, assuming that the original hydrologic modeling reflected the respective mix of soils and land use to establish those values.

A second trial (Trial "RedImp2") emulated a change of 25% of the High Intensity Developed areas to Grassland by adjusting the CN computations for these same sub-basins. Looking at the relative results for the 1% event (Table 4-5), the reduction in peak discharge was observed to be minimal so this scenario was not evaluated further.

Table 4-4: Flow Plane SCS Loss Value Uncertainty Range

Subbasin	Plane 2 Base Curve Number	Plane 1 Base Curve Number	Plane 1 Base Initial Abstraction (IN)	Plane 1 Lower Curve Number	Plane 1 Upper Curve Number
A1	98	78	1.0	69	81
A2	98	86	0.75	84	87
A3	98	83	0.9	79	84
A4	98	76	0.75	72	79
A5	98	81	0.75	76	83
A6	98	69	1.0	66	75
A7	98	76	1.0	73	79
A8	98	86	0.75	84	86
K5	98	85	1.0	81	86
K6	98	80	1.2	77	82
W1	98	83	0.8	81	86
W2	98	86	1.0	85	87
W3	98	82	0.95	80	82

Table 4-5 Comparison of 1% event discharges for Reduced Impervious Area Scenarios

AEP	1.0%	1.0%
	RedImp_100y	RedImp2_100y
Landmark	Peak Discharge (CFS)	Peak Discharge (CFS)
Confluence of Waihi & Waiakeakua Streams	2,121	2,121
Woodlawn Bridge	10,097	10,097
Confluence - Manoa - Palolo	13,457	13,457
Palolo Fire Station	7,153	7,153
Palolo Stream Gage	9,214	9,214
MP Canal at mouth	23,902	23,897
Kanaha Stream	1,775	1,775
Makiki @ King Street	4,629	4,612
Makiki at mouth	5,930	5,834
OUTLET	34,759	34,582

4.2.4. Interpretation / Application of Results to Study

The peak discharges as a result of the changes to the HEC-HMS model are tabulated in Addendum E for nine (9) frequency flood events. This table compares the model peak flows for existing conditions ("Ex Cond"), ungulate control ("Ungulate"), invasive vegetation mitigation ("InvVegMit"), and reduction of Impervious areas ("RedImp") scenarios based upon the model changes described above. As modeled, the plans to mitigate for invasive species of vegetation in the watershed show the greatest reduction potential in peak discharges of the three proposed measures. Given the steepness of the watershed and tendency for flood events to be flashy in nature, rising and falling over a very short period, the relatively small decreases in peak flows that are presented are an indication that the reductions in inundated areas will also be small. As indicated in Appendix A, the relative magnitude of the reductions in peak flows decrease with increasing magnitude (decreasing annual exceedance probability) of the storm events. A test was performed to validate the interpretation that the reduction in inundated areas would be small by comparing the 10% AEP storm inundation boundary for the future without-project (FWOP) conditions versus the inundation boundary resulting from the reduced flow for the Invasive Vegetation Mitigation plan in HEC-RAS. In Figure 4-8, the yellow areas were no longer inundated using the reduced flows for the Invasive Vegetation Mitigation during the 10% AEP

event. The largest concentrated area of improvement can be seen east of the Makiki stream at the H1/Lunalilo Freeway and the lower end of the Manoa University campus. In general, the changes in depths were small on the order of 0.5 foot, with the greatest changes in inundated area apparent where water surfaces didn't exceed the threshold for a pathway connecting to the isolated area.

It is noted that the three measures discussed above cannot be implemented in a short time; rather, to achieve reductions to the order of magnitude indicated here will require a sustained implementation program of these measures over the course of many years or even decades. For the initiatives to restore control the invasive vegetation and ungulates, it will take years for native vegetation and undergrowth to reestablish and restore the root systems to improve the soil infiltration capacity. It should also be noted that removal of invasive vegetation and its interception capability (although potentially small) may increase runoff in the short term until native vegetation is re-established. Changes to impervious areas will require a sustained funding stream dedicated to retrofitting public infrastructure to reduce their runoff, and other public initiatives would have to be explored to incentivize improvements on private / commercial property to make changes affordable, desirable, and/or implementable on a large scale across the developed portions of the watershed. That is not to say that such watershed management efforts should not be explored or implemented, but rather that they should be implemented outside of this federal project to amplify the benefits achieved from a federally supported plan and the reductions in flow may be compounded if more than one initiative can be implemented.

Figure 4-8 Inundated areas for 10% AEP FWOP (yellow) compared to Invasive Vegetation Mitigation reduced flows (blue)

It is acknowledged that this analysis was performed at a simplified screening level for the purposes of this project, comparing the standalone HEC-HMS FWOP model and the model reflecting watershed improvement measures. For a more correct comparison of the proposed watershed improvement measures to FWOP Conditions, a similar HEC-WAT analysis would need to be performed with the changes described above to the HEC-HMS model, with a range of changes to the curve number explored. The relative changes in peak discharge and volume would then be applied to the frequency FWOP hydrographs in HEC-RAS to determine true reductions in water surface elevations.

4.3. Screening of Hydraulic Measures

Engineering judgement, along with PDT discussion and collaboration, was used to identify which of the 200+ measures demonstrated promising results that were appropriate to pursue further, and which measures did not prove useful. The PDT focused on about 40 measures to analyze for further screening. Additional information regarding the screened measures can be found in the project's measure tracker spreadsheet.

Further explanation is provided in this section for the screening out of some of the measures that were determined of significant interest, specifically, the SWIFT tunnels, Ala Wai Canal microtunnels, Woodlawn bypass, Woodlawn channel widening, Palolo Valley District Park detention basin, and the Ala Wai Canal second outlet.

4.3.1. SWIFT tunnels:

The "Ala Wai Canal Flood Risk Management Project Report of the Permitted Interaction Group" completed by Oceanit in August 2020 investigated the use of Subsurface Watershed Inundation Flow Technology (SWIFT) tunnels. These tunnels were to reduce the amount of flood flow from the upper watersheds to the lower watershed to remove enough water from the 2% to 1% AEP flood to match that of the 5% to 4% AEP flood event, which is the original design capacity of the Ala Wai Canal.

These large SWIFT tunnels were investigated for the GRR Study, and multiple possible layouts were investigated, as shown in blue in Figure 4-9. The tunnels did not reduce the discharges and water surface elevations enough to make a significant difference to the water surface elevations and existing measures. The estimated costs of the tunnels were updated, and the very high costs screened these tunnels out.

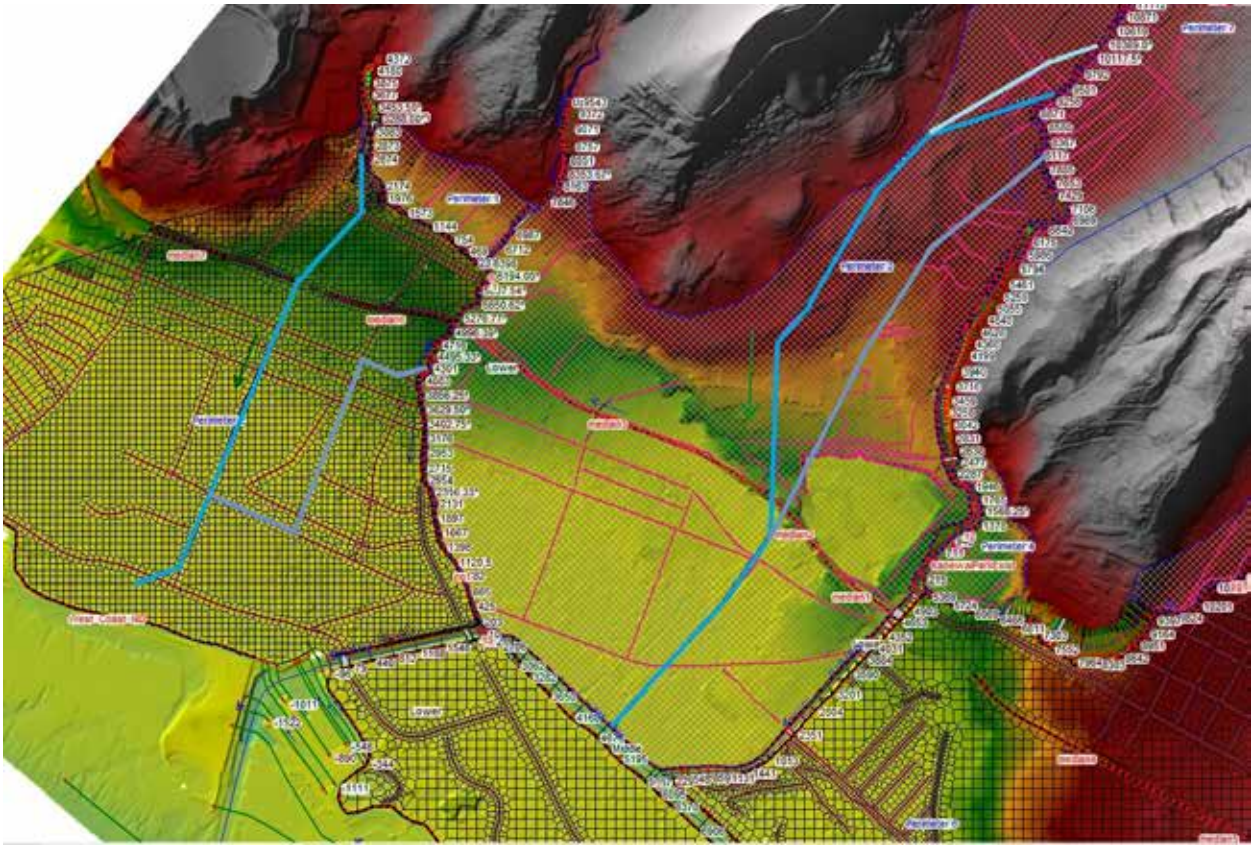


Figure 4-9: Example SWIFT Tunnel Alignments Investigated

4.3.2. Ala Wai Canal Microtunnels:

Analyzed as mechanism of passing flow from Ala Wai Canal to ocean through means of subsurface tunnels through the Wakiki area. Tunnels consisted of various sizes and configurations, and also were analyzed in multiple locations such as Kapahulu Avenue, Fort Derussy Park, and Saratoga Road. It was found that these subsurface tunnels provided little benefit in flood reduction of the Ala Wai Canal and its surrounding overbank areas. This was largely in part due to the limited slope available in the area. Much of the canal and overbank areas are not significantly higher in elevation that the ocean outlets at which the tunnels would tie into. Thus, the lack of significant slope prevents flood waters from conveying through the tunnels at an adequate flow rate to noticeable reduce flooding. There were also ecological concerns about the freshwater, possibly contaminated from the canal, flowing into the ocean near the coral reefs. The canal microtunnels are shown below in Figure 4-10 with the tunnel footprints highlighted in red.

Figure 4-10 Ala Wai Canal Microtunnels

4.3.3. Woodlawn Drive Bypass:

For the Validation Study, the analysis of this option assumed that all flow that was leaving the right bank at Woodlawn Drive Bridge near Manoa Marketplace would be captured through an inlet on Woodlawn Drive and redirected through a culvert that would run underground and along the driveway for the University's greenhouses and back into Manoa Stream. The Validation Study modeling removed the flow from the system upstream of the Woodlawn Bridge, then added the flow back in downstream. A culvert was then sized based on that flow. For this GRR Study, a culvert equal to the Validated study culvert was modeled, and the modeling showed much less impact to the water surface elevation and overland flood flows were still occurring. This was most likely due to energy losses being accounted for and the actual slope and size of the pipe being taken into consideration of the max conveyance through the bypass. The Woodland Bypass was modeled along with the Woodlawn Drive Floodwall, but the bypass did not significantly reduce the WSELs near the structures.

This measure was screened from evaluation as it did not significantly reduce water surface elevations and has a relatively high construction cost associated with it. The bypass did not negatively interact with other measures, however, and could be incorporated into the design if it is desirable to reduce WSEL on the Woodlawn Drive Floodwall. The bypass is shown in Figure 4-7.

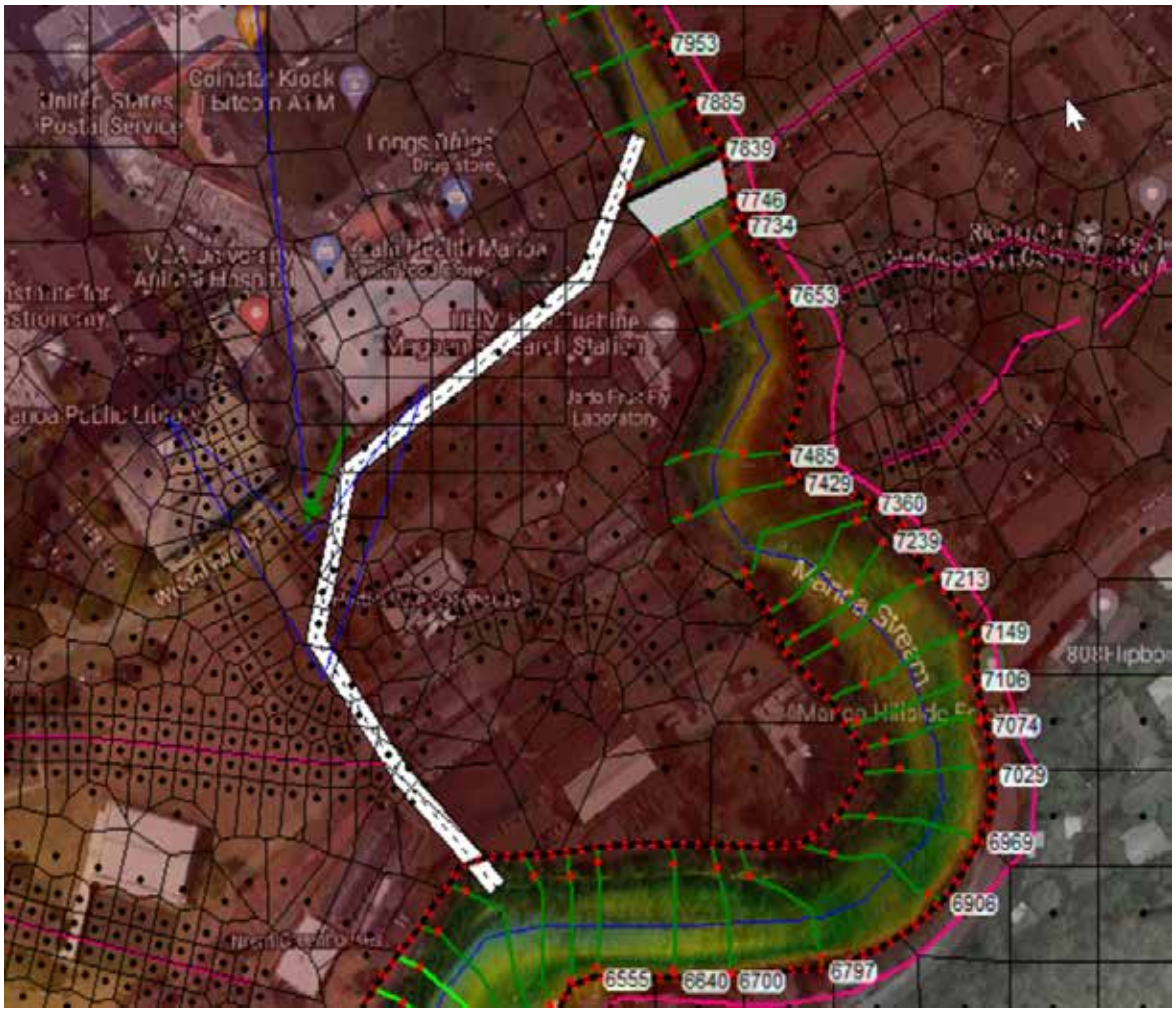


Figure 4-11 Woodlawn Drive Bypass

4.3.4. Woodlawn Channel Widening

The Woodlawn Channel Widening investigated widening the Manoa Stream channel downstream of Woodlawn Bridge where the channel naturally constricts. This measure cut into the left bank of the Manoa Stream to increase the flow conveyance in order to lower the water surface elevations through the Woodlawn bridge and reduce the overland flood flows. The location and a typical cross section in the measure area is shown in Figure 4-12. The measure was screened due to limited reduction in water surface elevation, the cost, and the fact that it did not eliminate the need for the proposed Woodlawn Drive Floodwall.

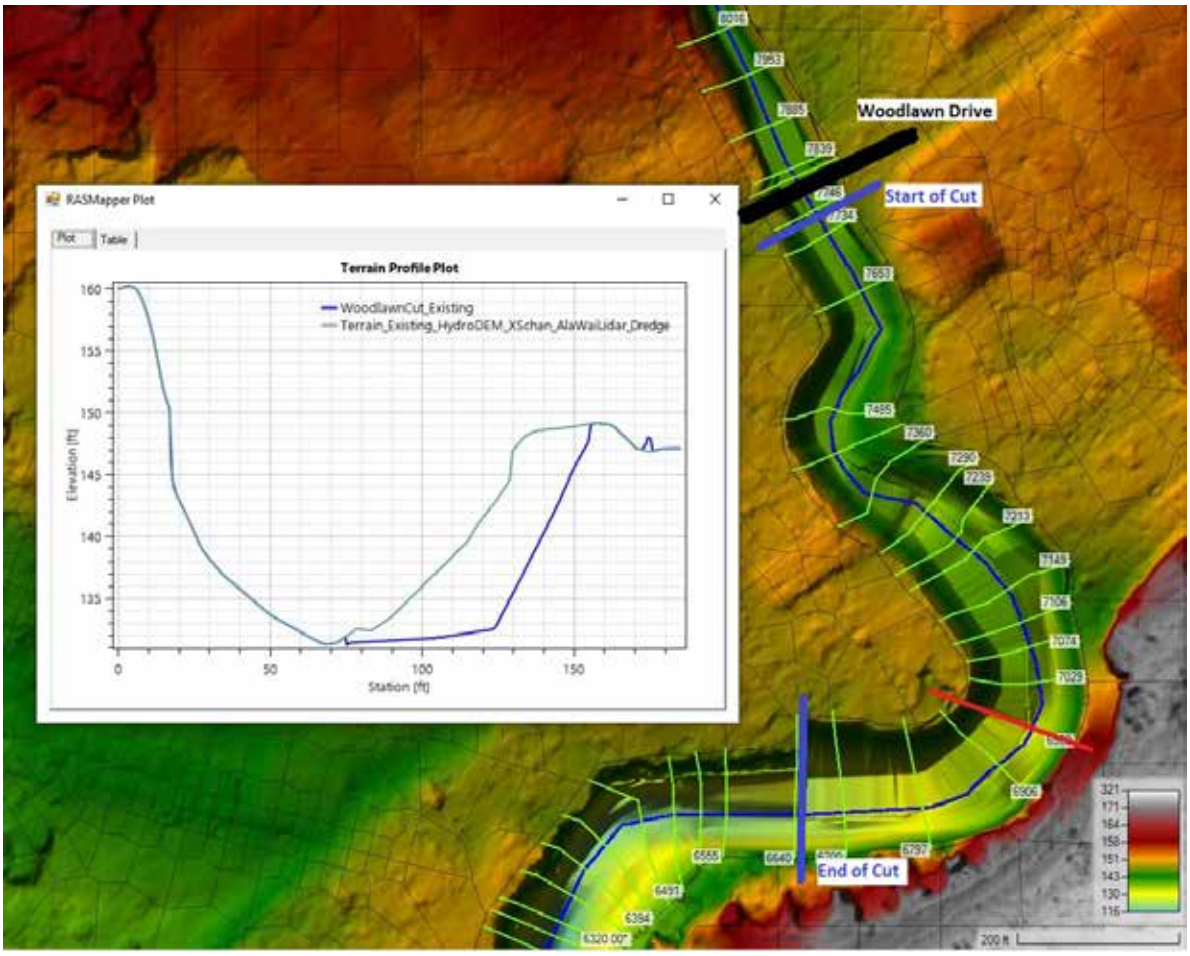


Figure 4-12: Woodlawn Channel Widening

4.3.5. Palolo District Park Detention Area

A detention area was placed around Palolo Valley District Park with a culvert diverting flow from Pukele, into the detention basin, and then into mainstem Palolo. The approximate volume of the detention basin was approximately 10 acre-ft. It was found that while the detention area captures and stores flood waters, it only shaved off a small portion of the peak flow and had limited impacts to the flooding with a large cost, therefore this measure was screened. The detention area is shown in Figure 4-13.

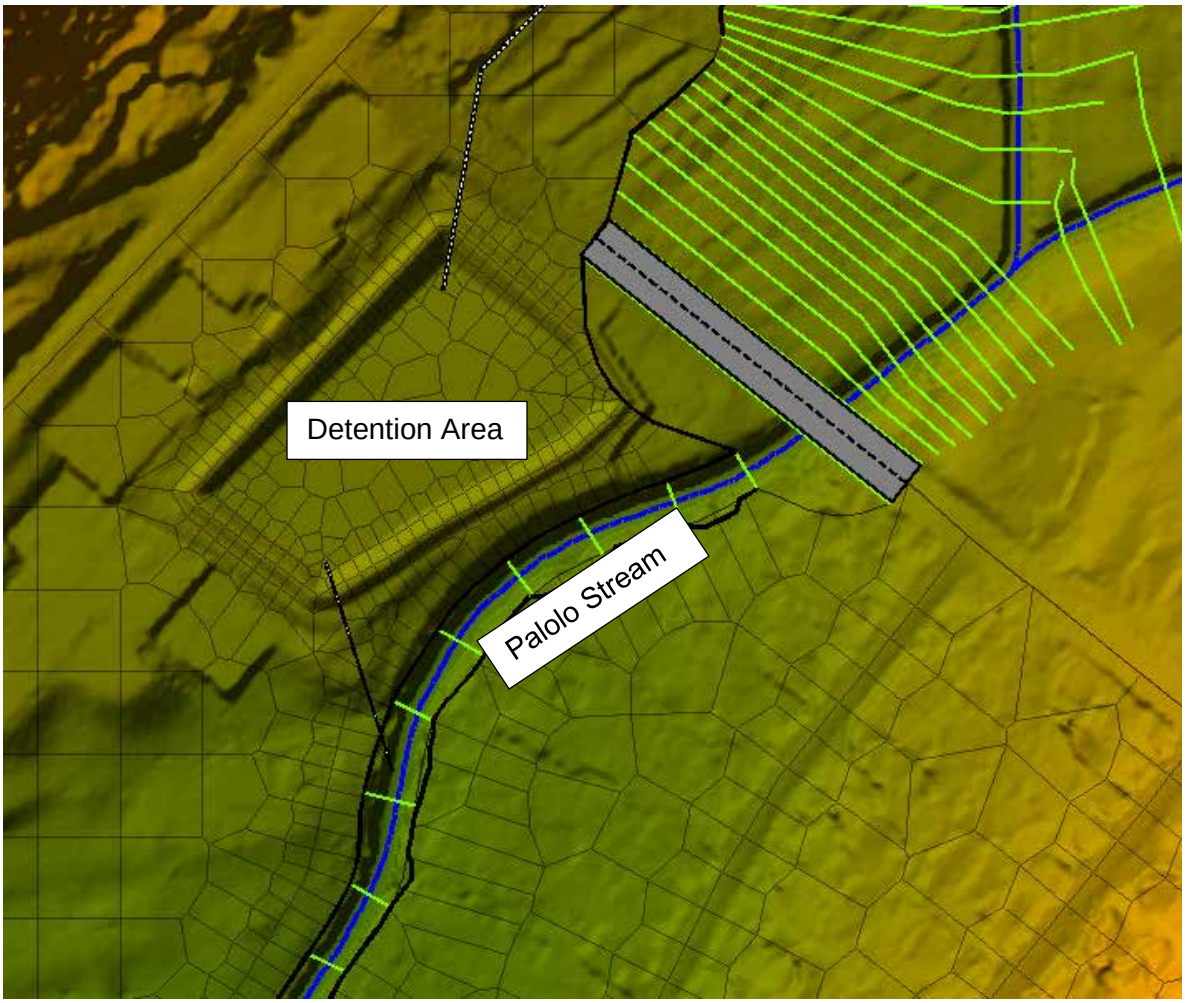


Figure 4-13 Palolo Valley District Park Detention Area

4.3.6. Ala Wai Canal Second Outlet

A second outlet of the existing Ala Wai Canal was analyzed by modeling the existing southern end of the canal back-channel to extend southward along Paki Avenue, then diverting west through Kapi'olani Park to the ocean. The width of the outlet was approximately 200ft and the depth was approximately elevations -5 to -6 feet in elevation along the daylighted portion. The intent of this measure was to enable additional flood conveyance capacity of the canal, rather than the existing condition where flood waters back up into the canal back-channel.

While hydraulic benefits were achieved, this measure was screened due to impractical costs and real estate considerations necessary to construct the outlet. There are also several environment concerns associated with this measure. Figure 4-14 shows the model schematic of the additional canal outlet.

Figure 4-14 Ala Wai Canal Second Outlet

4.4. Pumps and Floodgate Measures

The City and County of Honolulu (CCH) requested that the US Army Corps of Engineers (USACE) Ala Wai Canal Flood Risk Management General Reevaluation project delivery team (team) consider a pump station and lock system (i.e., floodgate) at the McCully Street bridge. A technical memorandum was written describing the justification for screening the pump station and floodgate at the mouth of the Ala Wai Canal as a flood risk management measure for the 1% event, then a follow up memorandum for a more frequent flood event (Philbin, 2023).

The pumps were considered at length, but screened during the development of the final array due to the following reasons:

a. Pumping of the canal ahead of a storm is not feasible given the sheer volume of water to excess and the rate of ramp-up time needed for pumps to safely excess water given the flashy nature of storms.

b. Pumping of the canal ahead of a storm would impact the structural stability of the existing canal walls, as the hydrostatic pressure of the water in the canal provides stability for the

existing condition of the walls. As the Ala Wai Canal is a historic property, there are many constraints, and ensuring structural stability is required.

c. Pumps were sized (in volume of water) at the Ala Moana Harbor for various storm events. A cost estimate was developed for a 20,000 cubic feet per second (approximately 9 million gallons per minute) pump, slightly larger in size than what is anticipated to be needed for this study. The estimate indicates the pump station would cost roughly $1.4-$1.8 billion.

d. Pumps at the canal would not reduce the need for other measures within the watershed. At the cost aforementioned, the study would not be able to proceed with any additional measures.

e. In 2020, a Value Engineering (VE) exercise was performed on a pump station at the mouth of the canal. The exercise was performed by the USACE New Orleans District, with review from private sector Architectural/Engineering firms.

The assumptions were as follows:

i. Performance was evaluated for the 1% Annual Exceedance Probability (AEP) (i.e. 100-year) event for a 24-hour storm.

ii. Two 65 ft by 15 ft miter gates were used in the simulation. Gates were open up to 7 ft if the head difference between the ocean and the canal was favorable.

iii. Ten 96- inch axial flow 800 horsepower pumps were used in the simulation. The pumps would drain the canal to elevation -5 ft LMSL in anticipation of the event.

iv. The structure was placed upstream of the Ala Moana Boulevard bridge.

Results are as follows:

i. The canal continues to fill despite outflow through the pumps and gates. The local runoff and riverine flow contribute greater water than what can be pumped through the structure.

ii. The pump and gate system has localized effects during the leading and lagging legs of the storm (beginning and end) but fails to provide benefits across the length of the canal due to its mild slope.

iii. In the VE simulation, the pump station is continuously working to expel water. Pumps typically need to cycle on and off to function properly and maintain efficiency throughout its life cycle.

iv. Pumping results in a drop in water surface elevation for the 1% annual exceedance probability event of 0.1 feet in the vicinity of the Ala Wai Community Park.

v. Pumping has a negligible impact to water surface elevation in the vicinity of the Manoa-Palolo Canal.

The PDT was asked to further evaluate the lock and pump system at a more frequent event

(i.e., the 5% AEP, or 20-year event). A multidisciplinary team of engineers, scientists, and economists reanalyzed the lock and pump system under a more frequent storm event. The results of that analysis are listed below.

a. Flow estimates at the site of the proposed lock and pump system were compared for the 1% (approximately 15,000 cfs), 2% (14,200 cfs), and 5% (12,750 cfs) AEP events. The difference in flow between the 1% event and the 5% event is less than 3,000 cubic feet per second, or 550 gallons per minute.

b. The previous cost evaluation for a lock and pump system for a 20,000 cfs pump, slightly larger than the 1% AEP event, was approximately $1.4 billion. The cost estimate for a lock and pump system for the 5% AEP event is approximately $1.1 billion. Thus, the difference in cost for the lock and pump system between these events is less than $258 million. Cost estimates developed for this measure include the pumps, pump house, lock/floodgates, and parapets. Costs are inclusive of design, construction, and administrative costs. The cost estimates do not include costs associated with the construction of new canal walls, which would be required to ensure structural stability during periods when pumping of the canal would result in the loss of hydrostatic pressure that provides stability for the existing walls. The cost estimate provided does not include annual O&M expenses.

c. The lock and pump system will not reduce the need for floodwalls entirely, as demonstrated by the Value Engineering exercise performed in 2020. The lock and pump system would reduce the required height of the floodwalls around the canal. However, preliminary results indicate the reduction in floodwall height would only be a few inches—a change that would have minimal impact on overall cost of the floodwalls. The typical floodwall cross section along the canal comprises of an above-ground structure and a below ground sub-structure. Due to the subsurface conditions, the floodwall substructure consists of macropiles that would be driven 40 feet into the ground. A reduction in height of the floodwall (from a few inches to a few feet) does not correlate to a reduction in depth or material of the floodwall substructure. Therefore, the costs of the floodwall are comparable with or without the pump station in place.

d. Environmental impacts associated with the lock and pump system would be substantial due to the expected changes in the volume of water within the canal and discharge of water to the nearshore coastal habitats. Further discussion of the environmental impacts is not provided within this memorandum.

The analyses discussed within this memorandum indicate that a lock and pump system would not be effective or efficient at reducing flood risk during the range of events that drive risk within the Ala Wai watershed (i.e., 1%, 2%, and 5%). As a result, the team recommended screening this measure from further consideration.

4.5. Summary of Screening Outcomes for determining the Array of Alternatives

Table 4-6 shows some of the measures that were modeled to analyze the impacts to water surface elevations and if they should be further retained or screened. The official measure tracking spreadsheet lists the reasons why the measures were retained or screened. The retained measures are further described under the Final Array of Alternatives in Section 5.

Table 4-6: Screening of Measures for Final Array of Alternatives

Measure	Description	Outcome
Kapahulu Bypass	Subsurface culvert connecting the upstream end of the Ala Wai Canal back channel to the ocean along Kapahulu Avenue.	Screened
Ala Wai Golf Course Detention Area	Berm along Ala Wai Golf Course with inline structure on Palolo to create flood storage on golf course.	Retained
Ala Wai Canal 2nd Outlet	2nd outlet of Ala Wai canal represented by a daylighted stream connecting the current upstream end of the Ala Wai Canal back channel to the ocean by following approximate path of Paki Avenue, then bending west through Kapiolani Park.	Screened
Ala Wai Canal Floodwall	Floodwalls ranging from 3-5 feet in height, offset from existing canal walls.	Retained
Kaimuki Levee	Levee structure around Kaimuki High School recreational fields preventing inundation in residential areas east of Kaimuki High School	Retained
Ala Wai Canal Microtunnels	Subsurface culverts connecting the Ala Wai Canal to the ocean along Kapahulu	Screened

Measure	Description	Outcome
	Avenue, Fort Derussy Park, and Saratoga Road.	
Paki Avenue Bypass	Subsurface culvert connecting the upstream end of the Ala Wai Canal back channel to the ocean along Paki Avenue.	Screened
Ala Wai Canal Dredging	Dredging of the Ala Wai Canal from the most upstream end of the canal back channel to the Ala Moana Bridge.	Screened
Kapiolani Park Detention Area	Detention area placed within Kapiolani Park, with entire area of park used.	Screened
Ala Wai Canal Pump Station	Pump station along Ala Wai Canal used to assist in draining of Ala Wai Golf Course.	Screened
Koali Road Floodwall	Floodwalls on Manoa Stream along Koali Road.	Retained
Makiki Detention Area	Detention structure at Makiki District Park.	Retained
Kanaha Floodwall	Floodwall placed along Kanaha Ditch.	Retained
Woodlawn Bypass	A bypass culvert was placed at an upstream location on the Manoa Stream upstream and re-entering further downstream.	Screened
Woodlawn Detention Area	Detention structure at Woodlawn.	Retained
Woodlawn Drive Floodwall	Floodwall placed along Manoa Stream across Woodlawn Drive	Retained
Manoa Detention Area	Detention structure at Manoa Valley District Park.	Retained

5. Final Array of Alternatives

Throughout the screening process several measures were retained based on hydraulic performance, potential benefits, and practicality of each measure. These measures were then combined into sets of alternatives to be further evaluated. Upon further screening of measures, an initial array of alternatives was identified from the retained measures. This initial array consisted of combining measures to form cornerstones centered around specific flood reduction concepts. The initial array of alternatives determined by the PDT was identified as follows:

Alternative 1: Storage Cornerstone
Alternative 2A: Conveyance Cornerstone (Existing Infrastructure/Bypasses)
Alternative 2B: Conveyance Cornerstone (Floodwall)
Alternative 2C: Conveyance Cornerstone (2nd Outlet/Daylight)
Alternative 3: Tunnel Cornerstone
Alternative 4A/B: Natural and Nature-Based Cornerstone
Alternative 5: Combined Plan
Alternative 6: Non-Structural

These initial alternatives were the further evaluated by the PDT using the plan formulation process. This further analysis resulted in refining the alternatives into a final array of alternatives. These alternatives, along with the measures used in each alternative, are shown in Table 5-1.

Table 5-1 Final Array of Alternatives

Alternative 1		Alternative 2B		Alternative 5
Kanaha Floodwall		Kanaha Floodwall		Kanaha Floodwall
Makiki District Park Detention Area		Makiki District Park Detention Area		Makiki District Park Detention Area
Manoa District Park Detention Area		Woodlawn Drive Floodwall		Manoa District Park Detention Area
Woodlawn Drive Floodwall		Koali Road Floodwall		Woodlawn Drive Floodwall
Koali Road Floodwall		Kaimuki High School Floodwall		Koali Road Floodwall
Kaimuki High School Floodwall		Ala Wai Canal Floodwall		Ala Wai Canal Floodwall (with Kaimuki Extension)
Ala Wai Golf Course Detention Basin				Ala Wai Golf Course Detention Basin

5.1. Alternative 1

Alternative 1 was formulated to maximize flood storage throughout the basin by utilizing multiple detention basins. Additional measures were also supplemented to provide added benefits through means of floodwalls and berms. This alternative included the Kanaha Floodwall and Maikiki Park Detention Basin, the Manoa Park Detention Basin, the Woodlawn Drive Floodwall,

the Koaki Road Floodwall, the Kaimuki High School floodwall, and the Ala Wai Golf Course Detention Basin.

5.1.1. Kanaha Floodwall and Makiki Detention Park

A floodwall placed along Kanaha Ditch will be approximately 6ft in height along the right bank. A detention basin will be built at the Makiki District Park. This measure is in all three of the final alternatives modeled. Figure 5-1 shows the general location of the Kanaha Floodwall and Makiki District Park Detention. Figure 5-2 shows the profile plot of the Kanaha Floodwall. Figure 5-3 shows the general profile plot of the Makiki District Park Detention Area. Figure 5-4 shows the elevation-storage plot of the Makiki Park detention area.

The approximate dimensions of the detention basin are 450 feet long by 250 feet wide with a top elevation of 62 ft MSL and an average excavation depth of 6-10 feet. This produces approximately 21.6 ac-ft of storage to provide required detention volume.

The inlet culvert was modeled as a 20 ft by 4 ft concrete box culvert with connection from the Kanaha Stream to the storage area. The outlet culvert is a 5 ft diameter culvert that drains into the Makiki Stream after the stream daylights downstream of the H1 Freeway.

It is estimated that the emptying time will be about 1-2 days, depending on the final culvert sizing after optimization and design.

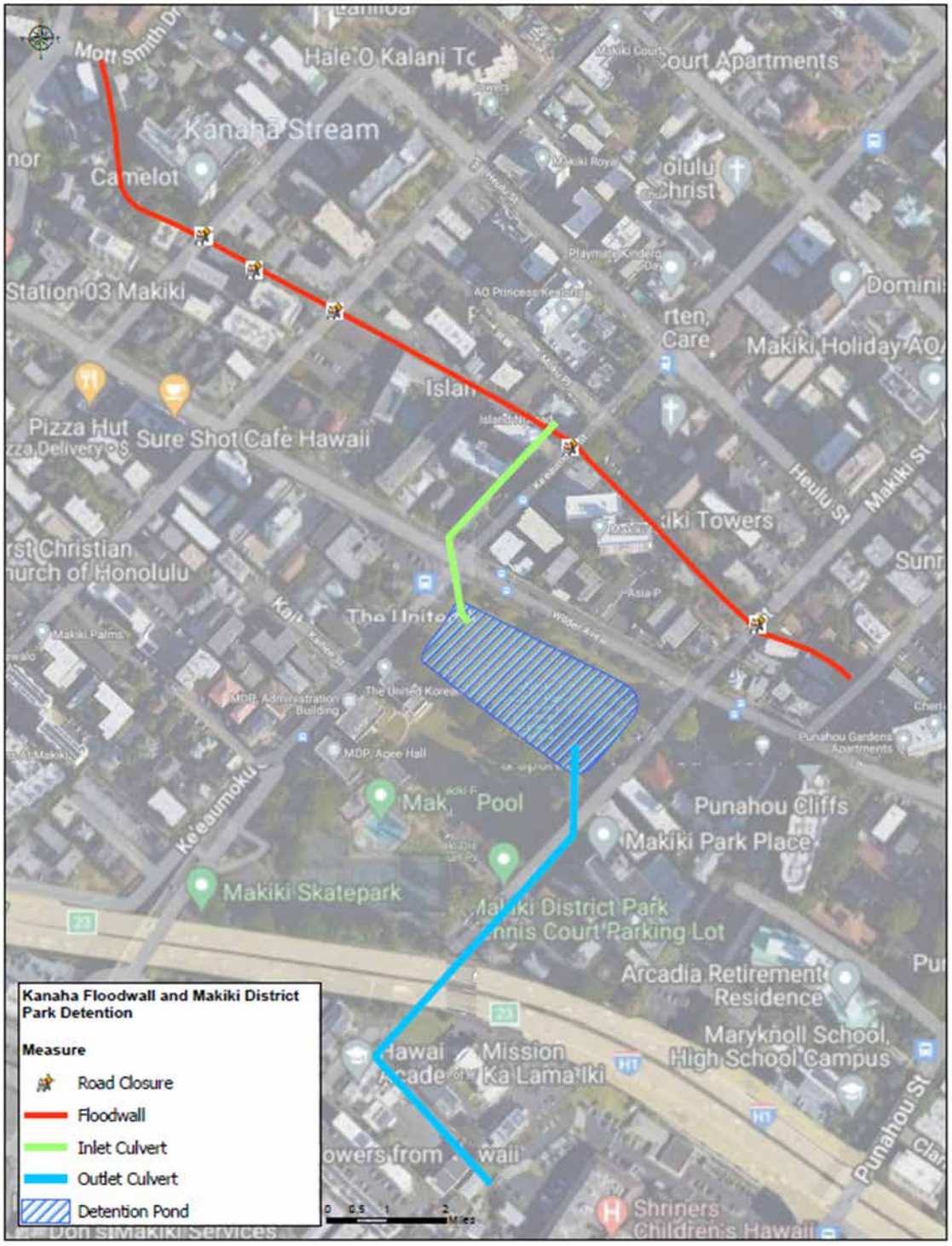


Figure 5-1 Kanaha Floodwall and Makiki District Park Detention Area

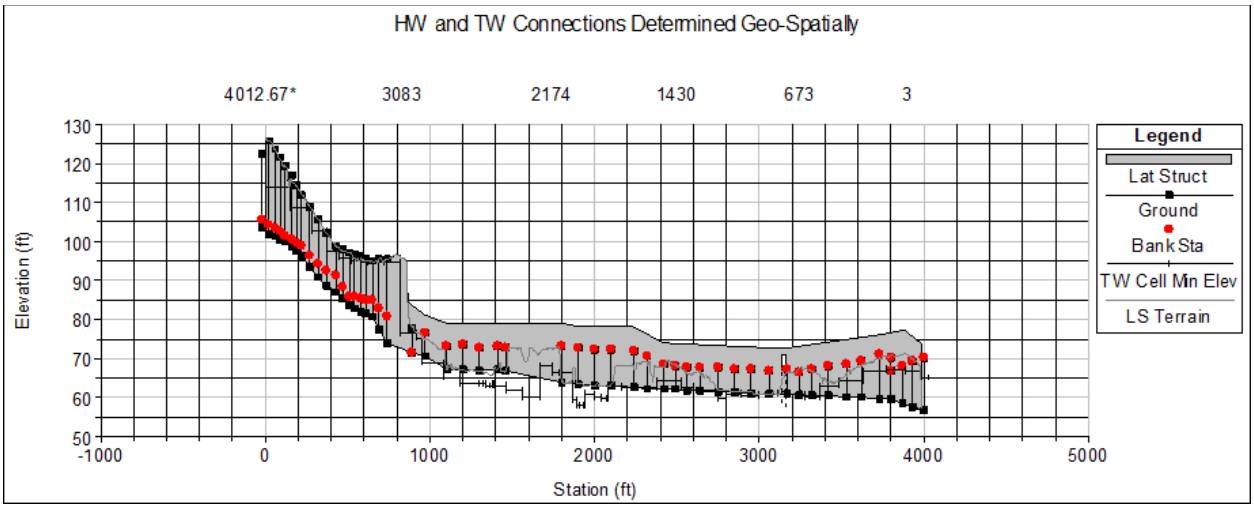


Figure 5-2 Kanaha Floodwall Profile

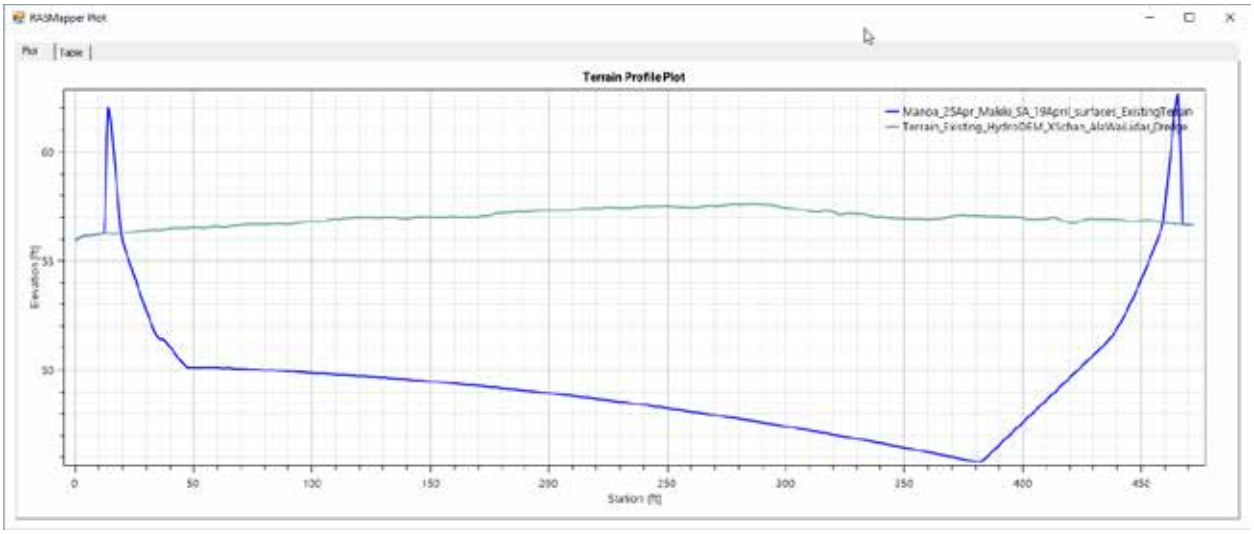
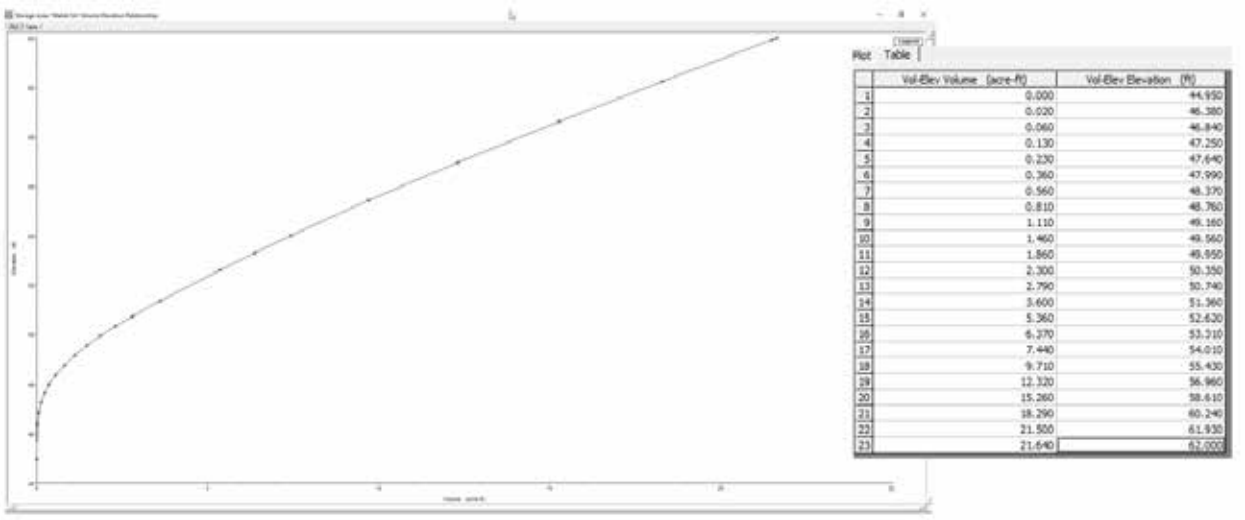


Figure 5-3 Makiki District Park Detention General Profile



	Vol-Elev Volume (acre-ft)	Vol-Elev Elevation (ft)
1	0.000	44.950
2	0.020	46.380
3	0.060	46.840
4	0.130	47.250
5	0.230	47.640
6	0.360	47.990
7	0.560	48.370
8	0.810	48.760
9	1.110	49.160
10	1.460	49.560
11	1.860	49.950
12	2.300	50.350
13	2.790	50.740
14	3.600	51.360
15	5.360	52.620
16	6.370	53.210
17	7.440	54.010
18	9.710	55.430
19	12.320	56.960
20	15.260	58.610
21	18.290	60.240
22	21.500	61.930
23	21.640	62.000

Figure 5-4 Makiki District Park Detention Area Storage Curve

5.1.2. Manoa District Park Detention Area:

A detention structure would be constructed at Manoa Valley District Park. The approximate dimensions of the detention basin are 700ft long by 600ft wide with a top elevation of 172 ft MSL at the downstream end. The wall elevation will need to be higher along the Manoa Stream to account for higher water levels in the upstream portion of the District Park boarder.

The detention basin would have an average excavation depth of 6-10 feet. This produces approximately 54.1 ac-ft of storage. Please note that the footprint of the detention area will be slightly reduced during the optimization phase, and the total volume of storage will be less than 50 acre-feet. This will ensure the detention basin is not so large as to qualify as a dam.

The inlet structure will be a 15ft x 4.5ft box culvert connecting from the Manoa Stream upstream of the bridge entrance to the Manoa District Park. The outlet structure is modeled as a 2 ft culvert exiting into the drain at the downstream end of the Manoa District Park which flows into the Manoa Stream. It is estimated that the emptying time will be about 1-2 days, depending on the final culvert sizing after optimization and design.

Figure 5-4 shows the top of wall elevations for the Manoa District Park Detention Area. Figure 5-5 shows the general profile plot for the Manoa District Park Detention Area. Figure 5-6 shows the storage curve for the detention area. And Figure 5-7 shows the Manoa District Park Detention Area.

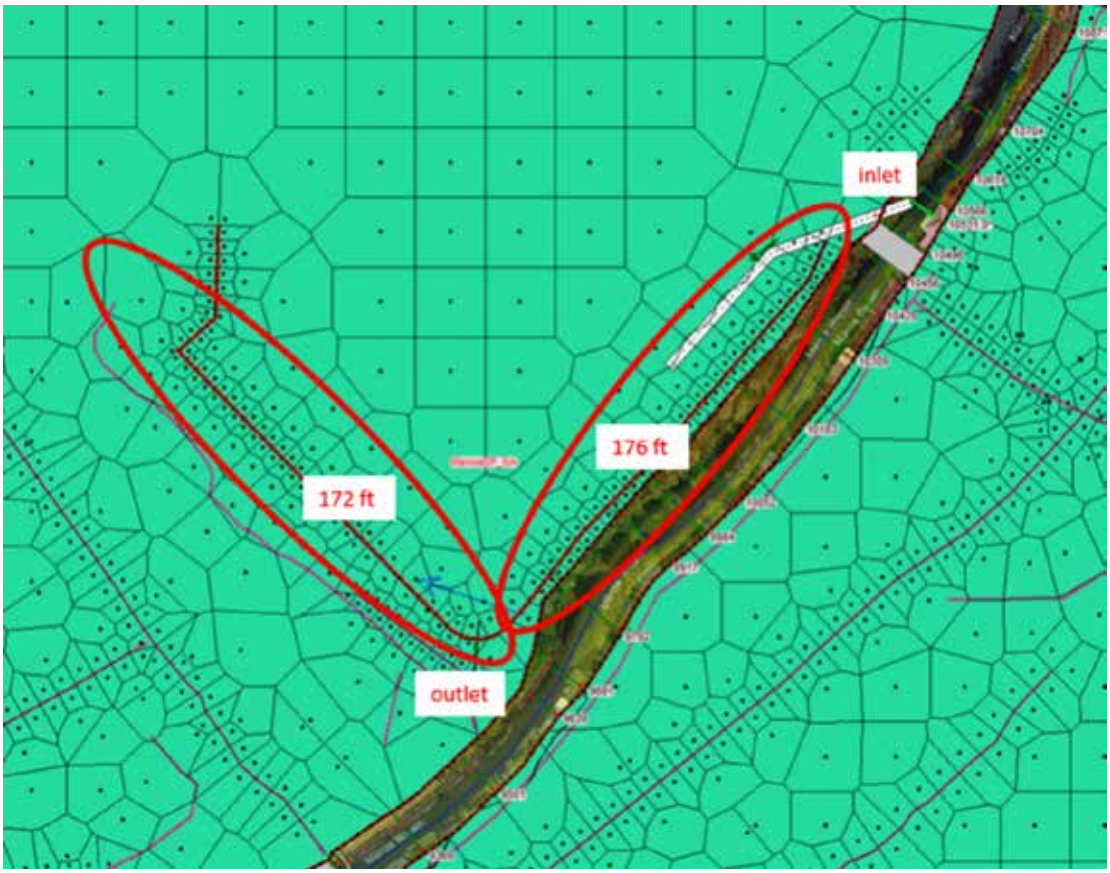


Figure 5-5 Manoa District Park Detention Top of Wall Elevations

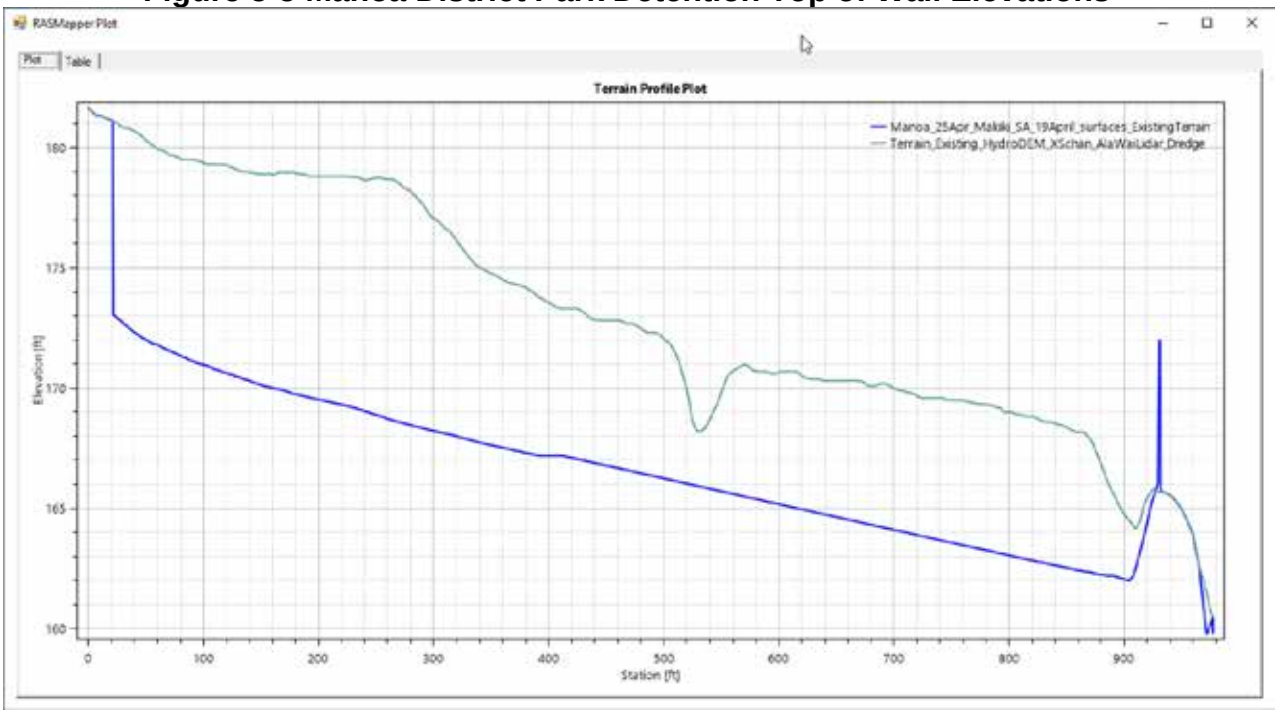
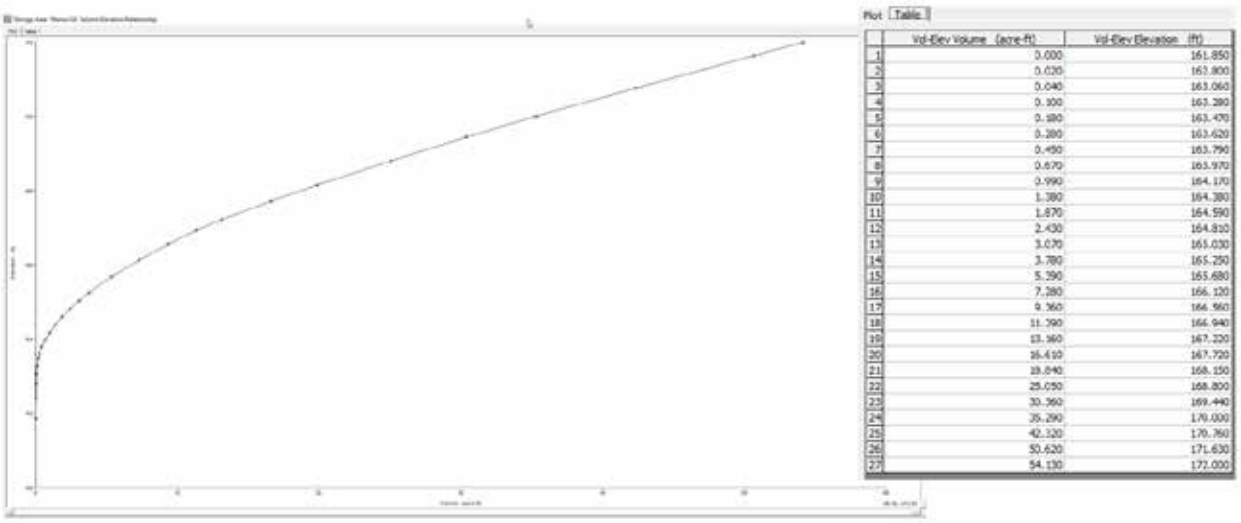


Figure 5-6 Manoa District Park Detention General Profile



Plot Table

	Vol-Elev Volume (acre-ft)	Vol-Elev Elevation (ft)
1	0.000	161.850
2	0.020	163.800
3	0.040	163.060
4	0.300	163.280
5	0.180	163.470
6	0.280	163.620
7	0.450	163.790
8	0.670	163.970
9	0.990	164.170
10	1.380	164.380
11	1.870	164.590
12	2.430	164.810
13	3.070	165.030
14	3.780	165.250
15	5.390	165.680
16	7.280	166.120
17	9.360	166.560
18	11.390	166.940
19	13.360	167.220
20	16.410	167.720
21	19.040	168.150
22	25.050	168.800
23	30.360	169.440
24	35.290	170.000
25	42.320	170.760
26	50.620	171.630
27	54.130	172.000

Figure 5-7 Manoa District Park Detention Area Storage Curve

Figure 5-8 Manoa District Park Detention Area

5.1.3. Woodlawn Drive Floodwall

A floodwall will be constructed along the right bank of the Manoa Stream to contain the floodwaters that leave the Manoa upstream of Woodland Drive. The wall will be approximately 6ft in height. This floodwall crosses Woodlawn Drive and is intended to protect the area west and south of the Manoa Stream at this location. This floodwall would prevent the overland flooding that moves overland all the way down to the university of Hawaii. Figure 5-9 shows the Woodlawn Drive Floodwall location. Figure 5-10 shows the Woodlawn Drive Floodwall profile.

Figure 5-9 Woodlawn Drive Floodwall

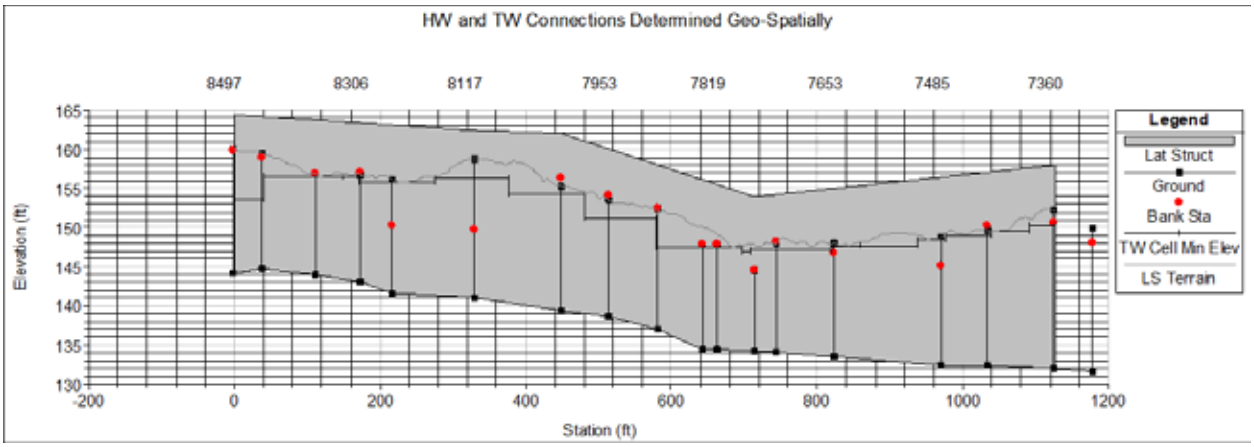


Figure 5-10 Woodlawn Drive Floodwall Profile

5.1.4. Koali Road Floodwall

A floodwall will be constructed along the left bank of the Manoa Stream to contain the floodwaters that leave the Manoa at the Kanewai Community Park and along Koali Road and also along the right bank of the Palolo Stream. The floodwalls will be a maximum height of 6 ft, but they may be lower in areas. Culverts were included along floodwall to drain areas inundated at higher flows due to overtopping of the floodwall. The Koali Road Floodwall is intended to protect the neighborhood and school just south of the Kanewai Community Park from flooding. Figure 5-11 shows the Koali Road Floodwall location. Figure 5-12 shows the Koali Road Floodwall profile plot along the Manoa Stream, and Figure 5-13 shows the Koali Road Floodwall along the Palolo Stream.

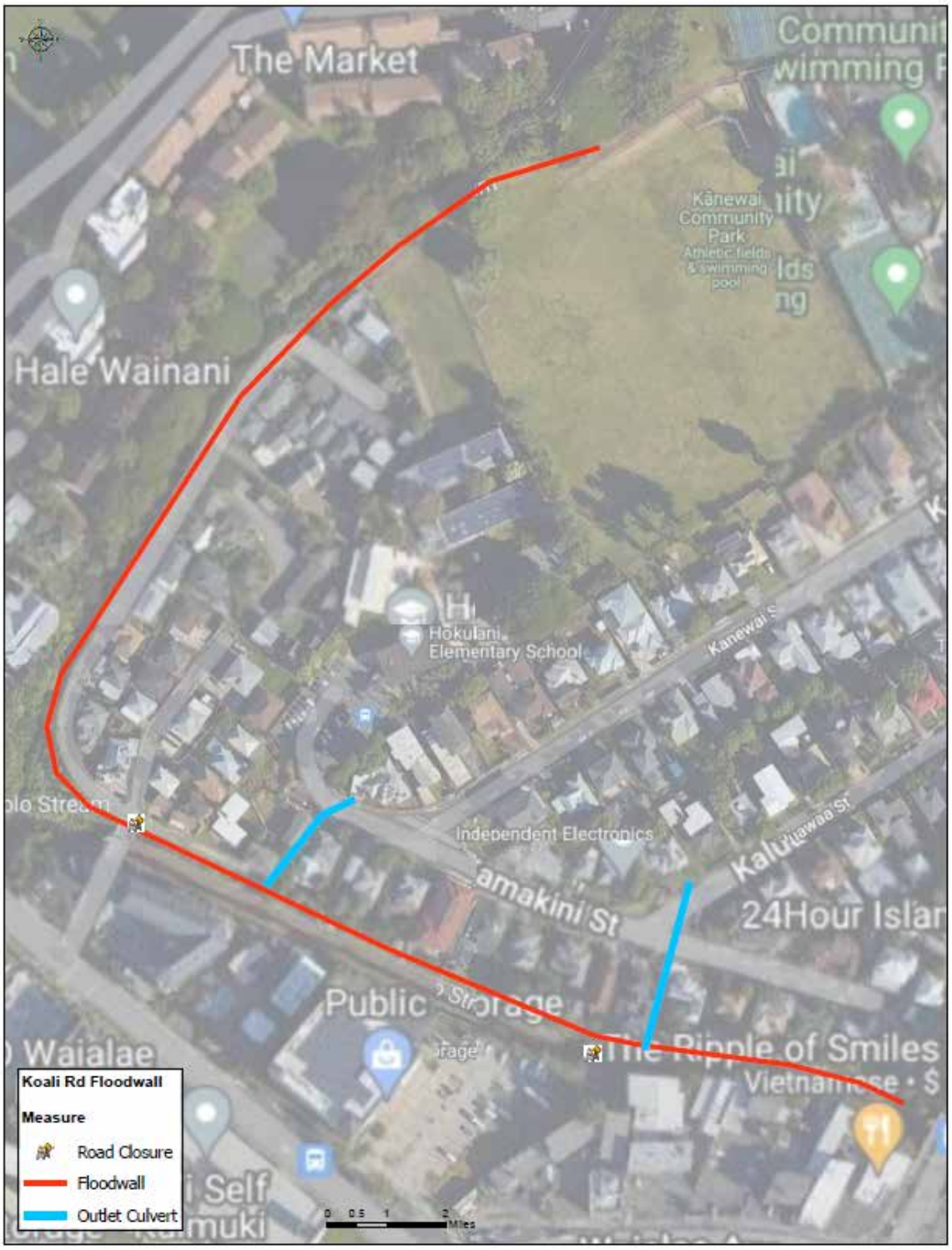


Figure 5-11 Koali Road Floodwall

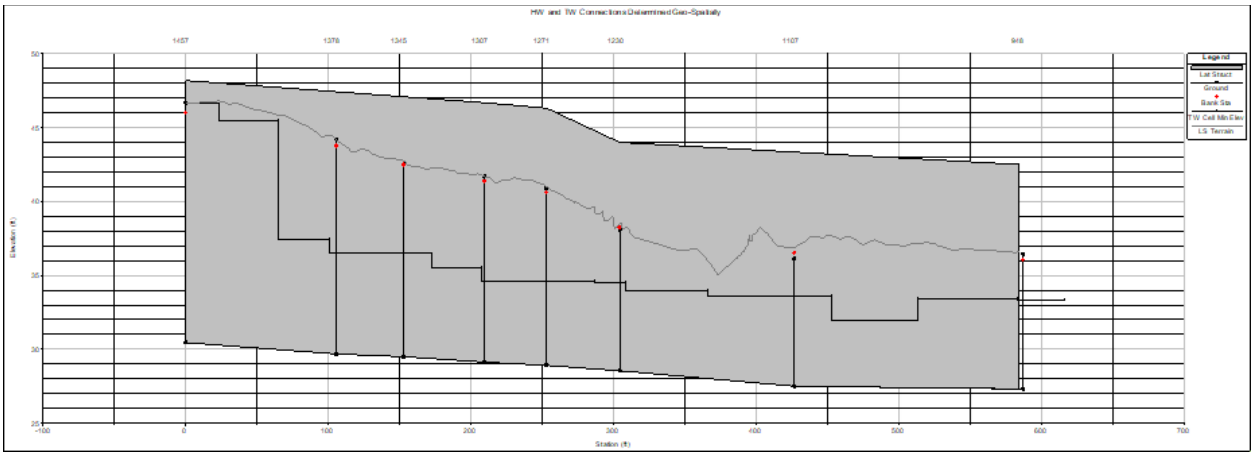


Figure 5-12: Koali Road Floodwall Profile Along the Manoa Stream

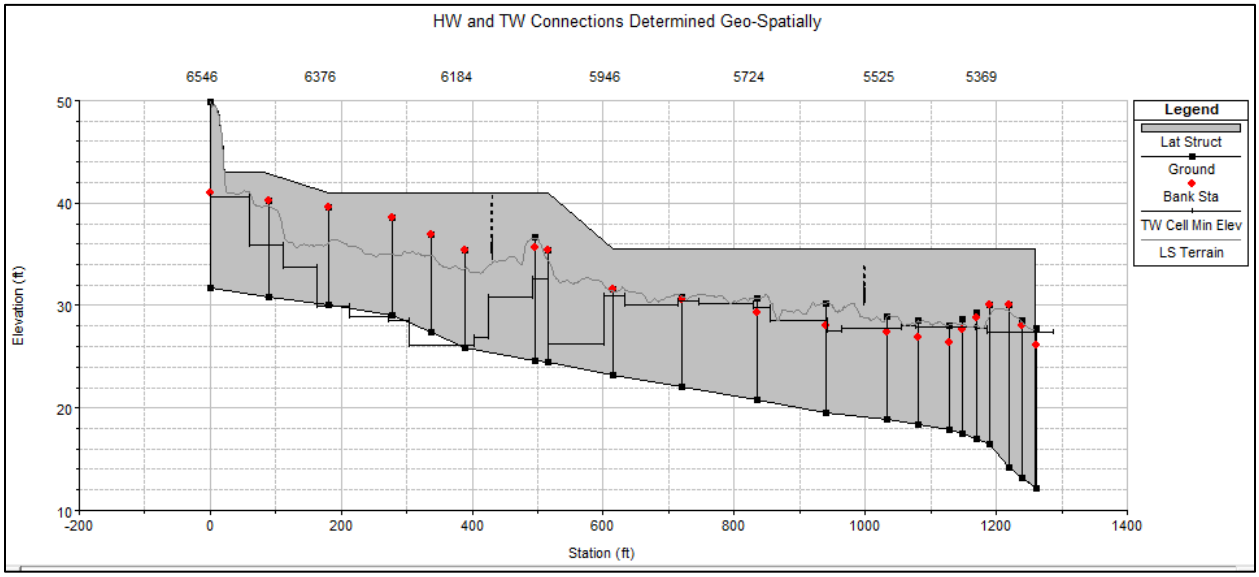


Figure 5-13: Koali Road Floodwall Profile Along the Palolo Stream

5.1.5. Kaimuki High School Floodwall and Ala Wai Golf Course Detention Area

The Kaimuki High School Floodwall structure was designed to be approximately 6ft in height around Kaimuki High School recreational fields, preventing inundation in residential areas east of Kaimuki High School.

The Ala Wai Golf Course Detention Area consists of placing an inline structure on the Palolo Stream with five 3 ft diameter culverts to pass normal flows while diverting high flows to the golf course for storage. The detention storage was created by utilizing a berm surrounding the golf course on the Northern and Eastern perimeter and along the banks of the Manoa-Palolo Canal and the Ala Wai Canal, and no excavation is to be utilized due to the high groundwater. The

floodwalls are expected to be a maximum of 6 feet tall. Three drainage structures were placed where the Ala Wai Golf Course meets Ala Wai Canal to assist in draining the golf course after a storm event. It is estimated that the emptying time will be about 1.5-2 days, depending on the final culvert sizing after optimization and design.

Figure 5-14 shows both the Kaimuki High School Floodwall and Ala Wai Golf Course Detention area. Figure 5-15 shows the Kaimuki High School Floodwall profile plot. Figure 5-16 shows the inline structure required to divert flows into the Golf Course detention basin. The Ala Wai Golf Course detention basin is bounded by the Manoa-Palolo Canal to the west, the northern and eastern perimeter of the Golf Course, and by the Ala Wai Canal to the south. The profile views of these floodwalls and berms is show in Figure 5-17, Figure 5-18, and Figure 5-19, respectively.

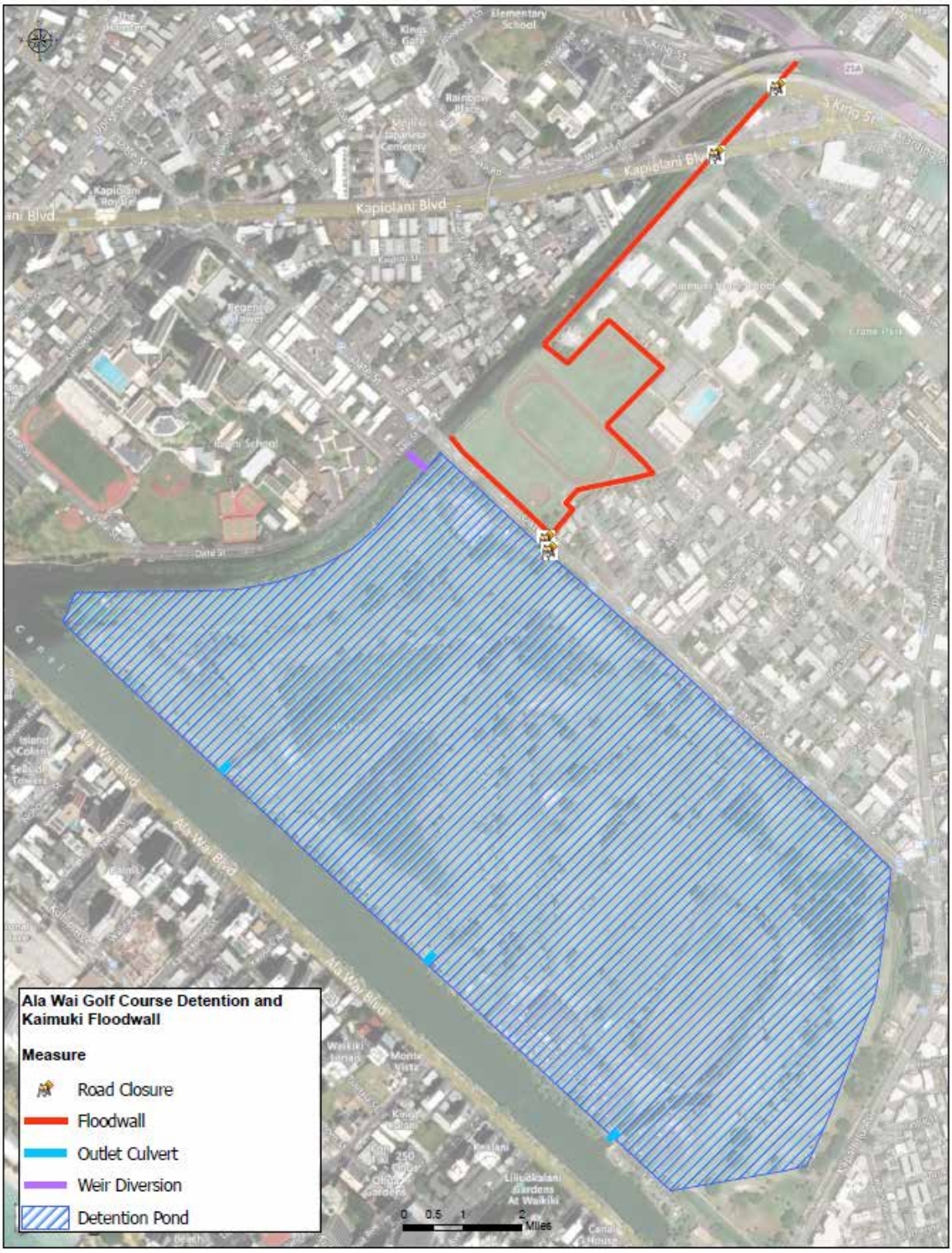


Figure 5-14 Kaimuki High School floodwall and Ala Wai Golf Course Detention Area

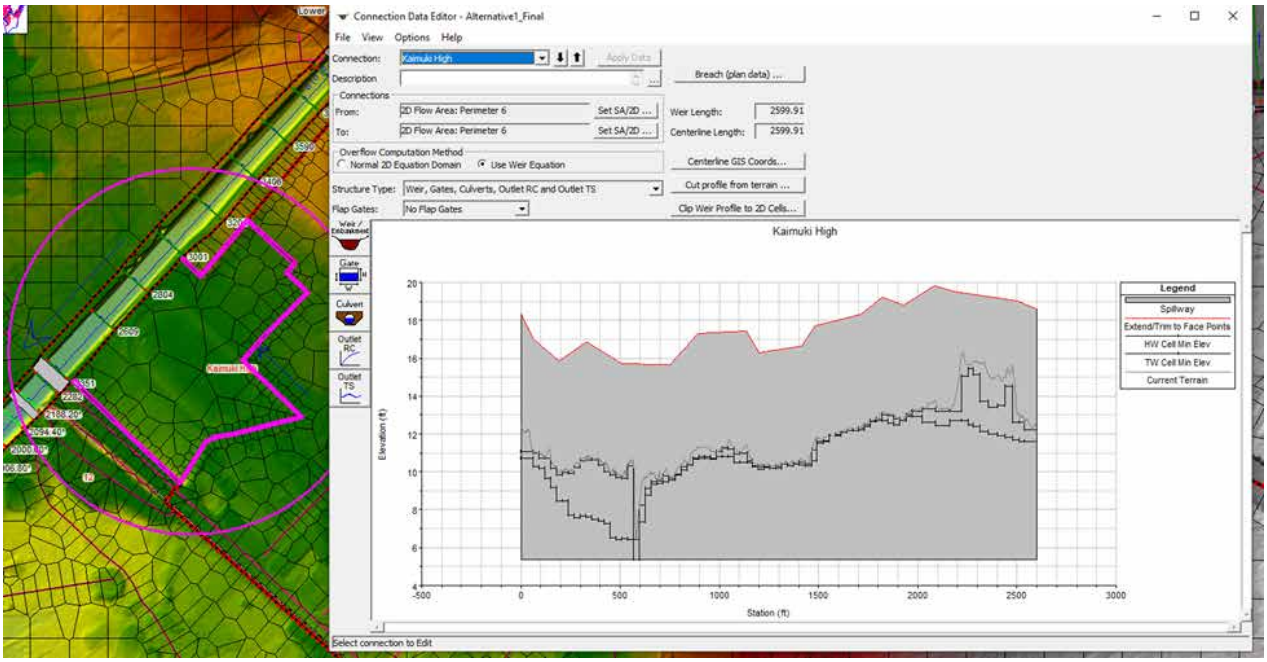


Figure 5-15 Kaimuki High School Floodwall Profile

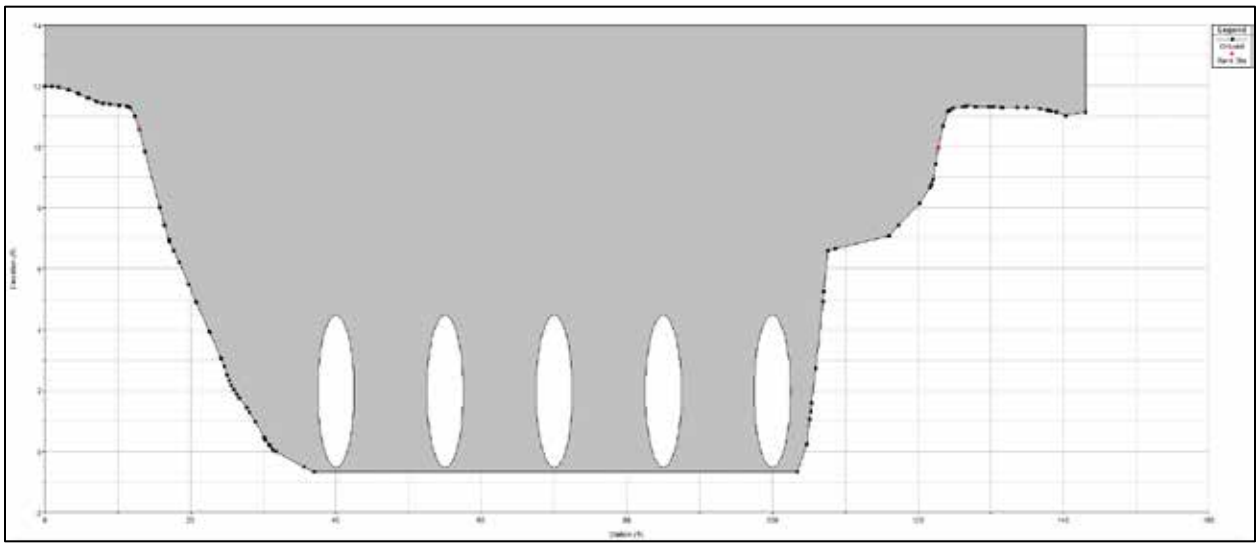


Figure 5-16 Inline Structure on the Manoa-Palolo Canal to Divert Flood Flows into the Ala Wai Golf Course Detention Area

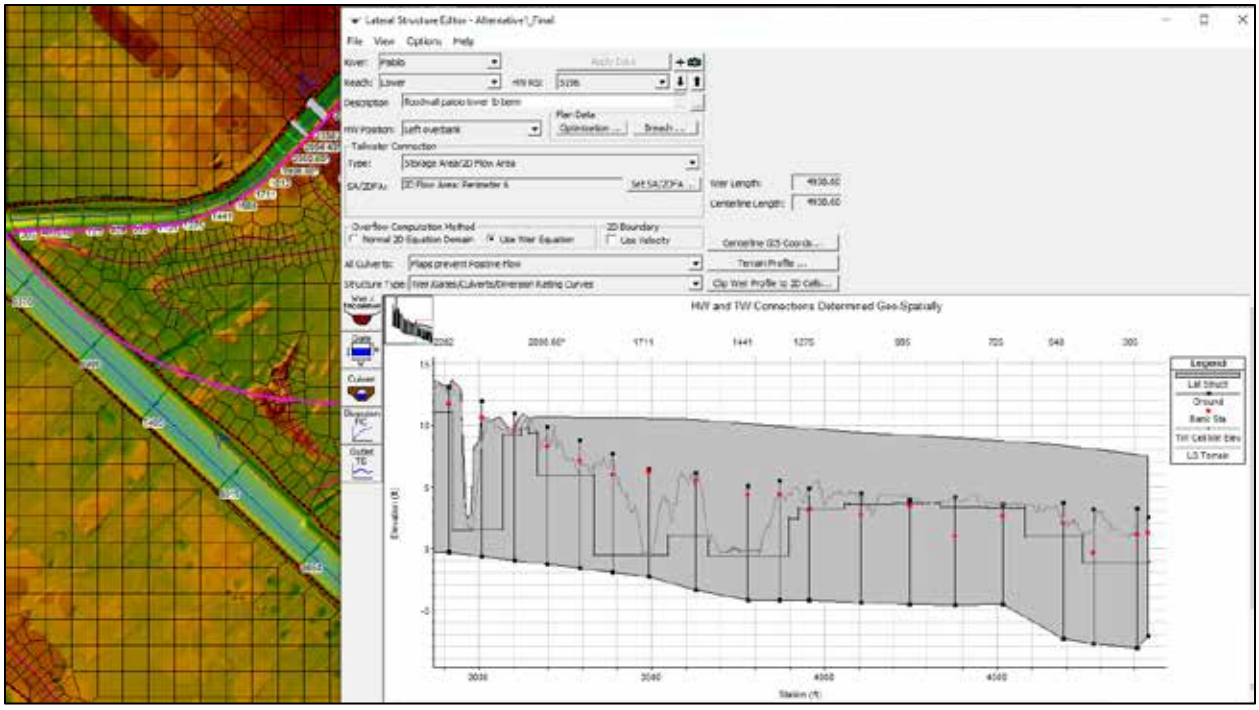


Figure 5-17: Golf Course Detention Floodwall Profile Along the Manoa-Palolo Canal

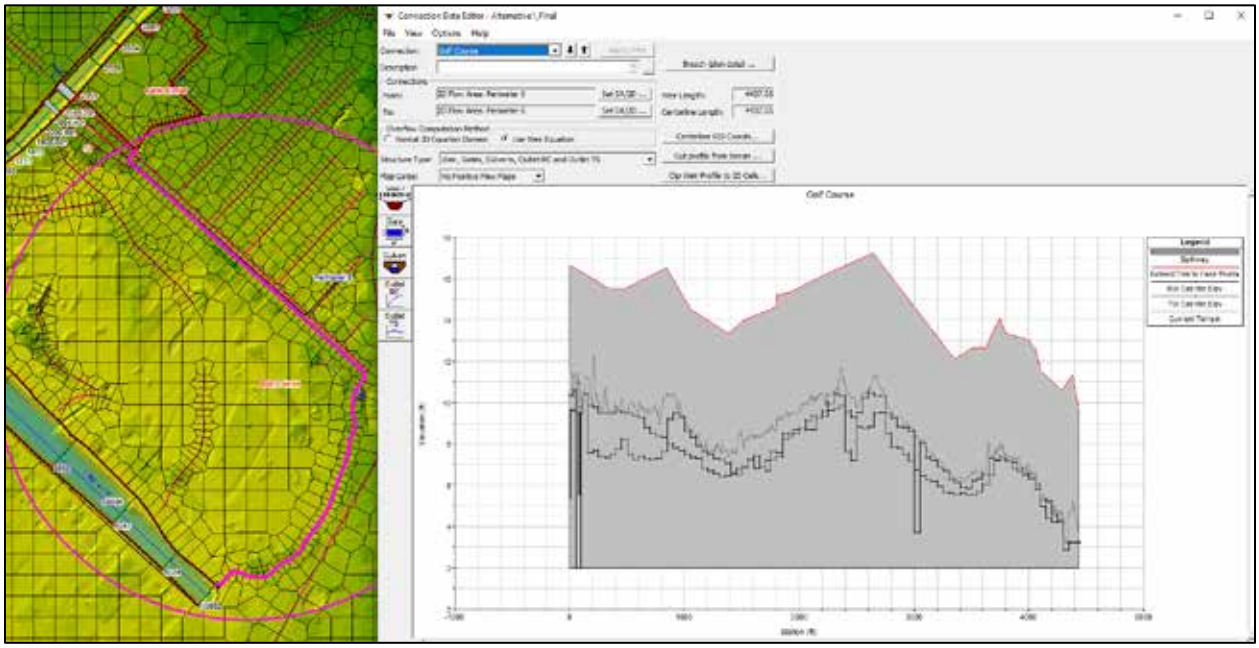


Figure 5-18: Golf Course Detention Area Profile of Northern and Eastern Walls

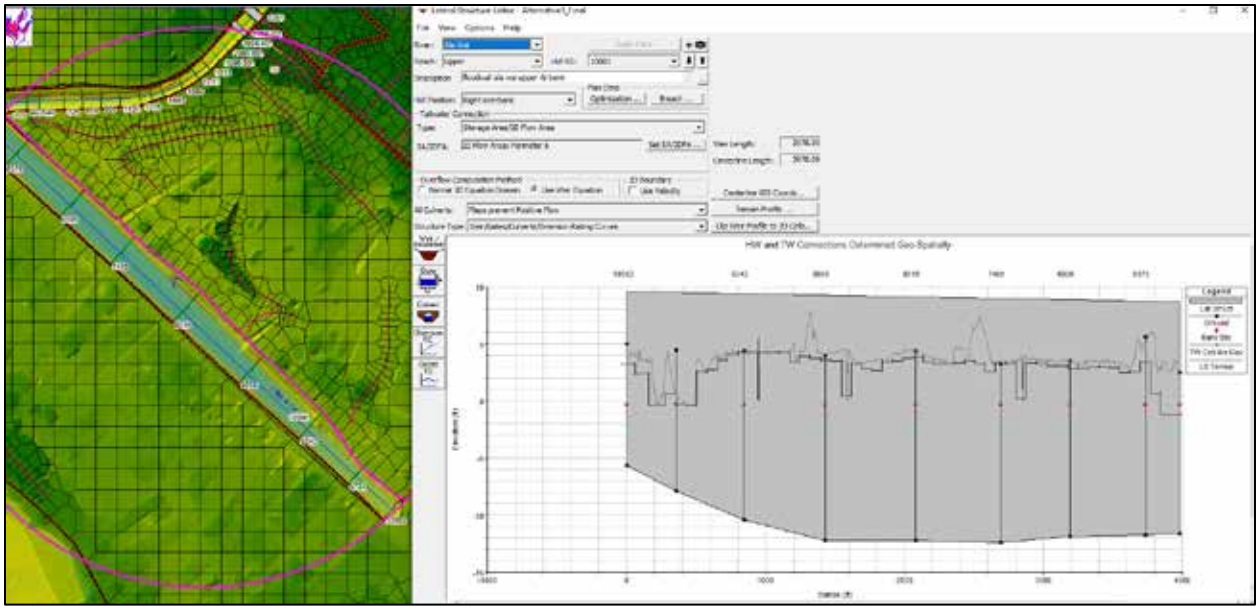


Figure 5-19: Golf Course Detention Area Profile Along the Ala Wai Canal

5.2. Alternative 2B

Alternative 2B was identified as the conveyance cornerstone as it was intended to maximize conveyance of flood waters throughout the main channels in the watershed during a flood event. This was accomplished by utilizing floodwalls throughout the basin to contain flood waters in the main channels and pass flows downstream, reducing the chance of flood waters from inundating the overbank areas.

5.2.1. Kanaha Floodwall and Makiki District Park Detention Area

The Kanaha Floodwall and Makiki District Park Detention Area were utilized in an identical manner here as in Alternative 1, however wall heights differed slightly in some locations. Information on these measures can be found in section 5.1.1. Figure 5-21 shows the floodwall profile, where the most notable differences in wall heights are from the middle section down to the lower section, which were actually lower than the 6 ft wall height.

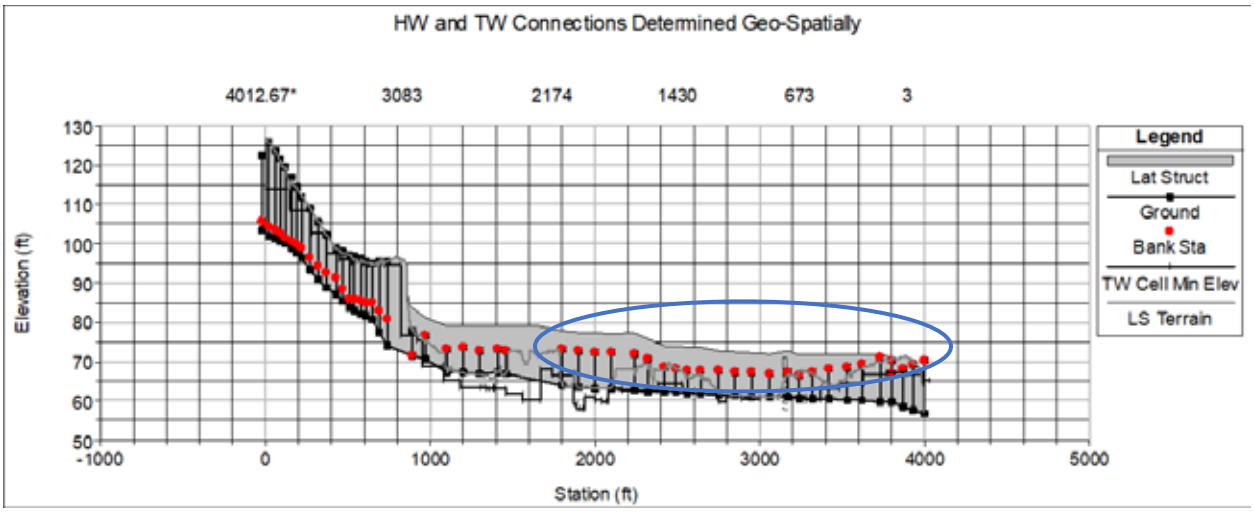


Figure 5-20 Kanaha Floodwall with Lower Wall Heights

5.2.2. Woodlawn Drive Floodwall

The Woodlawn Drive Floodwall was utilized in an identical manner here as in Alternative 1. Information on this measure can be found in section 5.1.3.

5.2.3. Koali Road Floodwall

The Koali Road Floodwall was utilized in an identical manner here as in Alternative 1. Information can be found in section 5.1.4.

5.2.4. Kaimuki High School Floodwall and Ala Wai Canal Floodwall

The Kaimuki High School Floodwall was utilized in an identical manner here as in Alternative 1. Information can be found in section 5.1.5.

For Alternative 2B, the Kaimuki High School was combined with the Ala Wai Canal Floodwall measure instead of the Ala Wai Golf Course Detention Area.

The Ala Wai Canal Floodwall was modeled with the left bank floodwall extending from the most upstream end of the Ala Wai Canal back channel to the mouth of the canal. The right bank of the canal extends from the right bank near Lunalilo Parkway of the Manoa-Palolo Canal to the confluence with the Ala Wai Canal, then continues on the right bank of the Ala Wai Canal to the mouth of the canal. Floodwall heights were approximately 6 ft. The floodwall consisted of 6 small drainage structures ranging from 2-5 feet in height and width. Also included with the floodwall were 9 road close structures necessary for high-flow flood events. No inline structure was required to divert water into a detention basin as for this alternative, water is meant to just flow in and out of the Golf Course area like a normal connected floodplain. The Golf Course berm is also approximately 6 ft in height and bounds the Golf Course on the north and east. The west and south are existing wall heights. Figure 5-21 shows the Ala Wai Canal Floodwall combined with the Kaimuki High School Floodwall. Figure 5-22 shows the Ala Wai Golf Course

berm profile, Figure 5-23 shows the Kaimuki High School floodwall profile, and Figure 5-24 shows a typical profile of the Ala Wai Canal Floodwall.

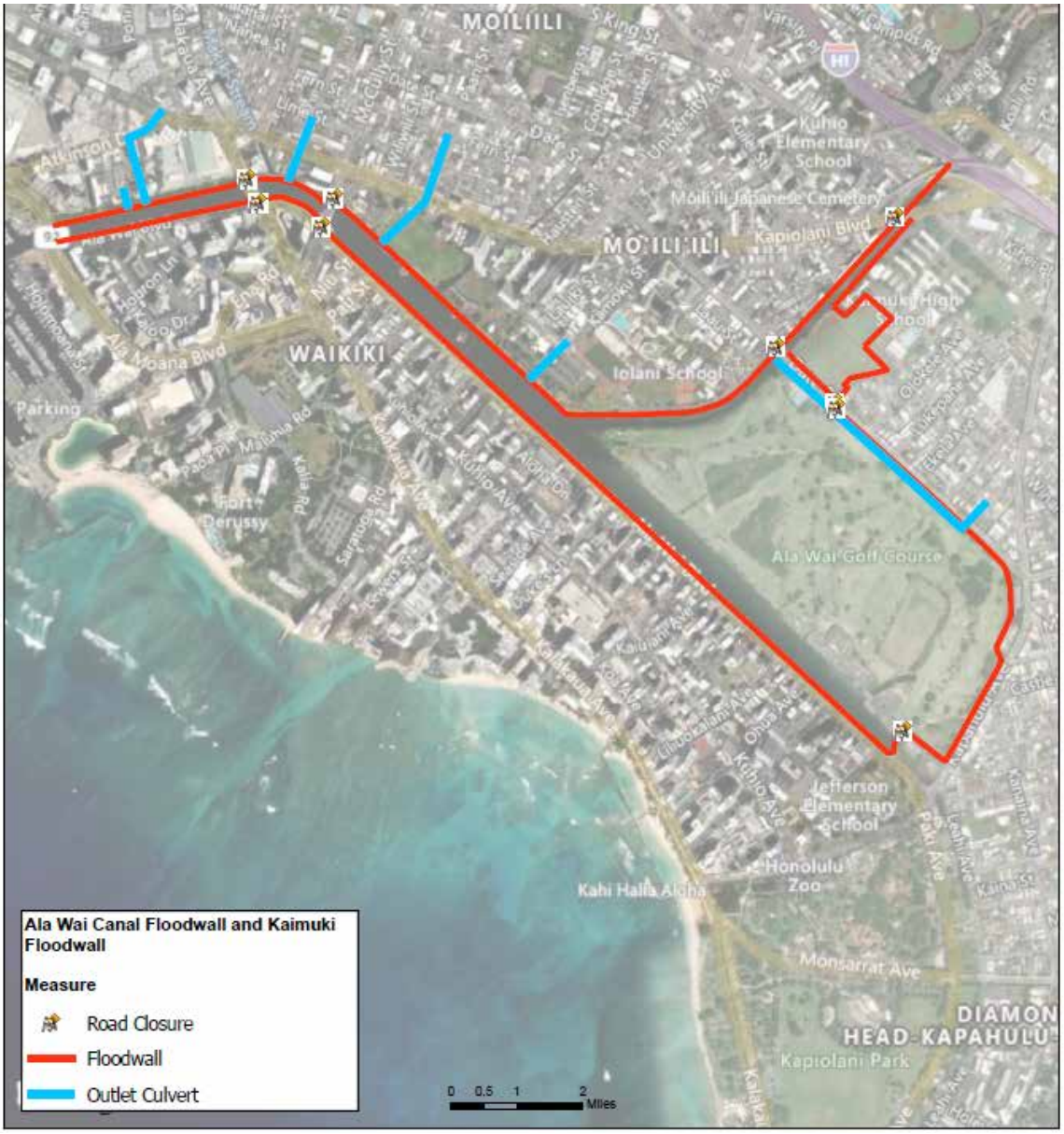


Figure 5-21 Ala Wai Canal Floodwall and Kaimuki High School Floodwall

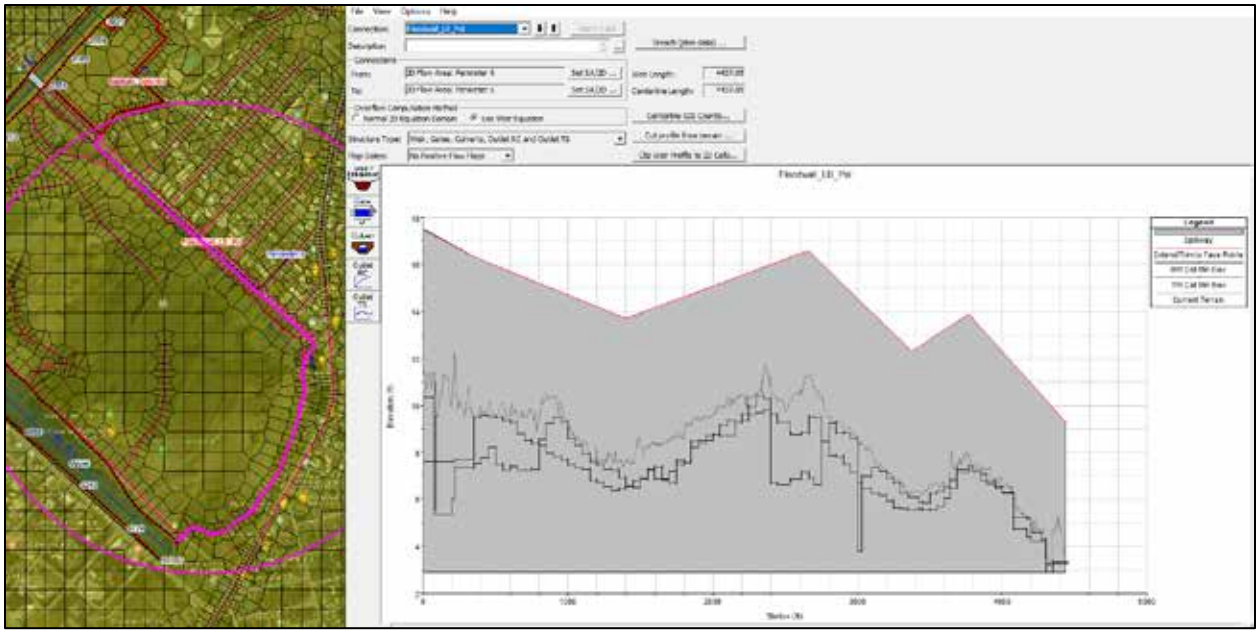


Figure 5-22: Ala Wai Golf Course Berm Profile

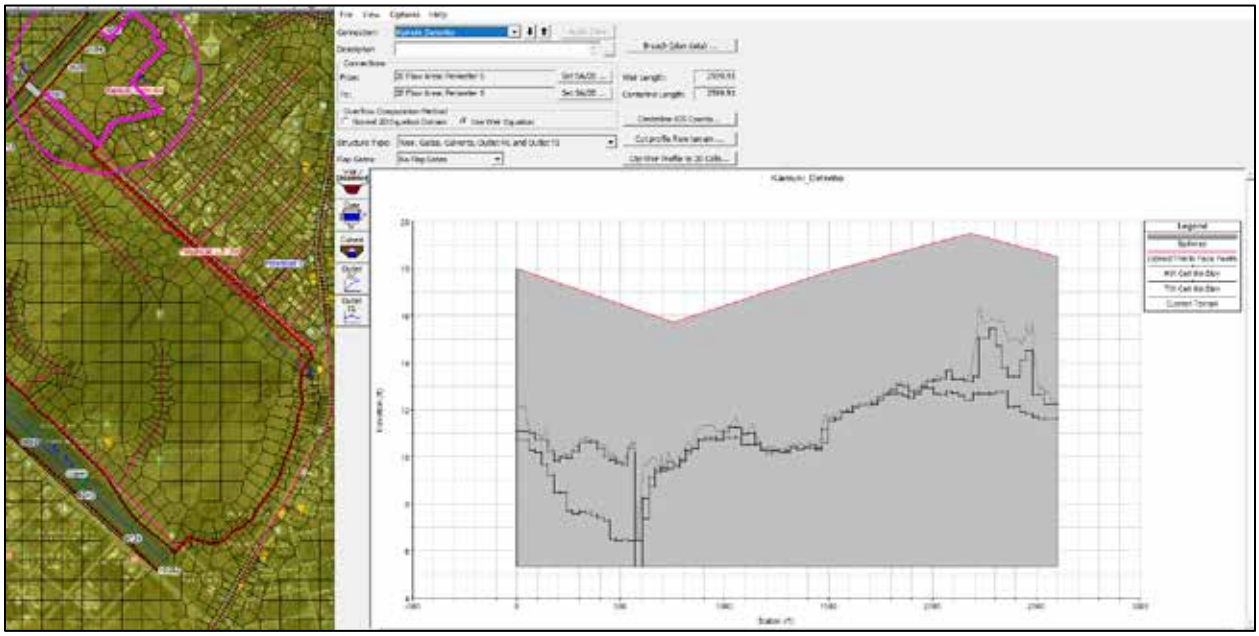


Figure 5-23: Kaimuki High School Floodwall Profile

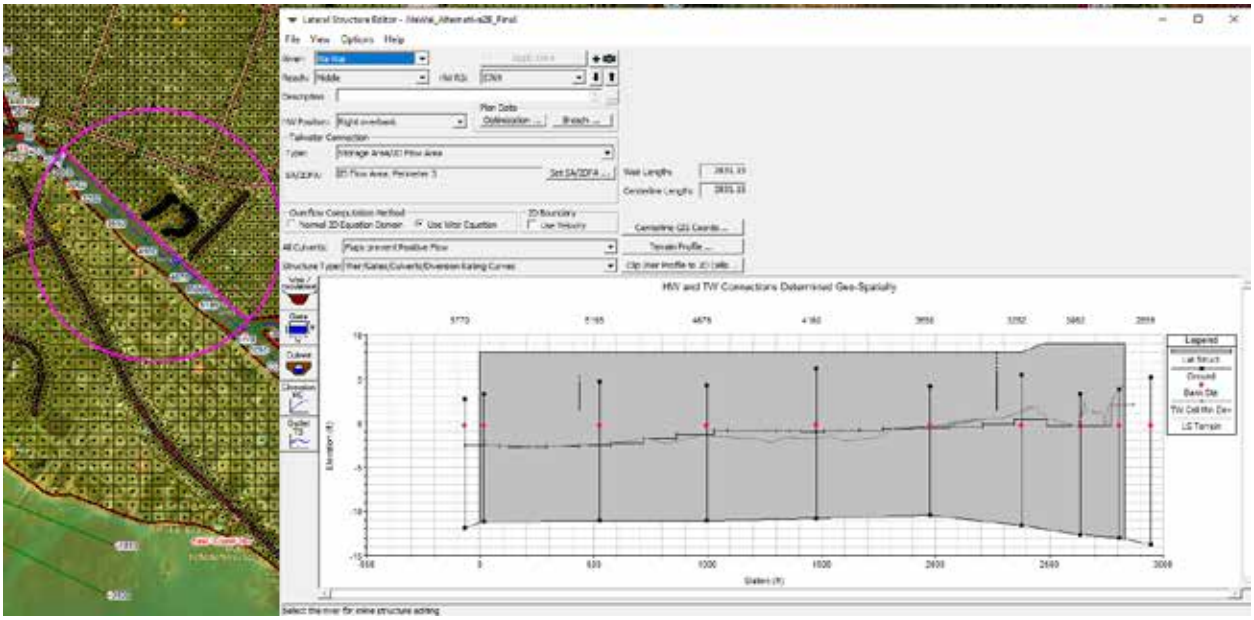


Figure 5-24: Typical Ala Wai Canal Floodwall

5.3. Alternative 5

Alternative 5 was identified as a hybrid alternative, as it utilized a combination of measures from alternatives 1 and 2B, without a specific focus placed on maximizing storage or conveyance.

5.3.1. Kanaha Floodwall and Makiki District Park Detention Area

The Kanaha Floodwall and Makiki District Park Detention Area were utilized in an identical manner here as in Alternative 1. This includes using the approximate 6ft wall heights along the Kanaha Stream as was used in Alternative 1, and not the slightly differing wall heights used in Alternative 2b. The Makiki District Park Detention Area is also unchanged from Alternative 1. Information on these measures can be found in section 5.1.1.

5.3.2. Manoa District Park Detention Area

The Manoa District Park Detention Area was utilized in an identical manner here as in Alternative 1. Information on this measure can be found in section 5.1.2

5.3.3. Woodlawn Drive Floodwall

The Woodlawn Drive Floodwall was utilized in an identical manner here as in Alternative 1. Information on this measure can be found in section 5.1.3.

5.3.4. Koali Road Floodwall

The Koali Road Floodwall was utilized in an identical manner here as in Alternative 1. Information can be found in section 5.1.4.

5.3.5. Ala Wai Canal Floodwall with Kaimuki High School Floodwall and Ala Wai Golf Course Detention Area

For Alternative 5, the Ala Wai Canal Floodwall was combined with both the Kaimuki High School Floodwall and the Ala Wai Golf Couse Detention Area. The floodwall consisted of 14 drainage structures ranging from 2-5 feet in height and width, with one large 25ft by 5ft drainage structure

included at the northeastern end of the golf course. Also included with the floodwall were 12 road close structures necessary for high-flow flood events.

The Ala Wai Golf Course was modeled in Alternative 5 using a berm surrounding the golf course to create detention storage similar to Alternative 1. However, Alternative 5 utilized an overflow section in the berm in the form of a weir to divert flow into the golf course instead of an inline structure on the Manoa-Palolo Canal. This overflow section was located just downstream of Date Street.

The Kaimuki High School Floodwall was utilized in the same manner as Alternatives 1 and 2B, except for it connected to the Ala Wai Canal Floodwall and the Ala Wai Golf Course differently. This consisted of additional drainage structures and road closure structures. The use of the Ala Wai Canal Floodwall, Kaimuki High School Floodwall, and Ala Wai Golf Course for Alternative 5 is shown below in Figure 5-25.

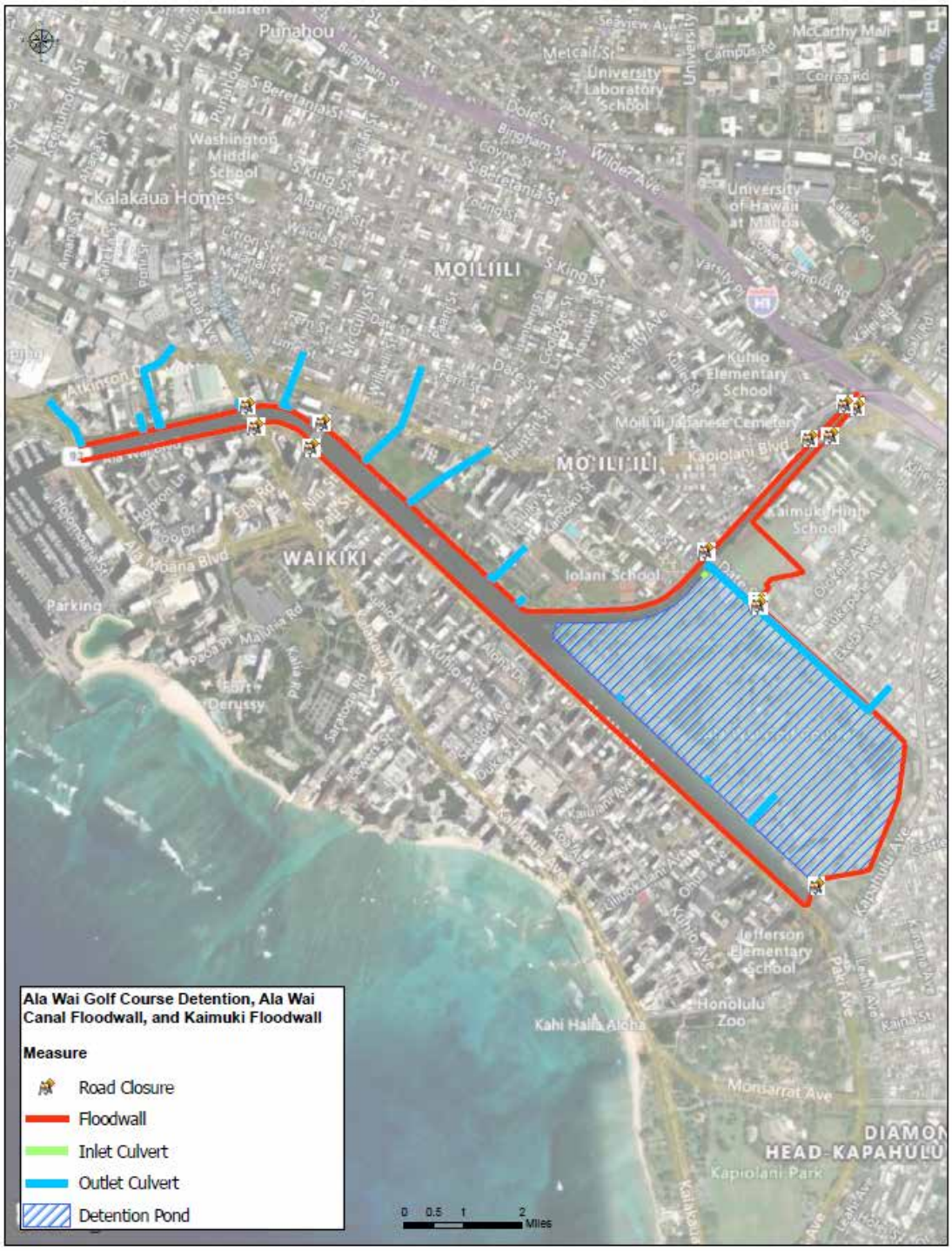


Figure 5-25 Ala Wai Canal Floodwall with Kaimuki High School Floodwall and Ala Wai Golf Course Detention Area

6. Summary of Results for Final Array of Alternatives

6.1. Alternative Comparisons

The Future Without Project model runs are compared to the Future With Project Alternatives. Table 6-4 shows the 1% AEP water surface elevations and discharge for the FWOP and all three alternatives at select locations in the Ala Wai Watershed that were used as Index Cross Sections for the Economic Analysis, shown in Figure 6-1. As the hydrologic inputs were the same for the FWOP and all alternative analyses, any changes in the discharge is due to the structural measures.

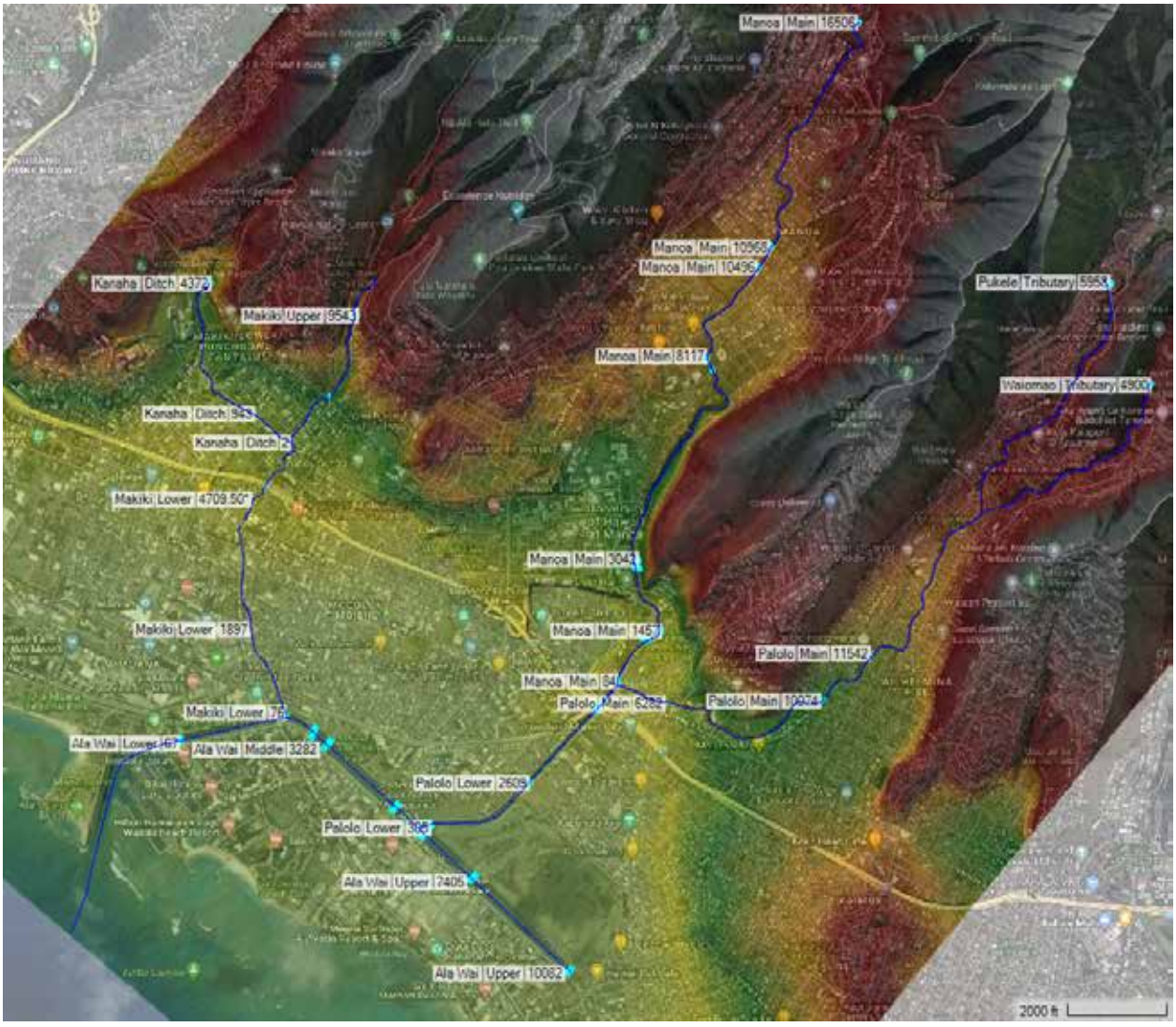


Figure 6-1: Index Cross Section Locations

Table 6-1: 50% AEP WSEL & Discharges for FWOP and With Project Alternatives

			FWOP		Alternative 1		Alternative 2b		Alternative 5	
River	Reach	River Sta	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
			(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Ala Wai	Upper	10082	176.63	4.20	696.40	3.75	176.63	4.23	176.63	4.27
Ala Wai	Upper	7405	551.52	4.20	683.46	3.74	527.07	4.23	541.96	4.27
Ala Wai	Upper	6095	751.24	4.19	726.62	3.73	794.97	4.22	604.31	4.27
Ala Wai	Middle	5770	5499.95	4.19	2693.42	3.73	5499.42	4.22	5613.87	4.27
Ala Wai	Middle	5195	5543.26	4.15	2540.67	3.71	5581.81	4.18	5701.91	4.23
Ala Wai	Middle	3282	5740.15	4.05	3145.09	3.66	5814.53	4.08	5938.33	4.12
Ala Wai	Middle	2961	5770.45	4.01	3202.08	3.64	5836.54	4.03	5964.00	4.07
Ala Wai	Lower	67	4763.84	3.23	4721.41	3.23	6598.70	3.23	6756.52	3.23
Kanaha	Ditch	4372	93.50	126.72	93.50	126.72	93.50	126.72	93.50	126.72
Kanaha	Ditch	943	210.53	65.75	210.32	65.75	210.33	65.75	210.33	65.75
Kanaha	Ditch	2	236.93	59.29	237.00	59.29	237.06	59.29	237.06	59.29
Makiki	Upper	9543	238.40	170.63	238.40	170.63	238.40	170.63	238.40	170.63
Makiki	Upper	7672	294.00	102.96	294.00	102.96	294.28	102.97	294.27	102.97
Makiki	Lower	5940.67*	627.55	47.35	627.50	47.35	627.50	47.35	627.84	47.35
Makiki	Lower	4709.50*	629.75	30.33	629.49	31.21	629.74	30.33	629.73	30.33
Makiki	Lower	1897	743.96	9.53	744.17	9.53	722.80	9.22	743.99	9.53
Makiki	Lower	76	634.52	3.79	880.82	3.49	842.22	3.81	878.98	3.84
Manoa	Main	16506	1499.33	275.69	1499.33	275.69	1498.87	275.69	1498.92	275.69
Manoa	Main	10968	2468.88	178.55	2477.53	178.56	2473.42	178.67	2475.63	178.56
Manoa	Main	10496	2692.34	172.93	2609.71	172.82	2705.20	172.94	2607.13	172.82
Manoa	Main	8117	2921.23	148.71	2848.31	148.61	2931.03	148.72	2846.79	148.61
Manoa	Main	8016	2930.35	147.55	2860.54	147.45	2940.20	147.57	2858.63	147.45
Manoa	Main	7839	2952.57	145.85	2886.28	145.74	2965.19	145.87	2884.23	145.74
Manoa	Main	3042	3069.44	62.63	3007.28	62.56	3086.14	62.64	3003.80	62.56
Manoa	Main	2891	3069.10	60.51	3006.57	60.44	3085.95	60.53	3003.25	60.44
Manoa	Main	1457	3495.19	39.77	3439.67	39.72	3515.05	39.79	3435.21	39.71
Manoa	Main	1378	3495.01	39.54	3439.42	39.49	3514.82	39.57	3434.96	39.49
Manoa	Main	1107	3585.13	36.83	3529.60	36.79	3605.25	36.85	3525.00	36.78
Manoa	Main	84	3541.37	19.85	3497.23	19.80	3574.00	19.87	3493.88	19.80
Palolo	Main	11542	1806.11	133.87	1806.24	133.87	1816.33	133.88	1815.86	133.88
Palolo	Main	10074	1891.63	110.61	1891.66	110.61	1900.41	110.63	1900.11	110.63
Palolo	Main	6282	2041.89	32.20	2038.94	32.20	2044.64	32.20	2048.12	32.21
Palolo	Lower	4810	5435.83	18.39	5394.07	18.34	5460.18	18.42	5384.02	18.35
Palolo	Lower	4653	5435.65	16.24	5393.77	16.32	5460.09	16.26	5383.90	16.20
Palolo	Lower	4557	5435.44	16.19	5393.11	16.33	5460.03	16.21	5383.81	16.14
Palolo	Lower	2609	5499.09	7.86	5556.61	13.49	5524.74	7.89	5447.40	7.83
Palolo	Lower	305	5062.62	3.99	1992.45	3.70	5110.83	4.01	5328.00	4.05
Pukele	Tributary	5958	654.20	518.92	654.20	518.92	653.57	518.92	653.42	518.92
Waiomao	Tributary	4900	638.43	395.73	638.43	395.73	638.43	395.73	638.43	395.73

Table 6-2: 20% AEP WSEL & Discharges for FWOP and With Project Alternatives

			FWOP		Alternative 1		Alternative 2b		Alternative 5	
River	Reach	River Sta	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
			(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Ala Wai	Upper	10082	312.35	5.27	1204.00	4.57	315.56	5.59	315.56	5.87
Ala Wai	Upper	7405	994.75	5.27	1169.20	4.57	1356.98	5.58	833.70	5.86
Ala Wai	Upper	6095	1454.25	5.26	935.00	4.56	1866.78	5.57	1127.74	5.85
Ala Wai	Middle	5770	8706.13	5.26	6071.33	4.56	8919.25	5.57	9561.87	5.85
Ala Wai	Middle	5195	8695.29	5.19	6229.00	4.52	9046.83	5.50	9702.07	5.77
Ala Wai	Middle	3282	8769.03	5.02	6704.28	4.39	9429.06	5.31	10118.78	5.57
Ala Wai	Middle	2961	8788.79	4.93	6753.59	4.33	9466.24	5.21	10157.76	5.46
Ala Wai	Lower	67	2292.10	3.22	7856.01	3.23	10633.06	3.23	11290.01	3.23
Kanaha	Ditch	4372	199.90	127.30	199.90	127.30	199.83	127.30	199.82	127.30
Kanaha	Ditch	943	326.65	68.03	385.00	68.08	380.51	68.12	379.37	68.13
Kanaha	Ditch	2	357.18	60.27	361.27	60.27	360.78	60.28	360.99	60.28
Makiki	Upper	9543	485.90	171.28	485.90	171.28	485.87	171.28	485.90	171.28
Makiki	Upper	7672	588.43	106.23	585.37	106.20	588.53	106.23	586.65	106.21
Makiki	Lower	5940.67*	1143.16	49.56	1141.29	49.55	1147.08	49.57	1142.46	49.56
Makiki	Lower	4709.50*	1150.10	36.46	1145.61	36.65	1135.04	36.00	1148.78	36.68
Makiki	Lower	1897	1047.46	10.91	1047.62	10.90	998.67	9.49	1047.04	10.91
Makiki	Lower	76	879.80	4.52	1118.67	4.02	993.00	4.74	1108.70	4.95
Manoa	Main	16506	2723.00	277.47	2723.00	277.47	2723.00	277.47	2723.00	277.47
Manoa	Main	10968	3993.98	181.63	4009.00	181.57	3988.46	181.64	4008.51	181.61
Manoa	Main	10496	3796.51	178.23	3720.34	177.97	3748.25	178.13	3726.25	177.99
Manoa	Main	8117	3427.25	150.94	3495.26	150.59	3542.62	151.10	3488.20	150.54
Manoa	Main	8016	3224.45	150.57	3461.39	149.97	3494.25	150.80	3376.17	149.86
Manoa	Main	7839	5013.13	149.58	4663.25	148.98	4985.74	149.86	4635.90	148.87
Manoa	Main	3042	5562.45	65.17	5088.60	64.75	5719.30	65.32	5006.34	64.67
Manoa	Main	2891	5561.52	63.54	5086.31	63.08	5719.23	63.69	5002.77	62.99
Manoa	Main	1457	6370.92	42.16	5899.65	42.06	6524.70	42.46	5811.76	41.98
Manoa	Main	1378	6370.36	41.75	5899.38	41.79	6524.05	42.14	5811.59	41.71
Manoa	Main	1107	5494.79	38.38	6068.86	38.80	6691.95	39.16	5980.53	38.74
Manoa	Main	84	5276.23	22.69	5950.37	22.84	6641.04	23.19	5893.06	22.74
Palolo	Main	11542	3125.22	135.25	3138.78	135.26	3146.49	135.27	3131.32	135.26
Palolo	Main	10074	2800.99	112.38	2775.45	112.33	2778.73	112.33	2803.26	112.38
Palolo	Main	6282	3506.82	33.55	3575.88	33.61	3582.68	33.62	3512.09	33.56
Palolo	Lower	4810	9138.38	21.27	9327.83	21.43	9855.94	21.79	9206.43	21.33
Palolo	Lower	4653	9137.54	19.00	9326.67	19.23	9855.79	19.49	9206.33	19.06
Palolo	Lower	4557	9136.67	19.15	9326.00	19.42	9855.74	19.67	9206.24	19.21
Palolo	Lower	2609	9265.28	10.20	9877.21	14.14	9998.93	10.61	9367.67	10.42
Palolo	Lower	305	7857.19	4.90	5204.73	4.40	8271.06	5.19	8922.02	5.42
Pukele	Tributary	5958	1242.60	520.19	1242.60	520.19	1241.21	520.19	1240.87	520.19
Waiomao	Tributary	4900	1135.38	397.38	1135.38	397.38	1134.61	397.38	1134.90	397.38

Table 6-3: 10% AEP WSEL & Discharges for FWOP and With Project Alternatives

			FWOP		Alternative 1		Alternative 2b		Alternative 5	
River	Reach	River Sta	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
			(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Ala Wai	Upper	10082	397.46	5.91	1643.00	5.24	363.37	6.68	427.99	7.14
Ala Wai	Upper	7405	1427.45	5.90	1581.35	5.23	2367.98	6.66	1185.43	7.12
Ala Wai	Upper	6095	1899.01	5.89	1152.11	5.23	2926.17	6.65	1590.38	7.12
Ala Wai	Middle	5770	10418.26	5.89	7951.07	5.23	11340.68	6.65	12202.05	7.12
Ala Wai	Middle	5195	10441.73	5.81	8016.82	5.17	11492.26	6.56	12373.21	7.02
Ala Wai	Middle	3282	10308.02	5.61	8529.85	4.99	11909.95	6.32	12922.90	6.76
Ala Wai	Middle	2961	10274.28	5.50	8576.95	4.91	11945.13	6.19	12968.70	6.61
Ala Wai	Lower	67	2541.76	3.23	9768.28	3.23	13163.31	3.23	14115.26	3.23
Kanaha	Ditch	4372	287.88	127.68	287.91	127.68	287.94	127.68	287.92	127.68
Kanaha	Ditch	943	344.77	68.48	476.03	68.73	476.08	68.73	473.26	68.73
Kanaha	Ditch	2	372.50	60.52	376.80	60.62	375.31	60.55	374.77	60.52
Makiki	Upper	9543	705.30	171.80	705.30	171.80	705.30	171.80	705.30	171.80
Makiki	Upper	7672	669.54	107.02	667.56	107.01	667.39	107.00	667.88	107.01
Makiki	Lower	5940.67*	1334.67	50.38	1361.64	50.50	1346.06	50.41	1334.22	50.38
Makiki	Lower	4709.50*	1345.52	38.83	1368.86	39.30	1352.91	38.15	1345.74	39.15
Makiki	Lower	1897	1098.28	11.45	1098.24	11.44	1075.70	9.57	1096.47	11.45
Makiki	Lower	76	957.09	4.98	1228.51	4.49	1071.02	5.56	1196.33	5.91
Manoa	Main	16506	3657.00	278.58	3657.00	278.58	3657.00	278.58	3657.00	278.58
Manoa	Main	10968	5048.51	182.64	5030.89	182.69	5028.25	182.67	5034.68	182.71
Manoa	Main	10496	4257.14	178.84	4329.45	179.01	4191.20	178.68	4341.18	179.04
Manoa	Main	8117	3394.60	152.01	3565.61	152.03	3570.20	152.40	3350.14	152.01
Manoa	Main	8016	2900.22	152.08	3480.16	152.02	3495.00	152.45	2900.27	152.03
Manoa	Main	7839	5379.37	150.97	5126.63	151.17	5265.48	151.68	5122.36	151.16
Manoa	Main	3042	7159.79	66.69	7121.01	66.66	7816.98	67.19	7080.51	66.62
Manoa	Main	2891	7151.55	65.38	7120.07	65.34	7810.10	65.93	7080.20	65.28
Manoa	Main	1457	8509.90	43.53	8322.25	43.69	9030.76	44.09	8262.15	43.65
Manoa	Main	1378	8504.99	42.83	8321.83	43.21	9029.61	43.53	8260.70	43.17
Manoa	Main	1107	6496.56	38.87	8573.99	40.31	9283.11	40.66	8507.88	40.27
Manoa	Main	84	6081.61	25.21	8504.62	25.65	9248.46	26.15	8458.98	25.65
Palolo	Main	11542	3971.69	135.99	4010.64	136.03	4010.65	136.03	3971.54	135.99
Palolo	Main	10074	3205.67	113.10	3112.14	112.93	3112.15	112.93	3205.65	113.10
Palolo	Main	6282	4720.15	34.67	4899.26	34.73	4899.01	34.74	4869.01	34.71
Palolo	Lower	4810	12422.47	24.09	13123.38	24.55	13857.62	25.08	13073.27	24.56
Palolo	Lower	4653	12418.85	22.54	13125.11	22.94	13855.87	23.46	13072.84	22.98
Palolo	Lower	4557	12414.38	22.91	13041.84	23.34	13855.67	23.84	13072.83	23.36
Palolo	Lower	2609	12146.22	11.64	13680.89	14.58	12953.47	12.46	12798.00	12.04
Palolo	Lower	305	8599.47	5.50	6426.76	5.01	9935.65	6.25	11269.06	6.57
Pukele	Tributary	5958	1722.09	520.98	1720.60	520.98	1720.60	520.98	1722.09	520.98
Waiomao	Tributary	4900	1537.51	398.49	1537.37	398.49	1537.37	398.49	1537.51	398.49

Table 6-4: 5% AEP WSEL & Discharges for FWOP and With Project Alternatives

			FWOP		Alternative 1		Alternative 2b		Alternative 5	
River	Reach	River Sta	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
			(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Ala Wai	Upper	10082	465.75	6.50	2168.60	5.81	411.94	7.97	557.20	7.91
Ala Wai	Upper	7405	1713.18	6.49	2082.46	5.81	3163.96	7.94	1336.81	7.91
Ala Wai	Upper	6095	2084.55	6.48	1585.61	5.81	3968.88	7.92	1790.10	7.91
Ala Wai	Middle	5770	12150.36	6.48	9313.38	5.81	13806.30	7.92	13325.68	7.91
Ala Wai	Middle	5195	12101.76	6.39	9425.96	5.74	13986.54	7.81	13589.35	7.80
Ala Wai	Middle	3282	11700.63	6.17	9934.90	5.53	14550.96	7.55	14429.46	7.53
Ala Wai	Middle	2961	11570.43	6.05	9982.44	5.43	14600.00	7.37	14499.68	7.35
Ala Wai	Lower	67	2831.25	3.23	11261.77	3.23	15715.02	3.23	15687.46	3.23
Kanaha	Ditch	4372	394.67	128.07	394.65	128.07	394.65	128.07	394.67	128.07
Kanaha	Ditch	943	351.40	68.87	599.35	69.59	596.31	69.59	603.51	69.61
Kanaha	Ditch	2	379.00	60.76	403.15	61.32	398.82	60.84	399.67	60.90
Makiki	Upper	9543	960.76	172.26	960.77	172.26	960.77	172.26	960.76	172.26
Makiki	Upper	7672	721.36	107.51	718.74	107.49	718.57	107.49	719.20	107.49
Makiki	Lower	5940.67*	1516.64	51.21	1731.22	53.12	1568.76	51.35	1562.25	51.52
Makiki	Lower	4709.50*	1518.87	40.40	1741.57	42.36	1582.36	39.00	1571.71	41.22
Makiki	Lower	1897	1121.90	11.80	1124.32	11.80	1111.58	9.63	1121.30	11.82
Makiki	Lower	76	969.23	5.44	1302.76	4.92	1177.11	6.56	1255.81	6.55
Manoa	Main	16506	4623.00	279.57	4623.00	279.58	4623.00	279.57	4623.00	279.58
Manoa	Main	10968	6113.48	183.44	6087.57	183.59	6058.05	183.46	6087.09	183.59
Manoa	Main	10496	4516.87	179.39	4782.34	179.98	4423.65	179.21	4791.73	180.00
Manoa	Main	8117	3325.22	152.76	3976.60	153.10	4348.97	153.48	3986.28	153.08
Manoa	Main	8016	2549.36	153.00	3484.16	153.25	3596.72	153.67	3316.25	153.24
Manoa	Main	7839	5498.35	151.79	5139.53	152.60	5319.89	153.08	5146.80	152.58
Manoa	Main	3042	8407.54	67.79	9019.81	68.20	9712.85	68.67	9006.22	68.19
Manoa	Main	2891	8389.34	66.74	9011.22	67.19	9708.35	67.71	8997.10	67.18
Manoa	Main	1457	10019.31	44.36	10580.74	45.02	11226.75	45.38	10565.06	45.00
Manoa	Main	1378	10019.17	43.37	10587.29	44.33	11245.55	44.60	10565.00	44.32
Manoa	Main	1107	6977.36	39.23	10920.46	41.52	11571.05	41.80	10896.56	41.51
Manoa	Main	84	6613.04	26.85	10869.49	29.83	11471.24	30.64	10879.33	29.67
Palolo	Main	11542	4701.85	136.59	4776.10	136.65	4776.10	136.65	4701.91	136.59
Palolo	Main	10074	3587.06	113.75	3440.81	113.50	3440.81	113.50	3587.06	113.75
Palolo	Main	6282	5799.85	35.66	6366.42	35.94	6388.49	36.00	6226.20	35.83
Palolo	Lower	4810	15088.53	25.72	16847.32	26.77	17335.72	27.53	16622.50	26.91
Palolo	Lower	4653	15082.84	23.92	16811.98	24.89	17335.72	25.99	16622.50	25.26
Palolo	Lower	4557	15117.10	24.28	16653.65	25.30	17335.27	26.38	16605.93	25.66
Palolo	Lower	2609	13585.19	12.26	16832.85	15.06	15025.05	14.44	14973.91	13.12
Palolo	Lower	305	10215.84	6.08	7968.80	5.54	11417.07	7.49	13268.20	7.28
Pukele	Tributary	5958	2231.49	521.73	2229.58	521.73	2229.58	521.73	2231.49	521.73
Waiomao	Tributary	4900	1973.61	399.51	1973.00	399.51	1973.00	399.51	1973.23	399.51

Table 6-5: 2% AEP WSEL & Discharges for FWOP and With Project Alternatives

			FWOP		Alternative 1		Alternative 2b		Alternative 5	
River	Reach	River Sta	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
			(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Ala Wai	Upper	10082	649.40	7.18	2972.80	6.44	587.70	9.00	569.21	8.87
Ala Wai	Upper	7405	1732.37	7.16	2854.34	6.44	3356.62	8.98	3045.50	8.85
Ala Wai	Upper	6095	2323.86	7.15	2240.83	6.44	4195.87	8.95	4240.95	8.83
Ala Wai	Middle	5770	13958.64	7.15	9789.72	6.44	18757.42	8.95	16959.00	8.83
Ala Wai	Middle	5195	13974.68	7.04	9999.99	6.37	18206.54	8.82	17039.99	8.69
Ala Wai	Middle	3282	13238.95	6.82	11055.30	6.14	16736.88	8.62	16688.99	8.43
Ala Wai	Middle	2961	12988.28	6.68	11295.64	6.01	16781.60	8.46	16313.18	8.30
Ala Wai	Lower	67	3177.29	3.23	12789.45	3.23	17667.45	3.24	17387.20	3.23
Kanaha	Ditch	4372	567.89	128.61	567.82	128.61	567.82	128.61	567.82	128.61
Kanaha	Ditch	943	365.76	69.54	768.27	70.93	684.03	70.45	756.15	70.86
Kanaha	Ditch	2	386.79	61.12	461.93	66.16	436.74	61.35	454.84	64.17
Makiki	Upper	9543	1342.22	172.91	1342.22	172.91	1342.22	172.91	1342.22	172.91
Makiki	Upper	7672	757.91	107.85	757.25	107.85	755.27	107.83	757.90	107.85
Makiki	Lower	5940.67*	1782.97	54.03	2086.85	62.85	1906.08	53.22	2013.78	63.11
Makiki	Lower	4709.50*	1798.57	42.57	2102.08	45.25	1924.43	39.89	2029.59	44.79
Makiki	Lower	1897	1139.41	12.23	1143.53	12.23	1142.87	9.72	1139.52	12.25
Makiki	Lower	76	1001.06	5.98	1384.34	5.41	1378.51	7.44	1300.89	7.31
Manoa	Main	16506	5934.00	280.75	5934.00	280.77	5934.00	280.75	5934.00	280.77
Manoa	Main	10968	7311.77	184.27	7455.92	184.57	7276.47	184.31	7461.27	184.56
Manoa	Main	10496	4736.46	179.88	5352.69	180.89	4664.58	179.71	5354.92	180.90
Manoa	Main	8117	3379.37	153.48	5366.60	154.15	5642.55	154.36	5342.82	154.13
Manoa	Main	8016	2308.67	153.82	4456.05	154.38	4658.23	154.63	4432.00	154.37
Manoa	Main	7839	5694.71	152.50	5970.73	153.84	6200.41	154.09	5949.80	153.82
Manoa	Main	3042	9536.27	68.85	11649.02	70.24	12199.30	70.54	11601.69	70.22
Manoa	Main	2891	9533.90	68.05	11633.17	69.57	12183.36	69.85	11584.39	69.55
Manoa	Main	1457	11664.26	44.98	13589.29	46.59	13926.59	46.74	13583.57	46.57
Manoa	Main	1378	11672.51	43.84	13611.23	45.66	13980.16	45.81	13621.63	45.64
Manoa	Main	1107	7453.17	39.53	14133.35	42.90	14462.03	43.05	14091.50	42.89
Manoa	Main	84	7235.59	30.94	12398.96	32.55	14430.42	32.56	11498.74	32.60
Palolo	Main	11542	5576.48	137.25	5612.95	137.28	5612.99	137.28	5576.61	137.25
Palolo	Main	10074	4054.35	114.51	3858.12	114.19	3858.16	114.19	4053.09	114.51
Palolo	Main	6282	7188.58	36.91	8229.26	37.73	8227.69	37.71	8003.85	37.57
Palolo	Lower	4810	19224.69	27.79	22628.85	29.32	21386.64	29.72	22294.80	29.99
Palolo	Lower	4653	19218.27	25.36	22148.29	26.49	21110.95	28.01	22289.29	28.07
Palolo	Lower	4557	18788.00	25.82	17227.82	26.92	20988.96	28.51	21907.15	28.63
Palolo	Lower	2609	14779.70	12.81	18802.59	15.41	17937.06	16.91	18102.42	14.36
Palolo	Lower	305	11171.07	6.76	8132.50	6.26	14069.96	8.43	13220.42	8.26
Pukele	Tributary	5958	2947.92	522.68	2947.92	522.68	2947.92	522.68	2947.92	522.68
Waiomao	Tributary	4900	2573.04	400.66	2573.04	400.66	2573.04	400.66	2573.04	400.66

Table 6-6: 1% AEP WSEL & Discharges for FWOP and With Project Alternatives

			FWOP		Alternative 1		Alternative 2b		Alternative 5	
River	Reach	River Sta	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
			(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Ala Wai	Upper	10082	684.39	7.52	3598.70	7.41	846.14	9.26	833.02	9.54
Ala Wai	Upper	7405	1990.62	7.52	3457.22	7.40	3685.01	9.23	4543.83	9.49
Ala Wai	Upper	6095	2715.52	7.52	2761.58	7.40	5132.08	9.19	6665.57	9.44
Ala Wai	Middle	5770	14568.90	7.52	11841.29	7.40	20387.56	9.19	22295.88	9.44
Ala Wai	Middle	5195	14620.00	7.40	12014.34	7.31	19551.41	9.06	21797.48	9.26
Ala Wai	Middle	3282	13833.08	7.18	13053.30	7.06	17142.33	8.90	18922.74	9.08
Ala Wai	Middle	2961	13596.45	7.04	13287.38	6.90	17168.97	8.75	17732.59	8.98
Ala Wai	Lower	67	3475.10	3.23	14958.03	3.23	18261.87	3.28	18622.24	3.32
Kanaha	Ditch	4372	711.73	129.02	711.73	129.02	711.68	129.02	711.68	129.02
Kanaha	Ditch	943	381.66	70.05	906.12	71.96	748.05	70.96	906.01	71.74
Kanaha	Ditch	2	363.63	64.20	498.01	68.99	459.91	63.97	494.98	68.09
Makiki	Upper	9543	1608.20	173.30	1608.25	173.30	1608.25	173.30	1608.20	173.30
Makiki	Upper	7672	771.55	107.98	771.98	107.98	771.12	107.97	772.75	107.99
Makiki	Lower	5940.67*	2030.93	63.12	2164.08	65.12	2270.16	62.73	2123.63	64.22
Makiki	Lower	4709.50*	2040.31	44.25	2181.91	46.00	2281.84	40.52	2128.47	45.74
Makiki	Lower	1897	1149.78	12.52	1154.96	12.54	1160.55	9.78	1149.14	12.55
Makiki	Lower	76	1028.75	6.30	1442.01	6.17	1476.25	7.71	1316.67	7.92
Manoa	Main	16506	6834.00	281.49	6834.00	281.52	6834.00	281.49	6834.00	281.52
Manoa	Main	10968	8294.58	184.87	8526.55	185.10	8267.16	184.85	8531.83	185.10
Manoa	Main	10496	4889.73	180.16	5745.68	181.50	4813.07	180.03	5751.76	181.51
Manoa	Main	8117	3890.30	153.92	6216.70	154.78	6458.18	154.98	6200.93	154.76
Manoa	Main	8016	2702.70	154.31	5164.36	155.06	5328.95	155.27	5156.12	155.04
Manoa	Main	7839	6173.39	152.87	6616.83	154.58	6848.91	154.77	6608.12	154.55
Manoa	Main	3042	10708.84	69.85	12447.42	71.79	12306.95	72.01	12397.32	71.79
Manoa	Main	2891	10672.67	69.23	12816.77	71.22	14045.04	71.34	12801.26	71.22
Manoa	Main	1457	13135.72	45.49	15816.60	47.61	16006.79	47.63	15851.25	47.60
Manoa	Main	1378	13179.87	44.21	15975.01	46.70	16204.33	46.69	16050.52	46.68
Manoa	Main	1107	7759.94	39.81	16556.01	44.05	16445.53	44.04	16548.72	44.05
Manoa	Main	84	5789.45	32.72	15894.32	33.54	16556.47	33.54	15556.96	33.69
Palolo	Main	11542	6212.25	137.69	6142.92	137.65	6142.92	137.65	6211.57	137.69
Palolo	Main	10074	4397.09	115.06	4214.54	114.77	4214.64	114.77	4397.91	115.06
Palolo	Main	6282	8075.01	38.44	9857.14	40.23	9836.96	39.69	9546.59	39.97
Palolo	Lower	4810	20521.75	28.34	25256.68	30.62	22903.29	30.63	24968.78	31.34
Palolo	Lower	4653	19584.12	25.61	25084.47	26.52	22903.29	28.88	24946.20	29.15
Palolo	Lower	4557	19325.88	26.18	17758.98	27.30	22452.61	29.40	23918.23	29.84
Palolo	Lower	2609	14992.22	12.95	20137.31	15.68	19491.52	17.26	19708.84	14.80
Palolo	Lower	305	11418.89	7.15	9512.79	7.25	14674.65	8.65	15497.57	8.79
Pukele	Tributary	5958	3418.67	523.26	3418.67	523.26	3418.67	523.26	3418.67	523.26
Waiomao	Tributary	4900	3070.11	401.49	3069.54	401.49	3070.11	401.49	3070.11	401.49

Table 6-7: 0.5% AEP WSEL & Discharges for FWOP and With Project Alternatives

			FWOP		Alternative 1		Alternative 2b		Alternative 5	
River	Reach	River Sta	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
			(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Ala Wai	Upper	10082	945.97	7.92	4276.50	8.03	1051.92	9.46	1051.92	9.89
Ala Wai	Upper	7405	2419.37	7.91	4133.06	8.03	4322.24	9.42	5701.63	9.82
Ala Wai	Upper	6095	3326.57	7.91	3443.12	8.02	6071.15	9.37	8813.78	9.73
Ala Wai	Middle	5770	15111.36	7.91	12755.76	8.02	21786.87	9.37	25565.58	9.73
Ala Wai	Middle	5195	15529.27	7.80	12953.27	7.92	20693.49	9.24	24695.84	9.54
Ala Wai	Middle	3282	14393.69	7.58	13994.12	7.67	17450.33	9.12	20310.88	9.40
Ala Wai	Middle	2961	14203.99	7.43	14351.01	7.50	17430.43	8.97	18603.63	9.33
Ala Wai	Lower	67	3724.62	3.23	16347.32	3.24	18707.24	3.32	19250.72	3.37
Kanaha	Ditch	4372	866.46	129.40	866.55	129.40	866.46	129.40	866.55	129.40
Kanaha	Ditch	943	384.97	70.69	984.59	72.89	828.05	71.54	1000.22	72.65
Kanaha	Ditch	2	308.43	66.62	515.76	70.06	483.12	66.69	513.50	69.69
Makiki	Upper	9543	1901.44	173.71	1901.62	173.71	1901.44	173.71	1901.62	173.71
Makiki	Upper	7672	783.08	108.08	789.32	108.14	781.82	108.07	793.29	108.18
Makiki	Lower	5940.67*	1992.95	62.47	2177.19	65.93	2271.22	63.32	2161.23	65.54
Makiki	Lower	4709.50*	2060.63	44.96	2200.21	46.50	2318.29	40.70	2138.49	46.27
Makiki	Lower	1897	1158.22	12.83	1162.99	12.83	1176.44	9.86	1157.99	12.85
Makiki	Lower	76	1055.18	6.64	1516.57	6.68	1484.76	7.92	1332.22	8.23
Manoa	Main	16506	7583.00	282.07	7583.00	282.11	7583.00	282.07	7583.00	282.11
Manoa	Main	10968	9150.59	185.27	9285.26	185.61	9123.61	185.24	9332.29	185.61
Manoa	Main	10496	5004.49	180.35	6093.29	182.01	4926.61	180.22	6104.53	182.02
Manoa	Main	8117	4252.63	154.21	6855.71	155.27	6966.73	155.29	6819.94	155.26
Manoa	Main	8016	2998.34	154.64	5696.18	155.58	5753.27	155.67	5668.96	155.56
Manoa	Main	7839	6546.32	153.16	7104.07	155.13	7774.59	155.06	7087.30	155.11
Manoa	Main	3042	11700.62	70.80	13551.25	72.44	14859.00	72.98	13516.66	72.43
Manoa	Main	2891	11660.62	70.30	13445.90	72.07	14754.12	72.59	13408.30	72.06
Manoa	Main	1457	14505.38	45.93	17437.04	48.27	17875.57	48.31	17566.85	48.33
Manoa	Main	1378	14608.65	44.52	17804.39	47.33	18269.36	47.33	18072.14	47.39
Manoa	Main	1107	8098.65	40.04	18421.01	44.65	18210.05	44.61	18641.90	44.70
Manoa	Main	84	7426.53	32.83	18586.31	34.59	19452.94	34.73	18589.56	35.31
Palolo	Main	11542	6696.57	138.03	6678.61	138.02	6678.70	138.02	6696.65	138.03
Palolo	Main	10074	4708.56	115.54	4572.90	115.33	4573.05	115.33	4708.55	115.54
Palolo	Main	6282	9404.02	39.84	11212.00	41.04	11066.87	40.61	11009.93	41.00
Palolo	Lower	4810	21025.01	28.84	27114.58	31.54	24636.25	31.50	27033.58	32.39
Palolo	Lower	4653	20999.20	26.46	27000.19	26.94	24556.38	29.51	27012.42	29.80
Palolo	Lower	4557	20780.92	26.92	18048.09	27.68	23832.36	30.12	25359.94	30.59
Palolo	Lower	2609	15470.52	13.28	21129.30	15.87	20290.38	17.36	20535.07	15.09
Palolo	Lower	305	11520.60	7.58	9862.38	7.97	15108.96	8.81	16564.70	9.03
Pukele	Tributary	5958	3935.83	523.85	3935.83	523.85	3935.83	523.85	3935.83	523.85
Waiomao	Tributary	4900	3625.10	402.32	3625.10	402.32	3625.10	402.32	3625.10	402.32

Table 6-8: 0.2% AEP WSEL & Discharges for FWOP and With Project Alternatives

			FWOP		Alternative 1		Alternative 2b		Alternative 5	
River	Reach	River Sta	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
			(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)	(cfs)	(ft)
Ala Wai	Upper	10082	676.84	8.37	5028.90	8.73	1135.16	9.75	1234.16	10.17
Ala Wai	Upper	7405	2771.48	8.36	4820.09	8.73	6104.63	9.69	6680.85	10.09
Ala Wai	Upper	6095	3916.92	8.37	3717.17	8.71	8214.51	9.62	10687.86	9.96
Ala Wai	Middle	5770	14734.14	8.37	13817.58	8.71	24126.95	9.62	28329.54	9.96
Ala Wai	Middle	5195	16094.16	8.26	14074.42	8.62	22699.74	9.48	27174.51	9.75
Ala Wai	Middle	3282	14760.03	8.04	15349.29	8.36	18053.90	9.42	21535.04	9.66
Ala Wai	Middle	2961	14933.96	7.89	15789.16	8.19	17838.73	9.28	19343.17	9.61
Ala Wai	Lower	67	3924.78	3.23	17950.42	3.26	19309.65	3.38	19767.11	3.42
Kanaha	Ditch	4372	1038.41	129.78	1038.39	129.78	1038.37	129.78	1038.39	129.78
Kanaha	Ditch	943	396.99	71.21	1060.49	73.59	881.98	71.75	1079.32	73.48
Kanaha	Ditch	2	317.56	67.26	530.40	71.12	486.26	67.46	527.35	70.96
Makiki	Upper	9543	2386.11	174.29	2385.88	174.29	2385.88	174.29	2385.88	174.29
Makiki	Upper	7672	803.35	108.27	812.95	108.35	806.52	108.30	814.81	108.37
Makiki	Lower	5940.67*	2037.51	62.45	2197.99	66.90	2278.16	63.44	2181.66	66.84
Makiki	Lower	4709.50*	2062.40	45.47	2223.93	47.11	2326.97	40.83	2194.20	46.99
Makiki	Lower	1897	1163.60	13.18	1167.91	13.18	1190.17	9.97	1163.37	13.20
Makiki	Lower	76	1000.96	7.01	1605.65	7.21	1492.31	8.20	1359.80	8.49
Manoa	Main	16506	8413.00	282.67	8413.00	282.71	8413.00	282.67	8413.00	282.71
Manoa	Main	10968	9971.20	185.71	10142.51	186.09	9941.00	185.69	10153.04	186.09
Manoa	Main	10496	5112.56	180.51	6387.32	182.42	5039.04	180.40	6397.39	182.44
Manoa	Main	8117	4746.00	154.50	7381.20	155.71	7569.27	155.78	7320.95	155.69
Manoa	Main	8016	3414.48	154.97	6138.80	156.04	6228.58	156.16	6094.03	156.03
Manoa	Main	7839	6942.79	153.44	7577.89	155.60	7942.24	155.61	7541.01	155.58
Manoa	Main	3042	11491.13	71.87	15195.66	73.84	15317.32	74.68	15284.60	73.91
Manoa	Main	2891	11634.15	71.50	14705.79	73.56	15643.73	74.50	14912.35	73.65
Manoa	Main	1457	16361.97	46.46	19008.26	48.89	19183.19	48.78	19136.56	48.96
Manoa	Main	1378	16577.02	44.91	19927.49	47.95	19971.23	47.79	20272.64	48.02
Manoa	Main	1107	8503.15	40.33	20394.42	45.26	19928.40	45.01	20678.87	45.33
Manoa	Main	84	8942.89	33.24	19641.93	35.48	20501.38	36.21	19707.55	36.65
Palolo	Main	11542	7275.36	138.42	7242.61	138.40	7242.20	138.40	7277.21	138.42
Palolo	Main	10074	5086.40	116.11	4993.03	115.97	4992.39	115.97	5087.08	116.11
Palolo	Main	6282	10942.51	40.62	12585.27	41.75	12404.49	41.25	12396.36	41.71
Palolo	Lower	4810	23203.64	29.61	29089.03	32.54	26933.81	32.77	29168.05	33.54
Palolo	Lower	4653	19854.48	26.43	29070.96	27.49	26941.74	30.32	29167.70	30.50
Palolo	Lower	4557	20316.26	26.71	18060.58	28.08	25507.55	31.05	26778.10	31.43
Palolo	Lower	2609	15581.83	13.45	22229.33	16.09	23934.59	18.03	21377.15	15.40
Palolo	Lower	305	11436.10	8.20	10561.79	8.76	15539.95	9.04	12702.23	9.32
Pukele	Tributary	5958	4730.12	524.69	4730.88	524.69	4727.08	524.69	4730.88	524.69
Waiomao	Tributary	4900	4307.81	403.23	4309.37	403.23	4308.69	403.23	4308.69	403.23

6.2. Flood Inundation Maps

Flood Inundation Maps were created for the 5% AEP (20-year), the 2% AEP (50-year), and the 1% AEP (100--year) flood events for the FWOP conditions and for the three final alternatives modeled.

6.2.1. 5% AEP Flood inundation Maps

The inundation depth grids for the 5% AEP (20-year) flood event is shown below for the Future Without Project conditions, for the Future Alternative 1 conditions, the Future Alternative 2b conditions, and the Future Alternative 5 conditions in the figures below, Figure 6-1 through Figure 6-4, respectively.

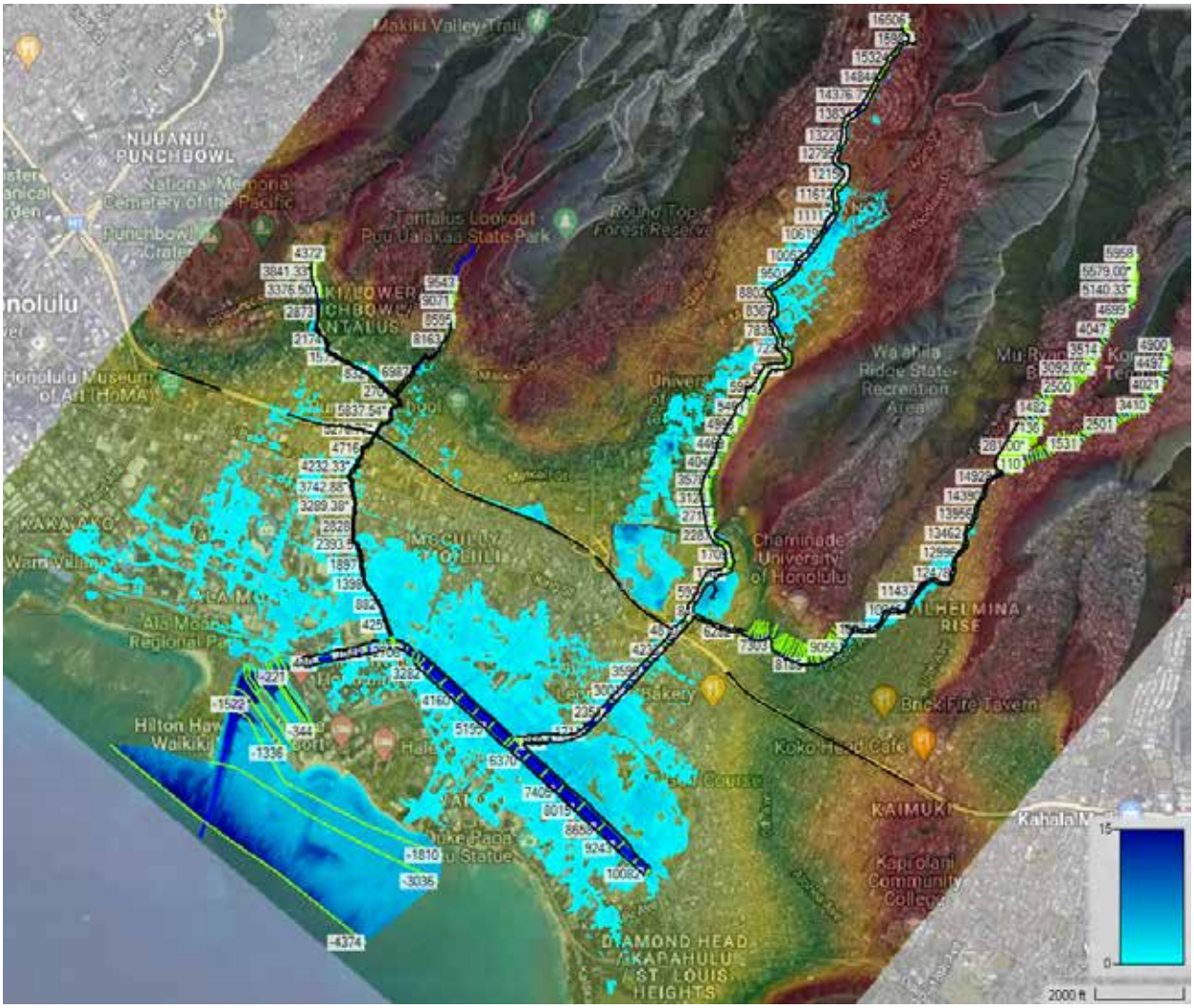


Figure 6-2: FWOP - 5% AEP (20-year) Flood Event

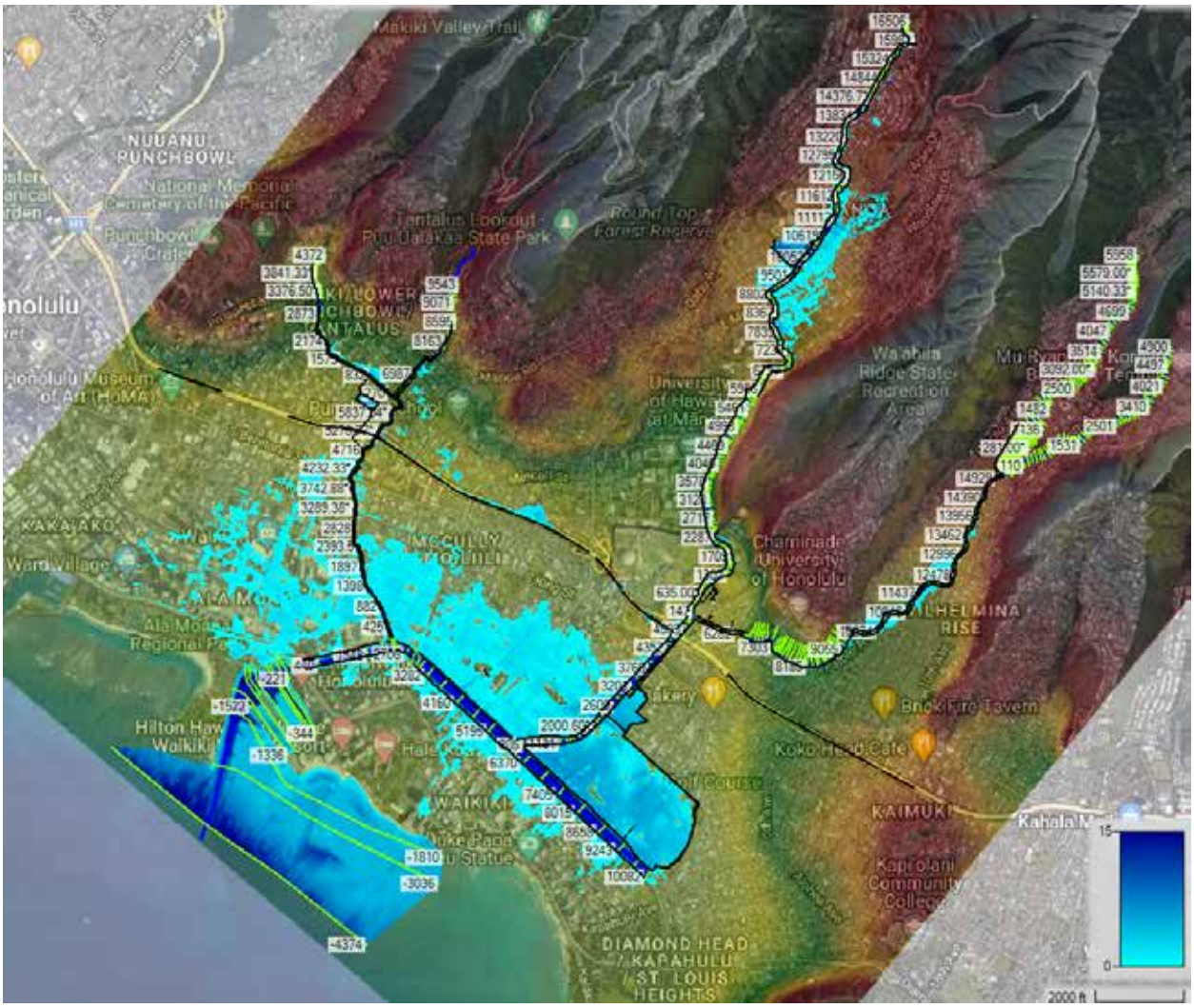


Figure 6-3: FWP Alt 1 - 5% AEP (20-year) Flood Event

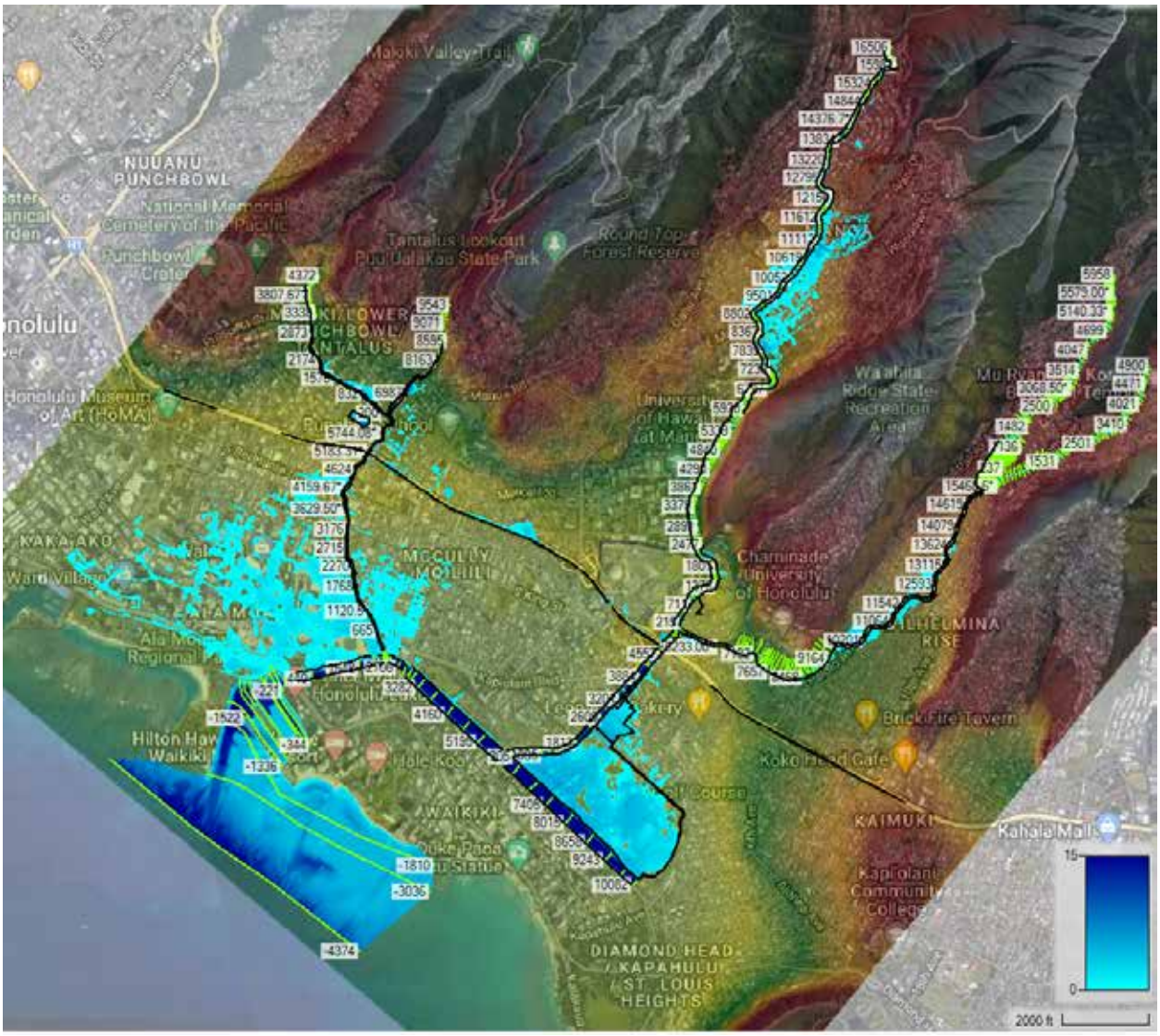


Figure 6-4: FWP Alt 2b - 5% AEP (20-year) Flood Event

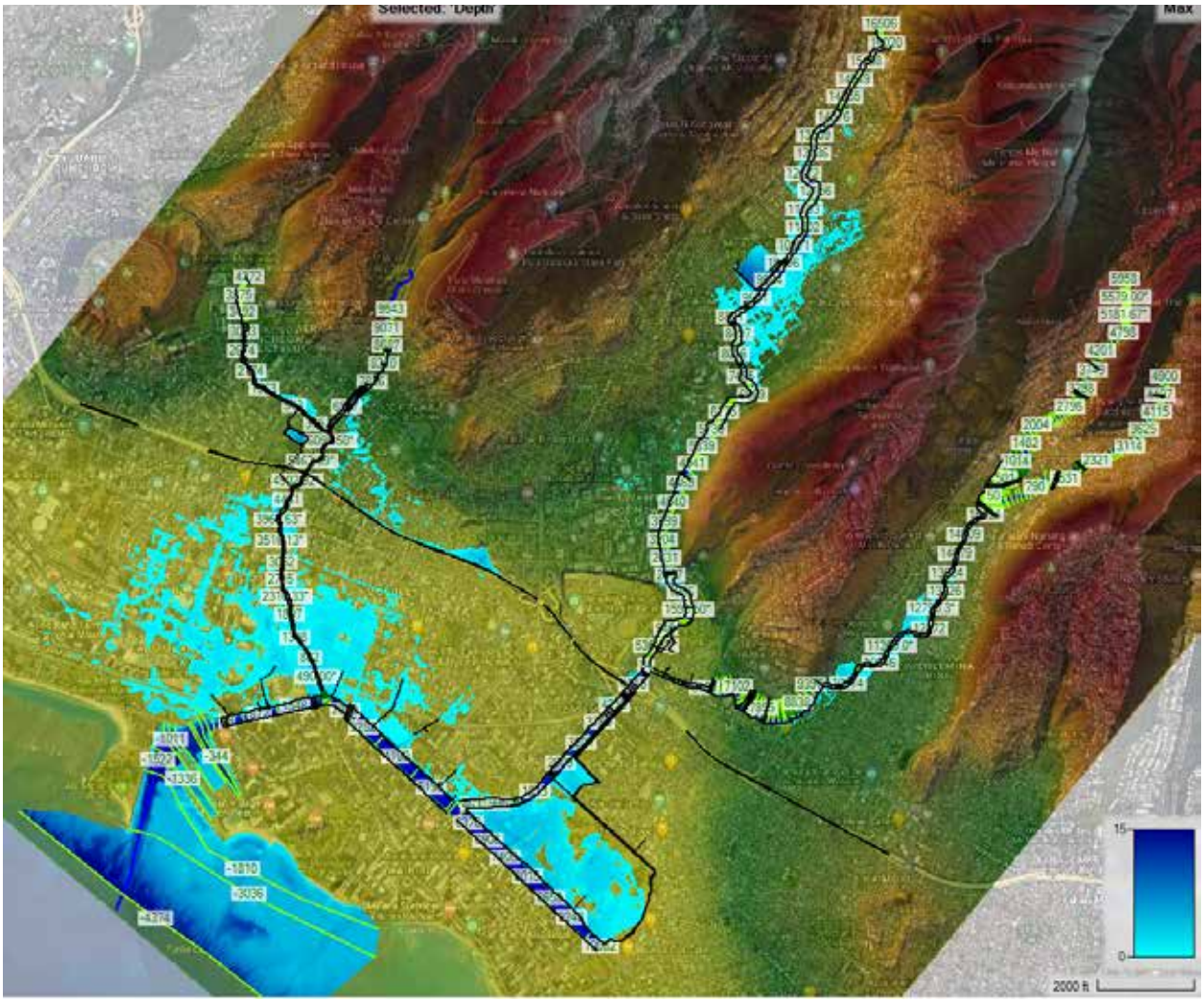


Figure 6-5: FWP Alt 5 - 5% AEP (20-year) Flood Event

6.2.2. 2% AEP Flood inundation Maps

The inundation depth grids for the 2% AEP (50-year) flood event is shown below for the Future Without Project conditions, for the Future Alternative 1 conditions, the Future Alternative 2b conditions, and the Future Alternative 5 conditions in the figures below, Figure 6-5 through Figure 6-8, respectively.

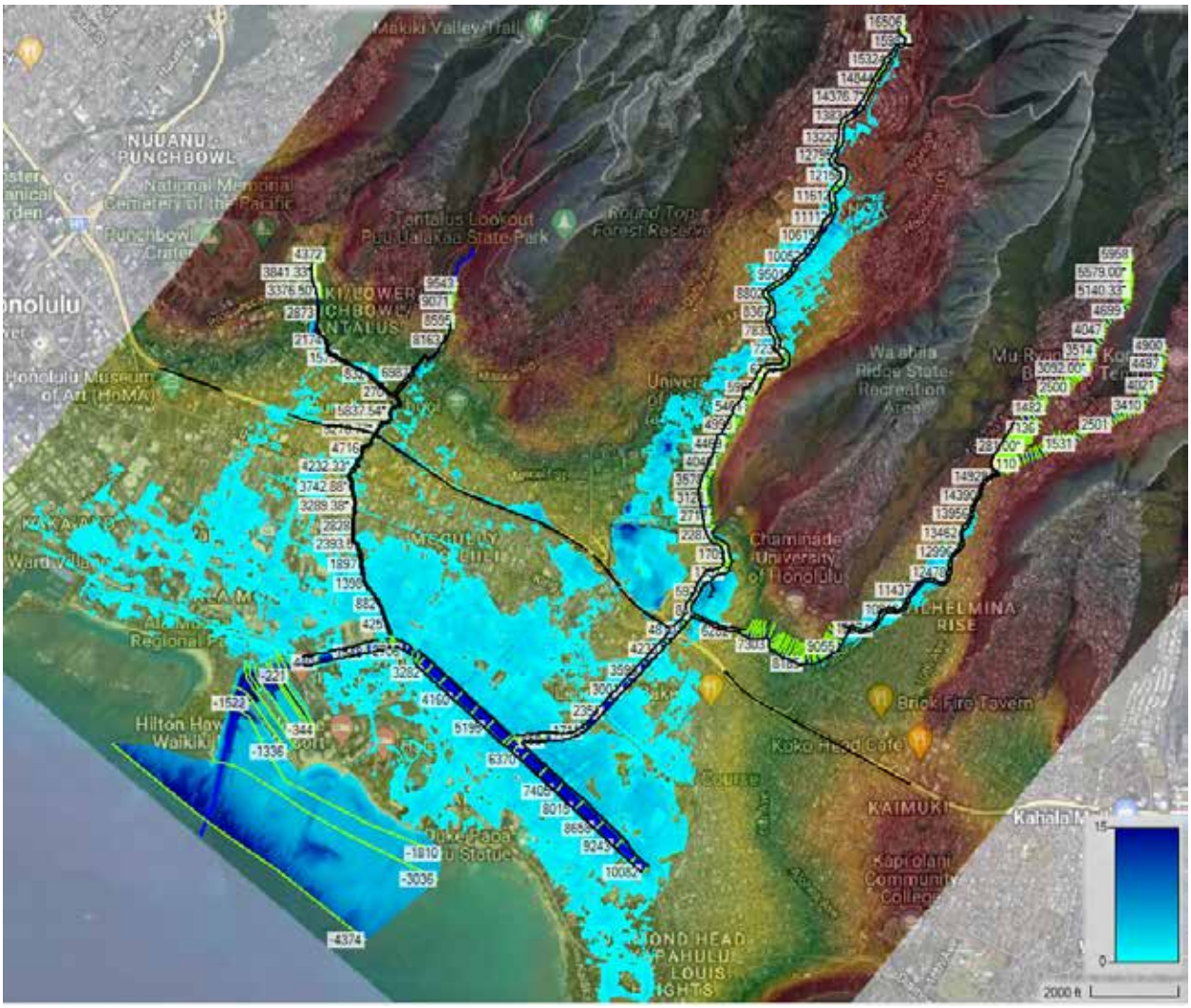


Figure 6-6: FWOP - 2% AEP (50-year) Flood Event

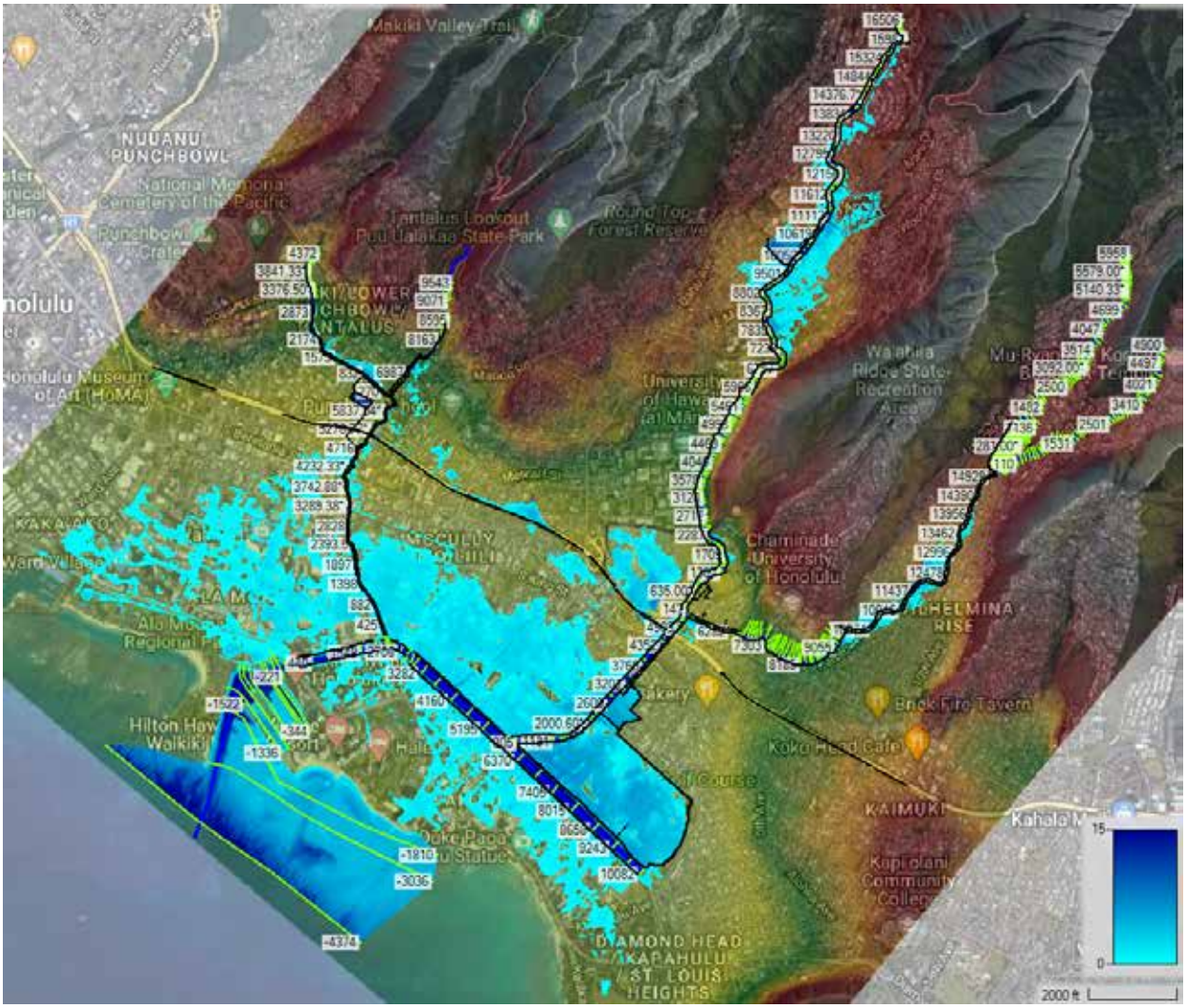


Figure 6-7: FWP Alt 1 - 2% AEP (50-year) Flood Event

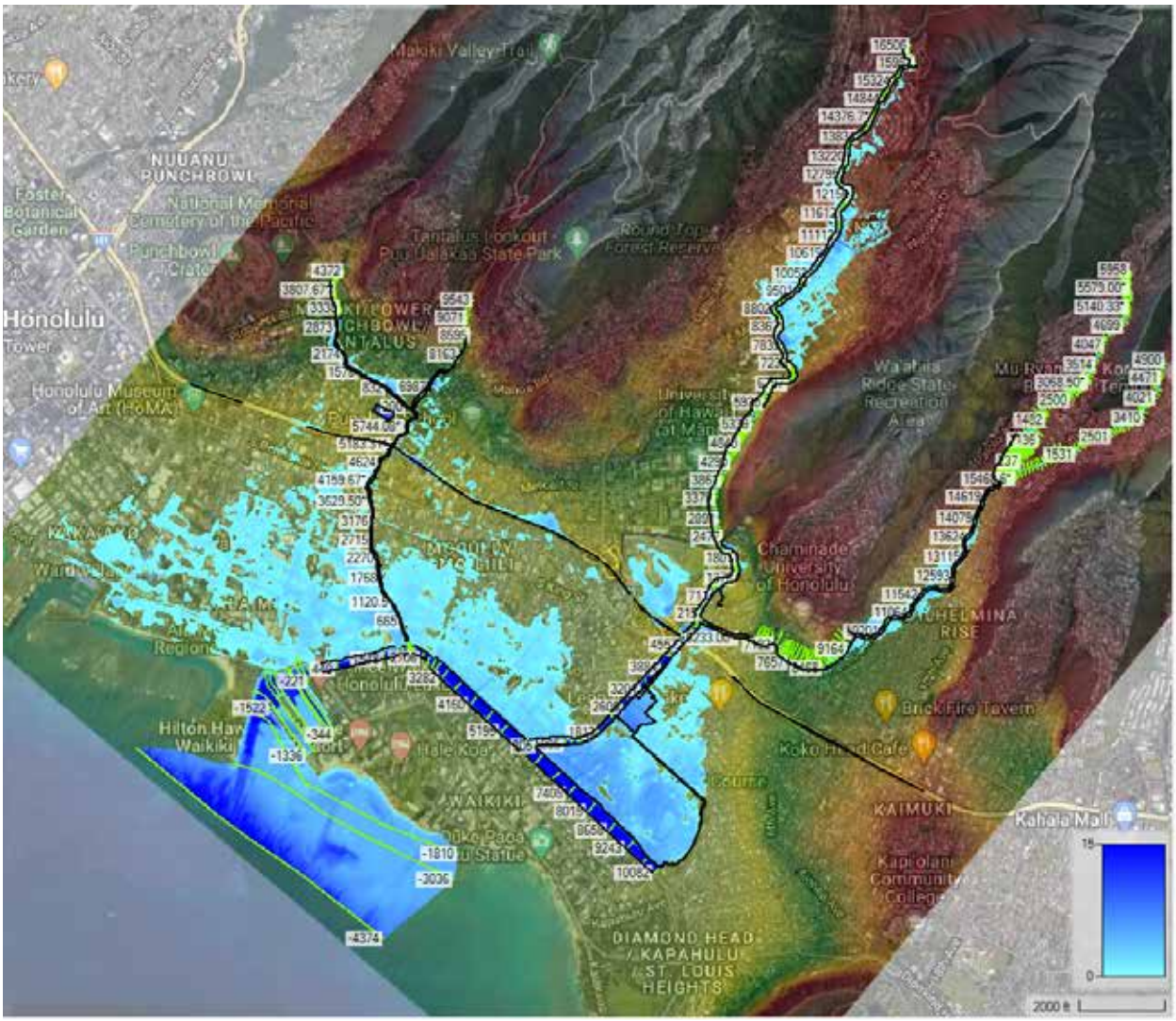


Figure 6-8: FWP Alt 2b - 2% AEP (50-year) Flood Event

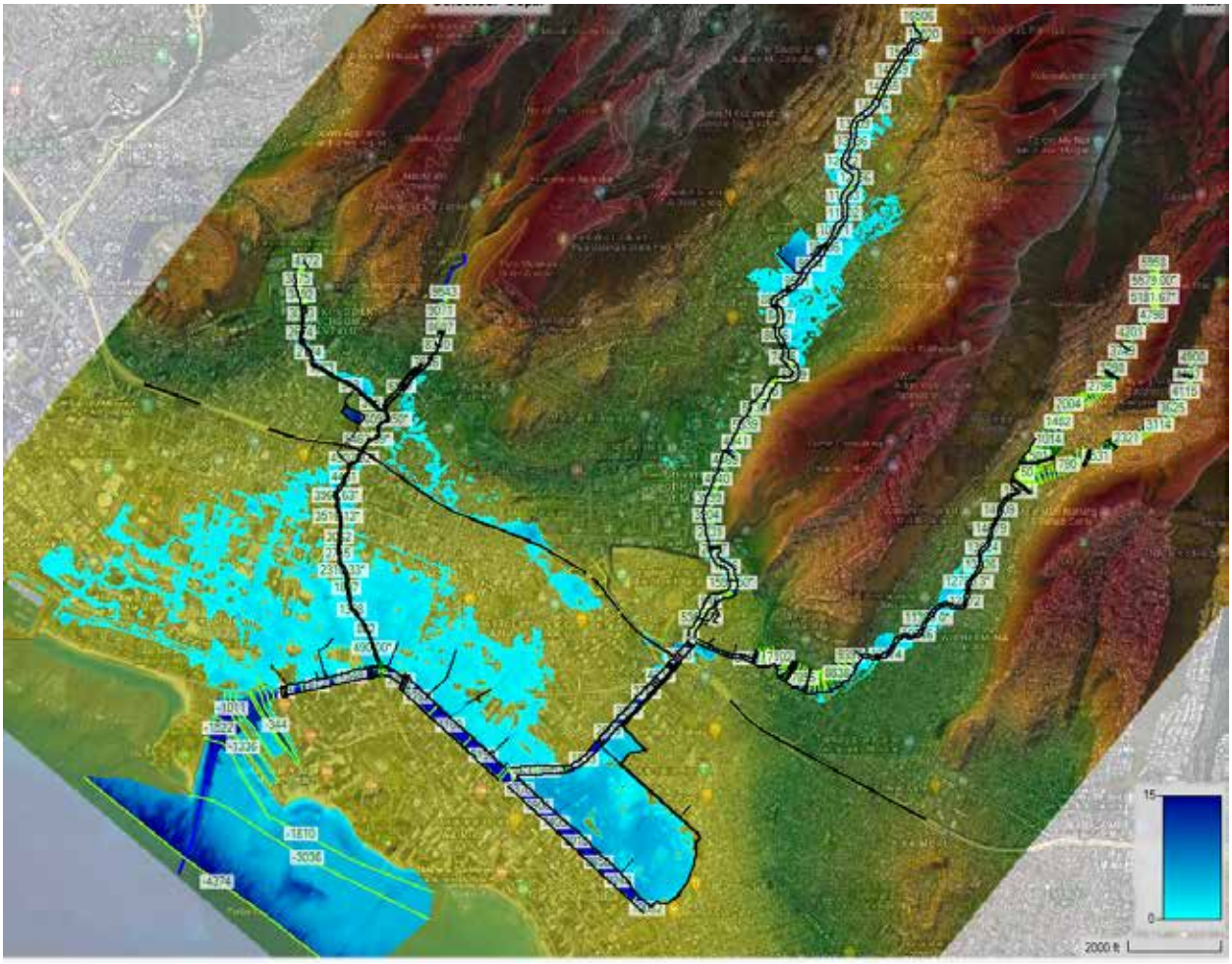


Figure 6-9: FWP Alt 5 - 2% AEP (50-year) Flood Event

6.2.3. 1% AEP Flood inundation Maps

The inundation depth grids for the 1% AEP (100-year) flood event is shown below for the Future Without Project conditions, for the Future Alternative 1 conditions, the Future Alternative 2b conditions, and the Future Alternative 5 conditions in the figures below, Figure 6-9 through Figure 6-12, respectively.

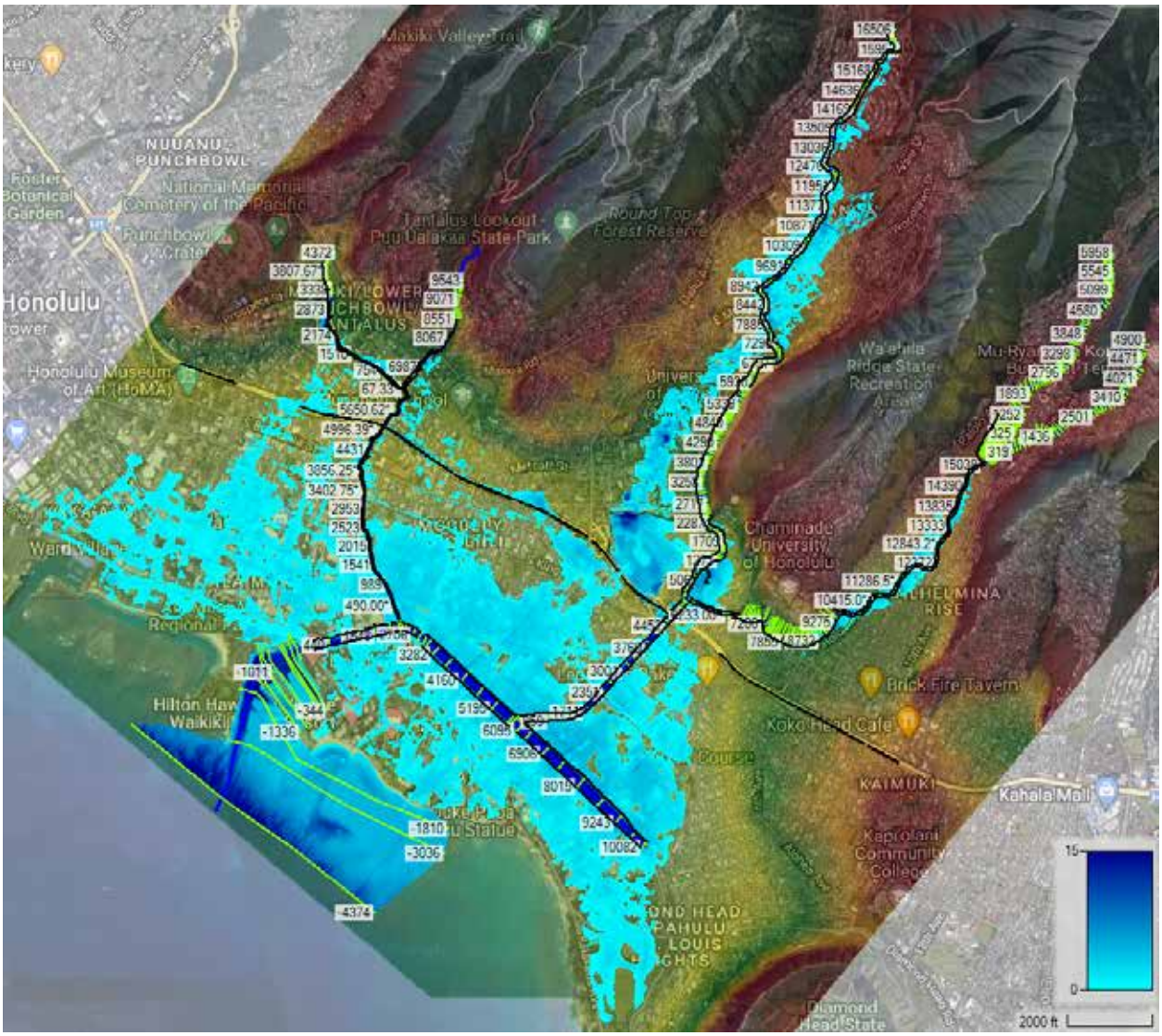


Figure 6-10: FWOP- 1% AEP (100-year) Flood Event

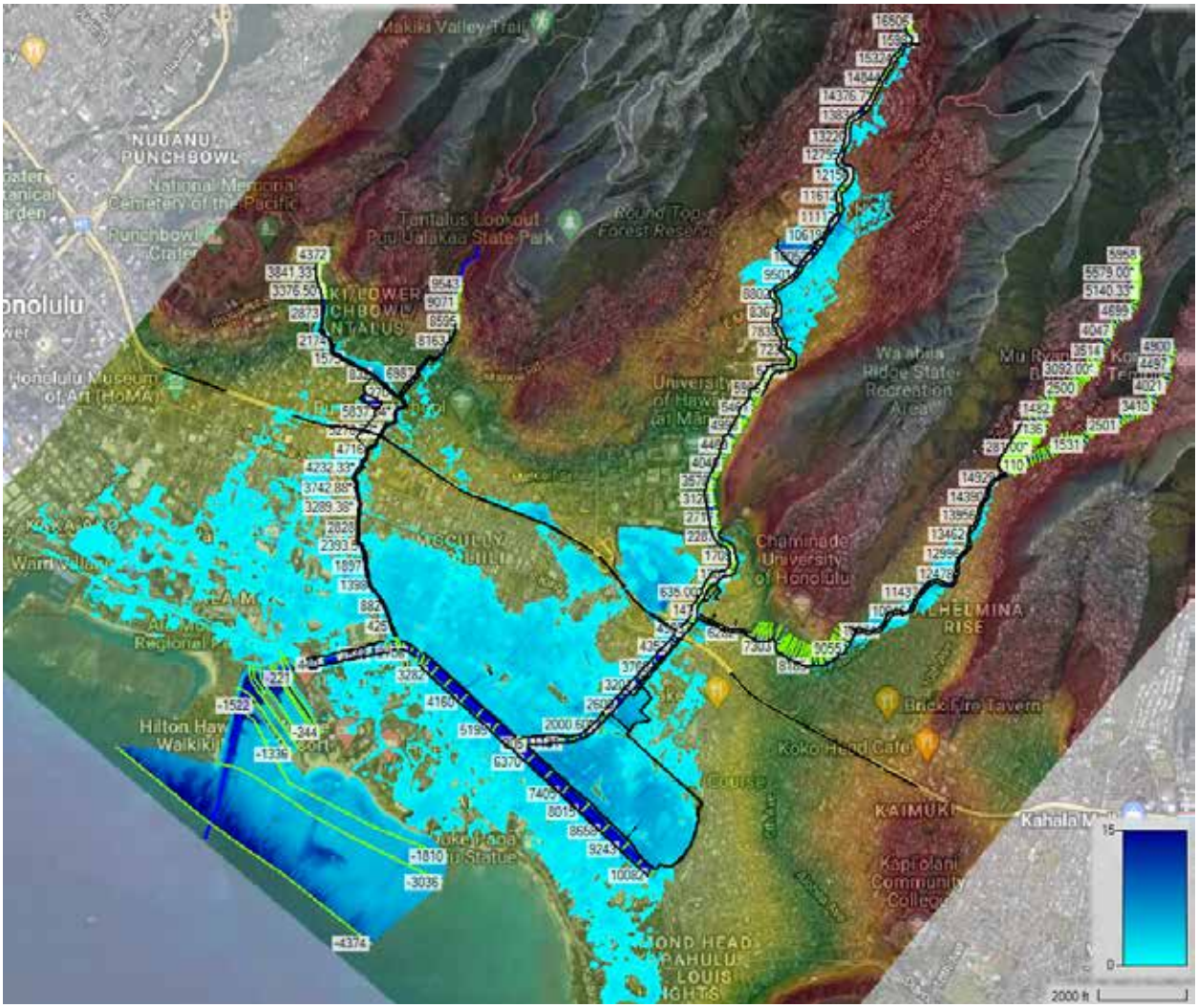


Figure 6-11: FWP Alt 1 - 1% AEP (100-year) Flood Event

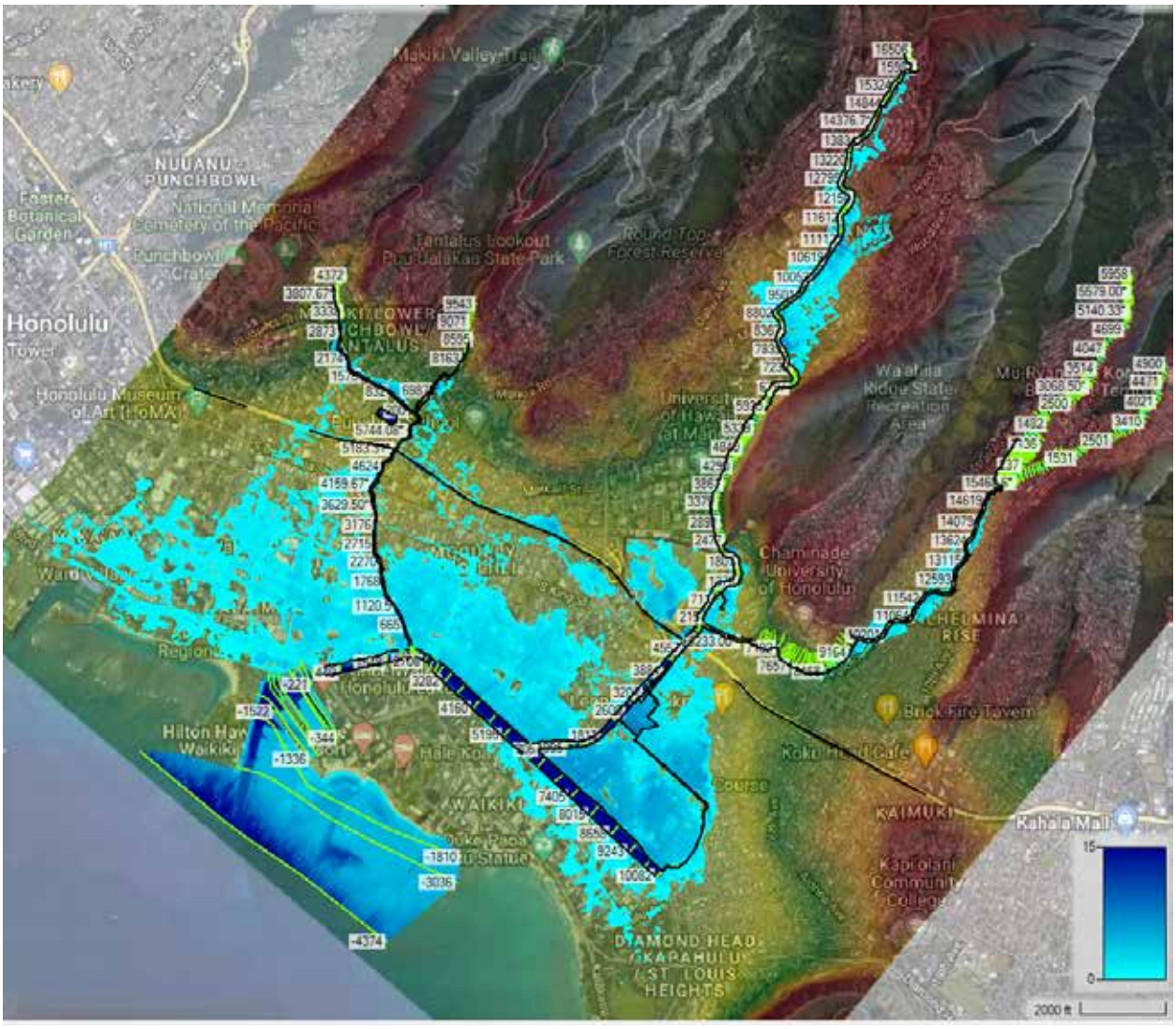


Figure 6-12: FWP Alt 2b - 1% AEP (100-year) Flood Event

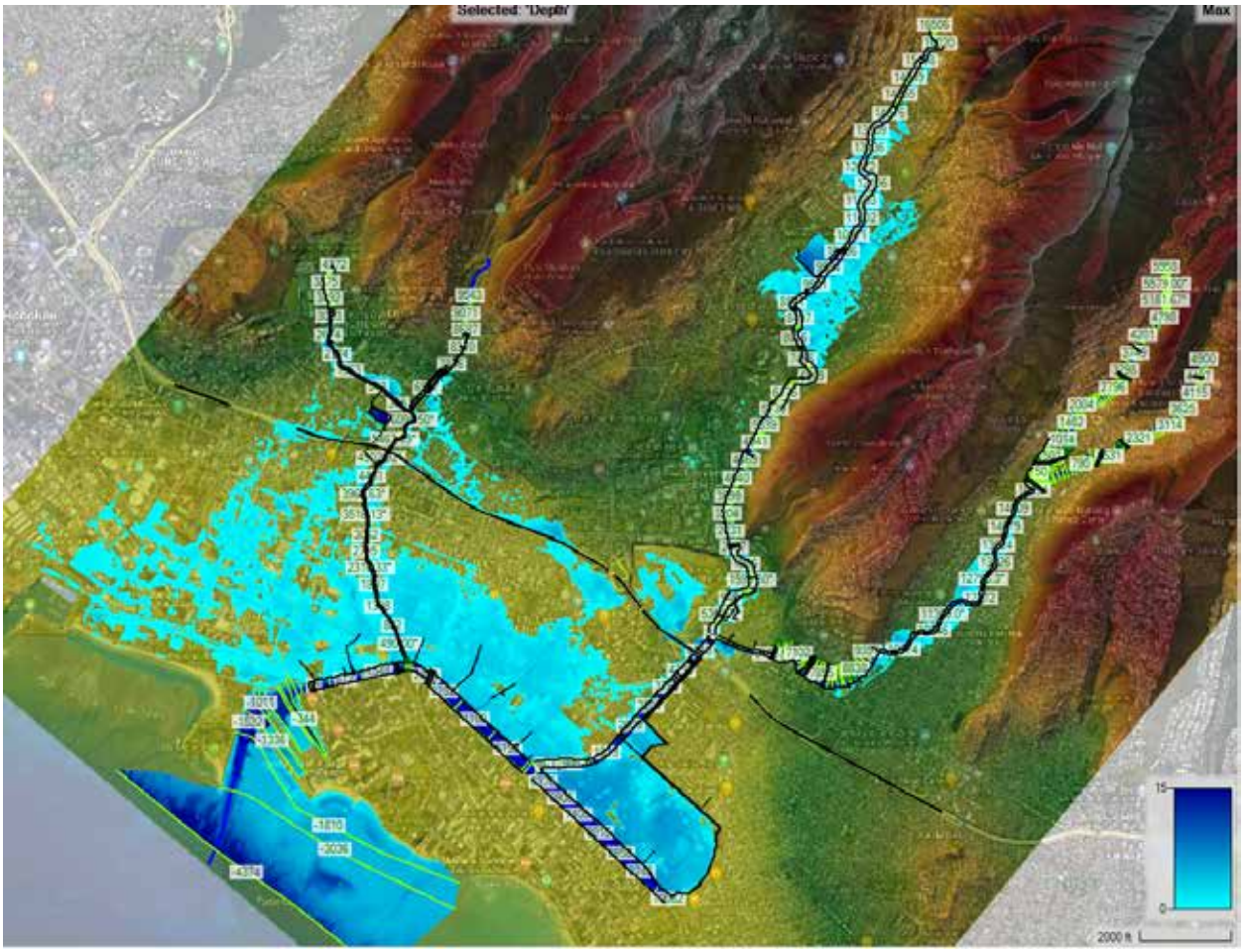


Figure 6-13: FWP Alt 5 - 1% AEP (100-year) Flood Event

7. Tentatively Selected Plan Refinement

7.1. Alternative 5.1: TSP after Incremental Analysis

The PDT conducted an incremental analysis of the project features contained in Alternative 5, which was the tentatively selected plan alternative. From the incremental analysis, modifications to the alternative were made.

Summary of changes:

Removed Makiki Park detention basin.
Removed Kanaha Floodwall.
Removed Manoa Park detention basin.
Adjusted alignment to increase storage at Ala Wai Community Park and reduce storage at Kaimuki High School.
Added ringwall around Ala Wai Golf Course Club House.
Focused design of floodwall sections (J-wall, Tieback I-Wall, etc.).
Included more detail on drainage structures and flap gate locations.
Included locations of canoe access points.

The project features included in this alternative are shown in Figure 7-1 and described below.

Figure 7-1: TSP Alternative 5.1 Measures Overview

7.1.1. Woodlawn Drive Floodwall & Koali Road Floodwall

Located within Manoa Valley, this floodwall extends a maximum of 6 ft above ground level (i.e., Woodlawn Drive Floodwall) and would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,270 ft in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,026 ft in length. Two box culverts would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall, and two flap gates would be retrofitted on smaller stormwater culverts along this feature. Two road closure structures would be constructed. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system.

7.1.2. Ala Wai Golf Course Detention Basin

At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately 6 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 10,151 ft in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. Near the vicinity of the Kapahulu Avenue and Ala Wai Boulevard intersection, the levee would join with the Ala Wai Canal Floodwall on the left descending bank of Ala Wai Canal. The existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be riprapped and used as an inlet for stormwater to overflow into the Ala Wai Golf Course Detention Basin. Four concrete drainage structures and four flap gates would be constructed along the levee alignment of the Ala Wai Golf Course to allow collected stormwater within the basin and from local runoff to slowly drain into Ala Wai Canal. The detention pond also includes a small floodwall around the Club House, which is 6 feet in height and 2,409 ft in length. The floodwall, or ringwall, has two flapgates and one road closure structure. Finally, there is one canoe access point in this location. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

7.1.3. Ala Wai Canal Floodwall

At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 22,796 ft long. Existing stormwater sewers inletting into the Ala Wai Canal would be modified so that

fifteen would be drainage structures and 59 would be retrofitted with flap gates. Twelve road closure structures would be constructed. There are three canoe access points for this feature. The typical cross section of this feature varies along the alignment. The floodwall along the canal, where space is not constricted, will include a walking path. Where space is constricted, Tieback I-Walls or L-walls will be constructed, with no walking path. The purpose of the Ala Wai Canal Floodwall system would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki.

7.2. Alternative 5.2: TSP after Induced Damages Mitigation

The PDT investigated modifications to project features contained in Alternative 5.1, along with new possible project features, in order to reduce the induced damages. From the reduction of induced damages analysis, modifications to the alternative were made based on analyses of the 2% and 0.2% AEP flood events.

Summary of changes:

Added Makiki Floodwall up to Fern Street.
Adjusted alignment of floodwall at Kaimuki High School to increase storage and allow floodwaters to enter golf course over Date Street.
Included design of inflow channel onto golf course.

The project features included in this alternative are shown in Figure 7-2 and described below.

Figure 7-2: TSP Alternative 5.2 Measures Overview

7.2.1. Woodlawn Drive Floodwall & Koali Road Floodwall

There is no change to these measures from Alternative 5.1. This measure is within Manoa Valley and consists of a floodwall extending 6 ft above ground level (i.e., Woodlawn Drive Floodwall). The floodwall would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,270 ft in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,510 ft in length. Two concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two flap gates would be retrofitted on smaller stormwater culverts along this feature. Two road closure structures would be constructed. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system.

7.2.2. Ala Wai Golf Course Detention Basin

At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately 6 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 10,151 ft in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. On the left descending bank of the Manoa-Palolo Canal, there is an overtopping spillway section, approximately 100 feet in length, that is reinforced with erosion protection. The levee along the Manoa-Palolo Canal is also lined with erosion protection on the canal-side. A portion of the existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be used as an inlet location for overflow into the Ala Wai Golf Course Detention Basin. A small inlet channel would be excavated and lined with erosion control material to improve the flow onto the golf course. Four concrete drainage structures and three flap gates would be constructed along the levee alignment of the Ala Wai Golf Course to allow collected stormwater within the basin and from local runoff to slowly drain into Ala Wai Canal.

The detention basin also includes a small floodwall (ringwall) around the Club House, which is 6 feet in height and 1,206 ft in length. The floodwall has two flap gates and one road closure structure. A small section of floodwall near the Kapahulu Avenue and Ala Wai Boulevard intersection at the Diamond Head end of the canal will tie-in to the golf course levee and Ala Wai Canal floodwall system. This section is 6 feet in height and includes one road closure structure and one drainage structure. Finally, there is one canoe access point in this location. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed. See Figure 7-2 below for the revised alignments.

Figure 7-3: TSP Alternative 5.2 Alignments of the Ala Wai Golf Course Detention, Ala Wai Floodwall, and Makiki Floodwall

7.2.3. Ala Wai Canal Floodwall

At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 23,708 ft long. Existing stormwater sewers inletting into the Ala Wai Canal would be modified so that fourteen would be drainage structures and 59 would be retrofitted with flap gates. Eleven road closure structures would be constructed. There are three canoe access points for this feature. The typical cross section of this feature varies along the alignment but all are assumed to be 6 feet above ground. The floodwall along the Ala Wai Canal and the lower right descending bank of the Manoa-Palolo Canal will include an elevated walking path. On the left descending bank of the Manoa-Palolo Canal and near Kaimuki High School, there will be a floodwall on macropiles with no walking path. Where space is constricted, along the upper right descending bank of the Manoa-Palolo Canal, Tieback I-Walls (tied-back I-wall) will be constructed, with no walking path. The purpose of the Ala Wai Canal Floodwall system would be to reduce the risk of flooding

within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki. See Figure 7-2 above for the revised alignments.

7.2.4. Makiki Stream Floodwall

To mitigate risk due to the increased storage of water in the Ala Wai Canal and its backwater up Makiki Stream, a floodwall will be included from the confluence with the Canal to Fern Street. This is a concrete-lined U-Wall that will extend 6 feet above ground on both sides of the stream. There is a potential to add a low-flow channel cut for environmental considerations. Total length of the U-wall is approximately 883 linear feet. The floodwall will include two flap gates, one concrete drainage structure, and four road closure structures, of which two are small pedestrian bridge closures. The Ala Wai Canal Floodwalls and Makiki Stream Floodwalls function as a system. See Figure 7-2 above for the alignment and and Figure 7-3 below for a typical cross section of the U-Shape floodwall for the Makiki Stream.

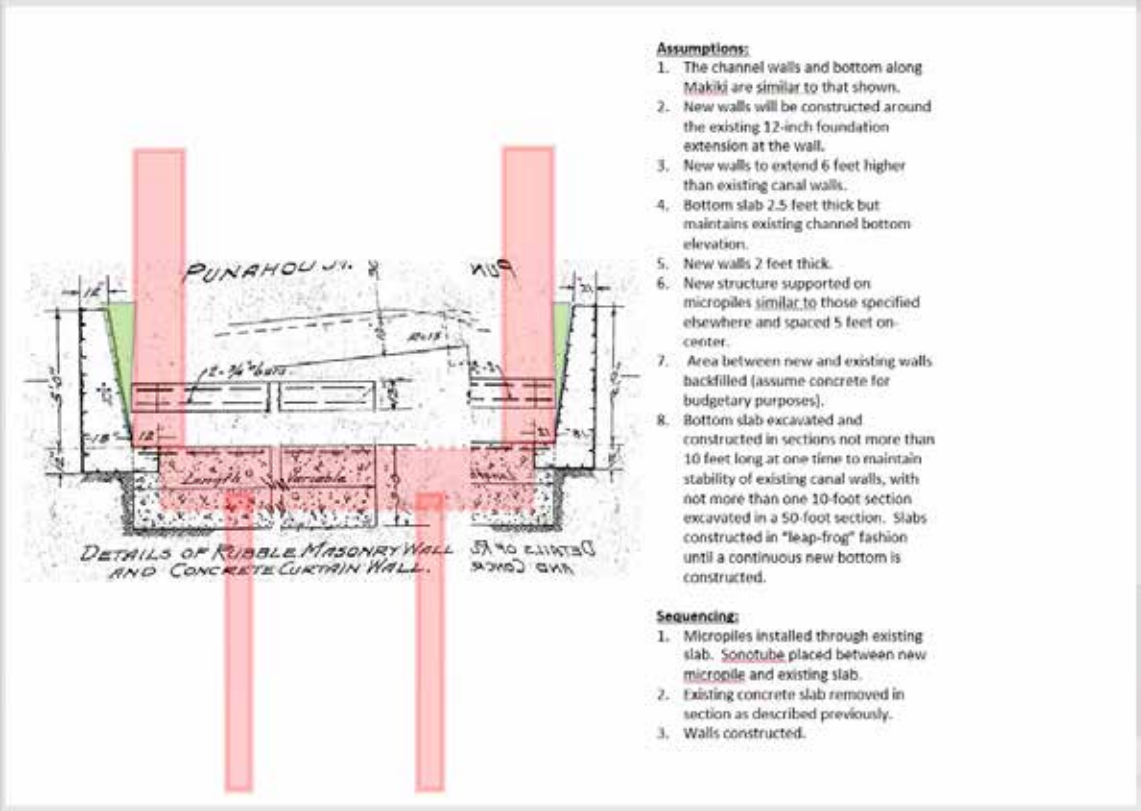


Figure 7-4: U-Shape floodwall ("U-wall") along Makiki Stream.

7.3. Alternative 5.3 - TSP - Recommended Plan

After the economic analysis was completed on Alternative 5.2, it was determined that the induced damages for the higher less frequent flood events analyzed had significant reduced damages, but the lower more frequent flood events actually saw an increased induced damages to the 50% and 20% AEP flood events due to the Makiki Floodwall and the revised alignment along the Ala Wai Canal. Further investigation was conducted looking into the full range of flood events, from the 50% AEP up to the 0.2% AEP floods. Multiple changes were made for Alternative 5.3 to further reduce the induced damages. A summary of changes and a list of final project features are listed below and can be seen in Figure 7-5. See Figure 7-6 below for a map of the Alternative 5.3 project features.

Summary of changes:

Removed Makiki Floodwall up to Fern Street
Adjusted alignment of floodwall at Kaimuki High School to increase storage and allow floodwaters to enter golf course over Date Street
Removed the ring wall at the Ala Wai golf course and increased the levee height to 9 ft for increased storage.

Summary of measures in the recommended plan:

Woodlawn Drive Floodwall
Koali Road Floodwall
Ala Wai Golf Course Detention
Ala Wai Floodwall

Figure 7-5: Conceptual Diagram of Changes from Alternative 5.2 to Alternative 5.3

Figure 7-6: Alternative 5.3, the Recommended Plan, Measures Overview

7.3.1. Woodlawn Drive Floodwall & Koali Road Floodwall

There is no change to these measures from Alternative 5.1 or Alternative 5.2. The Woodland Drive Floodwall is located within Manoa Valley, and extends 6 ft above ground level (i.e., Woodlawn Drive Floodwall) and would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,270 ft in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. Figure 7-7 shows the Woodlawn Drive floodwall profile, and Figure 7-8 shows the alignment of the floodwall.

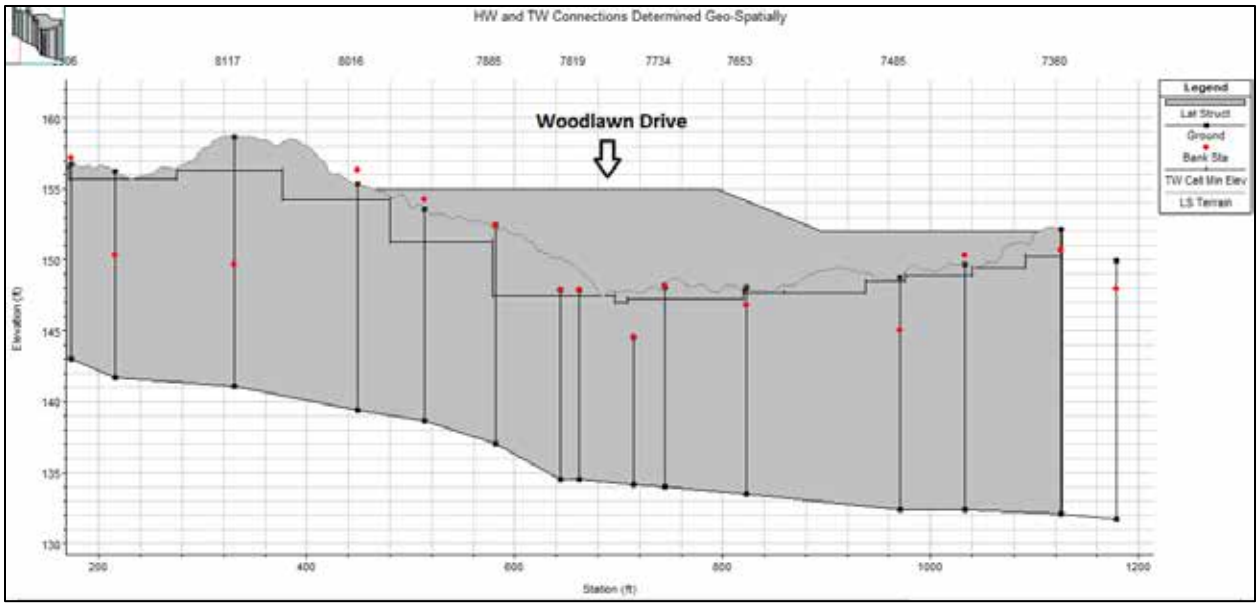


Figure 7-7: Alternative 5.3 Woodlawn Drive Floodwall Profile

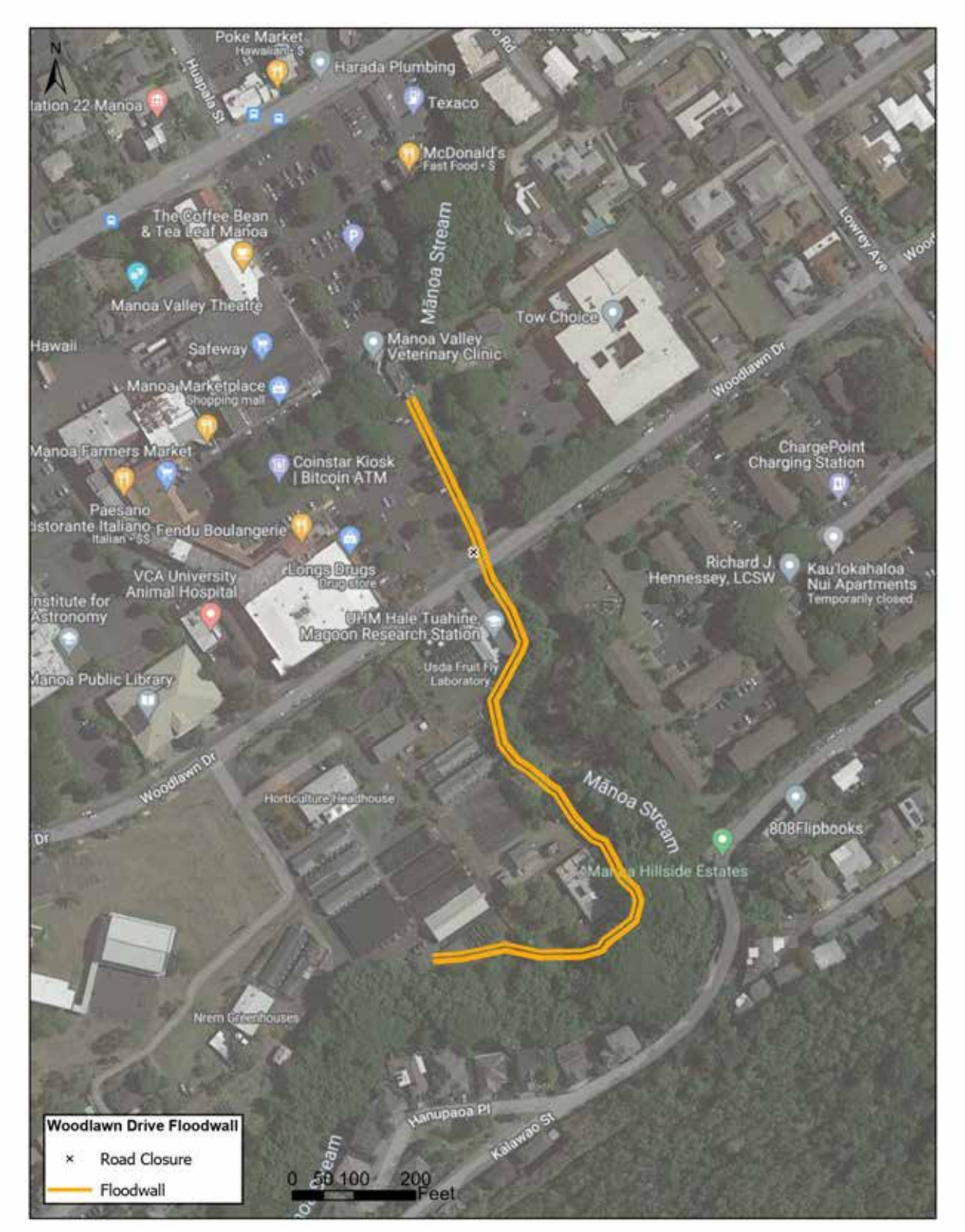


Figure 7-8: Alternative 5.3 Woodlawn Drive Floodwall

At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,510 ft in length. Two concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two flap gates would be retrofitted on smaller stormwater culverts along this feature. Two road closure structures would be constructed. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system. Figure 7-9 and Figure 7-10 shows Koali Road floodwall along the Manoa Stream, and Figure 7-11 shows the Koali Road profile along the Palolo Stream. Figure 7-12 shows the alignment of the floodwall.

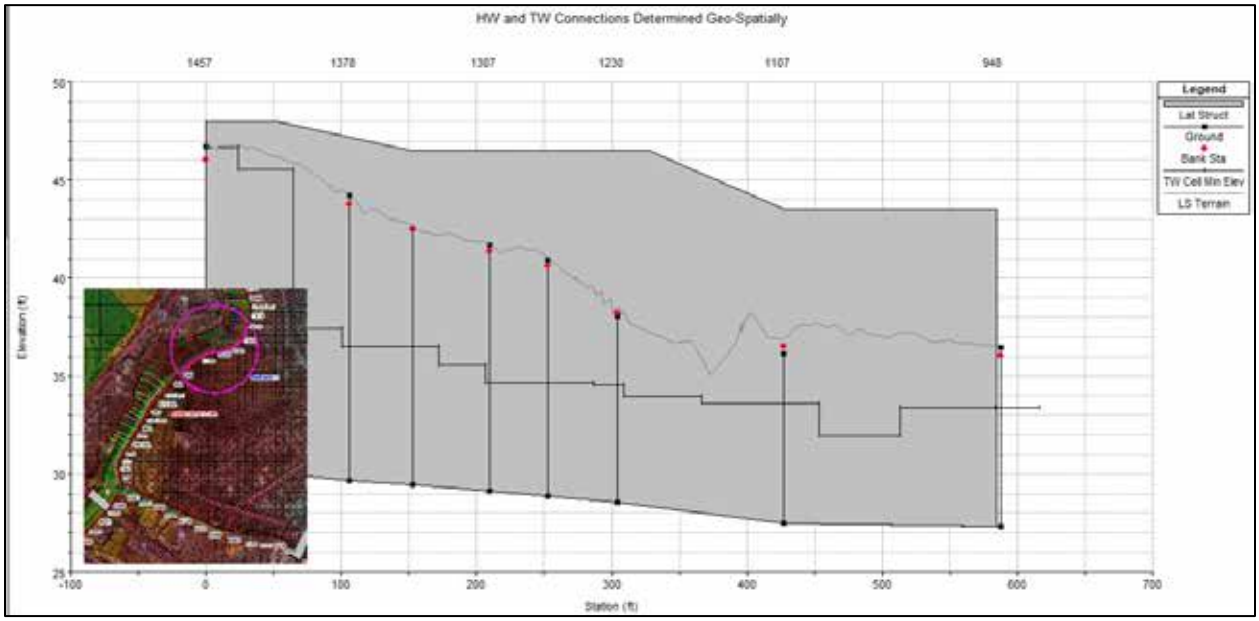


Figure 7-9: Alternative 5.3 Koali Road Floodwall Upper Profile on Manoa Stream

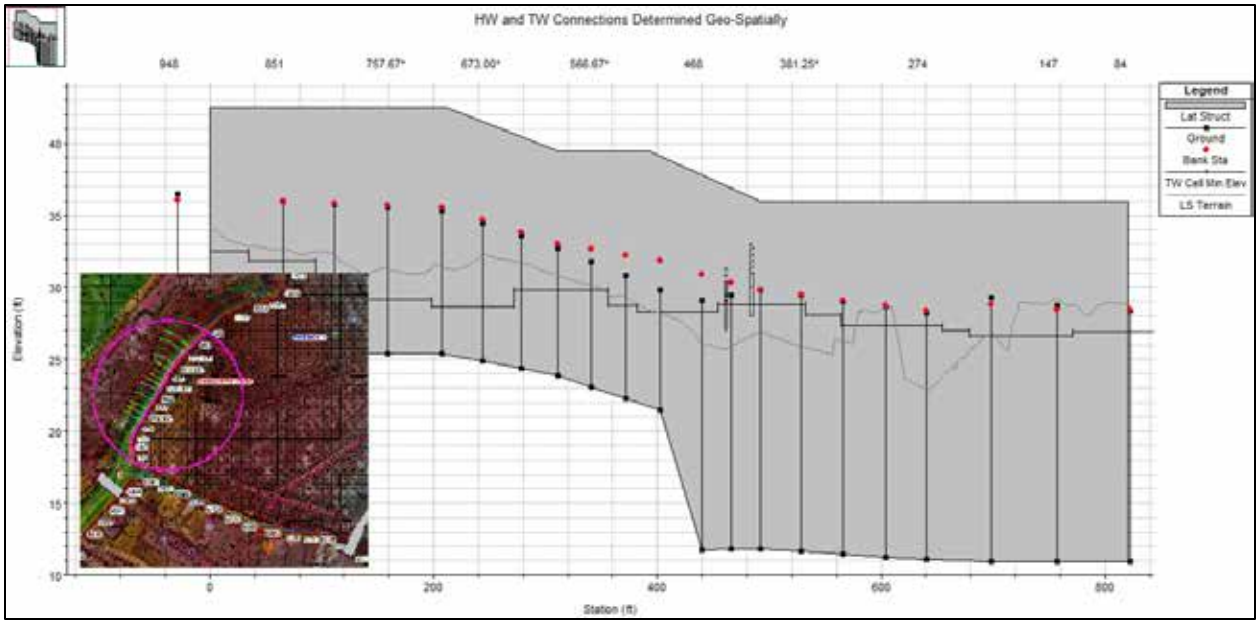


Figure 7-10: Alternative 5.3 Koali Road Floodwall Lower Profile on Manoa Stream

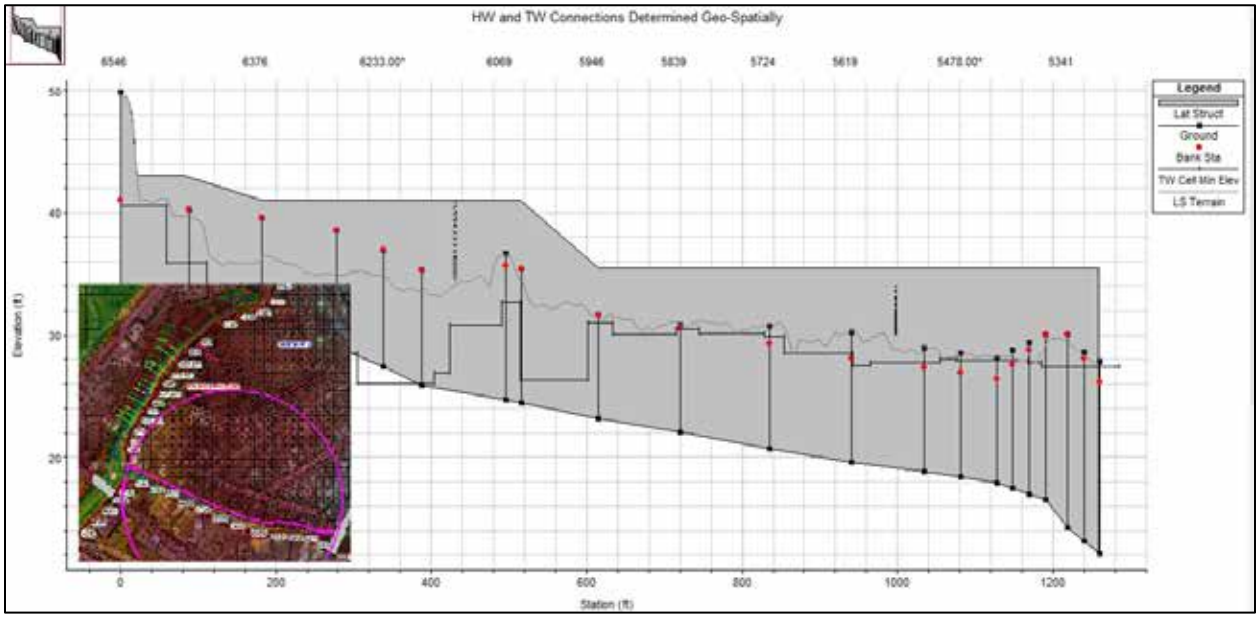


Figure 7-11: Alternative 5.3 Koali Road Floodwall Profile on Palolo Stream

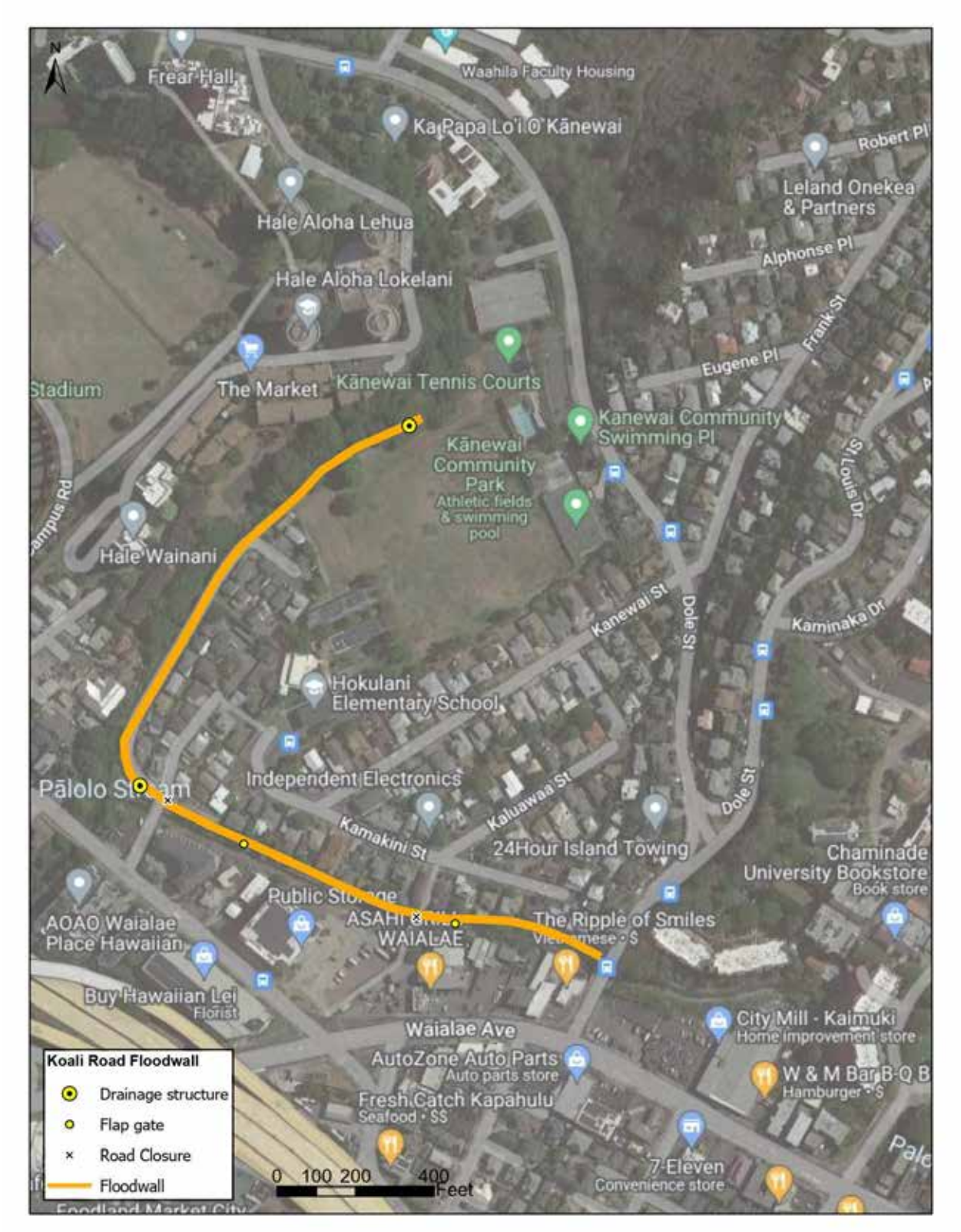


Figure 7-12: Alternative 5.3 Koali Road Floodwall

7.3.2. Ala Wai Golf Course Detention Basin

The Ala Wai Golf Course detention basin is located at the Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal. See Figure 7-13 below for the Golf Course Detention features. An earthen levee approximately 6-9 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin) to an elevation of 12 ft msl on the westward and southern sides of the Golf Course, and higher on the northern and eastern sides The total length of the earthen levee would be approximately 8,315 ft in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals and the northern and eastern boundaries of the Golf Course. See Figure 7-14 for the profile along the left bank of the Manoa-Palolo Canal and the right bank of the Ala Wai Canal, Figure 7-15 for the profile along the northern and eastern boundaries of the Golf Course, and Figure 7-16 for the profile of the floodwall along the left bank of the Manoa-Palolo Canal, including the area at Kaimuki High School, which is part of this measure.

The detention basin does not have any excavation due to the high-water table. The detention basin is comprised of levees and floodwalls to create storage. Currently there are no pumps, as it utilizes gravity flow to allow water onto the golf course during a storm as well as drain out to the canal after a storm.

On the left descending bank of the Manoa-Palolo Canal, there is an overtopping spillway section, approximately 100 feet in length, that is reinforced with erosion protection. The levee along the Manoa-Palolo Canal is also lined with erosion protection on the canal-side. A portion of the existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be used as an inlet location for overflow into the Ala Wai Golf Course Detention Basin. A small inlet channel would be excavated and lined with erosion control material to improve the flow onto the golf course. Additionally, Kaimuki High School storage area impacts the Golf Course Detention by allowing water to flow into the Golf Course Detention from that area over Date Street. Both the spillway section and the inlet channel are at elevation 7.7 ft MSL. For the spillway section, this is still approximately a 3 ft high levee. Water starts entering the golf course at the 5-yr event. Not every event utilizes full capacity of the golf course detention area. The 500-yr event is not contained within the detention area, it does slightly overtop. Three concrete drainage structures and three flap gates would be constructed along the levee alignment of the Ala Wai Golf Course to allow collected stormwater within the basin and from local runoff to slowly drain into Ala Wai Canal.

The detention basin also includes a floodwall, approximately 9 ft in height and 1,621 ft in length, along the golf course parking lot near the Ala Wai Canal. The floodwall has one concrete drainage structure and two flap gates. The drainage structure at this location serves to outlet flow from the Diamond Head neighborhood. The original outlet will be enclosed by concrete (instead of daylighted) and will need reconstruction of the vehicle and pedestrian access at this location. A small section of floodwall (approximately 240 ft in length) near the Kapahulu Avenue and Ala Wai Boulevard intersection at the Diamond Head end of the canal will tie-in to the golf course levee and Ala Wai Canal floodwall system. This section is 6 feet in height and includes

one road closure structure and one drainage structure. Finally, there is one canoe access point in this location. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

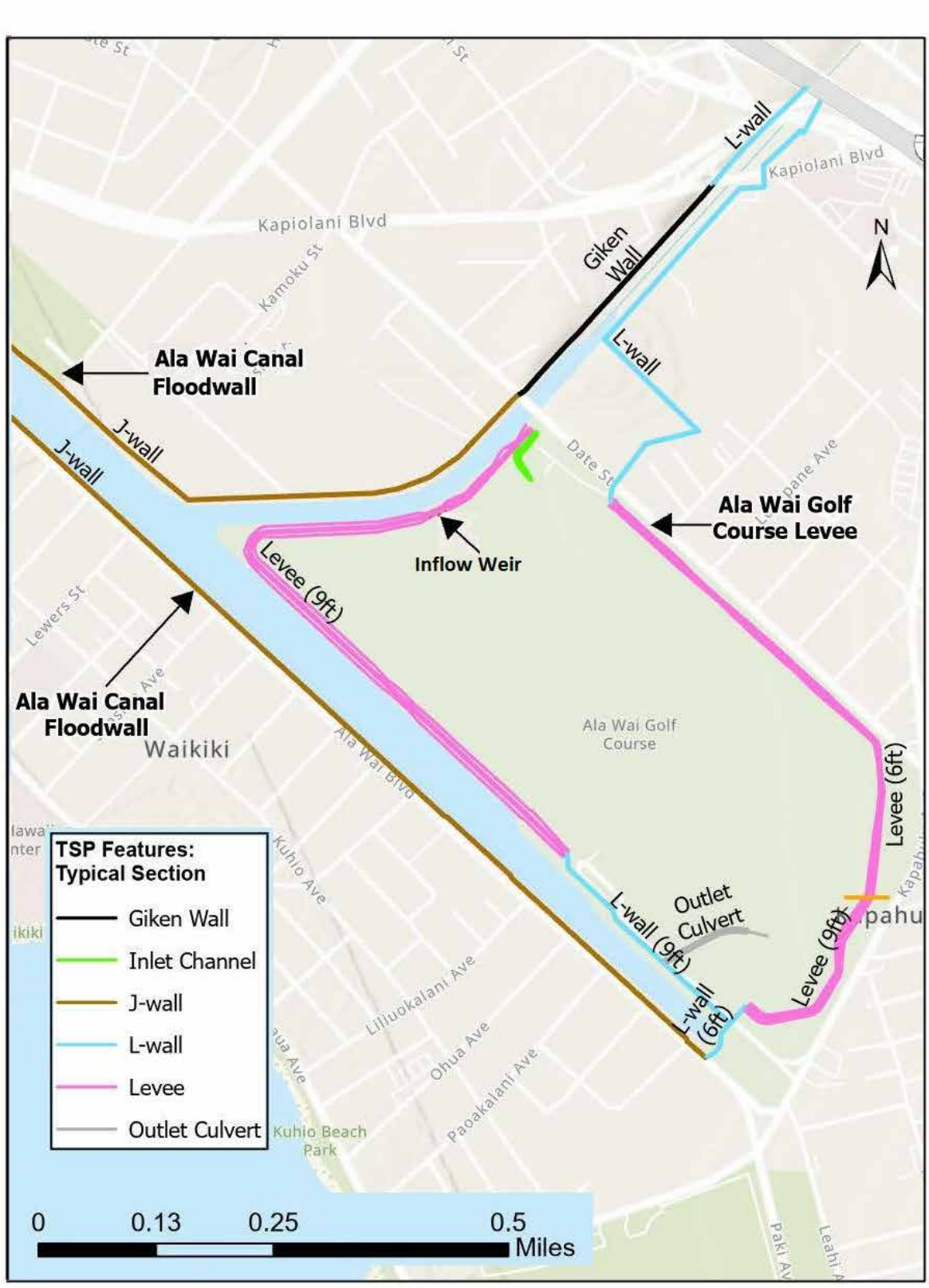


Figure 7-13: Alternative 5.3 Ala Wai Golf Course Detention

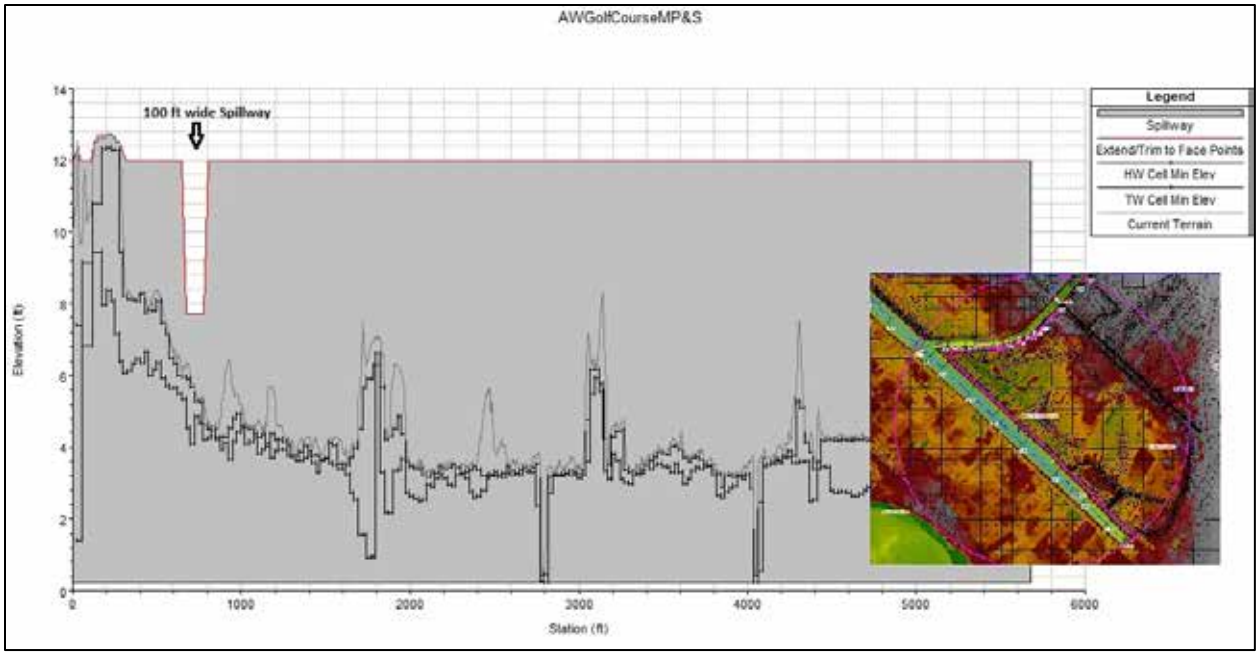


Figure 7-14: Ala Wai Golf Course Detention Profile Along the Left Bank of Manoa-Palolo Canal and the Right Bank of the Ala Wai Canal

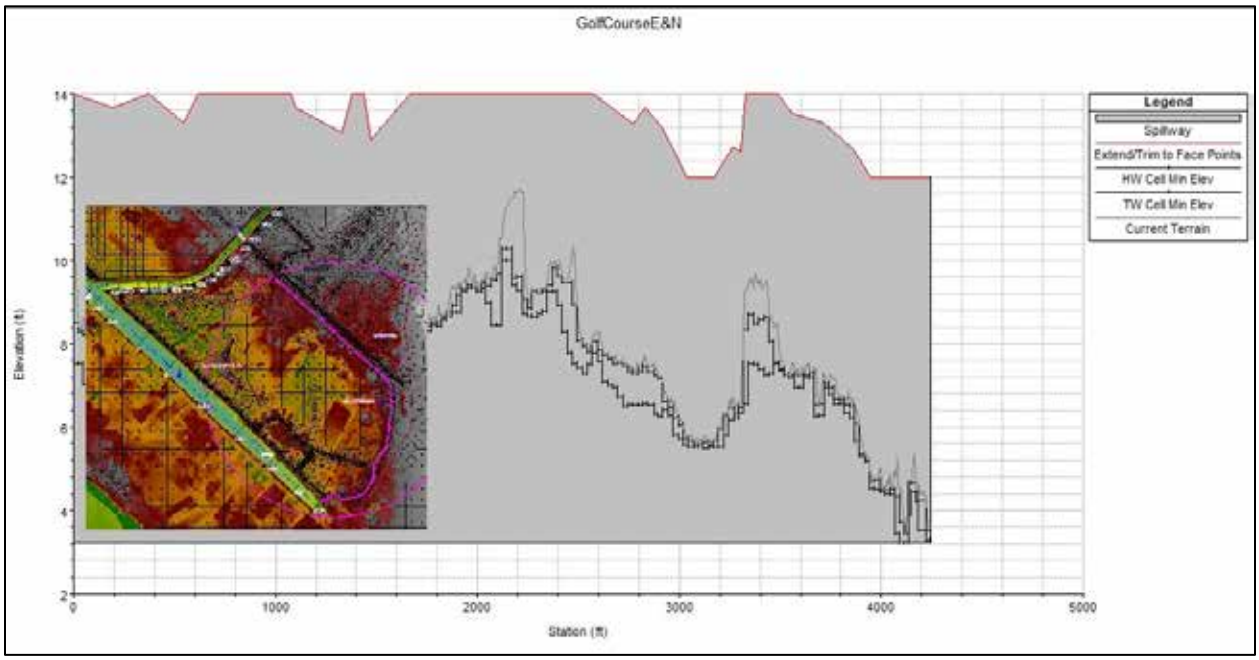


Figure 7-15: Ala Wai Course Detention Profile Along the Northern and Eastern Boundaries

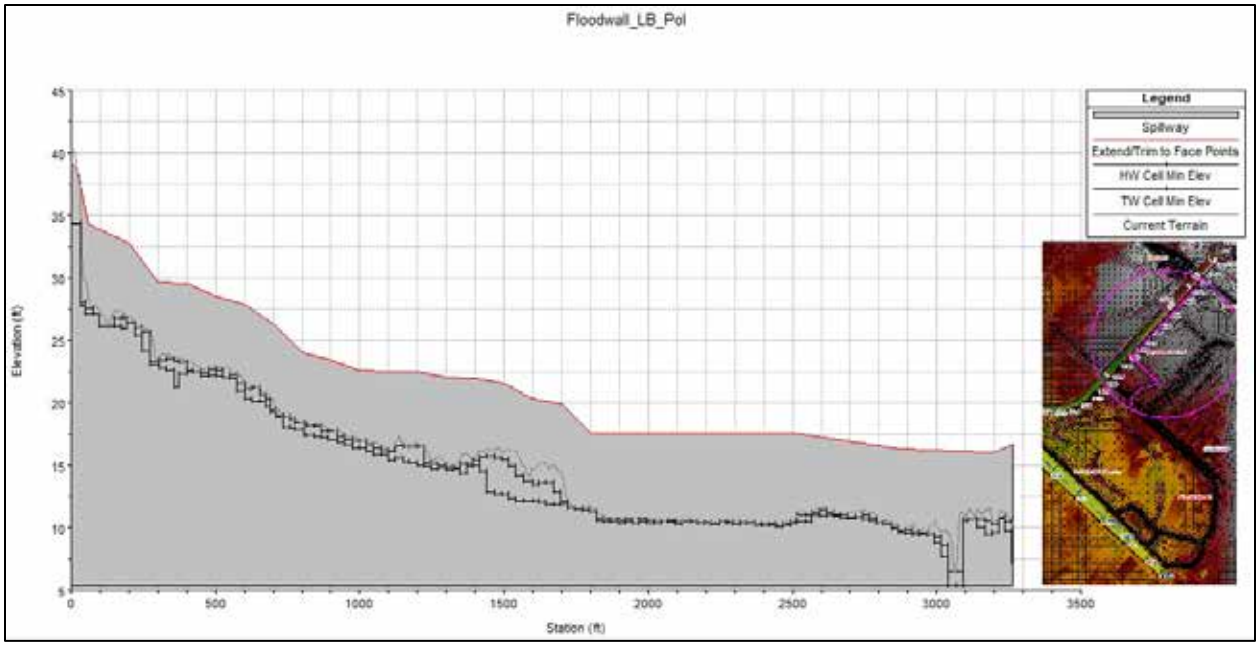


Figure 7-16: Ala Wai Canal Floodwall Along the Left Bank of the Manoa-Palolo Canal and the Kaimuki High School Floodwall (which is connected to the Ala Wai Golf Course Detention

7.3.3. Ala Wai Canal Floodwall

At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The purpose of the Ala Wai Canal Floodwall system would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki. See Figure 7-8 for the Ala Wai Canal Floodway system alignment.

The floodwall would be approximately 22,852 ft long. Existing stormwater sewers inletting into the Ala Wai Canal would be modified so that fourteen would be drainage structures and 59 would be retrofitted with no-negative flap gates and provides drainage during favorable conditions. Simulations indicate no pumps are needed. These areas are not flooded by direct rainfall any more than the without-project plan. This does not mean that flooding is eliminated, though.

Eleven road closure structures would be constructed. There are three canoe access points for this feature. The typical cross section of this feature varies along the alignment, but all are assumed to be 6 feet above ground. The floodwall along the Ala Wai Canal and the lower right descending bank of the Manoa-Palolo Canal will include an elevated walking path. See Figure 7-18 for the profile of the right bank floodwall from the H-1 to Date Street and Figure 7-19 for the profile of the right bank floodwall from Date Street to the Ala Wai Canal Confluence. On the left descending bank of the Manoa-Palolo Canal and near Kaimuki High School, there will be a

floodwall on macropiles with no walking path, see Figure 7-16 above for the profile of the floodwall. Where space is constricted, along the upper right descending bank of the Manoa-Palolo Canal, Tieback I-Walls will be constructed, with no walking path.

The floodwall profiles along the right bank of the Ala Wai Canal can be seen in Figure 7-20 through Figure 7-23 below. The floodwall profiles along the left bank of the Ala Wai Canal can be seen in Figure 7-24 through Figure 7-28 below. And finally, a summary table of the Ala Wai Canal floodwall features is shown below in Table 7-1.

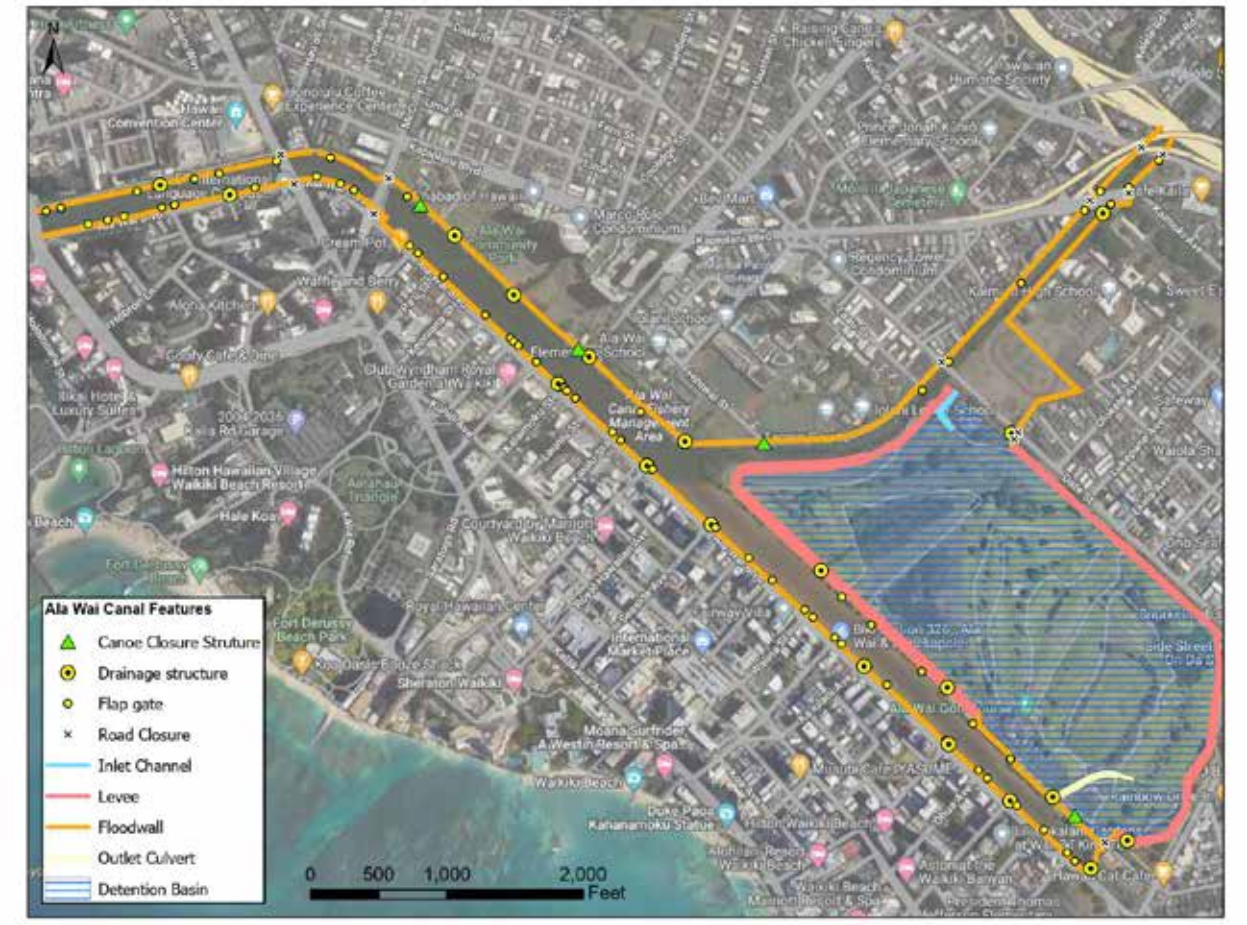


Figure 7-17: Alternative 5.3 Ala Wai Canal Floodwalls

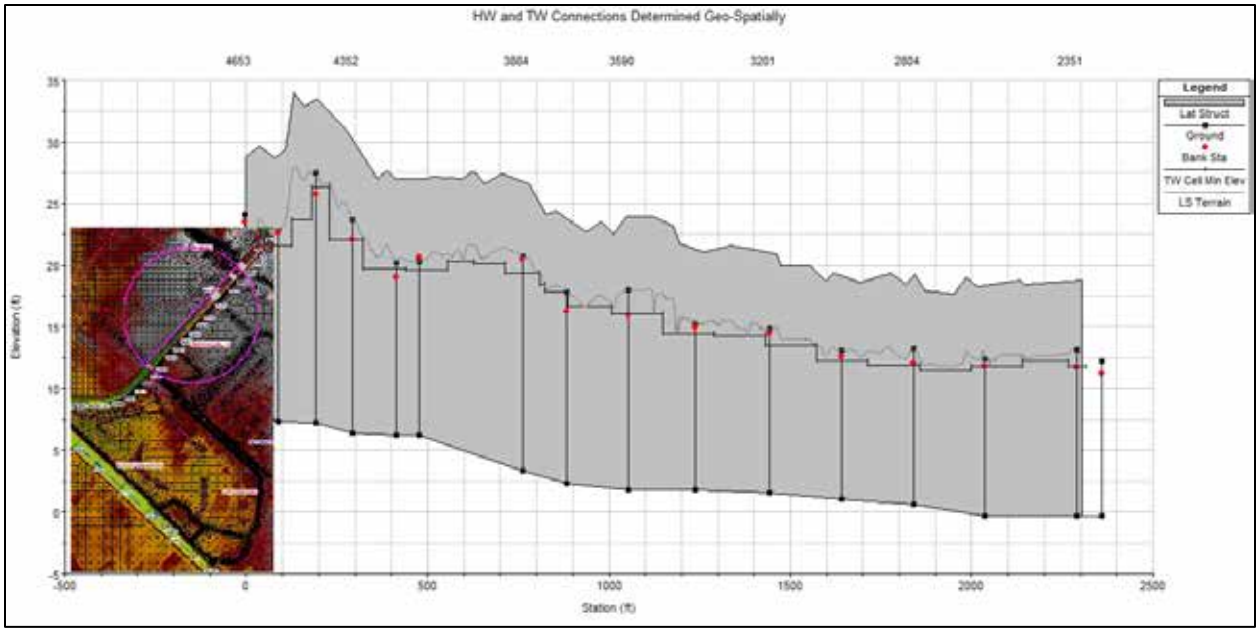


Figure 7-18: Manoa-Palolo Canal Right Bank Floodwall from the H-1 Freeway to Date Street

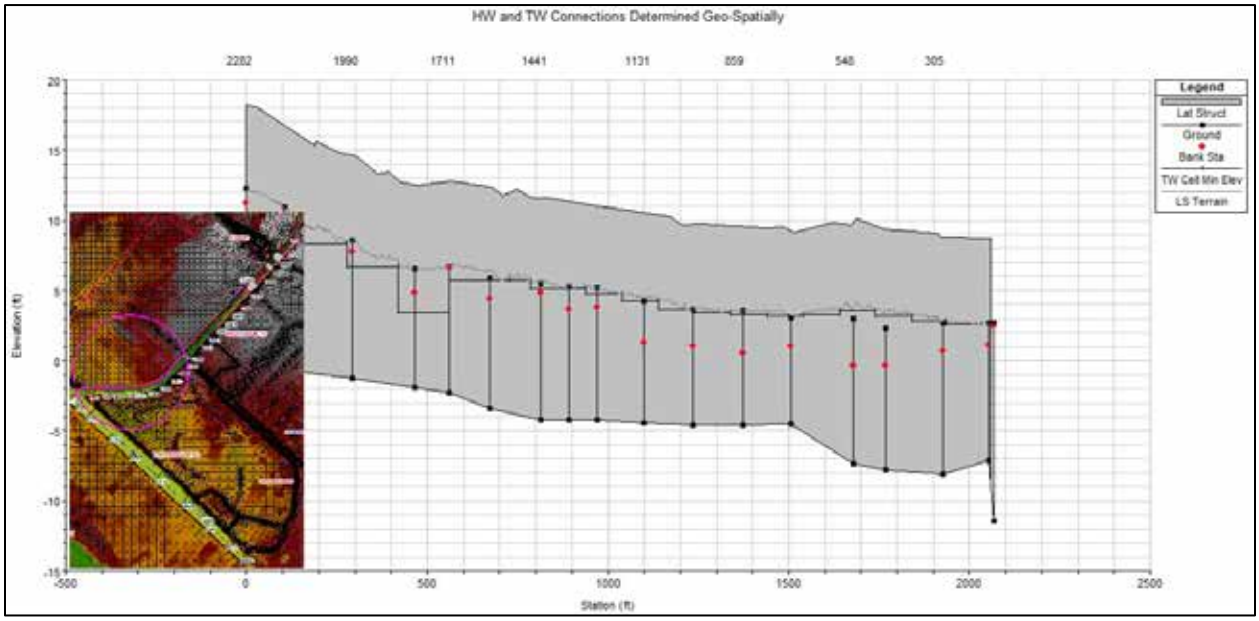


Figure 7-19: Manoa-Palolo Canal Right Bank Floodwall from Date Street to the Ala Wai Canal Confluence

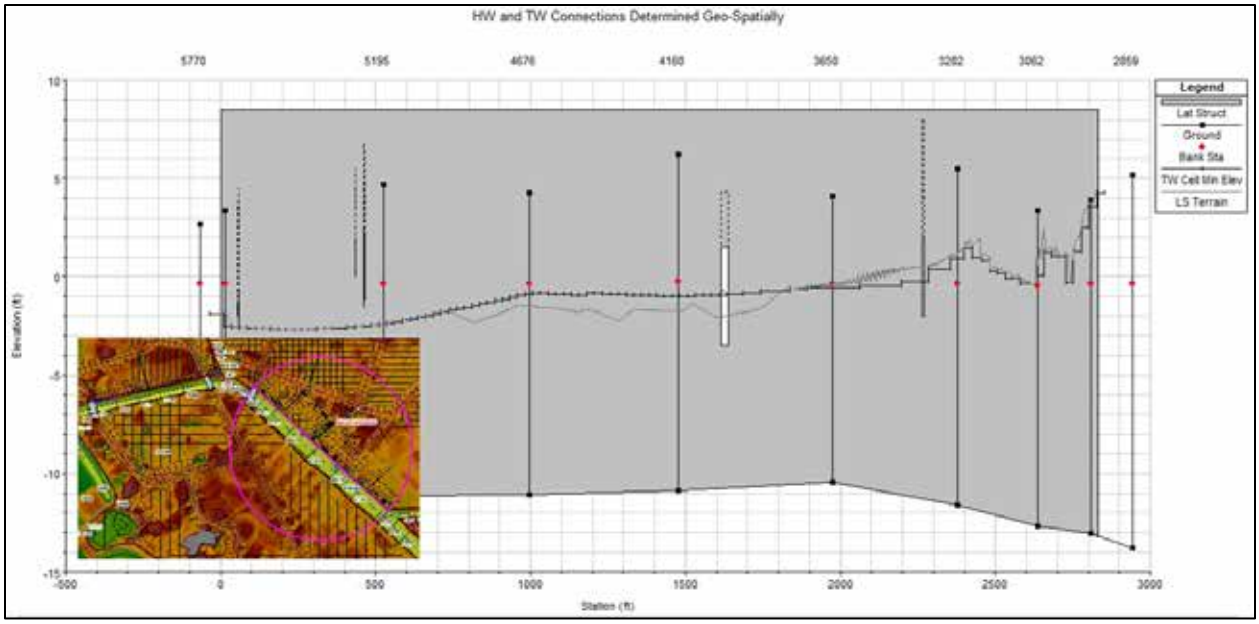


Figure 7-20: Ala Wai Right Bank Floodwall Profile from Confluence of Manoa-Palolo Canal to McCully Street

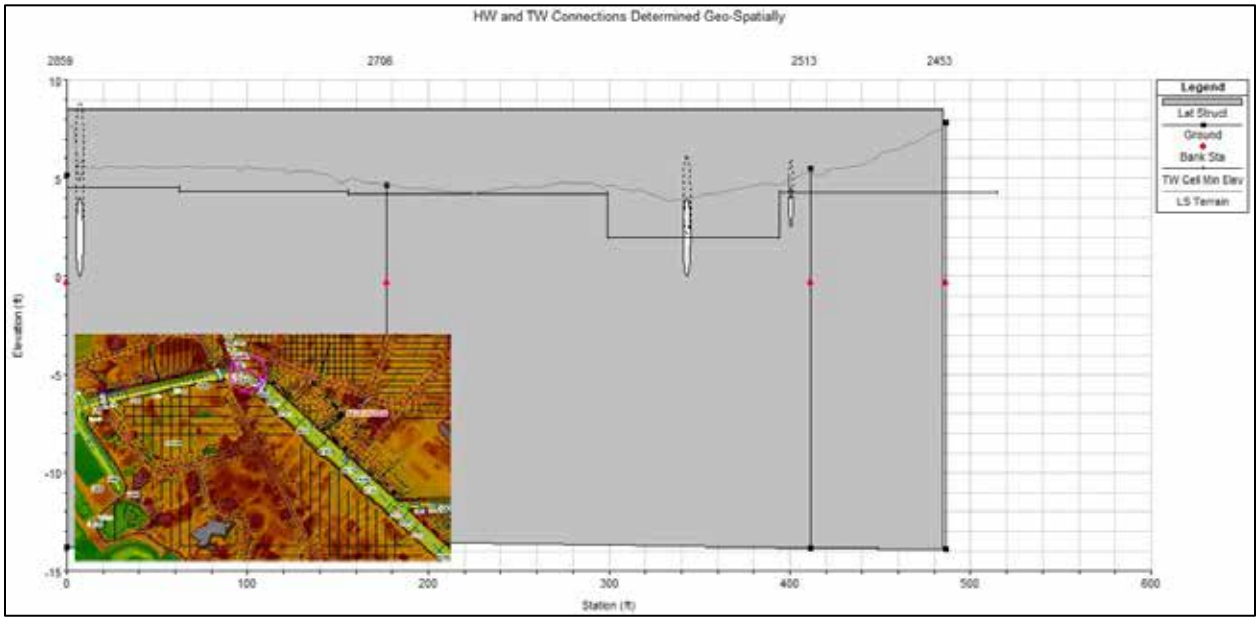


Figure 7-21: Ala Wai Right Bank Floodwall Profile from McCully Street to Makiki Stream

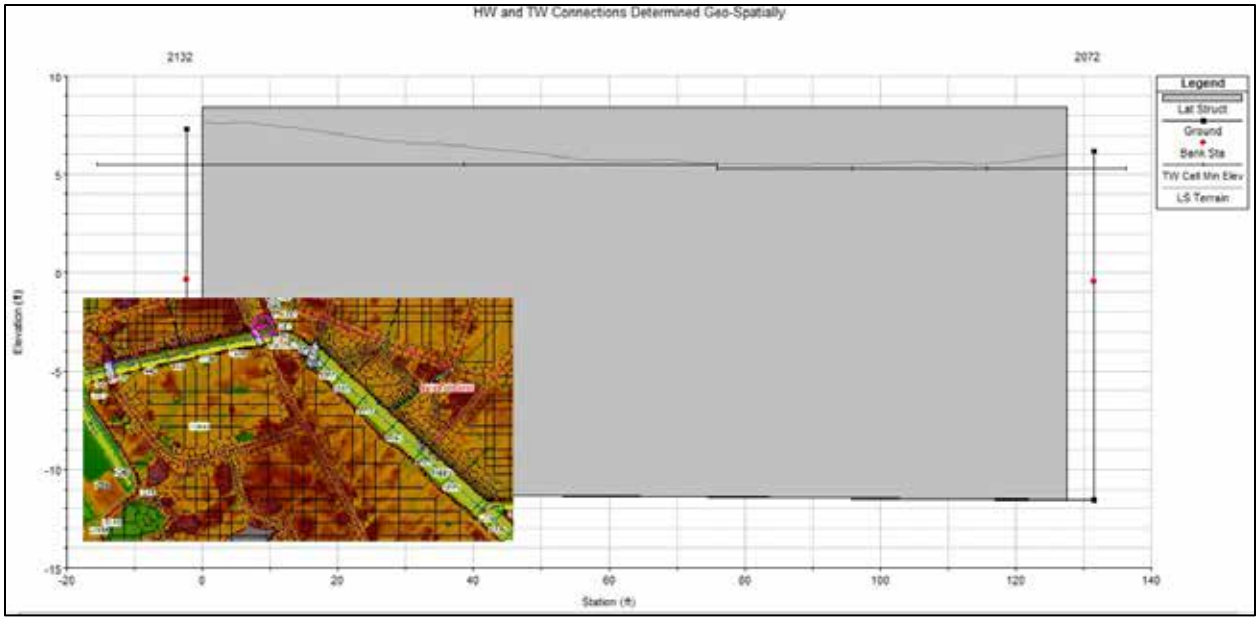


Figure 7-22: Ala Wai Right Bank Floodwall Profile from Makiki Stream to Kalakaua Avenue

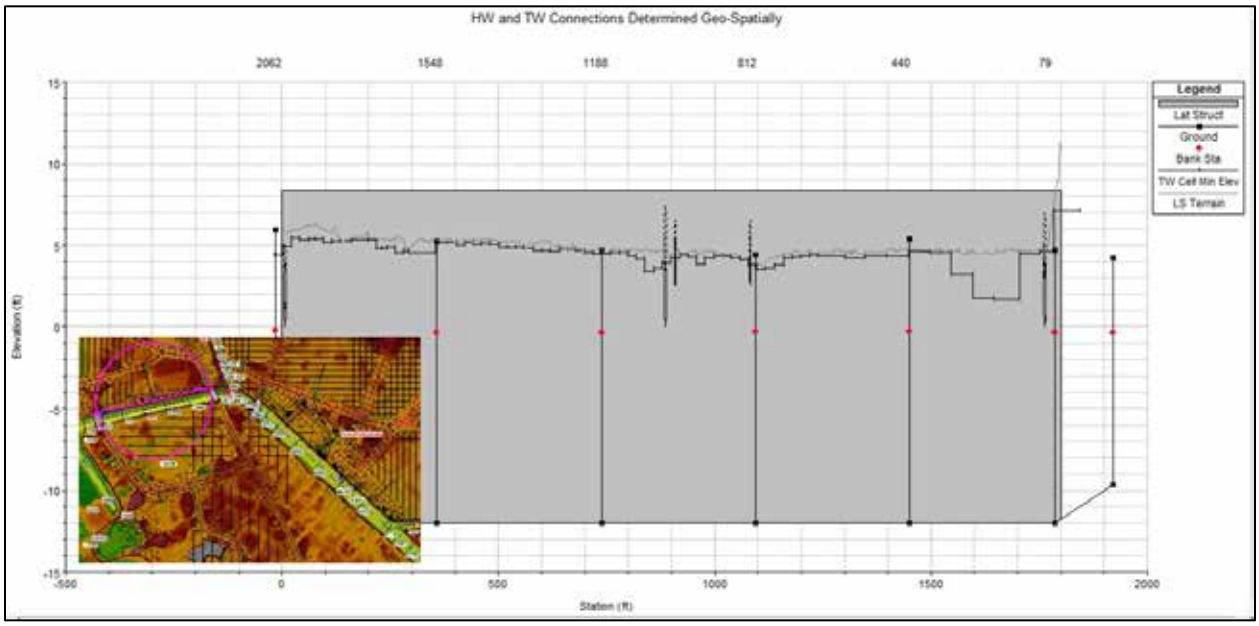


Figure 7-23: Ala Wai Right Bank Floodwall Profile from Kalakaua Avenue to Ala Moana Boulevard

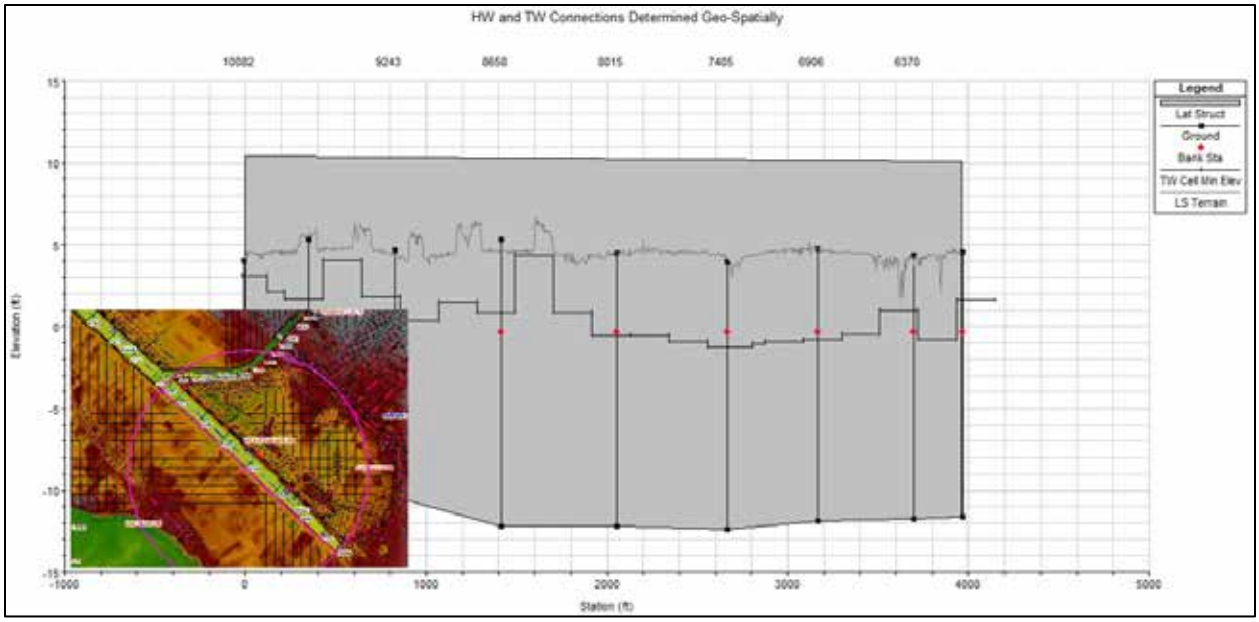


Figure 7-24: Ala Wai Left Bank Floodwall Profile from the Start of the Canal to the Confluence of Manoa-Palolo Canal

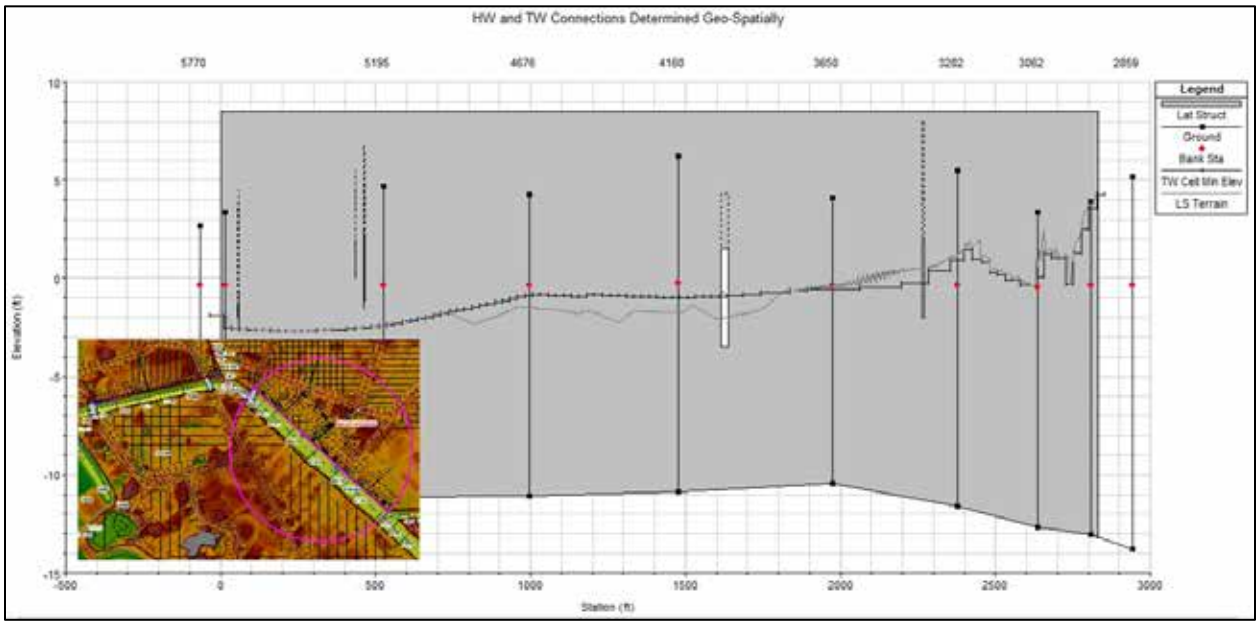


Figure 7-25: Ala Wai Left Bank Floodwall Profile from Confluence of Manoa-Palolo Canal to McCully Street

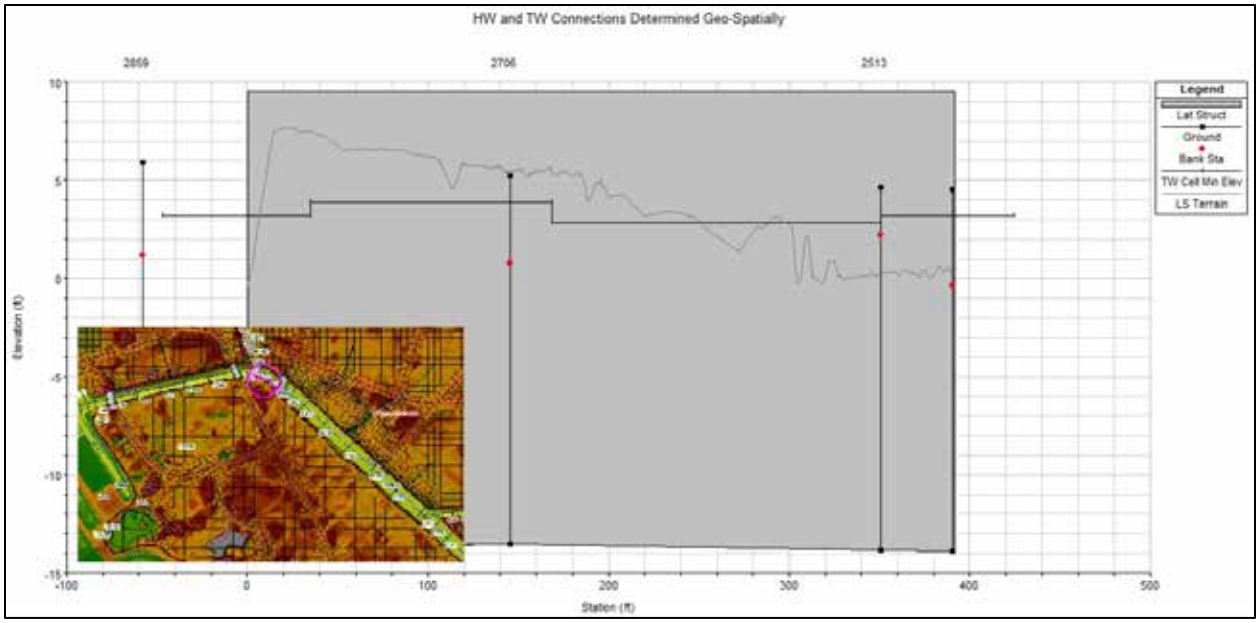


Figure 7-26: Ala Wai Left Bank Floodwall Profile from McCully Street to Makiki Stream

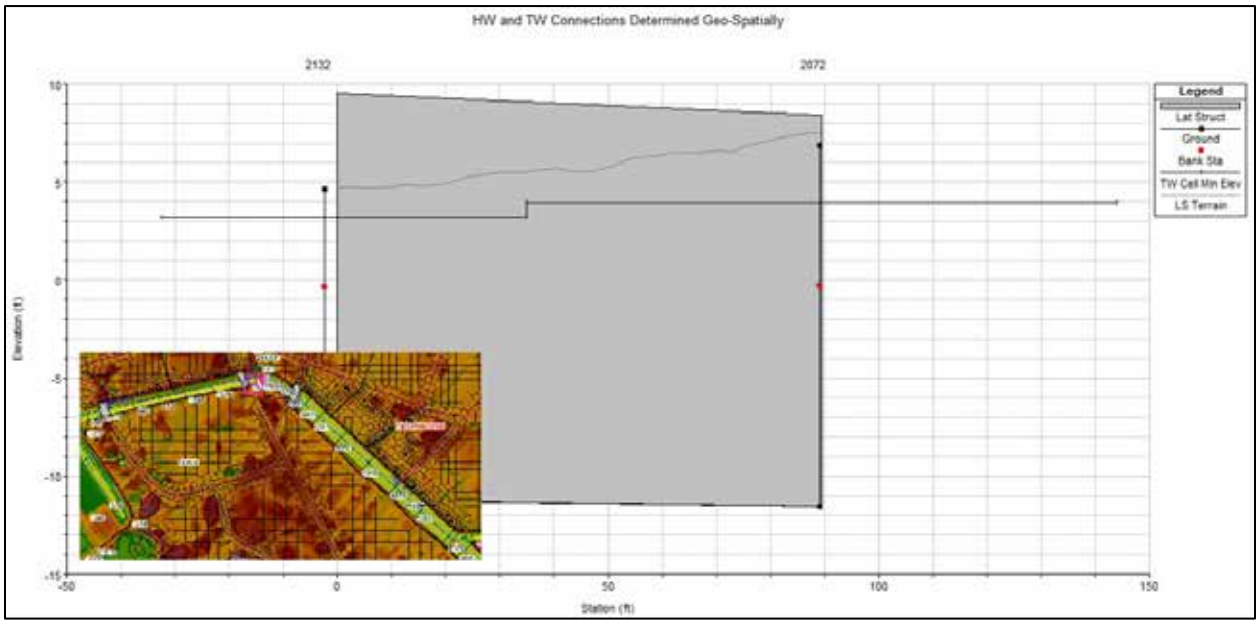


Figure 7-27: Ala Wai Left Bank Floodwall Profile from Makiki Stream to Kalakaua Avenue

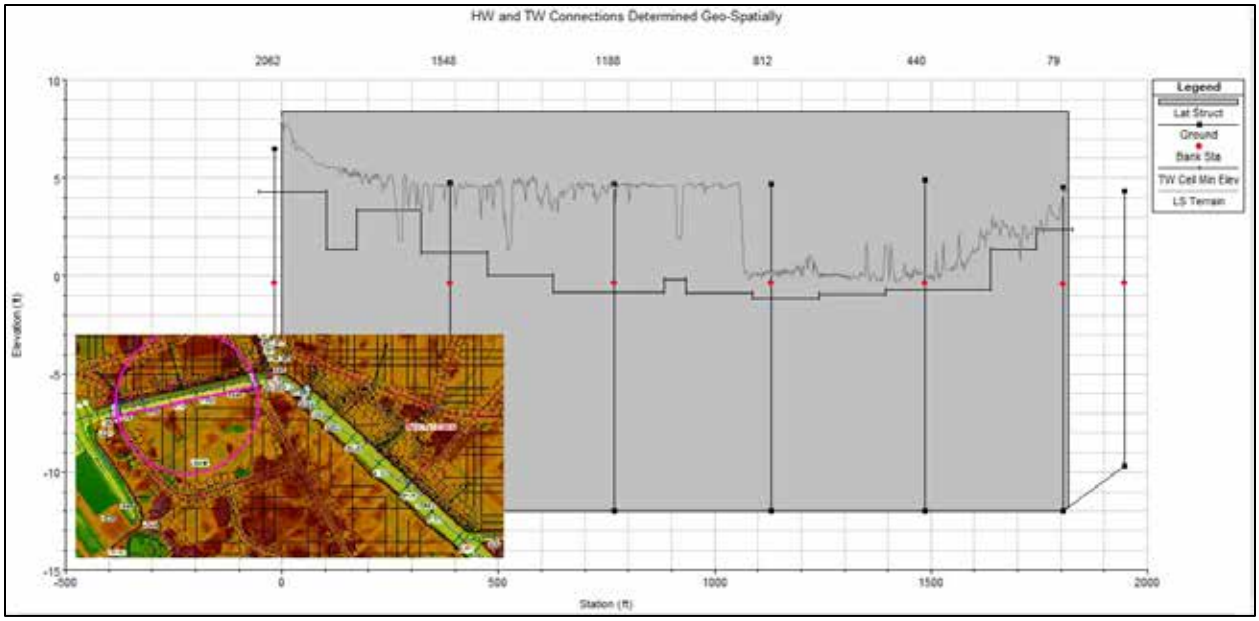


Figure 7-28: Ala Wai Left Bank Floodwall Profile from Kalakaua Avenue to Ala Moana Boulevard

As mentioned in Section 3.2.1, where the new Lidar data along the Ala Wai Canal and the new post dredge bathymetric survey was discussed, there is some risk associated with using the surveyed post dredge bathymetric data. There is a gradual reduction of depth and associated conveyance area in the canal as time goes on due to sediment buildup before the next dredging occurs. A sensitivity of the post dredge survey channel vs the MMC model channel representing a large sediment buildup was conducted to see the possible range of water surface elevations that can occur during the canal sediment cycle of filling up, and then dredging again, for Alternative 5.3. For the modeled Alternative 5.3 10% AEP flood with full sedimentation in the canal, there is up to a 1.0 foot increase to the Upper Ala Wai Canal water surface elevations, and for the modeled Alternative 5.3 1% AEP flood with full sedimentation in the canal, there is up to 0.5 foot of increase due to sediment. It is assumed that the canal will continue to be dredged, as needed, for sediment maintenance. Sedimentation of the Ala Wai Canal will be a risk factor during the Risk Assessment and during PED phase.

Table 7-1: Alternative 5.3 Features Summary Table

Measure	Structure Type1	Maximum Wall Height	Total Wall Length	Number of Road Closures	Number of Drainage Structures2	Number of Flapgates2
Woodlawn Drive Floodwall	L-wall on Macropiles	6 ft	1,270 ft	1	--	--
Koali Road Floodwall	L-wall on Macropiles	6 ft	2,510 ft	2	2	2
Ala Wai Golf Course Detention	Berm (8,315 ft) L-wall on Macropiles3 (1,861 ft)	6-9 ft	10,176 ft	1	5	5
Ala Wai Canal Floodwall4	J-wall on Macropiles3 (17,125ft) L-wall on Macropiles3 (4,069 ft) Tieback I-Wall3 (1,658 ft)	6 ft	22,852 ft	11	14	59

1 Berms assumed to be 6-9 feet tall and have side slopes of 3H:1V with a 12-foot crown. L-walls along the Ala Wai Canal assumed to be 6 feet tall with a 12-foot-wide X 40-inch-thick base supported on 16-inch diameter by 40 feet long cased macropiles with a 14-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 6V:1H. L-walls at the Golf Course assumed to be 9 feet tall with a 13-foot-wide X 44-inch-thick base supported on 18-inch diameter by 50 feet long cased macropiles with an 18-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 6V:1H. J-wall assumed to be the same design as 6-ft L-walls (i.e., same width, macropiles configuration, etc.), except the wall will include a 3-foot-tall concrete wall on the heel, with the 3-foot-deep area created between the front and rear walls backfilled with soil to create an elevated walkway along the Ala Wai Canal. Tieback I-Wall (tied-back I-wall) assumed to be toed into rock or extended 15 feet below the stream level with PZ30 sheet piles and 50-foot-long angled ties at 7 feet on-center with a continuous HP12X53 waler located 6 feet below the streambank crest.

2 Indicates the number of assumed outlet structures. It is assumed that existing storm drains larger than 36 inches will require a drainage structure (and positive closure). Smaller sizes may require drainage structures during future design phases.

3 J-wall on Macropiles assumed to be used along the Ala Wai Canal only. L-wall on Macropiles assumed to be used adjacent to streams where visibility of the canal is not a major consideration and where erosion is more of a concern, while the I-wall assumed to be used in areas away from streams where there is flat ground and erosion is not a concern; however, there are no I-walls in the TSP. The Tieback I-Wall will be used where space limitations and vibrations are major considerations and prevent the use of the other wall types (i.e., specifically planned on the Manoa-Palolo Stream from Date Street to Kapiolani Boulevard).

4 The floodwall around the canal also accounts for four canoe closure structures.

7.3.4. Other measures investigated for the reduction of induced damages.

Many other measures were investigated for reducing the induced damages, including changing of floodwall alignments and heights, changing golf course detention alignments and heights, multiple Makiki Stream floodwall design heights, adding a low flow channel into the Makiki Stream, and pumps. Over forty iterations of these measures were modeled. Some of these made the induced damages worse, some made no significant change added to costs, and a few helped hydraulically but were deemed not constructable by the PDT due to other constraints or costs.

7.3.4.1. Ala Wai Golf Course Detention

Many configurations of the Golf Course Detention basin were investigated. Many configurations of the levee alignment were looked into, along with multiple iterations of levee heights. Further, the inflow into the Golf Course Detention was investigated with different weir placements, lengths, and heights. Investigating how the Kaimuki High School storage area impacts the Golf Course Detention and allowing water to flow into the Golf Course Detention from that area over Date Street was investigated. The current design of the Ala Wai Golf Course Detention provided the best optimization of those features to create the most storage capacity with the least impact to utilities and costs. Increasing the detention levee heights from 6 ft to 9 ft, an increase up to an elevation of 12 ft msl, reduced the induced impacts in the damage reaches along the Ala Wai canal, especially in the two north of the Ala Wai Canal.

7.3.4.2. Ala Wai Canal Floodwall

The current design of the Ala Wai Canal floodwall alignment provided the most protection for the more frequent flood events with decreasing some of the induced impacts that the previous alignment in Alternative 5.2 caused.

7.3.4.3. Makiki Stream Floodwall

Multiple measures for reducing the induced damages along the Makiki Stream were investigated. The Makiki Floodwalls helped to reduce the inundations for the larger flood events, but the increased WSEL carried upstream and caused additional flows to leave the channel upstream of where the floodwalls started, especially for the smaller more frequent flood events. Extending the floodwalls upstream was deemed not constructable to due multiple constraints, including geotechnical issues, structural issues, utilities, and required closures. A low flow channel cut into the existing channel of the Makiki Stream downstream of Fern Street was investigated to help increase conveyance near the confluence with Ala Wai Canal. While this did have a small positive impact hydraulicly, it was determined that the cut would destabilize the existing channelized stream walls, and the costs to rebuild the entire canal wall system would be infeasible due to all the space constraints.

7.3.4.4. Pumps

The construction of a pump station(s) located along Makiki Stream where most of the induced flooding is occurring was investigated during the reduction of induced damages analysis. The purpose of the pumping station(s) would be to mitigate for flooding in the Makiki Stream area due to increased water surface elevations that propagated up the Makiki a little due to Ala Wai Canal backwater and from the interior flooding that was induced by the Ala Wai Canal floodwalls during large storm events. Modeling was conducted with one 500 cfs pump placed in the left overbank of the Lower Makiki Stream and one 500 cfs pump placed in the right overbank of the Lower Makiki Stream. The location of the pumps was not placed inline but were placed in ponding areas without consideration of real estate needs and constructability. As the number and precise location of permanent pump stations is unknown at this time, modeling shows that each of the pump stations would need a pumping capacity range between 500 cubic feet per second (cfs) up to a few thousand cfs, which would be very large pump stations. Permanent pump stations would likely consist of a wet well installed in a low-lying area where water naturally flows. The wet well would consist of a concrete inlet box with mesh screens for debris and wildlife protection, hinged lid for pump removal for maintenance, etc. The outlet from the wet well would be routed to the floodwall and would either pass over the wall or through it with a check valve to prevent inflow from the river side. The wet well would connect to a pump house. The pump house would be elevated and would hold the electrical infrastructure and other operating equipment, and a backup generator to minimize pump failure in the event of power disruption. The pumps would need to be designed to mitigate for induced flooding; however, pumps alone would not fully mitigate for induced flooding. The PDT determined that the pumps were not feasible for the induced damages due to the real estate issues, constructability, and the extremely high costs associated with the features described above for this measure.

Any while pumps directly on the Ala Wai Canal were not further investigated during the reduction of induced damages, the PDT felt that the results of the previously screened pump measures, the analysis which was described in Section 4.4 would still be applicable. The volume of discharge and the slope of the energy grade in the Ala Wai and up the Makiki Stream tributary would result in very minimal and localized benefits that would not be propagated up the system to the main induced damages areas.

8. TSP RESULTS

The Future Without Project model runs were compared to the Future With Project results for Alternatives 5.1, 5.2, and 5.3 at select cross sections, the Index Cross Sections for the Economic Analysis, in the Ala Wai Watershed. The locations are shown in Figure 6-1.

8.1. Water Surface Elevations and Discharge

Tables the water surface elevations and discharges for Alternatives 5.1, 5.2, and 5.3 are shown below for all of the eight flood profiles in Table 8-1 to Table 8-8.

Table 8-1: 50% AEP WSEL & Discharges for FWOP and TSP Alternatives

				FWOP		Alternative 5.1		Alternative 5.2		Alternative 5.3	
River	Reach	River Sta	Plan	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Ala Wai	Upper	10082	50% AEP	176.63	4.20	696.4	4.29	696.4	4.27	696.4	4.28
Ala Wai	Upper	7405	50% AEP	551.52	4.20	539.23	4.28	556.26	4.26	529.79	4.27
Ala Wai	Upper	6095	50% AEP	751.24	4.19	609.49	4.28	665.41	4.26	680.02	4.27
Ala Wai	Middle	5770	50% AEP	5499.95	4.19	5663.1	4.28	5633.94	4.26	5649.24	4.27
Ala Wai	Middle	5195	50% AEP	5543.26	4.15	5750.04	4.24	5687.86	4.22	5733.81	4.23
Ala Wai	Middle	3282	50% AEP	5740.15	4.05	6012.21	4.13	5939.36	4.11	5969.72	4.12
Ala Wai	Middle	2961	50% AEP	5770.45	4.01	6041.59	4.08	5977.42	4.06	5998.04	4.07
Ala Wai	Middle	2453	50% AEP	5792.27	3.83	6031.46	3.88	6003.49	3.87	6016.18	3.87
Ala Wai	Lower	67	50% AEP	4763.84	3.23	6798.29	3.23	6725.01	3.24	6762.29	3.23
Makiki	Upper	9543	50% AEP	238.40	170.63	238.4	170.63	238.4	170.63	238.4	170.63
Makiki	Upper	7672	50% AEP	294.00	102.96	294.27	102.97	294.27	102.97	294.27	102.97
Makiki	Lower	5940.67*	50% AEP	627.55	47.35	627.43	47.35	618.89	47.31	618.89	47.31
Makiki	Lower	4809.46*	50% AEP	629.99	31.21	629.41	31.21	618.8	31.15	618.8	31.15
Makiki	Lower	1897	50% AEP	743.96	9.53	744.03	9.53	719.87	9.77	740.18	9.41
Makiki	Lower	76	50% AEP	634.52	3.79	878.95	3.84	811.57	3.83	859.58	3.84
Kanaha	Ditch	4372	50% AEP	93.50	126.72	93.5	126.72	93.5	126.72	93.5	126.72
Kanaha	Ditch	943	50% AEP	210.53	65.75	210.49	65.75	206.02	65.63	206.02	65.63
Kanaha	Ditch	2	50% AEP	237.05	59.29	237.01	59.29	230.84	59.27	230.84	59.27
Manoa	Main	16506	50% AEP	1499.33	275.69	1499	275.69	1499	275.69	1499	275.69
Manoa	Main	10968	50% AEP	2468.88	178.55	2474.02	178.56	2474.04	178.56	2473.94	178.56
Manoa	Main	10496	50% AEP	2692.34	172.93	2698.13	172.94	2698.11	172.94	2698.02	172.94
Manoa	Main	8117	50% AEP	2921.23	148.71	2931.45	148.73	2932.81	148.73	2931.27	148.73
Manoa	Main	8016	50% AEP	2930.35	147.55	2940.21	147.57	2941.55	147.57	2940.1	147.57
Manoa	Main	7839	50% AEP	2952.57	145.85	2966.15	145.87	2967.38	145.87	2965.91	145.87
Manoa	Main	3042	50% AEP	3069.44	62.63	3083.93	62.64	3085.68	62.65	3084.09	62.64
Manoa	Main	2891	50% AEP	3069.10	60.51	3080.85	60.52	3084.74	60.53	3083.31	60.53
Manoa	Main	1457	50% AEP	3495.19	39.77	3510.86	39.8	3515.55	39.81	3513.97	39.81
Manoa	Main	1378	50% AEP	3495.01	39.54	3510.66	39.58	3515.37	39.59	3513.71	39.58
Manoa	Main	1107	50% AEP	3585.13	36.83	3599.99	36.86	3604.67	36.86	3603.07	36.86
Manoa	Main	84	50% AEP	3541.37	19.85	3567.31	19.86	3598.52	19.86	3570.42	19.86
Pukele	Tributary	5958	50% AEP	654.20	518.92	653.42	518.92	653.42	518.92	653.42	518.92
Waiomao	Tributary	4900	50% AEP	638.43	395.73	638.36	395.73	638.36	395.73	638.36	395.73
Palolo	Main	11542	50% AEP	1806.11	133.87	1815.87	133.88	1815.87	133.88	1815.86	133.88
Palolo	Main	10074	50% AEP	1891.63	110.61	1900.11	110.63	1900.11	110.63	1900.11	110.63
Palolo	Main	6282	50% AEP	2041.89	32.20	2048.12	32.21	2048.12	32.21	2048.12	32.21
Palolo	Lower	4810	50% AEP	5435.83	18.39	5446.66	18.4	5452.29	18.41	5450	18.41
Palolo	Lower	4653	50% AEP	5435.65	16.24	5446.57	16.25	5452.18	16.26	5449.9	16.26
Palolo	Lower	4557	50% AEP	5435.44	16.19	5446.46	16.19	5452.1	16.2	5449.81	16.2
Palolo	Lower	2609	50% AEP	5500.91	7.86	5509.33	7.88	5514.97	7.79	5510.16	7.79
Palolo	Lower	305	50% AEP	5063.74	3.99	5492.37	4.06	5389.25	4.05	5389.57	4.06

Table 8-2: 20% AEP WSEL & Discharges for FWOP and TSP Alternatives

				FWOP		Alternative 5.1		Alternative 5.2		Alternative 5.3	
River	Reach	River Sta	Plan	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Ala Wai	Upper	10082	20% AEP	312.35	5.27	1204	5.99	1204	5.7	1204	5.83
Ala Wai	Upper	7405	20% AEP	994.75	5.27	886.58	5.98	976.39	5.7	939.69	5.82
Ala Wai	Upper	6095	20% AEP	1454.25	5.26	1203.82	5.97	1415.44	5.69	1398.97	5.81
Ala Wai	Middle	5770	20% AEP	8706.13	5.26	9926.66	5.97	9293.57	5.69	9532.24	5.81
Ala Wai	Middle	5195	20% AEP	8695.29	5.19	10070.35	5.89	9341.97	5.62	9657.64	5.73
Ala Wai	Middle	3282	20% AEP	8769.03	5.02	10436.56	5.68	9713.01	5.42	10046.39	5.53
Ala Wai	Middle	2961	20% AEP	8788.79	4.93	10473.03	5.57	9818.44	5.31	10083.26	5.42
Ala Wai	Middle	2453	20% AEP	8823.29	4.55	10512.03	5.06	9865.75	4.86	10121.34	4.94
Ala Wai	Lower	67	20% AEP	2292.10	3.22	11574.61	3.23	10881.77	3.24	11184.48	3.23
Makiki	Upper	9543	20% AEP	485.90	171.28	485.86	171.28	485.86	171.28	485.86	171.28
Makiki	Upper	7672	20% AEP	588.43	106.23	588.65	106.23	588.65	106.23	588.65	106.23
Makiki	Lower	5940.67*	20% AEP	1143.16	49.56	1143.53	49.56	1143.53	49.56	1143.52	49.56
Makiki	Lower	4809.46*	20% AEP	1147.69	36.42	1149.43	36.43	1149.44	36.43	1149.43	36.43
Makiki	Lower	1897	20% AEP	1047.46	10.91	1047.04	10.91	1027.55	11.15	1046.96	10.91
Makiki	Lower	76	20% AEP	879.80	4.52	1108.75	5.04	1076.6	4.83	1110.16	4.92
Kanaha	Ditch	4372	20% AEP	199.90	127.30	199.85	127.3	199.85	127.3	199.85	127.3
Kanaha	Ditch	943	20% AEP	326.65	68.03	326.14	68.03	325.99	68.04	326.72	68.03
Kanaha	Ditch	2	20% AEP	356.94	60.27	356.84	60.27	356.84	60.27	356.84	60.27
Manoa	Main	16506	20% AEP	2723.00	277.47	2723	277.47	2723	277.47	2723	277.47
Manoa	Main	10968	20% AEP	3993.98	181.63	4001.06	181.63	4001.09	181.63	4001.07	181.63
Manoa	Main	10496	20% AEP	3796.51	178.23	3798.71	178.24	3798.72	178.24	3798.71	178.24
Manoa	Main	8117	20% AEP	3427.25	150.94	3366.99	151.01	3366.82	151.01	3366.83	151.01
Manoa	Main	8016	20% AEP	3224.45	150.57	3581.65	150.71	3581.35	150.71	3581.46	150.71
Manoa	Main	7839	20% AEP	5013.13	149.58	4964.39	149.74	4964.14	149.74	4964.33	149.74
Manoa	Main	3042	20% AEP	5562.45	65.17	5654.43	65.24	5654.84	65.25	5654.77	65.25
Manoa	Main	2891	20% AEP	5561.52	63.54	5654.97	63.62	5657.49	63.62	5657.43	63.62
Manoa	Main	1457	20% AEP	6370.92	42.16	6445.69	42.45	6448.64	42.45	6448.55	42.45
Manoa	Main	1378	20% AEP	6370.36	41.75	6445.36	42.15	6448.19	42.15	6448.13	42.15
Manoa	Main	1107	20% AEP	5494.79	38.38	6610.59	39.15	6613.38	39.16	6613.34	39.16
Manoa	Main	84	20% AEP	5276.23	22.69	6563.34	23.11	6615.06	23.11	6565.76	23.11
Pukele	Tributary	5958	20% AEP	1242.60	520.19	1240.87	520.19	1240.87	520.19	1240.87	520.19
Waiomao	Tributary	4900	20% AEP	1135.38	397.38	1134.9	397.38	1134.9	397.38	1134.9	397.38
Palolo	Main	11542	20% AEP	3125.22	135.25	3131.35	135.26	3131.35	135.26	3131.36	135.26
Palolo	Main	10074	20% AEP	2800.99	112.38	2803.26	112.38	2803.29	112.38	2803.3	112.38
Palolo	Main	6282	20% AEP	3506.82	33.55	3512.03	33.56	3512.09	33.56	3512.11	33.56
Palolo	Lower	4810	20% AEP	9138.38	21.27	9727.53	21.7	9730.73	21.7	9730.56	21.7
Palolo	Lower	4653	20% AEP	9137.54	19.00	9727.1	19.4	9730.3	19.4	9730.17	19.4
Palolo	Lower	4557	20% AEP	9136.67	19.15	9726.96	19.58	9730.16	19.58	9730.01	19.58
Palolo	Lower	2609	20% AEP	9265.28	10.20	9862.8	10.68	9872.74	10.39	9870.89	10.42
Palolo	Lower	305	20% AEP	7696.79	4.87	9789.2	5.52	8684.26	5.31	8850.36	5.42

Table 8-3: 10% AEP WSEL & Discharges for FWOP and TSP Alternatives

				FWOP		Alternative 5.1		Alternative 5.2		Alternative 5.3	
River	Reach	River Sta	Plan	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Ala Wai	Upper	10082	10% AEP	397.46	5.91	1643	7.27	1643	6.52	1643	7
Ala Wai	Upper	7405	10% AEP	1427.45	5.90	1207.21	7.26	1224.18	6.52	1178.39	7
Ala Wai	Upper	6095	10% AEP	1899.01	5.89	1569.09	7.25	1790.21	6.51	2063.06	6.99
Ala Wai	Middle	5770	10% AEP	10418.26	5.89	12589.07	7.25	10889.07	6.51	11997.75	6.99
Ala Wai	Middle	5195	10% AEP	10441.73	5.81	12762.33	7.15	10957.44	6.43	12106.28	6.89
Ala Wai	Middle	3282	10% AEP	10308.02	5.61	13246.32	6.9	11481.91	6.2	12661.37	6.64
Ala Wai	Middle	2961	10% AEP	10274.28	5.50	13294.68	6.74	11653.86	6.06	12708.67	6.49
Ala Wai	Middle	2453	10% AEP	10342.78	5.01	13342.85	6.03	11705.51	5.47	12757.51	5.82
Ala Wai	Lower	67	10% AEP	2541.76	3.23	14405.02	3.23	12832.38	3.24	13857.35	3.23
Makiki	Upper	9543	10% AEP	705.30	171.80	705.3	171.8	705.3	171.8	705.3	171.8
Makiki	Upper	7672	10% AEP	669.54	107.02	669.54	107.02	669.54	107.02	669.54	107.02
Makiki	Lower	5940.67*	10% AEP	1334.67	50.38	1334.61	50.38	1334.58	50.38	1334.6	50.38
Makiki	Lower	4809.46*	10% AEP	1347.63	38.88	1347.43	38.88	1347.64	38.88	1347.63	38.88
Makiki	Lower	1897	10% AEP	1098.28	11.45	1097.31	11.45	1060.82	11.69	1097.52	11.45
Makiki	Lower	76	10% AEP	957.09	4.98	1195.74	6.03	1202.48	5.45	1198.84	5.82
Kanaha	Ditch	4372	10% AEP	287.88	127.68	287.92	127.68	287.96	127.68	287.96	127.68
Kanaha	Ditch	943	10% AEP	344.77	68.48	345.03	68.49	344.25	68.48	344.67	68.48
Kanaha	Ditch	2	10% AEP	372.46	60.52	372.38	60.52	372.73	60.52	372.41	60.52
Manoa	Main	16506	10% AEP	3657.00	278.58	3657	278.58	3657	278.58	3657	278.58
Manoa	Main	10968	10% AEP	5048.51	182.64	5048.01	182.64	5047.55	182.64	5047.61	182.64
Manoa	Main	10496	10% AEP	4257.14	178.84	4256.99	178.84	4257	178.84	4256.99	178.84
Manoa	Main	8117	10% AEP	3394.60	152.01	3549.04	152.37	3547.89	152.37	3548.42	152.37
Manoa	Main	8016	10% AEP	2900.22	152.08	3591.11	152.46	3590	152.46	3585	152.46
Manoa	Main	7839	10% AEP	5379.37	150.97	5079.13	151.67	5079.09	151.67	5079.02	151.67
Manoa	Main	3042	10% AEP	7159.79	66.69	7782.12	67.16	7786.24	67.16	7786.06	67.16
Manoa	Main	2891	10% AEP	7151.55	65.38	7788.49	65.88	7790.87	65.88	7790.65	65.88
Manoa	Main	1457	10% AEP	8509.90	43.53	8979.29	44.09	8951.58	44.07	8951.23	44.07
Manoa	Main	1378	10% AEP	8504.99	42.83	8978.56	43.54	8950.68	43.53	8950.39	43.53
Manoa	Main	1107	10% AEP	6496.56	38.87	9229.72	40.67	9202.58	40.65	9202.15	40.65
Manoa	Main	84	10% AEP	6081.61	25.21	9197.84	26.16	9207.45	26.15	9160.96	26.15
Pukele	Tributary	5958	10% AEP	1722.09	520.98	1722.09	520.98	1722.09	520.98	1722.09	520.98
Waiomao	Tributary	4900	10% AEP	1537.51	398.49	1537.51	398.49	1537.51	398.49	1537.16	398.49
Palolo	Main	11542	10% AEP	3971.69	135.99	3971.71	135.99	3971.8	135.99	3971.76	135.99
Palolo	Main	10074	10% AEP	3205.67	113.10	3205.66	113.1	3205.71	113.1	3205.71	113.1
Palolo	Main	6282	10% AEP	4720.15	34.67	4869.06	34.71	4869.22	34.71	4869.21	34.71
Palolo	Lower	4810	10% AEP	12422.47	24.09	13876.64	25.09	13856.02	25.07	13855.16	25.07
Palolo	Lower	4653	10% AEP	12418.85	22.54	13872.51	23.46	13851.51	23.45	13851.03	23.45
Palolo	Lower	4557	10% AEP	12414.38	22.91	13874.03	23.84	13852.68	23.83	13852.5	23.83
Palolo	Lower	2609	10% AEP	12146.22	11.64	13019.71	12.3	13092.47	12.24	13099.5	12.23
Palolo	Lower	305	10% AEP	8550.98	5.48	12335.67	6.69	9792.1	6.09	10758.12	6.53

Table 8-4: 5% AEP WSEL & Discharges for FWOP and TSP Alternatives

				FWOP		Alternative 5.1		Alternative 5.2		Alternative 5.3	
River	Reach	River Sta	Plan	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Ala Wai	Upper	10082	5% AEP	465.75	6.50	2168.6	7.92	2168.6	7.21	2168.6	8.01
Ala Wai	Upper	7405	5% AEP	1713.18	6.49	1320.7	7.92	1360.5	7.2	1464.51	8.01
Ala Wai	Upper	6095	5% AEP	2084.55	6.48	1814.87	7.92	2134.55	7.19	2443.17	8
Ala Wai	Middle	5770	5% AEP	12150.36	6.48	13348.54	7.92	12093.86	7.19	13763.31	8
Ala Wai	Middle	5195	5% AEP	12101.76	6.39	13668.43	7.81	12181.43	7.1	13953.84	7.89
Ala Wai	Middle	3282	5% AEP	11700.63	6.17	14454.52	7.53	12844.66	6.85	14677.61	7.62
Ala Wai	Middle	2961	5% AEP	11570.43	6.05	14521.91	7.36	13064.19	6.69	14741.43	7.45
Ala Wai	Middle	2453	5% AEP	11683.44	5.46	14581.14	6.54	13127.89	5.99	14802.8	6.61
Ala Wai	Lower	67	5% AEP	2831.25	3.23	15701.17	3.23	14320.47	3.24	15857.9	3.23
Makiki	Upper	9543	5% AEP	960.76	172.26	960.76	172.26	960.76	172.26	960.76	172.26
Makiki	Upper	7672	5% AEP	721.36	107.51	721.36	107.51	721.36	107.51	721.36	107.51
Makiki	Lower	5940.67*	5% AEP	1516.64	51.21	1515.74	51.21	1515.76	51.21	1515.75	51.21
Makiki	Lower	4809.46*	5% AEP	1529.73	40.44	1529.71	40.44	1529.71	40.44	1529.71	40.44
Makiki	Lower	1897	5% AEP	1121.90	11.80	1119.98	11.81	1075.69	12.06	1120.43	11.81
Makiki	Lower	76	5% AEP	969.23	5.44	1254.85	6.55	1303.31	5.99	1261.77	6.62
Kanaha	Ditch	4372	5% AEP	394.67	128.07	394.67	128.07	394.61	128.07	394.48	128.07
Kanaha	Ditch	943	5% AEP	351.40	68.87	352.72	68.87	352.69	68.87	350.44	68.87
Kanaha	Ditch	2	5% AEP	378.84	60.76	378.98	60.76	378.89	60.76	378.83	60.76
Manoa	Main	16506	5% AEP	4623.00	279.57	4623	279.57	4623	279.57	4623	279.57
Manoa	Main	10968	5% AEP	6113.48	183.44	6111.44	183.44	6111.66	183.44	6111.66	183.44
Manoa	Main	10496	5% AEP	4516.87	179.39	4516.68	179.39	4516.69	179.39	4516.68	179.39
Manoa	Main	8117	5% AEP	3325.22	152.76	4408.3	153.48	4408.13	153.47	4408.15	153.48
Manoa	Main	8016	5% AEP	2549.36	153.00	3635.31	153.68	3635.26	153.68	3635.29	153.68
Manoa	Main	7839	5% AEP	5498.35	151.79	5278.88	153.09	5278.9	153.09	5278.87	153.09
Manoa	Main	3042	5% AEP	8407.54	67.79	9760.85	68.7	9752.2	68.7	9752.54	68.7
Manoa	Main	2891	5% AEP	8389.34	66.74	9751.06	67.74	9749.28	67.74	9749.51	67.74
Manoa	Main	1457	5% AEP	10019.31	44.36	11270.97	45.41	11290.63	45.42	11290.88	45.42
Manoa	Main	1378	5% AEP	10019.17	43.37	11273.9	44.63	11290.87	44.63	11291.18	44.63
Manoa	Main	1107	5% AEP	6977.36	39.23	11597.69	41.83	11619.95	41.84	11620.2	41.84
Manoa	Main	84	5% AEP	6613.04	26.85	11558.64	30.68	11616.3	30.65	11580.58	30.65
Pukele	Tributary	5958	5% AEP	2231.49	521.73	2231.49	521.73	2231.49	521.73	2231.49	521.73
Waiomao	Tributary	4900	5% AEP	1973.61	399.51	1973.23	399.51	1973.23	399.51	1972.84	399.51
Palolo	Main	11542	5% AEP	4701.85	136.59	4701.91	136.59	4701.94	136.59	4702	136.59
Palolo	Main	10074	5% AEP	3587.06	113.75	3587.08	113.75	3587.14	113.75	3587.14	113.75
Palolo	Main	6282	5% AEP	5799.85	35.66	6226.62	35.83	6226.82	35.83	6226.83	35.83
Palolo	Lower	4810	5% AEP	15088.53	25.72	16888.48	27.12	17315.62	27.37	17320.82	27.38
Palolo	Lower	4653	5% AEP	15082.84	23.92	16845.8	25.5	17314.25	25.74	17319.48	25.75
Palolo	Lower	4557	5% AEP	15117.10	24.28	16847	25.9	17313.18	26.14	17318.98	26.15
Palolo	Lower	2609	5% AEP	13585.19	12.26	15200.56	13.25	15849.77	13.16	15562.18	13.75
Palolo	Lower	305	5% AEP	11049.25	6.08	13369.3	7.29	10431.49	6.76	11946.74	7.52

Table 8-5: 2% AEP WSEL & Discharges for FWOP and TSP Alternatives

				FWOP		Alternative 5.1		Alternative 5.2		Alternative 5.3	
River	Reach	River Sta	Plan	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Ala Wai	Upper	10082	2% AEP	649.40	7.18	2972.8	8.97	2972.8	9.15	2972.8	8.96
Ala Wai	Upper	7405	2% AEP	1732.37	7.16	3101.49	8.95	4925.83	9.05	1612	8.96
Ala Wai	Upper	6095	2% AEP	2323.86	7.15	4315.68	8.93	7306.09	8.95	2936.06	8.95
Ala Wai	Middle	5770	2% AEP	13958.64	7.15	17848.67	8.93	16879.62	8.95	15444.18	8.95
Ala Wai	Middle	5195	2% AEP	13974.68	7.04	17847.6	8.79	16521.99	8.85	15594.21	8.83
Ala Wai	Middle	3282	2% AEP	13238.95	6.82	17070.59	8.54	16462.84	8.61	16381.83	8.55
Ala Wai	Middle	2961	2% AEP	12988.28	6.68	16572.85	8.41	16588.59	8.45	16466.28	8.4
Ala Wai	Middle	2453	2% AEP	13142.96	5.98	16645.08	7.4	16648.88	7.45	16562.58	7.39
Ala Wai	Lower	67	2% AEP	3177.29	3.23	17587.2	3.24	17672.69	3.25	17584.87	3.24
Makiki	Upper	9543	2% AEP	1342.22	172.91	1342.22	172.91	1342.22	172.91	1342.22	172.91
Makiki	Upper	7672	2% AEP	757.91	107.85	757.91	107.85	757.91	107.85	757.91	107.85
Makiki	Lower	5940.67*	2% AEP	1782.97	54.03	1783.29	54.03	1783.25	54.03	1783.25	54.03
Makiki	Lower	4809.46*	2% AEP	1800.78	42.60	1800.8	42.6	1800.79	42.6	1800.78	42.6
Makiki	Lower	1897	2% AEP	1139.41	12.23	1137.08	12.24	1088.79	12.5	1137.47	12.24
Makiki	Lower	76	2% AEP	1001.06	5.98	1298.24	7.41	1437.77	7.46	1313.91	7.4
Kanaha	Ditch	4372	2% AEP	567.89	128.61	567.82	128.61	567.82	128.61	567.82	128.61
Kanaha	Ditch	943	2% AEP	365.76	69.54	365.65	69.54	365.65	69.54	365.65	69.54
Kanaha	Ditch	2	2% AEP	390.99	61.12	390.97	61.12	390.97	61.12	390.97	61.12
Manoa	Main	16506	2% AEP	5934.00	280.75	5934	280.75	5934	280.75	5934	280.75
Manoa	Main	10968	2% AEP	7311.77	184.27	7311.65	184.27	7311.83	184.27	7311.61	184.27
Manoa	Main	10496	2% AEP	4736.46	179.88	4736.45	179.88	4736.47	179.88	4736.44	179.88
Manoa	Main	8117	2% AEP	3379.37	153.48	5620.11	154.33	5619.94	154.33	5619.9	154.33
Manoa	Main	8016	2% AEP	2308.67	153.82	4635.02	154.61	4635.11	154.61	4634.98	154.61
Manoa	Main	7839	2% AEP	5694.71	152.50	6181.54	154.06	6181.66	154.06	6181.55	154.06
Manoa	Main	3042	2% AEP	9536.27	68.85	12125.54	70.49	12143.67	70.48	12143.44	70.48
Manoa	Main	2891	2% AEP	9533.90	68.05	12150.59	69.8	12151.99	69.79	12151.71	69.79
Manoa	Main	1457	2% AEP	11664.26	44.98	13893.39	46.7	14049.87	46.76	14049.68	46.76
Manoa	Main	1378	2% AEP	11672.51	43.84	13941.71	45.76	14062.38	45.82	14063.45	45.83
Manoa	Main	1107	2% AEP	7453.17	39.53	14389.62	43.01	14552.91	43.09	14531.38	43.1
Manoa	Main	84	2% AEP	7235.59	30.94	12509.46	32.62	14980.44	32.37	14544.76	32.6
Pukele	Tributary	5958	2% AEP	2947.92	522.68	2947.92	522.68	2947.92	522.68	2947.92	522.68
Waiomao	Tributary	4900	2% AEP	2573.04	400.66	2573.04	400.66	2573.04	400.66	2573.04	400.66
Palolo	Main	11542	2% AEP	5576.48	137.25	5576.54	137.25	5576.61	137.25	5576.62	137.25
Palolo	Main	10074	2% AEP	4054.35	114.51	4053.13	114.51	4053.08	114.51	4053.21	114.51
Palolo	Main	6282	2% AEP	7188.58	36.91	8021.99	37.61	8001.66	37.54	8021.55	37.59
Palolo	Lower	4810	2% AEP	19224.69	27.79	22578.93	30.11	22180.62	30.28	22193.81	30.31
Palolo	Lower	4653	2% AEP	19218.27	25.36	22284.24	28.17	22129.59	28.61	22179.84	28.65
Palolo	Lower	4557	2% AEP	18788.00	25.82	22037.58	28.74	21812.79	29.12	21884.84	29.15
Palolo	Lower	2609	2% AEP	14779.70	12.81	18073.09	14.47	18521.76	14.76	18423.85	15.32
Palolo	Lower	305	2% AEP	11153.95	6.75	14858.07	8.35	10887.01	8.69	12651.26	8.48

Table 8-6: 1% AEP WSEL & Discharges for FWOP and TSP Alternatives

				FWOP		Alternative 5.1		Alternative 5.2		Alternative 5.3	
River	Reach	River Sta	Plan	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Ala Wai	Upper	10082	1% AEP	684.39	7.52	3598.7	9.58	3598.7	9.92	3598.7	9.34
Ala Wai	Upper	7405	1% AEP	1990.62	7.52	4656.35	9.54	7891.05	9.78	2514.47	9.35
Ala Wai	Upper	6095	1% AEP	2715.52	7.52	6993.05	9.47	12164.07	9.63	4126.46	9.33
Ala Wai	Middle	5770	1% AEP	14568.90	7.52	22753.12	9.47	22400.55	9.63	15738.41	9.33
Ala Wai	Middle	5195	1% AEP	14620.00	7.40	22205.95	9.3	21413.03	9.49	15943.08	9.22
Ala Wai	Middle	3282	1% AEP	13833.08	7.18	19107.98	9.12	18526.02	9.34	16775.33	8.95
Ala Wai	Middle	2961	1% AEP	13596.45	7.04	17851.66	9.02	17762.08	9.22	16763.38	8.8
Ala Wai	Middle	2453	1% AEP	13786.46	6.29	17751.75	7.95	17855.16	8.15	16991.25	7.8
Ala Wai	Lower	67	1% AEP	3475.10	3.23	18690.35	3.32	19079.65	3.36	18456.48	3.31
Makiki	Upper	9543	1% AEP	1608.20	173.30	1608.2	173.3	1608.25	173.3	1608.25	173.3
Makiki	Upper	7672	1% AEP	771.55	107.98	772.15	107.98	774.67	108.01	772.37	107.99
Makiki	Lower	5940.67*	1% AEP	2030.93	63.12	2013.71	63.05	2045.31	63.11	2012.61	63.02
Makiki	Lower	4809.46*	1% AEP	2040.38	44.44	2040.68	44.43	2039.55	44.42	2037.27	44.43
Makiki	Lower	1897	1% AEP	1149.78	12.52	1145.95	12.54	1093.13	12.81	1147.04	12.54
Makiki	Lower	76	1% AEP	1028.75	6.30	1316.21	7.95	1531.78	8.17	1330	7.81
Kanaha	Ditch	4372	1% AEP	711.73	129.02	711.68	129.02	711.68	129.02	711.73	129.02
Kanaha	Ditch	943	1% AEP	381.66	70.05	381.39	70.05	381.86	70.05	381.71	70.05
Kanaha	Ditch	2	1% AEP	410.25	64.20	410.33	64.2	410.32	64.19	410.32	64.16
Manoa	Main	16506	1% AEP	6834.00	281.49	6834	281.49	6834	281.49	6834	281.49
Manoa	Main	10968	1% AEP	8294.58	184.87	8294.74	184.87	8294.91	184.87	8294.73	184.87
Manoa	Main	10496	1% AEP	4889.73	180.16	4889.75	180.16	4889.77	180.16	4889.76	180.16
Manoa	Main	8117	1% AEP	3890.30	153.92	6527.06	154.92	6526.98	154.92	6526.95	154.92
Manoa	Main	8016	1% AEP	2702.70	154.31	5404.44	155.22	5404.41	155.22	5404.37	155.22
Manoa	Main	7839	1% AEP	6173.39	152.87	6841.2	154.74	6841.08	154.74	6841.09	154.74
Manoa	Main	3042	1% AEP	10708.84	69.85	13270.44	71.72	14052.94	71.92	14052.7	71.92
Manoa	Main	2891	1% AEP	10672.67	69.23	14122.44	71.23	14057.28	71.41	14057.04	71.41
Manoa	Main	1457	1% AEP	13135.72	45.49	16057.25	47.69	16321.07	47.76	16318.04	47.76
Manoa	Main	1378	1% AEP	13179.87	44.21	16281.97	46.77	16360.9	46.83	16361.27	46.84
Manoa	Main	1107	1% AEP	7759.94	39.81	16778.45	44.12	16926.47	44.2	16914.27	44.2
Manoa	Main	84	1% AEP	5789.45	32.72	16142.89	33.71	17460.41	33.95	16687.96	34.29
Pukele	Tributary	5958	1% AEP	3418.67	523.26	3418.67	523.26	3418.67	523.26	3418.67	523.26
Waiomao	Tributary	4900	1% AEP	3070.11	401.49	3070.11	401.49	3070.11	401.49	3070.11	401.49
Palolo	Main	11542	1% AEP	6212.25	137.69	6211.2	137.69	6211.73	137.69	6211.77	137.69
Palolo	Main	10074	1% AEP	4397.09	115.06	4397.88	115.06	4397.84	115.06	4397.83	115.06
Palolo	Main	6282	1% AEP	8075.01	38.44	9544.35	40.05	9585.24	39.62	9584.6	39.74
Palolo	Lower	4810	1% AEP	20521.75	28.34	25065.21	31.37	24445.57	31.66	24652.14	31.85
Palolo	Lower	4653	1% AEP	19584.12	25.61	24987.52	29.16	24430.19	29.76	24652.14	29.84
Palolo	Lower	4557	1% AEP	19325.88	26.18	23983.18	29.85	23612.57	30.37	23842.18	30.46
Palolo	Lower	2609	1% AEP	14992.22	12.95	19655.18	14.88	19575.01	15.41	19651.27	15.8
Palolo	Lower	305	1% AEP	10694.14	7.49	15890.02	8.82	10997.36	9.34	12902.63	8.97

Table 8-7: 0.5% AEP WSEL & Discharges for FWOP and TSP Alternatives

				FWOP		Alternative 5.1		Alternative 5.2		Alternative 5.3	
River	Reach	River Sta	Plan	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Ala Wai	Upper	10082	0.5% AEP	945.97	7.92	4276.5	9.91	4276.5	10.23	4276.5	9.77
Ala Wai	Upper	7405	0.5% AEP	2419.37	7.91	5763.08	9.84	8980.21	10.09	3489.02	9.74
Ala Wai	Upper	6095	0.5% AEP	3326.57	7.91	8990.66	9.75	14307.05	9.87	5418.4	9.7
Ala Wai	Middle	5770	0.5% AEP	15111.36	7.91	25794.43	9.75	24817.43	9.87	17060.68	9.7
Ala Wai	Middle	5195	0.5% AEP	15529.27	7.80	24891.67	9.55	23527.8	9.72	17129.92	9.57
Ala Wai	Middle	3282	0.5% AEP	14393.69	7.58	20408.32	9.42	19596.93	9.59	17477.66	9.3
Ala Wai	Middle	2961	0.5% AEP	14203.99	7.43	18667.86	9.35	18181.06	9.51	17172.01	9.17
Ala Wai	Middle	2453	0.5% AEP	14450.15	6.63	18309.49	8.24	18267.67	8.42	17476.47	8.14
Ala Wai	Lower	67	0.5% AEP	3724.62	3.23	19283.05	3.37	19625.99	3.41	19182.38	3.37
Makiki	Upper	9543	0.5% AEP	1901.44	173.71	1901.44	173.71	1901.62	173.71	1901.62	173.71
Makiki	Upper	7672	0.5% AEP	783.08	108.08	783.08	108.08	783.08	108.08	783.08	108.08
Makiki	Lower	5940.67*	0.5% AEP	1992.95	62.47	2085.44	62.43	2085.54	62.42	2085.48	62.43
Makiki	Lower	4809.46*	0.5% AEP	2107.22	45.04	2107.2	45.04	2107.3	45.04	2107.24	45.04
Makiki	Lower	1897	0.5% AEP	1158.22	12.83	1153.81	12.85	1097.7	13.14	1152.98	12.85
Makiki	Lower	76	0.5% AEP	1055.18	6.64	1322.22	8.24	1627.48	8.44	1332.5	8.16
Kanaha	Ditch	4372	0.5% AEP	866.46	129.40	866.37	129.4	866.37	129.4	866.55	129.4
Kanaha	Ditch	943	0.5% AEP	384.97	70.69	384.73	70.69	384.73	70.69	384.73	70.69
Kanaha	Ditch	2	0.5% AEP	430.50	66.62	430.17	66.62	430.92	66.62	431	66.62
Manoa	Main	16506	0.5% AEP	7583.00	282.07	7583	282.07	7583	282.07	7583	282.07
Manoa	Main	10968	0.5% AEP	9150.59	185.27	9150.11	185.27	9152.24	185.27	9149.84	185.27
Manoa	Main	10496	0.5% AEP	5004.49	180.35	5004.56	180.35	5004.57	180.35	5004.55	180.35
Manoa	Main	8117	0.5% AEP	4252.63	154.21	7133.45	155.37	7133.4	155.37	7133.47	155.37
Manoa	Main	8016	0.5% AEP	2998.34	154.64	5909.61	155.71	5909.63	155.71	5909.59	155.71
Manoa	Main	7839	0.5% AEP	6546.32	153.16	7314.13	155.26	7314.23	155.26	7314.16	155.26
Manoa	Main	3042	0.5% AEP	11700.62	70.80	14928.37	72.97	15395.09	72.93	15294.94	72.93
Manoa	Main	2891	0.5% AEP	11660.62	70.30	15970.17	72.56	15704.36	72.54	15731.86	72.54
Manoa	Main	1457	0.5% AEP	14505.38	45.93	17925.8	48.45	18361.71	48.45	18357.54	48.44
Manoa	Main	1378	0.5% AEP	14608.65	44.52	18532.83	47.5	18435.14	47.46	18436.05	47.45
Manoa	Main	1107	0.5% AEP	8098.65	40.04	19042.79	44.79	18946.78	44.78	18943.87	44.78
Manoa	Main	84	0.5% AEP	7426.53	32.83	18777.8	35.21	18798.72	35.27	18991.34	35.65
Pukele	Tributary	5958	0.5% AEP	3935.83	523.85	3935.83	523.85	3935.83	523.85	3935.83	523.85
Waiomao	Tributary	4900	0.5% AEP	3625.10	402.32	3625.1	402.32	3625.1	402.32	3625.1	402.32
Palolo	Main	11542	0.5% AEP	6696.57	138.03	6696.66	138.03	6696.48	138.03	6696.64	138.03
Palolo	Main	10074	0.5% AEP	4708.56	115.54	4708.51	115.54	4708.48	115.54	4708.59	115.54
Palolo	Main	6282	0.5% AEP	9404.02	39.84	11007.57	41	11018.91	40.98	11006.5	41
Palolo	Lower	4810	0.5% AEP	21025.01	28.84	26923.16	32.32	26060.83	32.65	26461.8	32.88
Palolo	Lower	4653	0.5% AEP	20999.20	26.46	26885.35	29.75	25999.85	30.44	26324.74	30.58
Palolo	Lower	4557	0.5% AEP	20780.92	26.92	25268.2	30.52	24745.99	31.15	25007.2	31.31
Palolo	Lower	2609	0.5% AEP	15481.85	13.28	20455.12	15.12	20208.01	15.75	20499.91	16.1
Palolo	Lower	305	0.5% AEP	11521.65	7.58	16745.63	9.04	11110.5	9.57	13664.14	9.33

Table 8-8: 0.2% AEP WSEL & Discharges for FWOP and TSP Alternatives

				FWOP		Alternative 5.1		Alternative 5.2		Alternative 5.3	
River	Reach	River Sta	Plan	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev
Ala Wai	Upper	10082	0.2% AEP	676.84	8.37	5028.9	10.17	5028.9	10.5	5028.9	10.01
Ala Wai	Upper	7405	0.2% AEP	2771.48	8.36	6609.57	10.09	9855.66	10.33	4829.09	10.01
Ala Wai	Upper	6095	0.2% AEP	3916.92	8.37	10679.16	9.96	16195.84	10.06	8857.31	9.99
Ala Wai	Middle	5770	0.2% AEP	14734.14	8.37	28305.89	9.96	27055.85	10.06	17610.63	9.99
Ala Wai	Middle	5195	0.2% AEP	16094.16	8.26	27147.68	9.87	25535.01	9.9	17489.91	9.87
Ala Wai	Middle	3282	0.2% AEP	14760.03	8.04	21527.92	9.75	20729.79	9.79	17796.92	9.62
Ala Wai	Middle	2961	0.2% AEP	14933.96	7.89	19340.86	9.67	18596.27	9.74	17220.39	9.51
Ala Wai	Middle	2453	0.2% AEP	15219.00	7.00	18537.67	8.51	18615.81	8.63	17620.88	8.5
Ala Wai	Lower	67	0.2% AEP	3924.78	3.23	19848.09	3.43	20068.64	3.46	19983.64	3.46
Makiki	Upper	9543	0.2% AEP	2386.11	174.29	2385.88	174.29	2385.88	174.29	2385.88	174.29
Makiki	Upper	7672	0.2% AEP	803.35	108.27	803.36	108.27	803.35	108.27	803.35	108.27
Makiki	Lower	5940.67*	0.2% AEP	2037.51	62.45	2094.46	62.45	2094.57	62.45	2094.53	62.45
Makiki	Lower	4809.46*	0.2% AEP	2117.70	45.54	2117.57	45.54	2117.79	45.54	2117.82	45.54
Makiki	Lower	1897	0.2% AEP	1163.60	13.18	1159.31	13.2	1102.97	13.45	1156.34	13.21
Makiki	Lower	76	0.2% AEP	1000.96	7.01	1357.65	8.53	1707.72	8.66	1340	8.52
Kanaha	Ditch	4372	0.2% AEP	1038.41	129.78	1038.37	129.78	1038.41	129.78	1038.37	129.78
Kanaha	Ditch	943	0.2% AEP	396.99	71.21	396.93	71.21	396.94	71.21	396.96	71.21
Kanaha	Ditch	2	0.2% AEP	440.49	67.26	437.09	67.25	439.74	67.25	435.79	67.25
Manoa	Main	16506	0.2% AEP	8413.00	282.67	8413	282.67	8413	282.67	8413	282.67
Manoa	Main	10968	0.2% AEP	9971.20	185.71	9975.89	185.71	9973.56	185.71	9977.33	185.71
Manoa	Main	10496	0.2% AEP	5112.56	180.51	5112.63	180.51	5112.64	180.51	5112.63	180.51
Manoa	Main	8117	0.2% AEP	4746.00	154.50	7616.13	155.8	7616.16	155.8	7616.08	155.8
Manoa	Main	8016	0.2% AEP	3414.48	154.97	6324.83	156.15	6324.86	156.15	6324.81	156.15
Manoa	Main	7839	0.2% AEP	6942.79	153.44	7737.36	155.71	7737.46	155.71	7737.35	155.71
Manoa	Main	3042	0.2% AEP	11491.13	71.87	15352.13	73.89	17631.71	75.21	18150.96	75.25
Manoa	Main	2891	0.2% AEP	11634.15	71.50	17303	73.63	17381.45	74.69	17882.91	74.64
Manoa	Main	1457	0.2% AEP	16361.97	46.46	19202.02	48.98	20247.29	48.99	20268.9	48.99
Manoa	Main	1378	0.2% AEP	16577.02	44.91	20356.1	48.03	20199.27	47.97	20245.61	47.98
Manoa	Main	1107	0.2% AEP	8503.15	40.33	20700.32	45.34	20567.9	45.31	20595.92	45.32
Manoa	Main	84	0.2% AEP	8942.89	33.24	19851.64	36.61	19880.57	36.32	19686.39	36.8
Pukele	Tributary	5958	0.2% AEP	4730.12	524.69	4727.08	524.69	4730.88	524.69	4730.88	524.69
Waiomao	Tributary	4900	0.2% AEP	4307.81	403.23	4308.69	403.23	4308.69	403.23	4308.69	403.23
Palolo	Main	11542	0.2% AEP	7275.36	138.42	7276.94	138.42	7276.59	138.42	7276.59	138.42
Palolo	Main	10074	0.2% AEP	5086.40	116.11	5086.75	116.11	5086.53	116.11	5085.48	116.11
Palolo	Main	6282	0.2% AEP	10942.51	40.62	12395.26	41.71	12384.69	41.72	12385.24	41.71
Palolo	Lower	4810	0.2% AEP	23203.64	29.61	29104.83	33.49	27504.43	33.6	27461.22	33.66
Palolo	Lower	4653	0.2% AEP	19854.48	26.43	29104.67	30.46	27498.92	31.04	27461.22	31.09
Palolo	Lower	4557	0.2% AEP	20316.26	26.71	26762.49	31.38	25742.3	31.84	25784.35	31.87
Palolo	Lower	2609	0.2% AEP	15590.81	13.45	21309.59	15.41	20819.15	16.04	21185.84	16.35
Palolo	Lower	305	0.2% AEP	11458.40	8.22	17493.49	9.47	11111.59	9.76	14812.45	9.62

8.2. Flood Inundation Maps

Flood inundation maps for the Future Without Project conditions are shown in Section 6.2, so only the Flood Inundation for Alternative 5.3 are shown below.

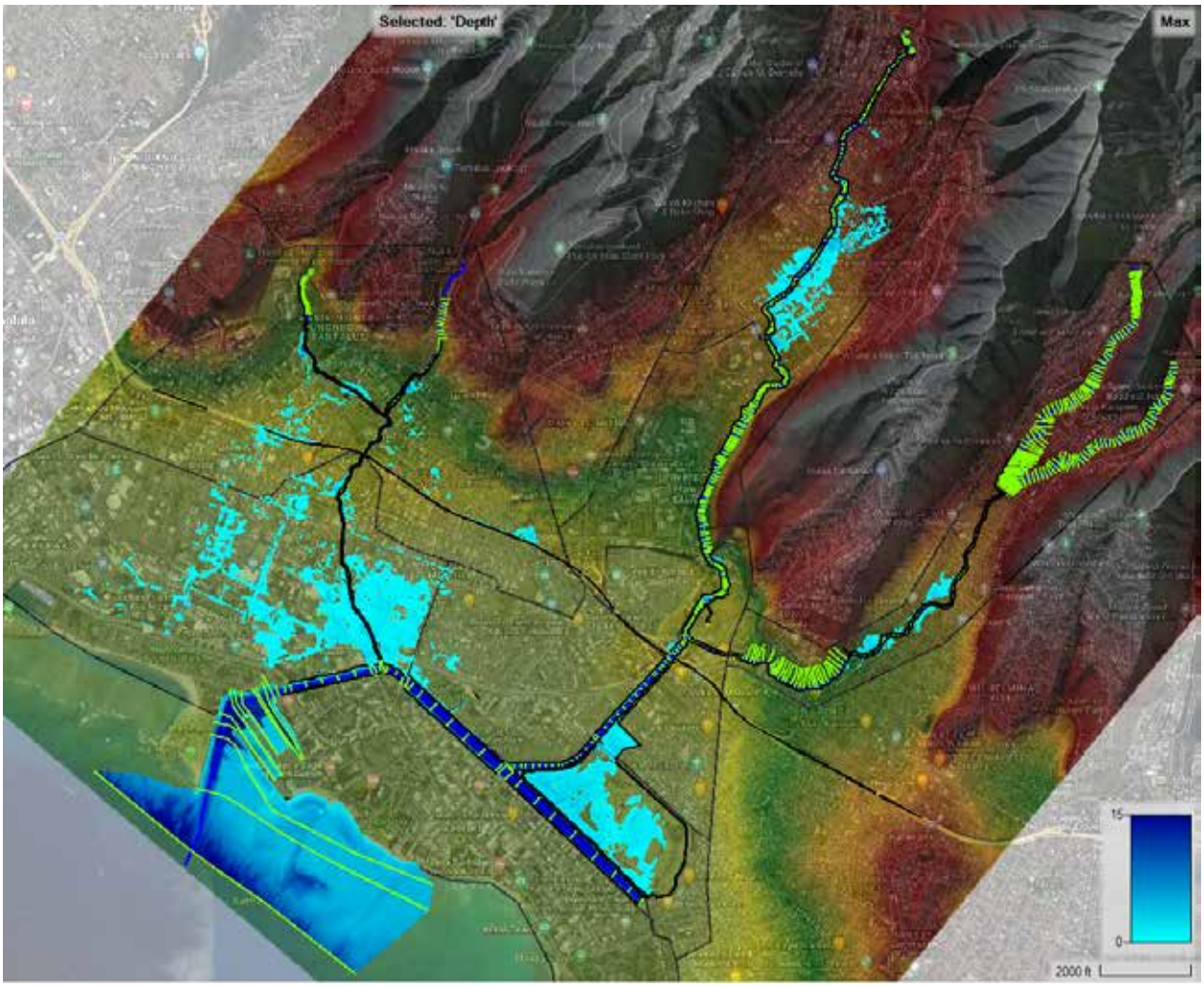


Figure 8-1: Alt 5.3 Flood Inundation Depths for the 10% AEP

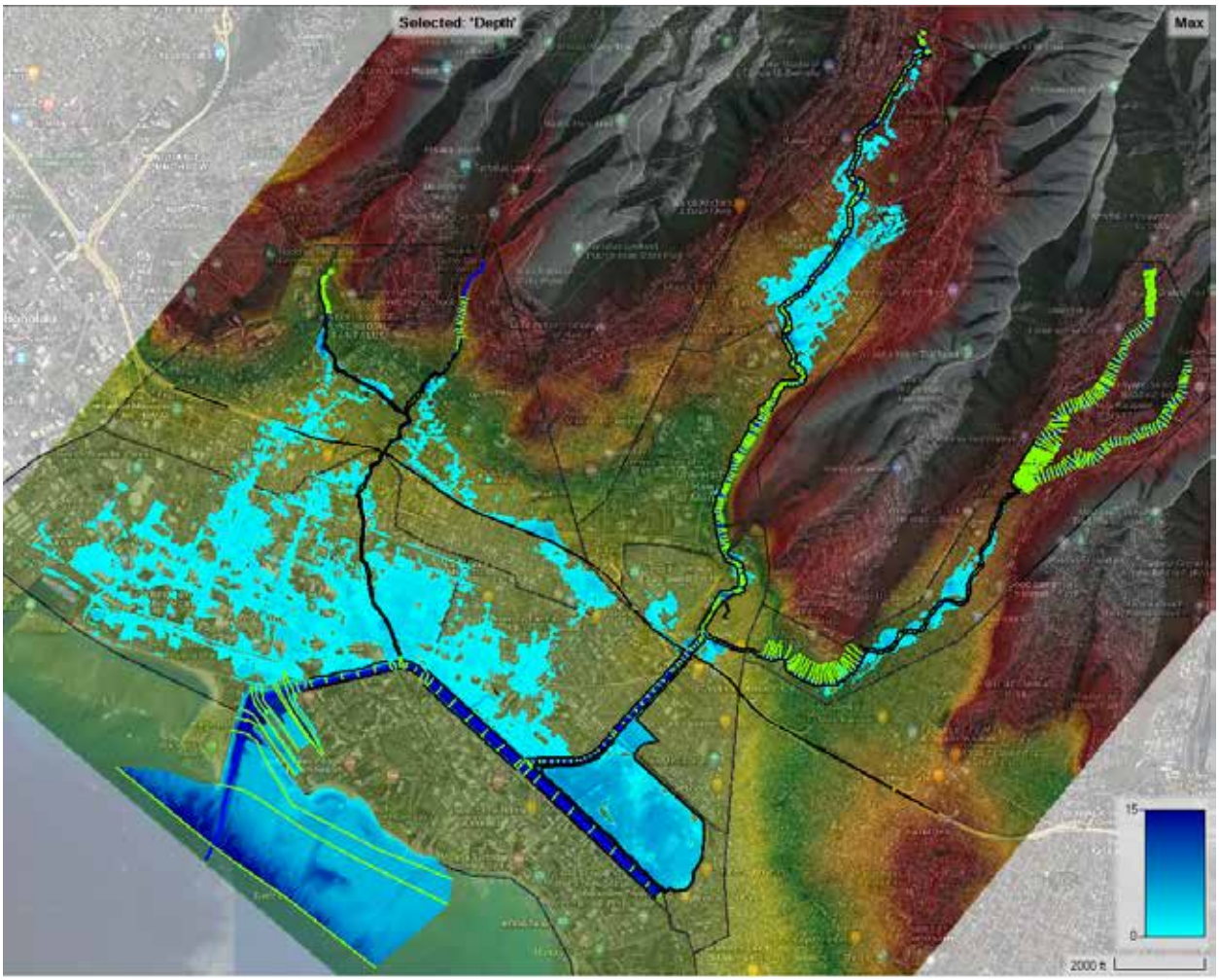


Figure 8-2: Alt 5.3 Flood Inundation Depths for the 2% AEP

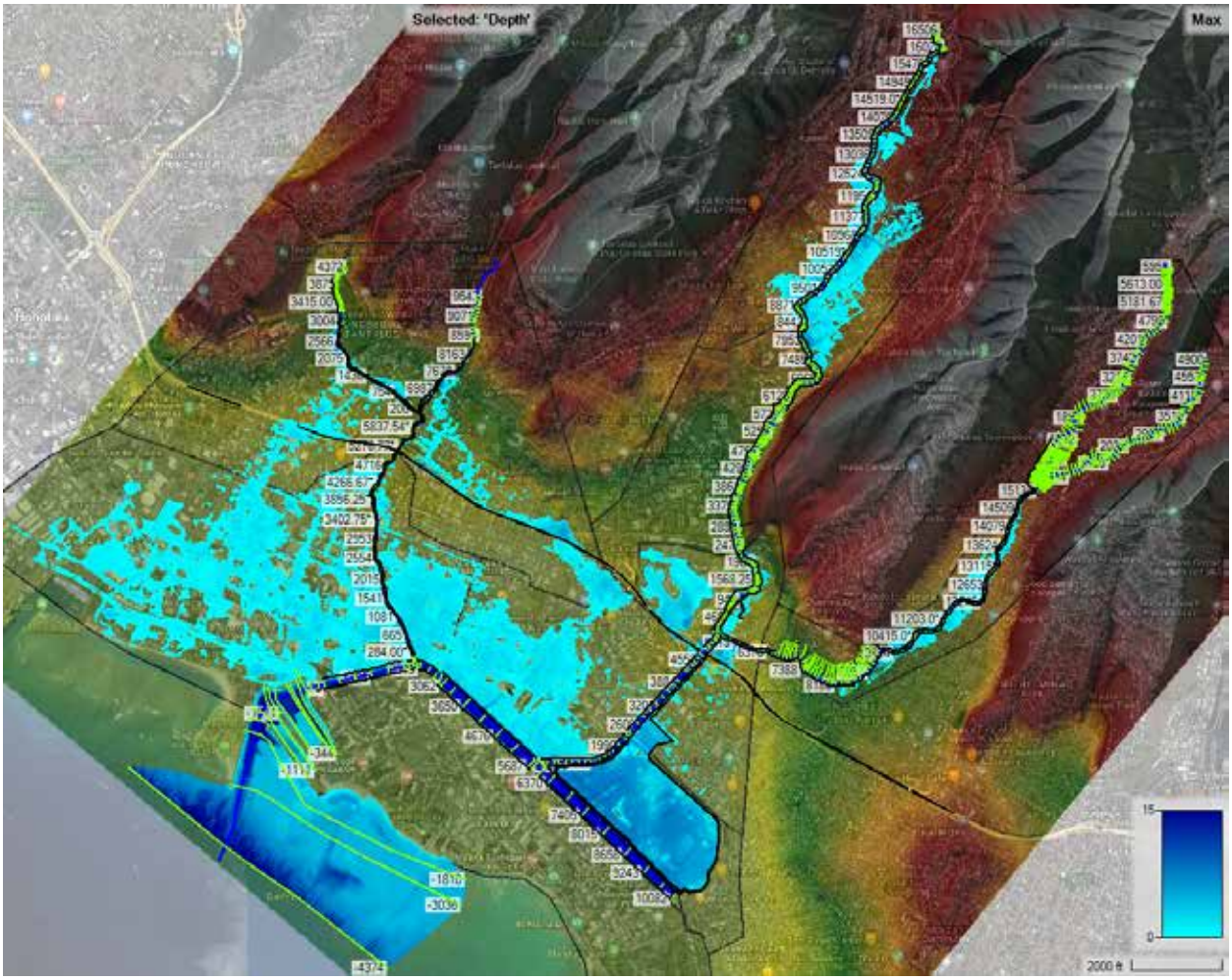


Figure 8-3: Alt 5.3 Flood Inundation Depths for the 1% AEP

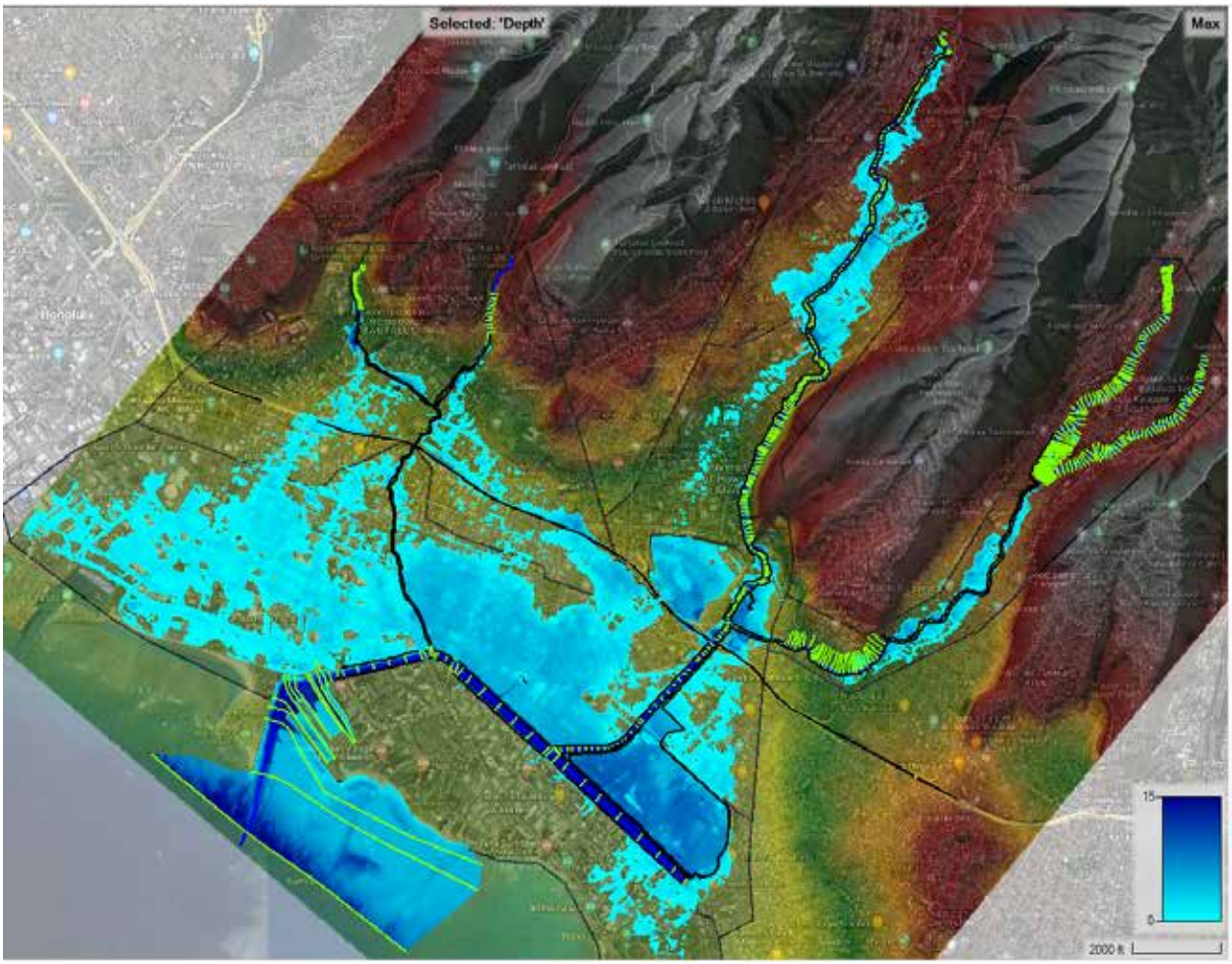


Figure 8-4: Alt 5.3 Flood Inundation Depths for the 0.2% AEP

8.3. Velocities and Shear Stress for the Recommended Plan, Alternative 5.3

The purpose of the floodwalls is to provide a barrier against flood inundation and to protect structures from hydrostatic and hydrodynamic loads. These barriers keep the flood discharges within the channels until they reach the top of the floodwall and start to overtop the floodwalls. The 6-foot heights of the floodwalls were chosen to help prevent overland flooding in some locations for the lower, more frequent flood events, while maintaining the viewshed and being constructable, both in design and costs. While these 6-foot-high levees do not protect against the larger, less frequent flood events, they do still reduce the flooding in the targeted locations.

When floodwalls keep the discharge within the channel, however, the water surface elevations increase along with the velocities. This can cause induced damages in other areas of the watershed and can increase the potential for erosion within the channel or along the banks. The overland flood flow velocities will decrease. See Figure 8-1 for the Future Without Project overland flood map for the 1% AEP event and the velocities in the overbanks. See Figure 8-2 for Alternative 5.3, the recommended plan.

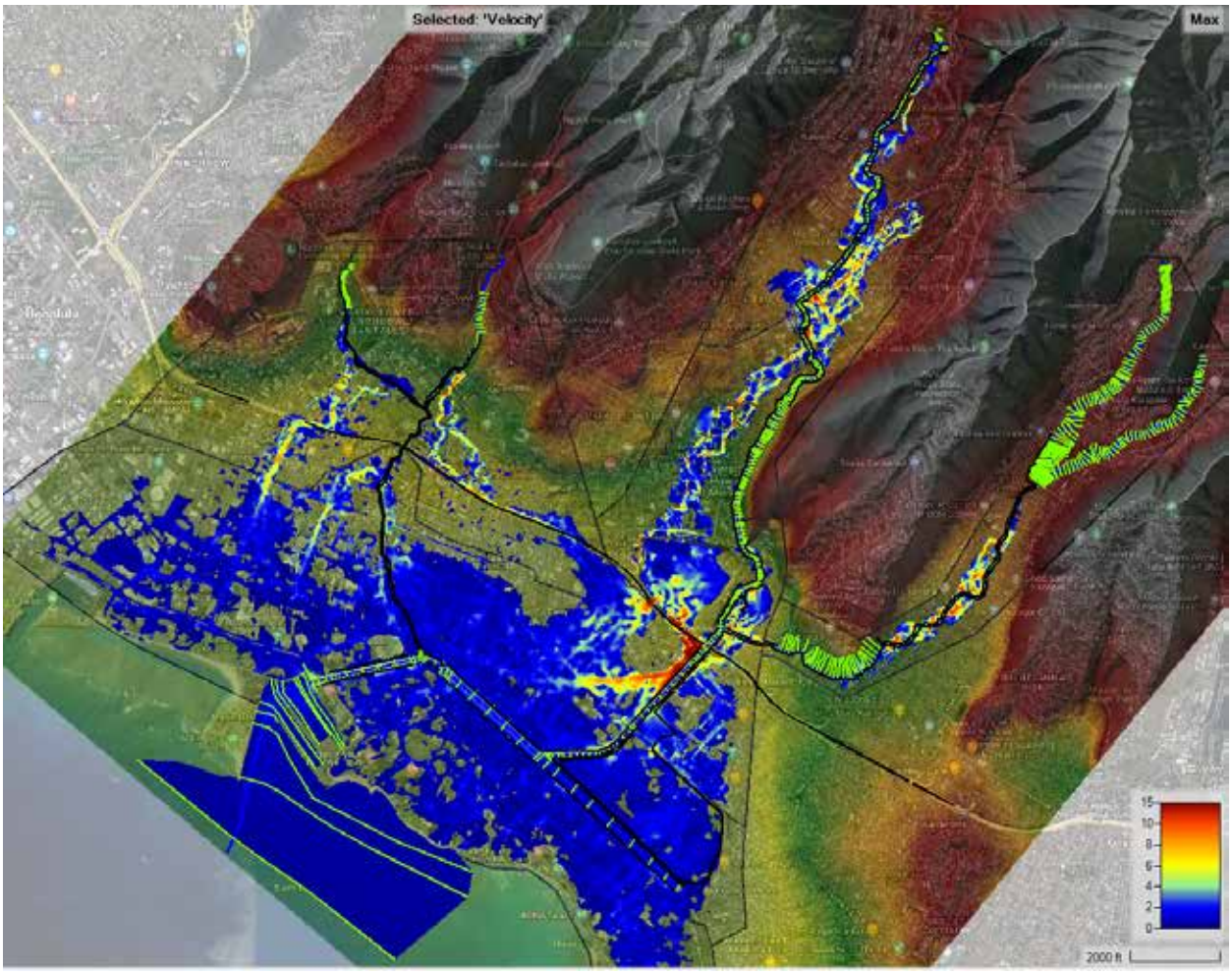


Figure 8-5: FWOP Overland Flood Velocities for the 1% AEP

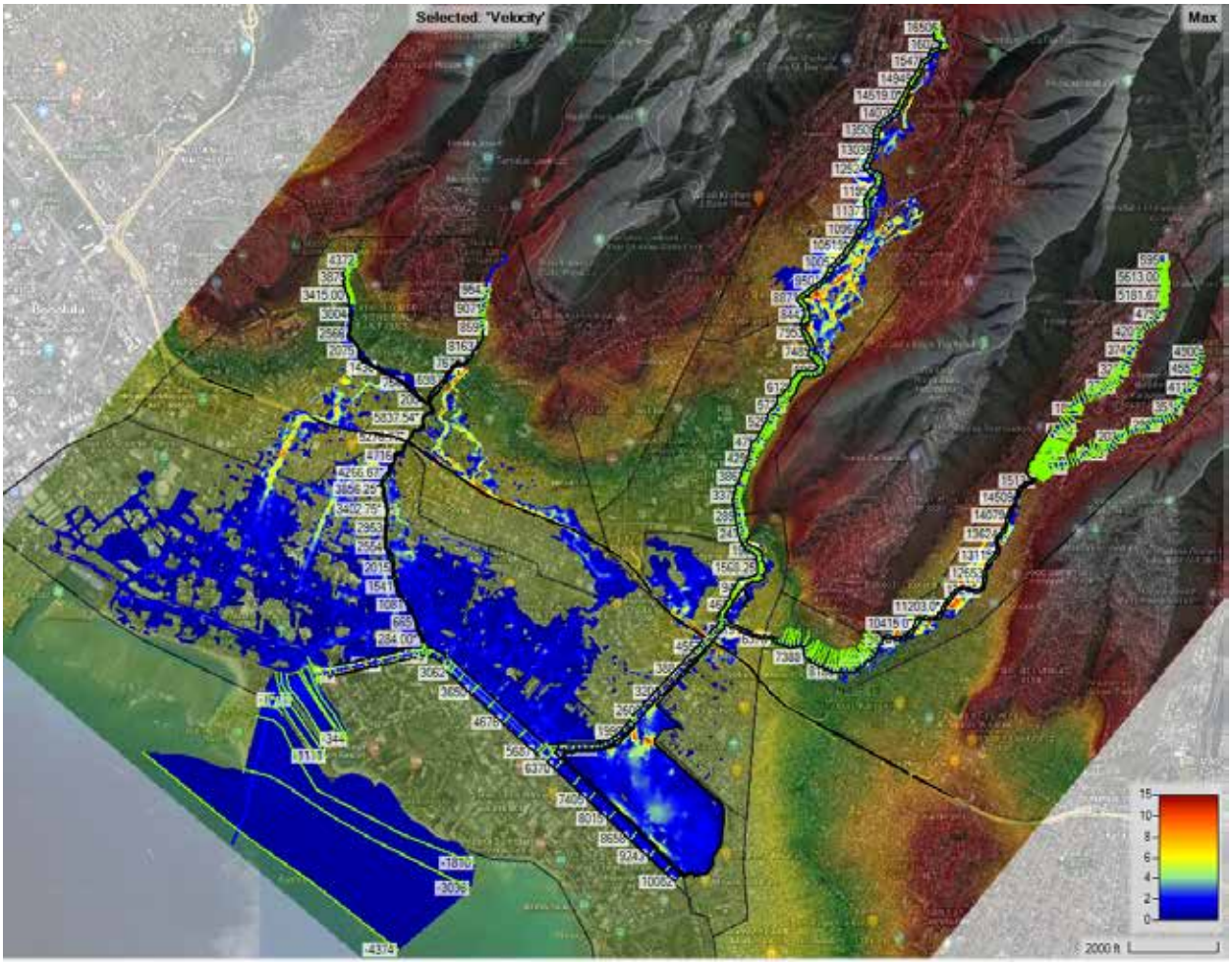


Figure 8-6: Alt 5.3 Overland Flood Velocities for the 1% AEP

One method of investigating the impacts of floodwalls on the channel and banks is by looking at the mean channel velocities of the FWOP and Recommended Alternatives and how they change, and as compared to the channel material. A table of the allowable velocities for channel design from the USDA NRCS (Part 654 Stream Restoration Design National Engineering Handbook, August 2007) is shown below in Table 8-9.

Table 8-9: Allowable Velocities for Threshold Channel Design from the USDA NRCS Stream Restoration Design National Engineering Handbook

Table 8–4 Allowable velocities

Channel material	Mean channel velocity (ft/s)	(m/s)
Fine sand	2.0	0.61
Coarse sand	4.0	1.22
Fine gravel	6.0	1.83
Earth		
Sandy silt	2.0	0.61
Silt clay	3.5	1.07
Clay	6.0	1.83
Grass-lined earth (slopes <5%)		
Bermudagrass		
Sandy silt	6.0	1.83
Silt clay	8.0	2.44
Kentucky bluegrass		
Sandy silt	5.0	1.52
Silt clay	7.0	2.13
Poor rock (usually sedimentary)	10.0	3.05
Soft sandstone	8.0	2.44
Soft shale	3.5	1.07
Good rock (usually igneous or hard metamorphic)	20.0	6.08

8.3.1. Woodlawn Drive Floodwall

The average channel velocities and shear stress was investigated for the area of the Woodlawn Drive Floodwall. The changes to the 1% AEP values from the FWOP to Alternative 5.3, the recommended plan, are shown below for the Woodlawn Drive Floodwall in Figure 8-7 and in Table 8-10. The changes are relatively minor and within the range for the existing channel material, see Figure 8-8 and Figure 8-9. While there does not appear to be a significant impact, a full erosion and scour analysis is recommended for the PED phase.

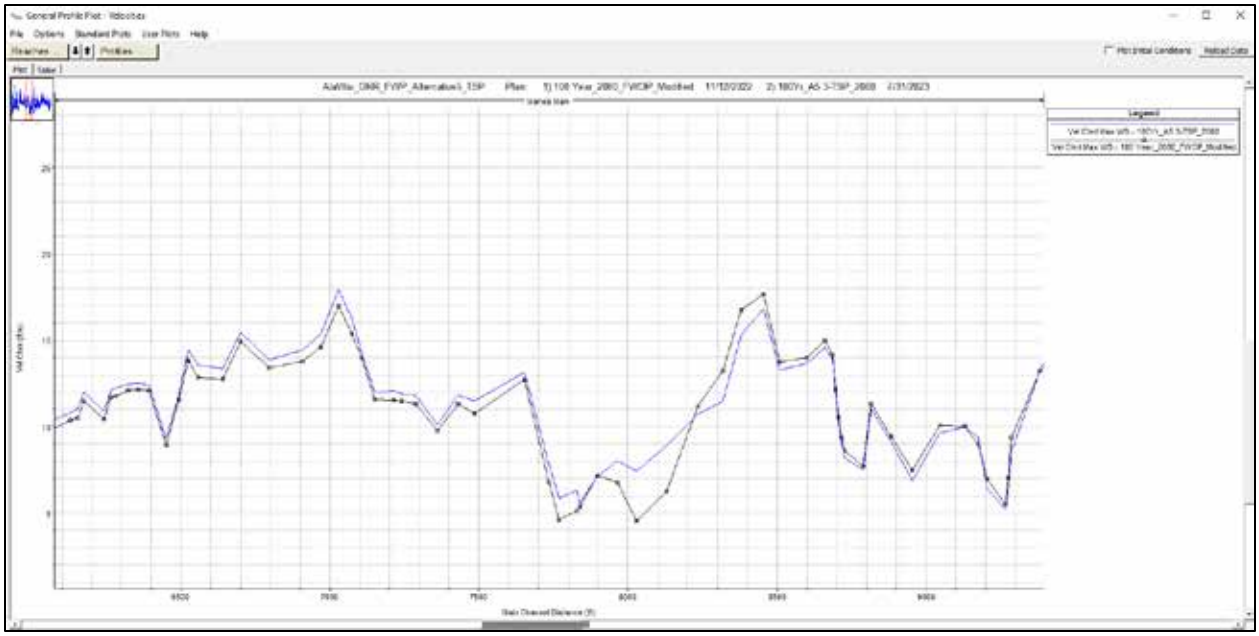


Figure 8-7: Average Channel Velocity for the 1% AEP Flood Event for the FWOP and Alternative 5.3 in the Woodlawn Drive Floodwall Area.

Table 8-10: Average Channel Velocity and Shear Stress for the 1% AEP Flood Event for the FWOP and Alternative 5.3 in the Woodlawn Drive Floodwall Area

HEC-RAS River: Manoa Reach: Main Profile: Max WS

Reach	River Sta	Profile	Plan	Q Total	W.S. Elev	E.G. Elev	Vel Chnl	Shear Chan	Shear LOB	Shear ROB	Shear Total
				(cfs)	(ft)	(ft)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Main	8588	Max WS	100 Year_2080_FWOP_Modified	8599.67	158.70	161.66	14.02	5.36	1.51	0.81	4.18
Main	8588	Max WS	100Yr_A5.3-TSP_2080	8518.21	158.85	161.65	13.66	5.07	1.46	0.72	3.91
Main	8497	Max WS	100 Year_2080_FWOP_Modified	9245.98	157.80	160.70	13.75	5.34	1.21		4.68
Main	8497	Max WS	100Yr_A5.3-TSP_2080	9154.63	158.02	160.72	13.26	4.95	1.19		4.34
Main	8490			Lat Struct							
Main	8442	Max WS	100 Year_2080_FWOP_Modified	10287.21	156.98	161.82	17.69	9.18	1.14		7.67
Main	8442	Max WS	100Yr_A5.3-TSP_2080	10200.91	157.30	161.66	16.84	8.23	1.30		6.93
Main	8367	Max WS	100 Year_2080_FWOP_Modified	10331.78	155.44	159.82	16.79	8.67			8.67
Main	8367	Max WS	100Yr_A5.3-TSP_2080	10246.48	156.00	159.66	15.34	7.20			7.20
Main	8306	Max WS	100 Year_2080_FWOP_Modified	10498.37	154.34	157.06	13.24	5.46			5.46
Main	8306	Max WS	100Yr_A5.3-TSP_2080	10303.89	155.16	157.21	11.48	4.03			4.03
Main	8223	Max WS	100 Year_2080_FWOP_Modified	7771.79	153.46	155.35	11.17	3.57	1.13	0.72	2.99
Main	8223	Max WS	100Yr_A5.3-TSP_2080	8591.97	154.63	156.35	10.70	3.14	1.07	0.73	2.55
Main	8117	Max WS	100 Year_2080_FWOP_Modified	4198.20	154.00	154.61	6.29	1.09		0.23	1.00
Main	8117	Max WS	100Yr_A5.3-TSP_2080	6526.95	154.92	156.14	8.91	2.14		0.51	1.93
Main	8016	Max WS	100 Year_2080_FWOP_Modified	3028.09	154.40	154.72	4.53	0.58			0.58
Main	8016	Max WS	100Yr_A5.3-TSP_2080	5400.81	155.22	156.09	7.45	1.54			1.54
Main	7953	Max WS	100 Year_2080_FWOP_Modified	4704.63	153.55	154.26	6.81	1.29	0.41		1.17
Main	7953	Max WS	100Yr_A5.3-TSP_2080	6315.88	154.71	155.69	8.04	1.75	0.60	0.10	1.25
Main	7885	Max WS	100 Year_2080_FWOP_Modified	6954.23	152.77	153.57	7.18	1.41			1.41
Main	7885	Max WS	100Yr_A5.3-TSP_2080	7839.12	154.37	155.16	7.13	1.35			1.35
Main	7839	Max WS	100 Year_2080_FWOP_Modified	6034.08	153.17	153.62	5.40	0.59			0.59
Main	7839	Max WS	100Yr_A5.3-TSP_2080	6841.09	154.74	155.22	5.58	0.61			0.61
Main	7819	Max WS	100 Year_2080_FWOP_Modified	4863.09	153.38	153.80	5.14	0.54			0.54
Main	7819	Max WS	100Yr_A5.3-TSP_2080	6467.67	154.66	155.27	6.30	0.80			0.80
Main	7756			Bridge							
Main	7746	Max WS	100 Year_2080_FWOP_Modified	4863.05	152.44	152.77	4.62	0.43			0.43
Main	7746	Max WS	100Yr_A5.3-TSP_2080	6467.46	153.22	153.76	5.87	0.69			0.69
Main	7734	Max WS	100 Year_2080_FWOP_Modified	7543.23	151.65	152.34	6.77	0.91	0.25	0.19	0.75
Main	7734	Max WS	100Yr_A5.3-TSP_2080	9190.70	152.35	153.28	7.82	1.20	0.35	0.26	0.98
Main	7653	Max WS	100 Year_2080_FWOP_Modified	10946.61	150.49	152.93	12.72	4.35	0.62	1.23	3.54
Main	7653	Max WS	100Yr_A5.3-TSP_2080	12155.50	151.18	153.77	13.13	4.54	0.71	1.43	3.69
Main	7485	Max WS	100 Year_2080_FWOP_Modified	10631.19	149.81	151.43	10.77	2.98	1.27	0.37	1.93
Main	7485	Max WS	100Yr_A5.3-TSP_2080	12187.48	150.46	152.28	11.50	3.34	1.50	0.56	2.21
Main	7429	Max WS	100 Year_2080_FWOP_Modified	10917.85	149.36	151.32	11.31	3.74	1.44		3.49
Main	7429	Max WS	100Yr_A5.3-TSP_2080	12422.05	150.04	152.16	11.81	3.99	1.61	0.23	3.36
Main	7360	Max WS	100 Year_2080_FWOP_Modified	11343.41	148.91	150.40	9.77	2.93	0.09		2.82
Main	7360	Max WS	100Yr_A5.3-TSP_2080	12913.38	149.58	151.17	10.12	3.06	0.34		2.94
Main	7355			Lat Struct							
Main	7290	Max WS	100 Year_2080_FWOP_Modified	11609.82	148.25	150.24	11.33	3.70	0.40	0.06	3.33
Main	7290	Max WS	100Yr_A5.3-TSP_2080	13141.29	148.93	151.08	11.79	3.90	0.66	0.20	3.39
Main	7239	Max WS	100 Year_2080_FWOP_Modified	11621.04	147.83	149.88	11.51	3.98	0.22		3.75
Main	7239	Max WS	100Yr_A5.3-TSP_2080	13237.62	148.53	150.72	11.90	4.15	0.55		3.92
Main	7213	Max WS	100 Year_2080_FWOP_Modified	11643.61	147.61	149.65	11.52	3.74	0.87	0.71	3.30
Main	7213	Max WS	100Yr_A5.3-TSP_2080	13248.76	148.31	150.54	12.07	4.00	0.94	0.70	3.37
Main	7149	Max WS	100 Year_2080_FWOP_Modified	11667.98	147.12	149.18	11.56	3.85	0.71	0.81	3.36
Main	7149	Max WS	100Yr_A5.3-TSP_2080	13258.82	147.85	150.04	11.99	4.03	0.97	0.90	3.50
Main	7106	Max WS	100 Year_2080_FWOP_Modified	11735.17	146.51	149.54	14.01	8.88	2.00		8.28
Main	7106	Max WS	100Yr_A5.3-TSP_2080	13338.45	147.26	150.40	14.29	9.04	2.56		8.47
Main	7074	Max WS	100 Year_2080_FWOP_Modified	11898.42	145.79	149.46	15.37	10.50	0.34		10.02
Main	7074	Max WS	100Yr_A5.3-TSP_2080	13899.89	146.55	150.65	16.25	11.41	1.28		10.88
Main	7029	Max WS	100 Year_2080_FWOP_Modified	11910.64	144.61	149.08	16.98	12.85	1.22	0.56	12.15
Main	7029	Max WS	100Yr_A5.3-TSP_2080	13936.42	145.38	150.37	17.93	13.86	2.02	1.08	12.76

Figure 8-8: Manoa Stream upstream of Woodlawn Drive

Figure 8-9: Manoa Stream downstream of Woodlawn Drive

8.3.2. Koali Road Floodwall

The average channel velocities and shear stress was investigated for the area of the Koali Road Floodwall. The changes to the 1% AEP values from the FWOP to Alternative 5.3, the recommended plan, are shown below for the Koali Road Floodwall in Figure 8-10 and in Table 8-11. The changes are relatively minor in the upstream portion of the Koali Road Floodwall but increase a bit near the small drop in the channel. The drop is rock, and the banks are stone revetment on the left bank and stone and vegetative on the right bank, see Figure 8-11. The increase in velocities and shear stress are less than the 20 ft/s criteria for stone, but it is still recommended that this is further investigated during the PED phase to ensure stability.

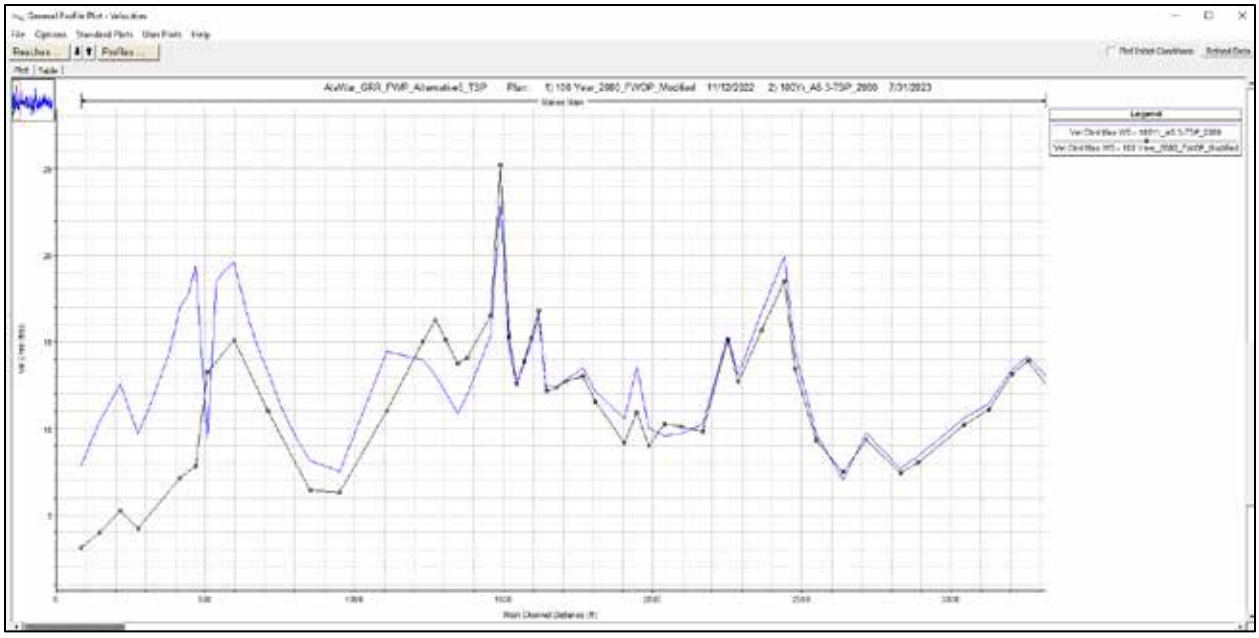


Figure 8-10: Average Channel Velocity for the 1% AEP Flood Event for the FWOP and Alternative 5.3 in the Koali Road Floodwall Area

Table 8-11: Average Channel Velocity and Shear Stress for the 1% AEP Flood Event for the FWOP and Alternative 5.3 in the Koali Road Floodwall Area

HEC-RAS River: Manoa Reach: Main Profile: Max WS

Reach	River Sta	Profile	Plan	Q Total	W.S. Elev	E.G. Elev	Vel Chnl	Shear Chan	Shear LOB	Shear ROB	Shear Total
				(cfs)	(ft)	(ft)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Main	1230	Max WS	100 Year_2080_FWOP_Modified	11126.28	41.44	44.73	15.03	9.22	2.26	2.26	6.02
Main	1230	Max WS	100Yr_A5.3-TSP_2080	16399.57	45.40	47.99	13.95	7.10	1.95	2.33	4.20
Main	1107	Max WS	100 Year_2080_FWOP_Modified	7505.39	39.82	41.57	11.00	5.16	1.67	1.15	3.34
Main	1107	Max WS	100Yr_A5.3-TSP_2080	16914.27	44.20	46.95	14.44	7.74	3.10	2.05	4.12
Main	948	Max WS	100 Year_2080_FWOP_Modified	7865.07	38.97	39.45	6.33	1.69	0.44	1.15	1.25
Main	948	Max WS	100Yr_A5.3-TSP_2080	16647.36	43.37	44.06	7.54	2.10	0.70	1.57	1.64
Main	947			Lat Struct							
Main	851	Max WS	100 Year_2080_FWOP_Modified	7934.58	38.58	39.14	6.46	1.74	0.27	0.98	1.36
Main	851	Max WS	100Yr_A5.3-TSP_2080	16607.61	42.93	43.81	8.14	2.42	0.38	1.55	1.91
Main	804.33*	Max WS	100Yr_A5.3-TSP_2080	16760.40	42.50	43.69	9.50	3.34	0.66	1.88	2.51
Main	757.67*	Max WS	100Yr_A5.3-TSP_2080	16682.06	41.92	43.58	11.15	4.68	1.11	2.22	3.35
Main	711	Max WS	100 Year_2080_FWOP_Modified	8109.47	37.47	39.29	11.02	5.34	1.14	1.01	3.61
Main	711	Max WS	100Yr_A5.3-TSP_2080	16698.84	41.31	43.72	13.27	6.76	1.83	2.53	4.56
Main	673.00*	Max WS	100Yr_A5.3-TSP_2080	16723.46	40.89	43.96	14.83	8.37	2.28	2.83	5.56
Main	635.00*	Max WS	100Yr_A5.3-TSP_2080	16644.51	40.39	44.39	16.81	10.69	2.94	3.19	7.04
Main	597	Max WS	100 Year_2080_FWOP_Modified	8009.09	35.65	39.17	15.13	9.91	2.46	0.39	8.45
Main	597	Max WS	100Yr_A5.3-TSP_2080	16560.99	39.72	45.27	19.58	14.53	4.07	3.65	9.58
Main	566.67*	Max WS	100Yr_A5.3-TSP_2080	16410.55	39.12	44.50	19.14	13.89	3.76	2.68	8.68
Main	536.33*	Max WS	100Yr_A5.3-TSP_2080	16258.80	38.55	43.64	18.50	12.98	3.38	2.17	8.24
Main	506	Max WS	100 Year_2080_FWOP_Modified	7972.25	34.03	36.72	13.23	7.52	1.67	0.39	6.56
Main	506	Max WS	100Yr_A5.3-TSP_2080	8624.19	38.13	39.45	9.38	3.32	0.83	0.54	2.20
Main	487			Inl Struct							
Main	468	Max WS	100 Year_2080_FWOP_Modified	7106.36	33.26	34.20	7.83	2.34	0.45	0.19	1.95
Main	468	Max WS	100Yr_A5.3-TSP_2080	20550.72	35.35	41.07	19.39	13.68	3.45	1.66	11.03
Main	442.50*	Max WS	100Yr_A5.3-TSP_2080	19644.41	35.43	40.24	17.74	11.46	2.92	0.90	9.61
Main	417	Max WS	100 Year_2080_FWOP_Modified	6837.18	33.01	33.81	7.18	1.96	0.38		1.79
Main	417	Max WS	100Yr_A5.3-TSP_2080	18250.66	34.62	39.09	17.05	10.77	2.52		9.77
Main	381.25*	Max WS	100Yr_A5.3-TSP_2080	17649.54	34.39	37.61	14.46	7.56	1.70	0.30	6.44
Main	345.50*	Max WS	100Yr_A5.3-TSP_2080	17525.69	34.42	36.89	12.67	5.63	1.21	0.45	4.48
Main	309.75*	Max WS	100Yr_A5.3-TSP_2080	17180.59	34.60	36.48	11.09	4.19	0.89	0.50	3.21
Main	274	Max WS	100 Year_2080_FWOP_Modified	6503.82	32.92	33.20	4.23	0.62	0.12	0.07	0.49
Main	274	Max WS	100Yr_A5.3-TSP_2080	16579.85	34.75	36.19	9.71	3.16	0.68	0.50	2.38
Main	215	Max WS	100 Year_2080_FWOP_Modified	6323.60	32.72	33.13	5.25	1.00	0.21	0.26	0.75
Main	215	Max WS	100Yr_A5.3-TSP_2080	16631.65	33.93	36.26	12.55	5.58	1.36	1.55	4.10
Main	147	Max WS	100 Year_2080_FWOP_Modified	5999.72	32.75	33.00	4.00	0.57	0.11	0.14	0.46
Main	147	Max WS	100Yr_A5.3-TSP_2080	17038.46	33.89	35.53	10.43	3.80	0.84	1.08	3.01
Main	84	Max WS	100 Year_2080_FWOP_Modified	5897.29	32.71	32.85	3.11	0.34	0.08	0.12	0.28
Main	84	Max WS	100Yr_A5.3-TSP_2080	16687.96	34.29	35.21	7.85	2.12	0.52	0.78	1.74

Figure 8-11: Manoa Stream at Koali Road, looking downstream.

8.3.3. Manoa-Palolo Canal portion of the Ala Wai Canal Floodwall

The average channel velocities and shear stress was investigated for the area of the Manoa-Palolo Canal portion of the Ala Wai Canal Floodwall. The changes to the 1% AEP values from the FWOP to Alternative 5.3, the recommended plan, are shown below for the Manoa-Palolo area of the Ala Wai Canal Floodwall in Figure 8-12 and in Table 8-12. The changes are relatively minor and within the range for the existing channel material in the downstream portion of the reach. There is an increase in the area between the King Street Bridge (RS 4501) and Kapiolani Boulevard (RS 4031), but that is in an area where the banks are armored in stone, see Figure 8-13 and Figure 8-14. The increase in velocities and shear stress are less than the 20 ft/s criteria for good stone, but it is still recommended that this is further investigated during the PED phase to ensure stability.

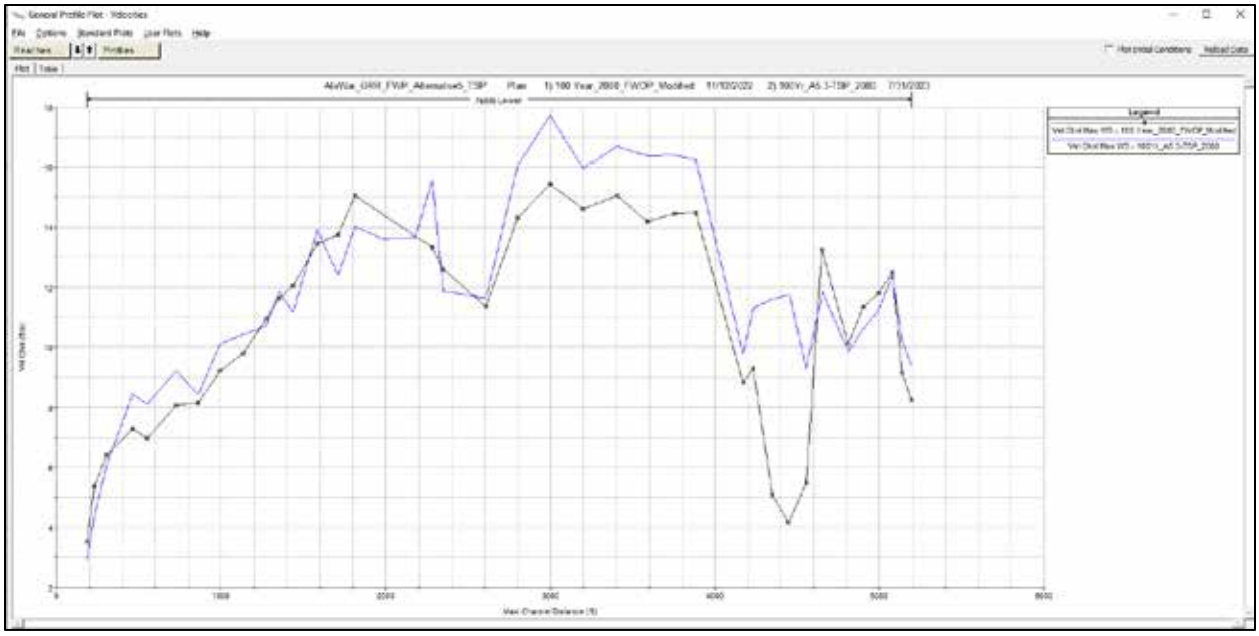


Figure 8-12: Average Channel Velocity for the 1% AEP Flood Event for the FWOP and Alternative 5.3 in the Manoa-Palolo Area of the Ala Wai Canal Floodwall

Table 8-12: Average Channel Velocity and Shear Stress for the 1% AEP Flood Event for the FWOP and Alternative 5.3 in the Manoa-Palolo Area of the Ala Wai Canal Floodwall

HEC-RAS River: Palolo Reach: Lower Profile: Max WS

Reach	River Sta	Profile	Plan	Q Total	W.S. Elev	E.G. Elev	Vel Chnl	Shear Chan	Shear LOB	Shear ROB	Shear Total
				(cfs)	(ft)	(ft)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Lower	4903	Max WS	100 Year_2080_FWOP_Modified	21399.82	28.21	30.17	11.33	1.83	0.19	0.50	1.45
Lower	4903	Max WS	100Yr_A5.3-TSP_2080	24986.54	31.66	33.35	10.61	1.50	0.33	0.51	1.19
Lower	4810	Max WS	100 Year_2080_FWOP_Modified	20733.56	28.44	30.02	10.11	1.45	0.13	0.04	1.30
Lower	4810	Max WS	100Yr_A5.3-TSP_2080	24652.14	31.85	33.34	9.86	1.30	0.27	0.09	0.99
Lower	4732			Bridge							
Lower	4653	Max WS	100 Year_2080_FWOP_Modified	20603.69	25.59	28.30	13.26	1.82	0.08	0.28	1.64
Lower	4653	Max WS	100Yr_A5.3-TSP_2080	24652.14	29.84	31.97	11.84	1.35	0.17	0.48	1.12
Lower	4652			Lat Struct							
Lower	4557	Max WS	100 Year_2080_FWOP_Modified	11279.87	26.65	27.11	5.50	0.27	0.02	0.05	0.23
Lower	4557	Max WS	100Yr_A5.3-TSP_2080	23842.18	30.46	31.77	9.29	0.72	0.11	0.20	0.58
Lower	4501			Bridge							
Lower	4452	Max WS	100 Year_2080_FWOP_Modified	7697.40	26.23	26.50	4.15	0.16	0.00	0.00	0.14
Lower	4452	Max WS	100Yr_A5.3-TSP_2080	23649.87	27.57	29.71	11.75	1.23	0.10	0.04	0.93
Lower	4352	Max WS	100 Year_2080_FWOP_Modified	10193.53	26.91	27.29	5.07	0.23	0.06	0.05	0.18
Lower	4352	Max WS	100Yr_A5.3-TSP_2080	24257.83	27.51	29.52	11.60	1.17	0.35	0.27	0.92
Lower	4233	Max WS	100 Year_2080_FWOP_Modified	16307.38	24.55	25.84	9.29	0.78	0.18	0.18	0.57
Lower	4233	Max WS	100Yr_A5.3-TSP_2080	24276.80	27.48	29.34	11.31	1.09	0.35	0.33	0.81
Lower	4171	Max WS	100 Year_2080_FWOP_Modified	17063.12	24.91	26.09	8.84	0.71	0.13	0.18	0.53
Lower	4171	Max WS	100Yr_A5.3-TSP_2080	23132.72	27.95	29.36	9.78	0.82	0.22	0.27	0.63
Lower	4031			Bridge							
Lower	3884	Max WS	100 Year_2080_FWOP_Modified	16979.73	17.29	20.55	14.49	2.12			2.12
Lower	3884	Max WS	100Yr_A5.3-TSP_2080	23088.79	19.64	23.72	16.27	2.54	0.38		2.15
Lower	3760	Max WS	100 Year_2080_FWOP_Modified	16971.69	16.82	20.07	14.46	2.11	0.09	0.12	2.10
Lower	3760	Max WS	100Yr_A5.3-TSP_2080	23339.58	19.24	23.42	16.41	2.55	0.55	0.59	2.54
Lower	3590	Max WS	100 Year_2080_FWOP_Modified	16683.37	16.24	19.37	14.18	2.05	0.14	0.04	2.05
Lower	3590	Max WS	100Yr_A5.3-TSP_2080	23595.37	18.69	22.86	16.39	2.56	0.64	0.52	2.55
Lower	3406	Max WS	100 Year_2080_FWOP_Modified	17697.88	15.50	19.02	15.05	2.34	0.18	0.10	2.31
Lower	3406	Max WS	100Yr_A5.3-TSP_2080	24475.38	18.07	22.40	16.70	2.67	0.72	0.63	2.65
Lower	3201	Max WS	100 Year_2080_FWOP_Modified	17559.73	14.72	18.04	14.61	2.24		0.06	2.24
Lower	3201	Max WS	100Yr_A5.3-TSP_2080	24393.16	17.37	21.32	15.95	2.47	0.52	0.60	2.46
Lower	3001	Max WS	100 Year_2080_FWOP_Modified	16927.16	13.97	17.68	15.45	2.42	0.33	0.33	2.41
Lower	3001	Max WS	100Yr_A5.3-TSP_2080	23995.70	16.67	21.56	17.74	2.97	0.95	0.94	2.96
Lower	2804	Max WS	100 Year_2080_FWOP_Modified	15522.06	13.35	16.52	14.30	2.08	0.26	0.25	1.80
Lower	2804	Max WS	100Yr_A5.3-TSP_2080	21827.49	16.00	19.94	16.06	2.45	0.62	0.75	2.13
Lower	2609	Max WS	100 Year_2080_FWOP_Modified	15219.63	13.02	15.03	11.37	1.30	0.07	0.07	1.03
Lower	2609	Max WS	100Yr_A5.3-TSP_2080	19651.27	15.80	17.87	11.64	1.27	0.07	0.29	1.02
Lower	2351	Max WS	100 Year_2080_FWOP_Modified	15189.88	12.23	14.69	12.58	1.61	0.06	0.03	1.43
Lower	2351	Max WS	100Yr_A5.3-TSP_2080	18920.93	15.47	17.60	11.88	1.33	0.30	0.22	0.97
Lower	2317			Bridge							
Lower	2282	Max WS	100 Year_2080_FWOP_Modified	15077.89	10.94	13.70	13.34	1.89			1.89
Lower	2282	Max WS	100Yr_A5.3-TSP_2080	18920.79	11.69	15.46	15.57	2.52		0.04	2.51
Lower	2281			Lat Struct							
Lower	2182	Max WS	100Yr_A5.3-TSP_2080	17631.08	11.34	14.22	13.68	1.92	0.42	0.09	1.66
Lower	1990	Max WS	100Yr_A5.3-TSP_2080	16934.13	10.79	13.65	13.61	1.90	0.24	0.29	1.77
Lower	1813	Max WS	100 Year_2080_FWOP_Modified	14861.58	9.23	12.70	15.05	2.38	0.70	0.69	2.19
Lower	1813	Max WS	100Yr_A5.3-TSP_2080	15475.87	10.32	13.32	14.01	1.99	0.72	0.72	1.85
Lower	1711	Max WS	100 Year_2080_FWOP_Modified	14411.10	8.83	11.75	13.75	2.03	0.20	0.39	1.85
Lower	1711	Max WS	100Yr_A5.3-TSP_2080	14982.86	10.18	12.55	12.41	1.58	0.15	0.38	1.42
Lower	1588	Max WS	100 Year_2080_FWOP_Modified	12184.78	8.38	11.15	13.46	1.94	0.31	0.55	1.71
Lower	1588	Max WS	100Yr_A5.3-TSP_2080	14599.17	9.76	12.71	13.92	1.98	0.33	0.64	1.73
Lower	1441	Max WS	100 Year_2080_FWOP_Modified	11505.28	7.94	10.16	12.06	1.53	0.27	0.38	1.29

Figure 8-13: Manoa Stream on King Street, looking upstream.

Figure 8-14: Manoa Stream on King Street, looking downstream.

8.3.4. Ala Wai Canal Floodwall

The average channel velocities and shear stress was investigated for the Ala Wai Canal Floodwall. The changes to the 1% AEP values from the FWOP to Alternative 5.3, the recommended plan, are shown below for entire length of the Ala Wai Canal Floodwall in Figure 8-15, and the area with the largest velocities and change in velocities are shown in Table 8-13. The changes are relatively minor and within the range for the existing channel material the Ala Wai Canal. There is an increase in the area between the McCully Street (RS 2910) and Ala Moana Boulevard (RS 73), see Figure 8-16 and Figure 8-17. The increase in velocities and shear stress are less than the canal capacity, but it is still recommended that this is further investigated during the PED phase to ensure structural stability.

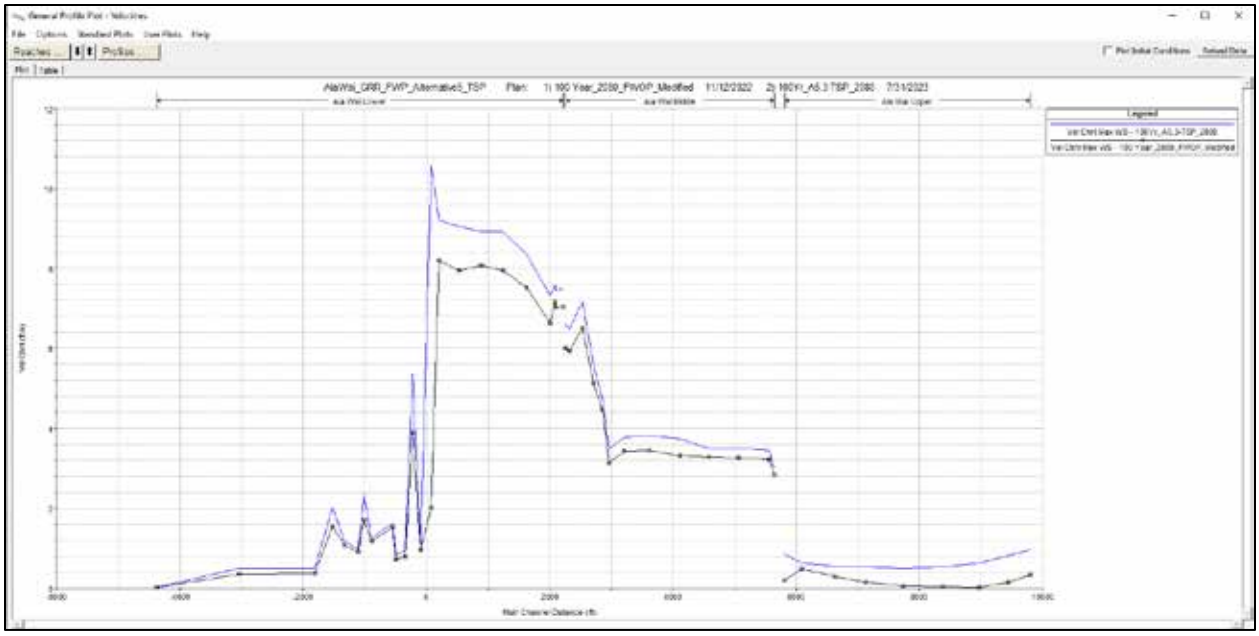


Figure 8-15: Average Channel Velocity for the 1% AEP Flood Event for the FWOP and Alternative 5.3 along the Ala Wai Canal Floodwall

Table 8-13: Average Channel Velocity and Shear Stress for the 1% AEP Flood Event for the FWOP and Alternative 5.3 at the Ala Wai Canal Floodwall in the area of the Maximum Channel Velocity and increase in Velocity.

HEC-RAS Profile: Max WS

Reach	River Sta	Profile	Plan	Q Total	W.S. Elev	E.G. Elev	Vel Chnl	Shear Chan	Shear LOB	Shear ROB	Shear Total
				(cfs)	(ft)	(ft)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Middle	3062	Max WS	100 Year_2080_FWOP_Modified	13774.48	7.39	7.54	3.14	0.10	0.02	0.02	0.08
Middle	3062	Max WS	100Yr_A5.3-TSP_2080	16772.88	8.95	9.13	3.49	0.12	0.03	0.03	0.10
Middle	2961	Max WS	100 Year_2080_FWOP_Modified	13901.62	7.22	7.53	4.49	0.20	0.04	0.07	0.18
Middle	2961	Max WS	100Yr_A5.3-TSP_2080	16763.38	8.80	9.13	4.74	0.22	0.03	0.07	0.14
Middle	2910			Bridge							
Middle	2859	Max WS	100 Year_2080_FWOP_Modified	13898.06	6.78	7.19	5.13	0.26	0.01	0.07	0.22
Middle	2859	Max WS	100Yr_A5.3-TSP_2080	16763.32	8.19	8.66	5.57	0.30	0.02	0.05	0.18
Middle	2858			Lat Struct							
Middle	2857			Lat Struct							
Middle	2706	Max WS	100 Year_2080_FWOP_Modified	13964.28	6.49	7.14	6.51	0.44	0.03	0.09	0.33
Middle	2706	Max WS	100Yr_A5.3-TSP_2080	16863.21	7.84	8.61	7.17	0.52	0.07	0.13	0.39
Middle	2513	Max WS	100 Year_2080_FWOP_Modified	14136.81	6.49	7.02	5.94	0.37	0.03	0.07	0.28
Middle	2513	Max WS	100Yr_A5.3-TSP_2080	16991.27	7.86	8.49	6.47	0.42	0.05	0.11	0.33
Middle	2453	Max WS	100 Year_2080_FWOP_Modified	14151.18	6.45	7.00	6.02	0.37	0.07	0.07	0.31
Middle	2453	Max WS	100Yr_A5.3-TSP_2080	16991.25	7.80	8.47	6.61	0.44	0.10	0.08	0.34
Lower	2132	Max WS	100 Year_2080_FWOP_Modified	15147.79	6.45	7.21	7.05	0.53	0.17	0.11	0.49
Lower	2132	Max WS	100Yr_A5.3-TSP_2080	17798.36	7.80	8.66	7.50	0.59	0.21	0.16	0.54
Lower	2131			Lat Struct							
Lower	2130			Lat Struct							
Lower	2072	Max WS	100 Year_2080_FWOP_Modified	15084.02	6.37	7.13	7.02	0.54	0.12	0.10	0.47
Lower	2072	Max WS	100Yr_A5.3-TSP_2080	17798.25	7.73	8.58	7.44	0.58	0.13	0.10	0.46
Lower	2071	Max WS	100 Year_2080_FWOP_Modified	15083.90	6.34	7.13	7.17	0.56	0.14	0.09	0.50
Lower	2071	Max WS	100Yr_A5.3-TSP_2080	17798.26	7.70	8.58	7.58	0.61	0.15	0.11	0.48
Lower	2066.5			Bridge							
Lower	2062	Max WS	100 Year_2080_FWOP_Modified	15062.08	6.01	6.69	6.63	0.47	0.13	0.08	0.42
Lower	2062	Max WS	100Yr_A5.3-TSP_2080	17798.25	6.97	7.80	7.32	0.55	0.17	0.12	0.50
Lower	2061			Lat Struct							
Lower	2060			Lat Struct							
Lower	1548	Max WS	100 Year_2080_FWOP_Modified	14860.45	5.61	6.48	7.51	0.62	0.09	0.08	0.47
Lower	1548	Max WS	100Yr_A5.3-TSP_2080	17797.67	6.49	7.55	8.35	0.75	0.13	0.13	0.58
Lower	1188	Max WS	100 Year_2080_FWOP_Modified	14788.66	5.20	6.17	7.95	0.71	0.13	0.09	0.56
Lower	1188	Max WS	100Yr_A5.3-TSP_2080	17782.90	5.97	7.18	8.92	0.87	0.19	0.16	0.70
Lower	812	Max WS	100 Year_2080_FWOP_Modified	15132.38	4.78	5.78	8.07	0.73	0.10	0.09	0.58
Lower	812	Max WS	100Yr_A5.3-TSP_2080	17911.47	5.54	6.76	8.92	0.87	0.15	0.15	0.70
Lower	440	Max WS	100 Year_2080_FWOP_Modified	15307.94	4.44	5.41	7.95	0.70	0.14	0.10	0.59
Lower	440	Max WS	100Yr_A5.3-TSP_2080	18353.61	5.06	6.32	9.06	0.89	0.15	0.15	0.74
Lower	79	Max WS	100 Year_2080_FWOP_Modified	15688.37	4.03	5.07	8.21	0.74		0.08	0.66
Lower	79	Max WS	100Yr_A5.3-TSP_2080	18463.92	4.64	5.94	9.20	0.92		0.10	0.78
Lower	73			Bridge							
Lower	67	Max WS	100 Year_2080_FWOP_Modified	3469.81	3.23	3.29	2.01	0.08	0.01	0.01	0.08
Lower	67	Max WS	100Yr_A5.3-TSP_2080	18444.26	3.31	5.05	10.60	2.29	0.28	0.41	2.15
Lower	-96	Max WS	100 Year_2080_FWOP_Modified	1779.04	3.22	3.23	0.97	0.02	0.00	0.00	0.02
Lower	-96	Max WS	100Yr_A5.3-TSP_2080	1873.62	3.22	3.23	1.02	0.02	0.00	0.00	0.02
Lower	-221	Max WS	100 Year_2080_FWOP_Modified	11989.12	3.25	3.48	3.88	0.33	0.04		0.32
Lower	-221	Max WS	100Yr_A5.3-TSP_2080	16591.22	3.28	3.72	5.35	0.62	0.08		0.61
Lower	-344	Max WS	100 Year_2080_FWOP_Modified	15656.08	3.35	3.36	0.80	0.01	0.00		0.01
Lower	-344	Max WS	100Yr_A5.3-TSP_2080	18435.95	3.41	3.43	0.94	0.02	0.00		0.02

Figure 8-16: Ala Wai Canal at Kalakaua Ave looking upstream to McCully Street.

Figure 8-17: Ala Wai Canal at Ala Moana Blvd looking upstream to Kalakaua Ave.

9. Economic Analysis

H&H worked with the Economic PDT members to develop the damage reaches and the index cross sections for this General Reevaluation Study. The damage reaches changed significantly from the Validation Study to reduce the number of reaches and to better match the measures in the General Reevaluation Study alternatives, and the representative Cross Sections have been modified accordingly.

9.1. Damage Reaches

The study area was divided into 14 damages reaches based on similar topography, hydromorphology, hydraulic characteristics, and plan formulation measures. Figure 9-1 depicts study area reach boundaries.

Figure 9-1: Study Area Reach Delineations

9.2. Index Cross Sections

Each reach is associated with an index station, which is used to specify discharge-probability, stage-discharge, stage-damage functions, and top of bank elevations for each reach. The index station assignments are based on hydrologic parameters and hydraulic conditions specific to each reach. The assigned index station is generally representative of the conditions throughout the reach. Terrain elevations increase quickly throughout the study area, particularly in reaches AW7 through AW9. In these reaches, the index station is less representative of the changing conditions throughout the reach. Figure 9-2 shows the locations of the index cross sections and Table 9-1 includes the index cross sections and the bank elevations associated with the index station for each alternative.

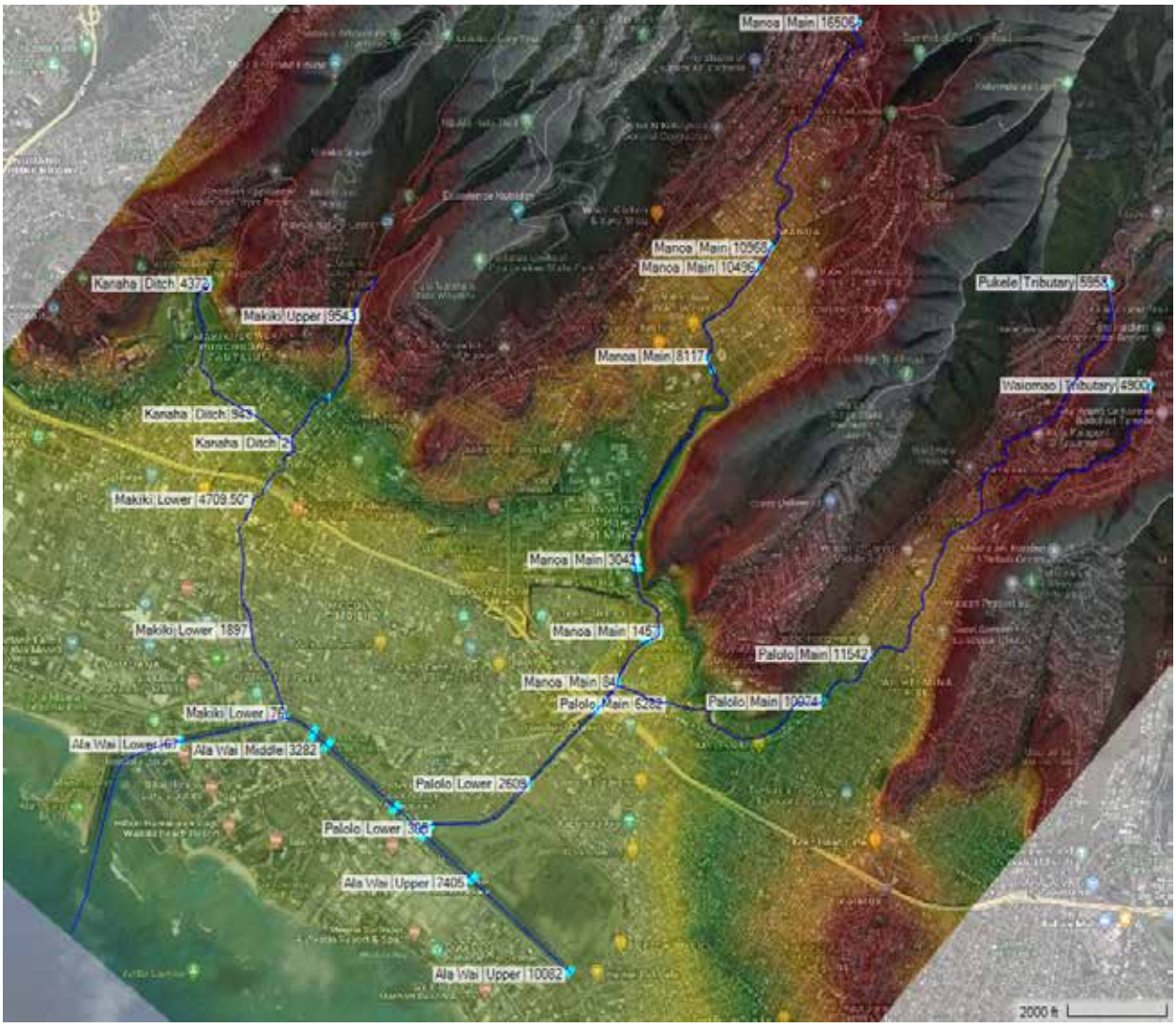


Figure 9-2: Location of Index Cross Sections

Table 9-1: Index Cross Sections and Associated Banks for each of the Alternatives. Ones highlighted in blue are modified from the FWOP.

					FWOP		FWP Alt 1		FWP Alt 2B		FWP Alt 5 & 5.1		FWP Alt 5.2		FWP Alt 5.3	
					Bank Elevation		Bank Elevation		Bank Elevation		Bank Elevation		Bank Elevation		Bank Elevation	
Damage Reach	River	Reach	Cross Section	Location	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
AW1	Ala Wai	Upper	10082	u/s damage reach	3.7		3.7		10.5		10.4		10.4		10.4	
AW1	Ala Wai	Middle	3282	index	3.4		3.4		9.5		9.57		9.57		9.57	
AW1	Ala Wai	Lower	-1810	d/s damage reach	4.7											
AW1	Ala Wai	Lower	67	d/s damage reach	4.22	4.22	4.22		6		6.1		6.1		6.1	
AW2R	Makiki	Lower	4709.5	u/s damage reach	42.6	38.9		38.9		38.9		38.9		38.9		38.9
AW2R	Makiki	Lower	1897	index	8.4	9		9		9		9		9		9
AW2R	Makiki	Lower	76	d/s damage reach	3.1	3.65		3.65		3.65		3.65		9		3.65
AW2L	Makiki	Lower	4709.5	u/s damage reach	42.6	38.9	42.6		42.6		42.6		42.6		42.6	
AW2L	Makiki	Lower	1897	index	8.4	9	8.4		8.4		8.4		8.4		8.4	
AW2L	Makiki	Lower	76	d/s damage reach	3.1	3.65	3.1		3.1		3.1		9		3.1	
AW3R	Kanaha	Ditch	4372	u/s damage reach	137	137.2		137.2		137.2		137.2		137.2		137.2
AW3R	Kanaha	Ditch	943	index	66.81	66.81		78		72		78		66.81		66.81
AW3R	Kanaha	Ditch	2	d/s damage reach	70.41	70.41		74		70.41		74		70.41		70.41
AW3L	Makiki	Upper	9543	u/s damage reach	189.6	156.8	189.6		189.6		189.6		189.6		189.6	
AW3L	Makiki	Upper	7672	index	110.14		110.14		110.14		110.14		110.14		110.14	
AW3L	Makiki	Lower	5940.67	d/s damage reach	62	64.2	62		62		62		62		62	
AW4	Ala Wai	Middle	5770	u/s damage reach	4.81	2.7		2.7		8		8.5		8.5		8.5
AW4	Ala Wai	Middle	5195	index		4.6		4.6		8		8.35		8.5		8.5
AW4	Ala Wai	Middle	2961	d/s damage reach		3.73		3.73		5		7		8.5		8.5
AW5	Ala Wai	Upper	10082	u/s damage reach		3.6		9.6		3.6		7.7		9		12
AW5	Ala Wai	Upper	7405	index		3.4		9		3.4		7.7		9		12
AW5	Ala Wai	Upper	6095	d/s damage reach		2.6		8.7		2.6		7.7		9		12
AW6	Palolo	Lower	4653	u/s damage reach	29	24.5	29		29		34		34		34	
AW6	Palolo	Lower	2609	index	11	12.3	11		11		11		11		11	
AW6	Palolo	Lower	305	d/s damage reach	3.4	3.25	3.4		3.4		3.4		3.4		3.4	
AW7R	Manoa	Main	8016	u/s damage reach		156.33		156.33		156.33		156.33		156.33		156.33
AW7R	Manoa	Main	7839	index	148.4	147.9		155		154.68		155		155		155
AW7R	Manoa	Main	1457	d/s damage reach	46.5	48.2		48.2		48.2		48.2		48.2		48.2
AW7L	Manoa	Main	2891	u/s damage reach	87.2		87.2		87.2		87.2		87.2		87.2	
AW7L	Manoa	Main	1107	index	36.5		43.5		43.36		43.5		43.5		43.5	
AW7L	Manoa	Main	84	d/s damage reach	28.41		36		34.1		36		36		36	
AW8R	Manoa	Main	16506	u/s damage reach	284.4	288		288		288		288		288		288
AW8R	Manoa	Main	10496	index		176.55		176.55		176.55		176.55		176.55		176.55
AW8R	Manoa	Main	8117	d/s damage reach		158.75		158.75		158.75		158.75		158.75		158.75
AW8L	Manoa	Main	16506	u/s damage reach	284.4	288	284.4		284.4		284.4		284.4		284.4	
AW8L	Manoa	Main	10968	index	180.15		180.15		180.15		180.15		180.15		180.15	
AW8L	Manoa	Main	3042	d/s damage reach	86.44		86.44		86.44		86.44		86.44		86.44	
AW9R	Pukele	Tributary	21484	u/s damage reach	524	525		525		525		525		525		525
AW9R	Palolo	Main	15526	most u/s XS on Palolo	212.18	212.18		212.18		212.18		212.18		212.18		212.18
AW9R	Palolo	Main	10074	index	113.5	110.5		110.5		110.5		110.5		110.5		110.5
AW9R	Palolo	Main	6282	d/s damage reach	42.6	36.6		36.6		36.6		36.6		36.6		36.6
AW9L	Waiomao	Tributary	20426	u/s damage reach	405.8	411	405.8		405.8		405.8		405.8		405.8	
AW9L	Palolo	Main	15526	most u/s XS on Palolo	212.18	212.18	212.18		212.18		212.18		212.18		212.18	
AW9L	Palolo	Main	11542	index	138.4		138.4		138.4		138.4		138.4		138.4	
AW9L	Palolo	Main	6282	d/s damage reach	42.6	36.6	42.6		42.6		42.6		42.6		42.6	

9.3. Uncertainty for Discharge Relationships

See Section 1.3 and Addendums A and B for background on development of the frequency flows used in this study and Appendix C relative to application of model results to the Economic analysis. While the Validation Study developed uncertainty estimates for discharge for use in the economic and Flood Damage Reduction Analysis software HEC-FDA ("FDA"), many discussions were held between the economist, the hydrologic engineer, the MMC, and HEC relative to changes in the economic damage reaches and relative changes in the Equivalent Record Length (ERL) used in the FDA statistical analysis From those discussions, HEC had stated that they agreed with the general process the MMC used for the Validation Study, but that it omitted the uncertainty in the transform of precipitation to runoff. HEC stated that omitting that uncertainty makes the Equivalent Record Length (ERL) used in previous analysis too high. This is a change in guidance from the recommendations of the RMC during the Validation Study. USACE is currently updating the methods of statistical analysis that defines ERL due to the software changes in FDA from 1D to gridded 2D modeling capabilities and will update EM 1110-2-1619, but final guidance has not been formalized or released yet.

From the discussions with the subject matter experts, the economist determined the most appropriate method for this study's FDA model was the graphical method, which was used to generate probability-discharge functions. Uncertainty was computed using an ERL (N) of 50 years, which was qualitatively based upon the recommended ERL in Table 4-5 of EM 1110-2-1619 and other considerations: Per this table, an ERL for a well calibrated rainfall-runoff-routing model was recommended to be 20 to 30 years. Consideration was given to the historic gauge records available within the watershed (see Section 3.5.1), the long periods of rainfall records that contributed to the precipitation frequencies, and the methodologies used in determining the computed frequency flows using the historically calibrated model with HEC-WAT for numerous iterations. Selecting an ERL of 50 years was deemed appropriate to reflect that greater confidence in the flow discharges, also considering the understanding from HEC that historical experience has shown that the recommended ERL within EM 1110-2-1619 are generally low. The “Less Simple” method of Order Statistics was used to approximate uncertainty with a standard normal distribution. Since HEC-FDA 1.4.3 was used, 173 points were included in the standard probabilities for graphical probability functions.

9.4. Stage-Discharge Function with Uncertainty

In HEC-FDA, the stage-discharge information is imported from the water surface profile information from HEC-RAS model that is detailed in the section above. The Validation Study went through a full analysis of the MMC model, the base model for this study, to determine the stage-discharge function uncertainty. For the Validation study, a normal distribution was used to represent uncertainty for this data and that option required a standard deviation for each damage reach. The standard deviation was determined by running a sensitivity on the Manning’s “n” values in the HEC-RAS model. To test the sensitivity, model runs were made with the “n” values varying on average by +/- 20% for the without project plan, post-feasibility TSP plan, and the proposed final features plan. The range of roughness values was estimated at each location to determine a realistic high and low value for the area. The difference in stage between the high estimate and low estimate was calculated for each cross-section. For each damage reach, an average stage difference was determined for the cross-sections contained within the damage reach. To estimate the standard deviation relative to the mean stage for the

95% confidence interval for a normal distribution, the difference in stage between the high and low was divided by 4 (+/- 2 standard deviations). This was done for the FWOP, Post-Feasibility TSP, and the Proposed Final Features. Those calculations showed that for the FWOP run, the highest standard deviation was 0.43 ft; for the Post-Feasibility TSP run, the highest standard deviation was 0.41 ft; and for the Proposed Final Features run, the highest standard deviation was 0.46 ft. The calculated standard deviations for each damage reach for the different project configurations can be found in the Validation Study H&H Appendix Hydraulic Report, which is included as an Addendum to this Appendix, for their study.

The Engineer Manual (EM) 1110-2-1619, Risk Based Analysis for Flood Damage Reduction Study, however, provides guidance on determining standard deviations. Table 5-2 from EM 1110-2-1619 describes the minimum standard deviation of error in stage that can be used for a flood damage reduction study. The table was reproduced and is shown below in Table 9-2. As stated in the Terrain section of the Validation Report, the LiDAR data has an accuracy of 45 cm (1.5 ft) horizontal, 37 cm (1.2 ft) vertical and was processed with 1 ft horizontal point spacing and survey data was provided for some channel data. The Manning's “n” values were considered "Fair" due to the limited calibration data and coupled with the use of LiDAR and survey data, the minimum standard deviation of error in stage was determined to be 0.7 ft. Since the calculated standard deviations for every reach was lower than the minimum standard from EM 1110-2-1619, a 0.7 ft standard deviation was adopted for all reaches across the 3 project configurations.

Table 9-2: Minimum Standard Deviations of Error in Stage (Table 5-2 from EM 1110-2-1619)

Manning's n Value Reliability[1]	Standard Deviation (in feet)	
	Cross Section Based on Field Survey or Aerial Spot Elevation	Cross-section based on Topographic Map with 2-5' Contours
Good	0.3	0.6
Fair	0.7	0.9
Poor	1.3	1.5

[1]Where good reliability of Manning's *n* value equations relate to excellent to very good model adjustment/validation to a stream gauge, a set of high-water marks in the project effective size range, and other data. Fair reliability relates to fair to good model adjustment/validation for which some, but limited, high-water mark data are available. Poor reliability equates to poor model adjustment/validation or essentially no data for model adjustment/validation

As there were only minor changes made to the base existing Future Without Project conditions model, and most of those were due to updated lidar data in the limited overbank area along the Ala Wai Canal and bathymetric survey data of the Ala Wai canal, and all the other reaches and channel n-values are the same, it has been determined that the Validation Analysis of the uncertainty for the FWOP runs is still valid, and as both of the Validation alternatives included more measures than our recommended plan and were designed for larger flood events and still under 0.5 ft, less than the minimum standard deviation required, it was determined that the

Validation Analysis of the uncertainty would still be valid for our alternatives and our recommended alternative.

10. Analyses not conducted with this TSP

It should be noted that there are a couple of analysis that have not been conducted for this TSP. The PDT has determined that they will be completed in later phases of the study.

10.1. Risk Assessment

USACE defined risk assessment in a white paper (al, 2007) as follows: "Risk assessment is a broad term that encompasses a variety of analytic techniques that are used in different situations, depending upon the nature of the risk, the available data, and needs of decision makers. It is a systematic, evidence based approach for quantifying and describing the nature, likelihood, and magnitude of risk associated with the current condition and the same values resulting from a changed condition due to some action." A risk assessment is a critical component of a flood risk management project, and one will be conducted after the TSP.

10.2. Interior Drainage

The PDT determined that the interior drainage analysis will be conducted during the PED phase of the study. A full interior drainage analysis will be conducted according to EM 1110-2-1413, Hydrologic Analysis of Interior Areas, at that time.

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ALA WAI CANAL FLOOD RISK MANAGEMENT STUDY
O'AHU, HAWAI'I

FINAL FEASIBILITY STUDY REPORT WITH INTEGRATED ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
HYDROLOGY AND HYDRAULIC ENGINEERING

A1 **Existing/Without-Project Hydrologic Appendix**

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Ala Wai Canal Project
Feasibility Study
Honolulu, Hawaii

Existing Without-Project Hydrologic Appendix

Appendix A1

U.S. ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
FORT SHAFTER, HAWAII

February 2017

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Existing Without-Project Hydrologic Appendix

Ala Wai Canal Project

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Abbreviations and Acronyms

A	Ala Wai (designating sub-watershed)
BWS	Board of Water Supply
City	City and County of Honolulu
cfs	cubic feet per second
CN	curve number
USACE	United States Army Corps of Engineers
DLNR	State of Hawai‘i, Department of Land and Natural Resources
FEMA	Federal Emergency Management Agency
GIS	geographical information system
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HEC-SSP	Hydrologic Engineering Center-Statistical Software Package
HEC-GeoHMS	Hydrologic Engineering Center Geospatial Hydrologic Modeling Extension
HEC-GeoRAS	Hydrologic Engineering Center Geospatial River Analysis System Extension
HSG	hydrologic soil group
IDF	Intensity-duration-frequency
ID	Identification number
J	junction
K	Makiki (designating sub-watershed)
LiDAR	light detection and ranging
M	Mānoa (designating sub-watershed)
MP	Mānoa-Pālolo (designating sub-watershed)
MSL	Mean sea level
MWP	Mānoa Watershed Project
NOAA	National Oceanit and Atmospheric Agency
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
P	Pālolo (designating sub-watershed)
SCS	Soil Conservation Service
T_c	time of concentration
TR-55	Technical Release 55
UHM	University of Hawai‘i at Mānoa
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
W	Waikīkī (designating sub-watershed)

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Executive Summary

Introduction

In 2001, the United States Army Corps of Engineers (USACE) recommended flood mitigation and ecosystem restoration measures for the Ala Wai Watershed, located on the southeast sector of the island of Oʻahu, Hawaiʻi. As part of this larger goal, USACE contracted Oceanit to develop a Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) for a range of potential storms in the Ala Wai Watershed. HEC-HMS is the USACE hydrologic model. The purpose of this study was to estimate peak flow discharges at particular drainage junctions in the Ala Wai Watershed corresponding to the following storm return periods: 2-, 5-, 10-, 20-, 50-, 100-, 200-, and 500-year. These storm return periods correlate to storm chance exceedance probabilities of 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent, respectively.

Purpose

Whereas this study focuses on the HEC-HMS model, this study uses a total of five different methods to estimate peak flow discharges throughout the Ala Wai Watershed for potential storms ranging in duration and intensity. Estimated peak flow discharges are based on the existing conditions of the Ala Wai Watershed's sub-watersheds of Makiki, Mānoa, and Pālolo valleys; Mānoa- Pālolo and Ala Wai Canals; and Waikīkī. Discharge at junctions of interest throughout these sub-watersheds was studied. Oceanit modeled storms using both rainfall-runoff and peak flow frequency methods for a range of storm scenarios, as follows. The study (1) researched and collected relevant hydrologic data; (2) constructed and calibrated both rainfall-runoff and peak flow frequency hydrologic models; and (3) weighted and compared the results from these models to arrive at estimated peak flow discharges.

Study Area

The Ala Wai Watershed encompasses a drainage area of 10,400 acres (16.2 square miles) of area that are economically significant and densely populated. The existing conditions throughout the Ala Wai Watershed are relevant to its hydrologic analysis, including the character of the watershed's overall climate, topography, geology, vegetation, land use and cover, and water resources. Hawaiʻi's high moisture, orographic rainfall, and northeasterly trade winds create wet conditions in the upper Ala Wai Watershed. The topography of the upper Ala Wai watershed is relatively steep and stony that, in combination with heavy rainfall, provides conditions prone to flash flooding. The lower Ala Wai watershed has finer well-drained soil, but much of it is urbanized, meaning its terrain surfaces are impervious. In terms of streams, the Makiki, Mānoa, and Pālolo streams drain their respective sub-watersheds. Mānoa and Pālolo streams combine to form the Mānoa-Pālolo Canal that empties into the Ala Wai Canal. Runoff and drainage from Waikīkī empties into the Ala Wai Canal as well.

Data Collection Procedure

Data collection for hydrologic analysis included rainfall gage data, stream flow gage data, records of historical storms, maps of storm drainage systems, geospatial data, and field surveys observations. Storms that occurred on December 17–18, 1967; October 30, 2004; and March 31, 2006 were used to calibrate the HEC-HMS model. The City and County of Honolulu drainage maps and University of Hawai'i's utility maps were used to determine the existing storm drainage system. Geospatial information, including LiDAR data and aerial maps established terrain roughness characteristics and stream channel cross sections. Rainfall data was extrapolated to be converted into intensity-duration-frequency (IDF) curves, illustrating rainfall intensities according to their duration.

Hydrologic Analysis Procedure

Hydrologic analysis of sub-watersheds of the Ala Wai Watershed predicted from the application of five hydrologic modeling methods: the HEC-HMS model, USGS regression method, City and County of Honolulu drainage standards Plate 6, Federal Emergency Management Agency Flood Insurance Study, and the HEC Statistics Software Package (SSP). The HEC-HMS model of the Ala Wai Watershed was the focus of this report, and the results from this model were relied on more than other methods.

SCS curve number Loss Method was applied and Clark Unit Hydrograph transform method was applied for non-urbanized areas, and the Kinematic Wave Transform Method was used for urbanized areas. The Ala Wai Canal was assumed to be a reservoir for the purposes of this study because of backwater effects that are possible in the mouth of Ala Wai Canal. Also, according to the TR-55 method, the water flow path was separated into three portions: sheet flow, shallow concentrated flow, and channel flow, which are summed to calculated time of concentration. Manning's *n* values were selected for the land surface characteristics for the Ala Wai Watershed. Curve number calculations were established according to the hydrologic soil group.

Results

Final "best" peak flow discharges were determined by comparing the various derived discharge-frequency curves graphically and by the accuracy or uncertainty of each method. Table ES-1 shows the results of peak flows discharges at the mouth of the Ala Wai Canal.

Peak Flow Discharges at Mouth of Ala Wai Canal

Return Period (yr)	2	5	10	20	50	100	200	500
Percent Chance Exceedance	50%	20%	10%	5%	2%	1%	0.5%	0.2%
Methodology	Peak flow discharge (cubic feet per second)							
HEC-HMS (original Dec 2008)	6,000	10,100	13,390	15,190	16,740	17,670	18,690	20,480
Plate 6						22,500		
FEMA			13,700		23,000	28,200		36,200
HEC-HMS (updated 2016)	8,080	12,000	14,100	16,000	17,800	19,100	20,700	22,200
Final Used (2016)	**8,000**	**11,500**	**13,500**	**16,000**	**18,000**	**19,500**	**20,500**	**22,000**

Table ES-1. Peak Flow Discharges at Mouth of Ala Wai Canal (Updated March 2016)

1 Introduction

1.1 Background

In 2001, the United States Army Corps of Engineers (USACE) recommended flood mitigation and ecosystem restoration measures for the Ala Wai Watershed, located on the southeast sector of the island of Oʻahu, Hawaiʻi. These measures constitute the Ala Wai Watershed Project that encompasses a drainage area of approximately 10,400 acres of the valleys of Makiki, Mānoa, and Pālolo, and low-lying areas of Mōʻiliʻili, McCully, and Waikīkī. These areas are economically significant and densely populated, and many have high potential for flooding. Historically, floods have occurred in the Mānoa, Makiki, and Mōʻiliʻili areas due to quick concentration of storm waters that overwhelms the drainage system capacities. Depending on a storm's intensity and duration, the steep slopes of the upper Ala Wai Watershed can create flood conditions due to its steep slopes and impervious surfaces from urbanization. In the past, such as during the severe storm of October 30, 2004, flash flood waters with accumulated debris have caused significant property damage to residential, commercial, and public land (Belt Collins 1998).

Storm runoff in these areas flows through drainage systems that ultimately empty into the Ala Wai Canal. In turn, the Ala Wai Canal flows into the Pacific Ocean. The Ala Wai Canal was constructed in the 1920s, and has experienced heavy sedimentation and economic degradations since its inception (Belt Collins 1998). The proposed flood mitigation measures for the Ala Wai Watershed Project must be based on the best hydrologic and hydraulic data available.

USACE contracted Oceanit to conduct hydrologic analysis for a range of potential storms in the Ala Wai Watershed. This hydrologic study uses five different methods to estimate peak flow discharges throughout the Ala Wai Watershed for potential storms ranging in duration and intensity. Best available predictions are based on the existing conditions of the Ala Wai Watershed's sub-watersheds of Makiki, Mānoa, and Pālolo valleys, Ala Wai Canal, and Waikīkī. Also, the existing conditions of junctions along the Mānoa-Pālolo Canal were considered because of the canal's crucial position as a drainage channel between Mānoa-Pālolo and the Ala Wai Canal, where it empties. Oceanit was directed to model storms using both rainfall-runoff and peak flow frequency methods for a range of storm scenarios, as follows.

1.2 Purpose and Scope

The purpose of this study was to estimate peak flow discharges at particular drainage junctions in the Ala Wai Watershed corresponding to the following storm return periods: 2-, 5-, 10-, 20-, 50-, 100-, 200-, and 500-year. These storm return periods correlate to storm chance exceedance probabilities of 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent, respectively. The study's scope is solely hydrologic and encompasses the Ala Wai Watershed's sub-watersheds of Makiki, Mānoa, and Pālolo valleys, Ala Wai Canal, and Waikīkī. The study also examines the junctions along the Mānoa-Pālolo Canal.

1.3 Methodology

This hydrologic study provides estimated peak flow discharges for a range of storms for particular junctions throughout the Ala Wai Watershed by applying five hydrologic methods as appropriate

and necessary. The following were completed in this study: (1) relevant hydrologic data was researched and collected; (2) rainfall-runoff models were constructed and calibrated; (3) peak flow discharges based on rainfall intensity-frequency-duration curves were modeled; and (4) these peak flow discharges were weighted and compared to arrive at final results that represent the *best* estimated peak flow discharges.

First, research on the overall existing conditions in the Ala Wai Watershed study area was conducted. Section 2.1 describes these overall existing conditions, and then Sections 2.2 through 2.4 detail the existing conditions in each sub-watershed. Conditions that were necessarily evaluated for hydrologic modeling included the slope, character, elevation, vegetative coverage, acreage, and use of the sub-watershed lands. Many of these conditions were evaluated from review of existing literature, gathering of geospatial data, and inspection during field visits. This data collection is documented in Section 3.5. Sub-basins within each sub-watershed were delineated using the geospatial data (see Section 3.6). Also, Manning's *n* values, which describe land cover and roughness, were selected (see Section 4.1.5). The existing conditions of drainage systems in the study area were primarily collected from the City and County of Honolulu's Storm Drainage System Maps (Section 3.4), and were confirmed during field visits. Primarily, drainage junctions of interest in the Ala Wai Watershed were determined from evaluating the existing drainage facilities.

Second, potential storm rainfall amount determinations were extrapolated from historic rainfall data. The storm rainfall amounts that were the input for the hydrologic model are considered the meteorological model. The rainfall and stream flow data were collected from rain gage and stream flow gage records as available for the study area (see Sections 3.1 through 3.2). Records from three severe storms were collected and later used to calibrate the hydrologic model (see Section 3.3). Rainfall amounts that constitute the frequency storms in the meteorological model were gathered from a study entitled "Rainfall Frequency Study for Oahu" (Giambelluca 1984) known commonly as Report R-73. Rainfall amounts were gathered from Report R-73 for the storm chance exceedance probabilities of 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent. Intensity-Duration-Frequency curves were established for input into the model.

Third, five methods were used to model the Ala Wai Watershed's hydrology. The rainfall-runoff method used was USACE's Hydrologic Engineering Center–Hydrologic Modeling System (HEC-HMS). The peak flow frequency methods used were the United States Geological Survey (USGS) regression equations, the City and County of Honolulu (the City) Plate 6 storm drainage standards, the Federal Emergency Management Agency (FEMA) Flood Insurance Study for the City and County of Honolulu (2004), and Hydrologic Engineering Center–Statistical Software Package (HEC-SSP). The fourth step in this study was, depending on the data available, applying these methods for each sub-watershed or junctions if available for the range of potential storms: chance exceedance probabilities of 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent. The methods used for each junction (by sub-watershed) are shown in Table 1-1 and designated by a checkmark.

Junction	Drainage area (mi^2)	HEC-HMS	USGS Regression Equations	FEMA-FIS	C&C-Plate 6	HEC-SSP
MAKIKI						
JK1	2.33	√	√		√	
JK2	2.49	√	√	√	√	
JK3	2.89	√			√	
MANOA						
JM8	5.97	√	√	√	√	
PALOLO						
JP1	1.15	√	√		√	√
JP2	2.94	√	√		√	
JP3	3.62	√	√	√	√	√
JP4	4.07	√	√		√	
MANOA-PALOLO						
JMP1	10.04	√	√		√	
JMP2	10.34	√	√	√	√	√
JMP3	10.68	√			√	
ALAWAI						
Mouth of Ala Wai Canal	16.22	√		√	√	

Table 1-1. Methods Used by Sub-Watershed Junction

J = junction; K = Makiki; M = Mānoa; P = Pālolo; MP = Mānoa-Pālolo; and mi = miles. A checkmark indicates a method that was used for a particular junction or outlet.

1.3.1 HEC-HMS Analysis

The HEC-HMS model was the primary method of this study. The HEC-HMS method is a precipitation-runoff process model that requires three components including a basin model, a meteorological model, and a control model. The basin model layout was created according to sub-basin delineation and junctions of interest. For the purposes of this study, sub-watershed refers to the larger areas of Makiki, Mānoa, Pālolo, Ala Wai Canal, and Waikīkī; the term "sub-basin" refers to the smaller sub-watersheds within these sub-watersheds to avoid confusion. Also the term "sub-basin" is commonly accepted for the HEC-HMS model delineation of small drainage areas.

1. **Basin Model:** Under the basin model, Ala Wai Watershed was divided into 38 sub-basins. The SCS loss method and Clark Unit Hydrograph transform methods were applied for upper Makiki, Mānoa, and Pālolo valleys because these areas are considered non-urban. The Kinematic Wave Transform Method was applied for the lower Makiki ,Ala Wai Canal, and Waikīkī areas because these areas are considered urban. Selected stream flow routing methods included the Muskingum-Cunge method to account for the peak flow attenuation and the Modified Puls method to account for the backwater effects for reaches collected in the Ala Wai Canal. Ala Wai Canal was modeled as a reservoir. Several basin models were created based on the calibration and determination purposes.

2. **Meteorological Model:** A meteorological model was used to specify how precipitation would be generated for each sub-watershed in the selected basin model. For calibration purposes, hyetographs were used based on the gage weights. For predictive purposes, the frequency storms were used to produce synthetic flood events, according to exceedance probabilities.

3. **Control Model:** A control model was used to set the computation parameters. This study used a five-minute time interval for all computations.

1.3.2 Peak Flow Discharge Results

Ultimately, all five of these accepted hydrologic methods offer the *best* estimated peak flow discharges at particular junctions through Ala Wai Watershed for a range of potential storms. Available results were first weighted by accuracy or uncertainty of method, and then plotted on log-probability graph paper. Selection was completed for a best fit curve function for the peak flow discharge frequency curve at each junction of interest. Final peak flow discharges are presented in Section 5.

1.4 Acknowledgements

The USACE project managers for this study were Mr. Derek Chow and Ms. Cindy Barger. The hydrologic analysis technical team consisted of Mr. Michael Wong with the USACE and Mr. Simon Li of Oceanit. Oceanit's project manager was Dr. Dayananda Vithanage with assistance from Mr. Jay Stone and Ms. Joanne Hiramatsu. Oceanit's technical staff included Ms. Frances Ajo, Mr. Robert Bourke, Mr. Kevin Gooding, Mr. Jonathan Levy, and Mr. Manabu Tagomori. Thank you to the National Climatic Data Center, Board of Water Supply (BWS), and USGS for providing rain and stream gage data pertinent to this study.

2 Study Area Description

The Ala Wai Watershed contains five sub-watersheds that are addressed in this study: Makiki, Mānoa, Pālolo, Ala Wai Canal, and Waikīkī. The Mānoa-Pālolo Canal is also addressed in terms of its drainage junctions. Section 2.1 describes the existing conditions throughout the Ala Wai Watershed, including the overall climate, topography, geology, vegetation, land use, and water resources. These conditions are similar in each of the Ala Wai sub-watersheds that are described in Sections 2.2 through 2.6.

2.1 Ala Wai Watershed

The subject of this hydrology study is the Ala Wai Watershed, which is located on the southeastern sector of the island of Oʻahu, Hawaiʻi as shown in Figure 2-1. The watershed encompasses 10,378 acres, or 16.215 square miles. The Ala Wai Watershed stretches from the Koʻolau Mountains at Puʻu Kōnāhuanui's peak (3,105 feet) down through the three urban valleys of Makiki, Mānoa, and Pālolo, to the low-lying areas of McCully, Mōʻiliʻili, and Waikīkī. Storm runoff in the watershed flows through numerous drainage systems in these areas and ultimately empties into the Ala Wai Canal. The three major sub-watersheds that constitute the Ala Wai Watershed are Makiki, Mānoa, and Pālolo; all three of these sub-watersheds are valley systems of economic significance and dense population. The Makiki, Mānoa, and Pālolo Streams receive flows from each of these valley systems, respectively (see Figure 2-2). Another Ala Wai sub-watershed is at the confluence of the Mānoa and Pālolo Streams, referred to as the Mānoa-Pālolo Canal, which empties storm water runoff into the Ala Wai Canal between the Ala Wai Golf Course and ʻIolani School. The area surrounding the Ala Wai Canal and the adjacent tourist area of Waikīkī comprise another sub-watershed. These major sub-watersheds are shown in Figure 2-2. (According to the existing conditions, sub-basins are delineated within each sub-watershed, and these sub-basin delineations are presented in Section 3, and shown in Figure 3-4.)

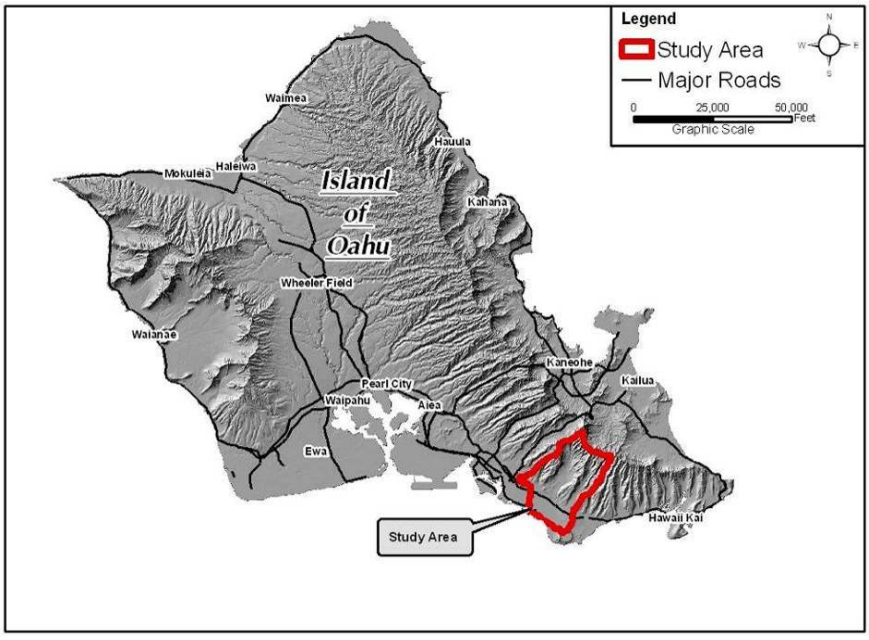

Figure 2-1. Ala Wai Watershed Location Map

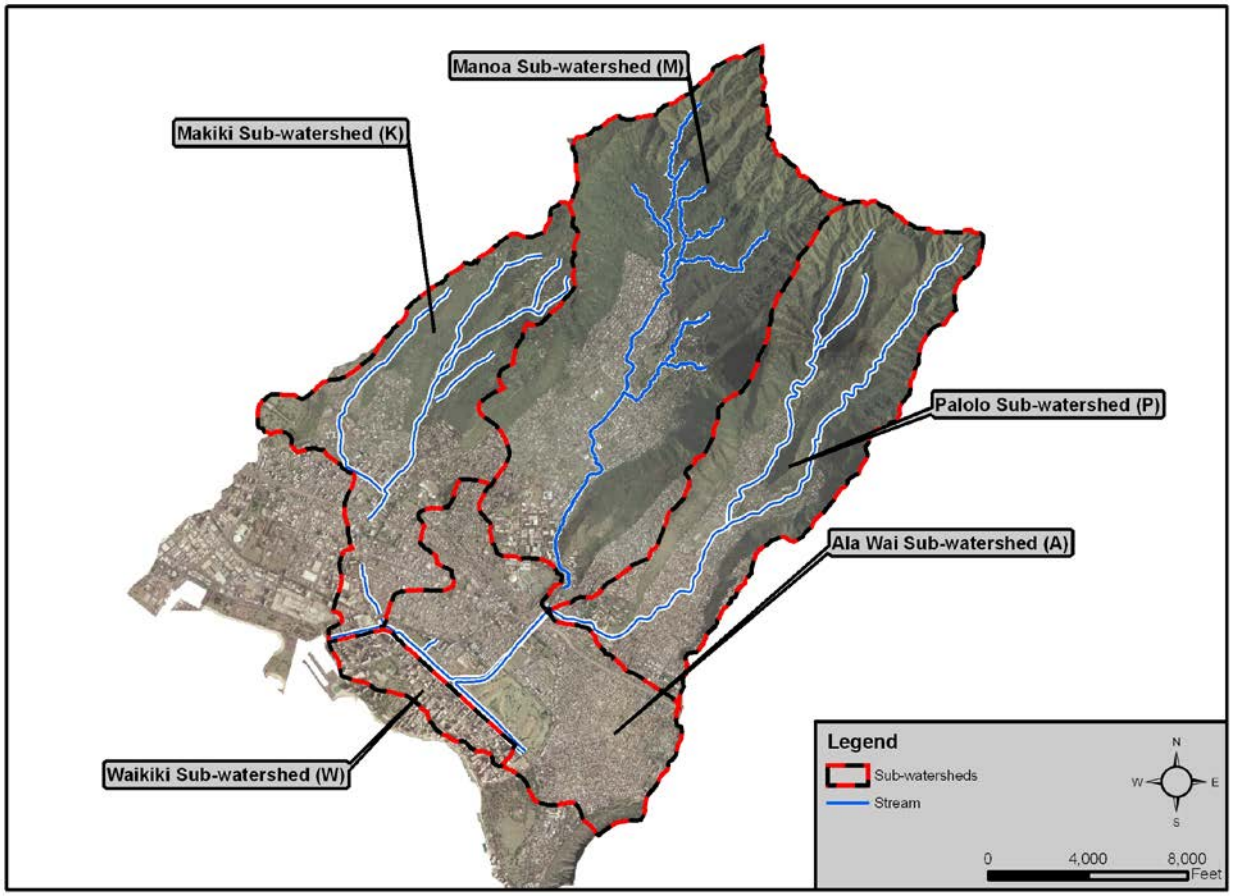

Figure 2-2. Major Streams and Sub-watersheds of Ala Wai Watershed

2.1.1 Climate and Flood Hydrology

Hawai'i's subtropical climate is governed by northeasterly trade winds that regulate weather patterns. The trade winds rise over the Ko'olau Mountain ridges, creating high moisture and orographic rainfall in the mountainous regions. These regions, such as the valley systems of Makiki and Mānoa typically receive more than 160 inches of annual rainfall, whereas the Pālolo valley system receives less annual rainfall (Giambelluca 1984). Generally, rainfall amount decreases as one moves down the valley systems to the southern coast of O'ahu, and so the low-lying areas of the Ala Wai Canal and Waikīkī receive about 30 inches of annual rainfall. The wet winter season occurs from October to April, and the dry summer season occurs from May to September. It should be noted that the three severe storms described for this study occurred in October, December, and March, during the wet winter season. Temperatures on O'ahu fluctuate according to the season, with the winter temperature averaging a high of 77 degrees Fahrenheit (°F) and a low of 64°F. In the summer, temperatures average a high of 81°F and a low of 70°F (National Weather Service, 2008).

Floods on Oahu, other than those generated by high ocean waves, are caused by high intensity rainfall. Most major rainstorms that bring flood-producing rainfall are caused by the non-trade wind or Kona wind conditions which occurred during the wet winter season. Rainstorms can bring intense local showers affecting a small area or can blanket the entire island with rain. High-intensity rainfall, small drainage-basin size, steep basin and stream slopes, and little channel storage, produce

floods that are flashy (Wong, 1994). Most drainage basins have rapid response to rainfall characterized by steep triangular hydrographs. Time to peak is usually less than 1 hour and even for large intense storms, the rise and recession of the flood hydrograph usually occurs with 6 hours.

2.1.2 Geology and Soils

The valleys and gulches forming the Ala Wai Watershed are incised into the Koʻolau Volcano. The Koolau lavas are divided into the Koʻolau Basalt and the Honolulu Volcanics. Both of these formations play an important role in the Ala Wai Watershed. The Koʻolau Basalt primarily consists of Pliocene aged shield stage tholeiitic basalt. The Honolulu Volcanics are composed of Pleistocene aged alkalic basalt, basanite, and nephelinite (Lagenheim and Clague, 1987). Holocene and Pleistocene sedimentary caprock is found at the seaward end of the watershed.

The rocks of the Koʻolau Basalt can be divided into three groups, lava flows (aʻa and pahoehoe), pyroclastic deposits, and dikes. The lava flows of the Koʻolau basalt are usually thin bedded with an average thickness of about ten feet (Wentworth and MacDonald, 1953). These beds are composed of aʻa and pahoehoe flows and pyroclastic deposits. Aʻa contains a solid central core between two gravely clinker layers. Pahoehoe flows are usually characterized by a smooth ropy texture. Pyroclastic deposits originate from explosive volcanism. They are composed of friable sand-like ash and indurated tuff deposits. Dikes are thin near vertical sheets of rock that intruded or squeezed into existing lava flows or pyroclastic deposits.

The Honolulu Volcanics erupted much later than the Koʻolau Basalt and overlay the deeply eroded Koʻolau Volcano and its associated alluvial deposits. In Ala Wai they are composed of lava flows and ash and tuff. The lava flows have flow structures similar to the Koʻolau Basalt. The pyroclastic deposits are characterized by easily erodable, sand-like ash and relatively soft and easily erodable tuff. The Sugar Loaf flow which outcrops in cliffs in the UH Quarry poured down from Sugar Loaf on the northwest side of Mānoa Valley and pushed the lower section of Mānoa Stream to the southeast.

The caprock is composed of a wedge of terrestrial and marine sediments. It forms a coastal plain about 8000 feet wide in the Ala Wai area. The caprock is over 1000 feet thick in the seaward areas of the watershed (Wentworth, 1951). Near the ocean, much of the caprock has been covered with artificial fill.

Mānoa and Pālolo valleys are deeply eroded amphitheater shaped valleys that was later backfilled with alluvium and Honolulu Volcanic deposits. The original valleys were probably "V" shaped but the alluvial and volcanic fill material has formed a broad, flat-bottomed valley. The valley fill material is weathered at the surface but despite the heavy rainfall is probably fresh and unweathered in the subsurface. The ridges and valley walls of Mānoa and Pālolo Valleys are generally composed of Koʻolau Basalt (In some areas Honolulu pyroclastics drape the walls). The layered flows of Koʻolau Basalt have eroded into steep weathered cliffs which facilitate rapid runoff. Dikes in the back of the valleys impound groundwater at high elevations which contributes to perennial streamflow.

The altitude within the watershed ranges from mean sea level along the coastal areas, to 40 feet near the confluence of Mānoa and Pālolo Streams, and approximately 2,400 feet in the mountains. Several soil groups are found in the Ala Wai Watershed. The Lualualei-fill land-Ewa association is a

well-drained soil that may be found in the lower elevations. These soils have fine textured or moderately fine-textured subsoil or underlying material. The upper watershed is comprised of rock land-stony steep land association. These soils are generally found on steep to precipitous lands and are well-drained to excessively drained (MacDonald et al. 1970).

2.2 Makiki Sub-Watershed

The Makiki sub-watershed is the westernmost of the Ala Wai Canal drainage sub-watersheds, and drains 1,850 acres or 2.89 square miles of land. Makiki Stream, which is approximately 3.5 miles long, drains the sub-watershed. The stream's tributaries include Kanahā Stream, the main tributary that connects to Makiki Stream via Kanahā Ditch (a long lateral channel of about 6,400 feet), Kānealole Stream, Moleka Stream, and Maunalaha Stream (Townscape 2003). The upper segment of the sub-watershed is in the Koʻolau Mountains and is bordered to the west by the Punchbowl Crater.

Whereas the upper sub-watershed is largely forested and undeveloped, the sub-watershed becomes more urbanized as one moves seaward. The upper Makiki sub-watershed has preservation land uses and is considered non-urbanized in this study. The lower Makiki sub-watershed includes the populated Makiki areas of Wilder Avenue, Mānoa Road, and McCully Street. The urbanized portion of the sub-watershed has residential and commercial land uses. Makiki Stream runoff from urban areas and minor streams ultimately discharges into the Ala Wai Canal between McCully Street and Kalākaua Avenue bridges.

2.3 Mānoa Sub-Watershed

Mānoa sub-watershed is located between the Makiki and Pālolo drainage sub-watersheds and drains 3,822 acres (5.97 square miles) of land from the Koʻolau Mountains to the confluence of Mānoa and Pālolo Streams. The upper sub-watershed has preservation land uses and is considered non-urban. In the upper sub-watershed area, several smaller tributaries feed into the Waihī and Waiakeakua Streams and flow into the Mānoa Stream. Mānoa Stream drains the sub-watershed. The Mānoa Stream passes by Noelani Elementary School, the University of Hawaiʻi at Mānoa (UHM) upper campus, and Kānewai Field, and finally meets the Pālolo Stream to form the Mānoa-Pālolo Canal.

Most of the ground surface in the upper sub-watershed is covered with primarily non-native forest, and the middle segment of the sub-watershed is highly urbanized. The natural path and the characteristics of the Mānoa Stream have been altered significantly. Urban culverts discharge storm runoff into the Mānoa Stream throughout the developed area.

2.4 Pālolo Sub-Watershed

The Pālolo drainage sub-watershed is the easternmost of the Ala Wai Canal drainage sub-watersheds, and drains 2,601 acres (4.07 square miles) of land. The Mānoa sub-watershed borders it to the west, and the Mauʻumae Ridge borders the sub-watershed to the east. The Pālolo sub-watershed drains the Koʻolau Mountains and extends down Pālolo Valley to Waiʻalae Avenue. For the purposes of this study, the upper Pālolo sub-watershed is considered non-urban because it has preservation land use. Pūkele Stream and Waiʻōmaʻo Stream are the sub-watershed's two tributary streams. These streams flow into the Pālolo Stream that drains mostly the urbanized portion of the sub-watershed. The land uses in this area are commercial and residential. The Pālolo Stream meets the Mānoa Stream as the Mānoa-Pālolo Canal. As the Pālolo Stream passes through the urban Pālolo area, the stream is a concrete-lined channel that was part of a flood control project constructed by the City and County of Honolulu.

2.5 Mānoa-Pālolo Canal Junctions

The Mānoa and Pālolo Streams meet as the Mānoa-Pālolo Canal downstream of Kānewai Field and immediately north of Waiʻalae Avenue. The Mānoa-Pālolo Canal discharges into the Ala Wai Canal downstream of the Ala Wai Golf Course. Even though Mānoa-Pālolo Canal drains a segment of the Ala Wai Canal sub-watershed, it does so through large storm drainage outfalls that empty directly into the canal. Thus, only junctions (not areas of the sub-watershed) of the Mānoa-Pālolo Canal were examined for this study, and the large outfalls that enter the canal drain 20,285 acres of land.

2.6 Ala Wai Canal Sub-Watershed

The Ala Wai Canal sub-watershed drainage system is 1805 acres (2.82 square miles) including the Mānoa-Pālolo Canal. Historically, the lower portion of Ala Wai Watershed consisted of wetlands and provided ample storage for heavy runoff from the watershed. Ala Wai Canal was designed to drain the wetlands formed by the streams and create dry land for Waikīkī resort development, and the canal was constructed in the 1920s. At the time of the Ala Wai Canal project, the urban development in the watershed was limited, but today the Waikīkī area is heavily urbanized. Runoff from Makiki, Mānoa, and Pālolo sub-watersheds contains suspended materials from the natural

reaches of these watersheds, and, as a result, Ala Wai Canal has experienced significant sedimentation over the years.

For the purpose of this study, the Ala Wai Canal was modeled as a reservoir using USACE's HEC-HMS. Considering that the canal may be subject to backflow and meets the ocean at mean sea level, a reservoir model is appropriate due to the low elevation and likelihood of water storage. This assumption significantly affected the modeling of the Ala Wai Canal.

2.7 Waikīkī Sub-Watershed

The Waikīkī drainage sub-watershed is the southern-most and coastal area of the Ala Wai Canal drainage sub-watersheds, and drains 298 acres (0.47 square miles) of coastal land. The Waikīkī area is heavily urbanized and not only a vital center of the tourism industry on Oʻahu but also a popular residential, shopping, and nightlife area. Historically, the Waikīkī area was swamp land, and thus the sub-watershed is low-lying. The sub-watershed is characterized by impervious surfaces, and storm drainage runoff either flows as overland flow, flows directly into the ocean, or flows through the City drainage system directly into the Ala Wai Canal. The canal is at a similar elevation as the Waikīkī sub-watershed itself.

3 Data Gathered

The character of the land, the historical rainfall data, and historical stream flow data are relevant to the hydrological analysis of the Ala Wai Watershed. Data used for HEC-HMS model calibration included rain gage data, stream flow gage data, stage gage data, and tide gage data records of historical storms, and field surveys. These data were used to create rainfall intensity-duration-frequency curves. Rainfall data were the input for the HEC-HMS rainfall-runoff model calibration.

3.1 Rain Gages

Data sets from thirteen rain gages were used for the Ala Wai Watershed hydrologic analysis. Four of these rain gages are operated by the National Weather Service (NWS), four rain gages are operated by the BWS, three rain gages are operated by USGS, one rain gage is operated by the UHM, and one rain gage is privately operated. The characteristics of each gage are listed in Table 3-1. Figure 3-1 maps these rain gages in or nearby the study area, labeled by their name and identification number (ID). As shown, rain gages are located in a diversity of elevations and locations throughout the greater Ala Wai Watershed.

Typically, rainfall in upper elevations of the sub-watersheds is greater than that of the lower elevations. For the Makiki sub-watershed, the rain gage at the highest elevation is the Tantalus Peak gage at 1,665 feet above mean sea level (MSL). The Mānoa Tunnel rain gage at 650 feet above MSL is the highest for the Mānoa sub-watershed, and the Pālolo Tunnel rain gage is located at 995 feet above MSL. The lowest rain gage for the entire Ala Wai watershed is the Waikīkī Zoo gage at about 5 feet above MSL. It should be noted that three rain gages were located outside the study area. The Waikīkī Zoo rain gage (717.2) was used to represent the Ala Wai Canal and Waikīkī sub-watersheds. The Wihelmina Rise rain gage (721) was used to represent the middle Pālolo sub-watershed, and the Punchbowl Crater rain gage (709) was used to represent the lower Makiki sub-watershed. Figure 3-2 shows the annual rainfall distribution in the Ala Wai Watershed by major sub-watersheds.

Rain gage data sets vary according to whether records are taken in real time (typically 15-minute intervals) or daily. Records were used to extrapolate the rainfall hyetographs for all the sub-watersheds in the calibration basin models. Also, rain gage records provided essential data for three storms that were used to calibrate the HEC-HMS model. Those storms occurred on December 17–18, 1967; October 30, 2004; and March 31, 2006.

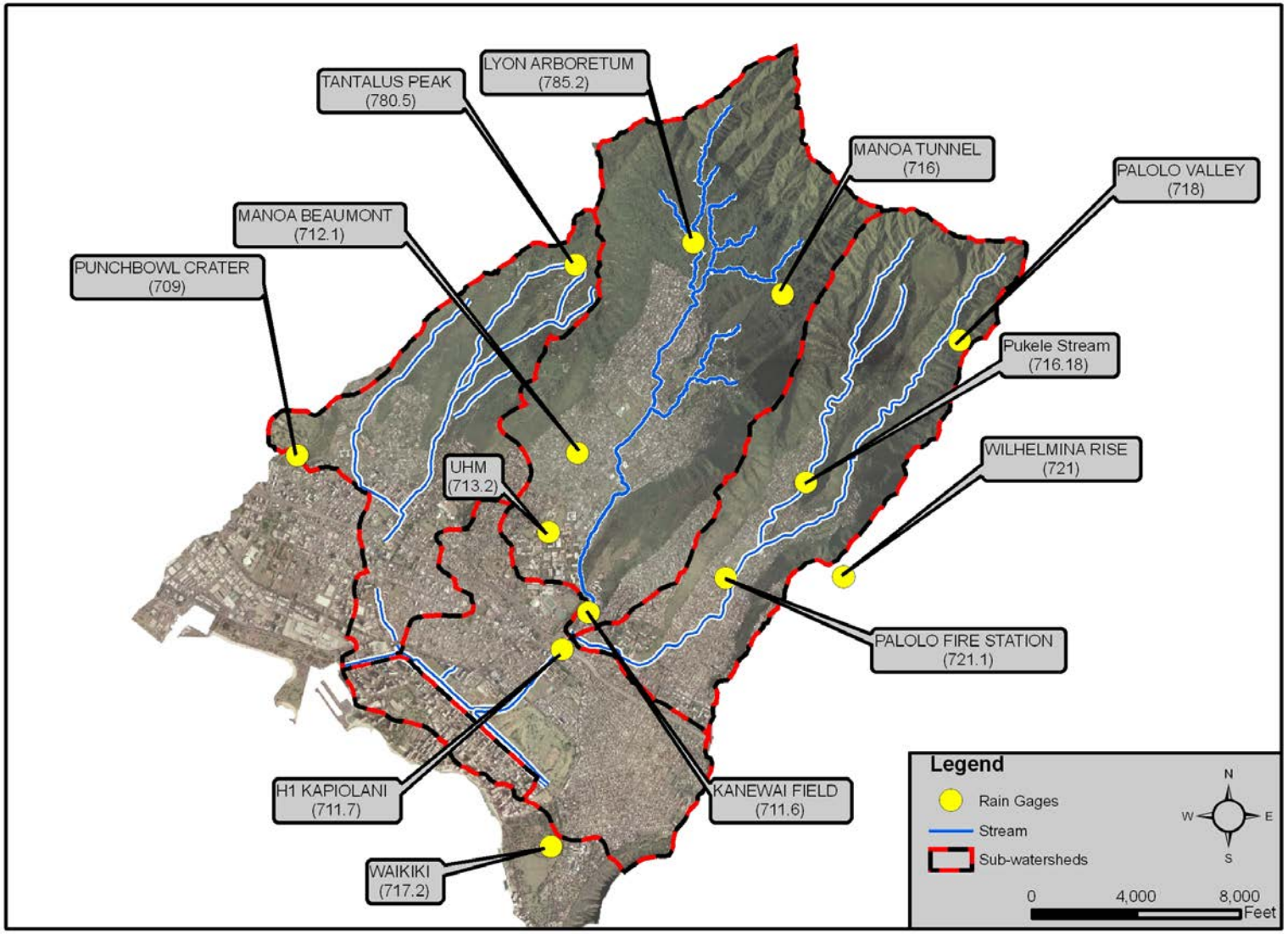

Figure 3-1. Ala Wai Watershed Rain Gages Used by Identification Number

Characteristics of Rain Gages Used

Name	ID	Latitude	Longitude	Elevation (ft)	Records	Real-time recording†	Daily recording*	Operator
Lyon Arboretum	785.2	21°20'08"	157°48'12"	500	1975– Present	√		NWS
Mānoa Tunnel	716	21°19'48"	157°47'36"	650	1927– Present		√	BWS
Kānewai Field	711.6	21°17'47"	157°48'56"	38	1999– Present	√		USGS
Mānoa Beaumont	712.1	21°18' 48"	157°49'00"	200	1947– Present		√	Private
UHM	713.2	21°18'18"	157°49'12"	120	1952– Present		√	UH
Pālolo Fire Stn.	721.1	21°18'00"	157°48'00"	190	1950– Present	√		NWS
Pālolo Tunnel	718	21°20'00"	157°49'00"	995	1926– Present	√		BWS
H-1 Kapiolani	711.7	21°17'22"	157°48'56"	20	2005– Present	√		USGS
Punchbowl Crater	709	21°18'48"	157°50'54"	355	1950– Present		√	NWS
Waikīkī Zoo	717.2	21°16'00"	157°49'00"	5	1957– Present	√		NWS
Wihelmina Rise	721	21°18' 00"	157°47'12"	1100	1927– Present		√	BWS
Pūkele Stream	716.18	21°18'36"	157°47'27"	345	1927– 2005	√		USGS
Tantalus Peak	780.5	21°20'00"	157°49'00"	1665	1927– Present		√	BWS

Table 3-1. Characteristics of Rain Gages Used.

†Real-time recording is by time intervals of 15 minutes. *Daily recording is 24-hour period

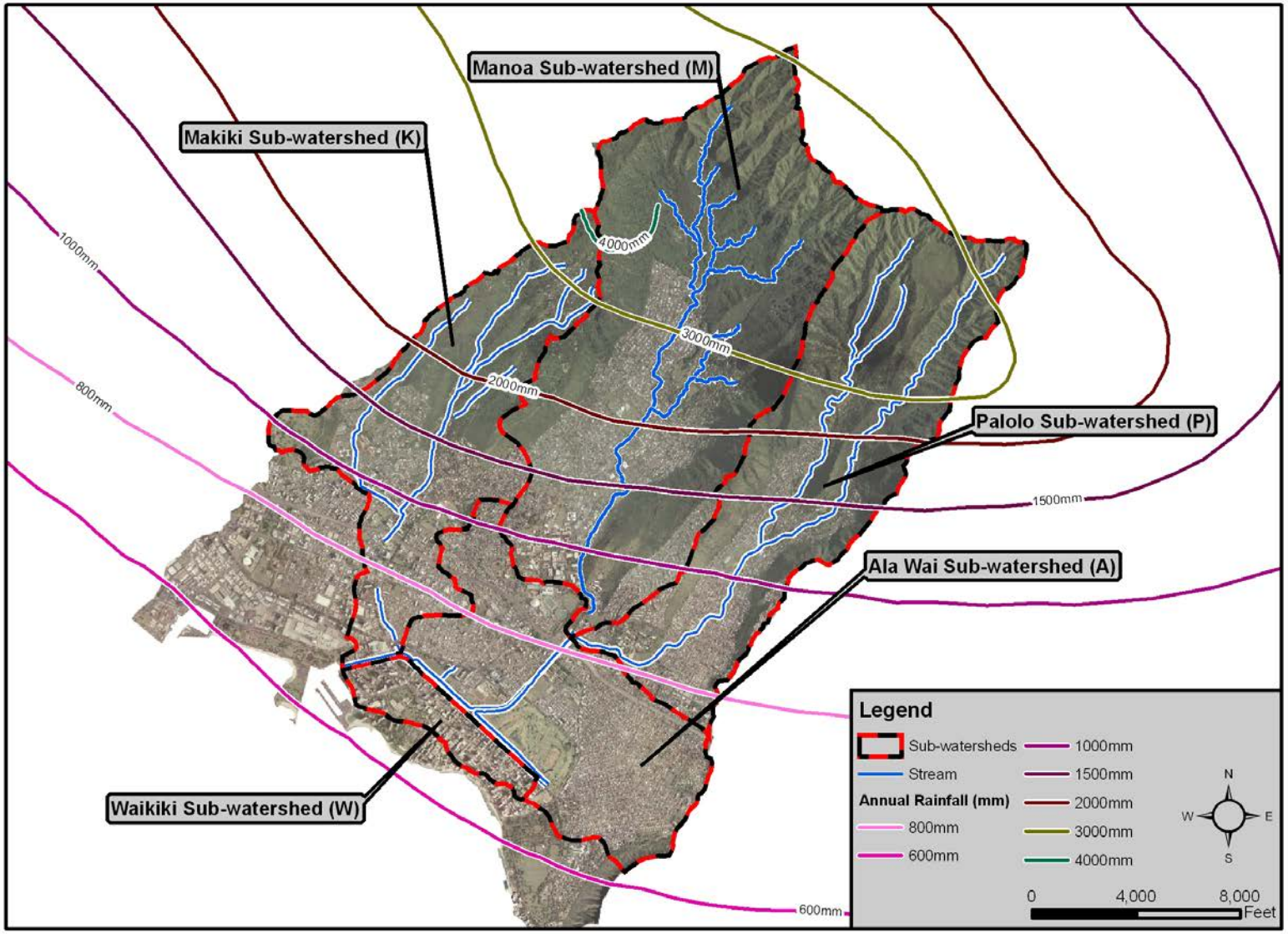

Figure 3-2. Annual Rainfall Distribution for Ala Wai Watershed by Major Sub-watershed

3.2 Stream Flow Gages

Historic stream gage records were used to develop the sub-basin analyses for the HEC-HMS model. Data sets came from nine stream gages throughout the Ala Wai Watershed, and these gages are shown in Figure 3-3 labeled with their USGS identification number. Stream gage data for three storms were essential for calibrating the HEC-HMS model (see calibration discussion in Section 3.8). These three storms occurred in 1967, 2004, and 2006 and are discussed in Section 3.8. Stream gage data for these events are limited depending on whether the gages' record continuously, such as by 15-minute intervals, or whether they simply record peak flow values. The characteristics of the stream gages are given in Table 3-2, and the stream flow gages are shown in Figure 3-3.

3.3 Stage Gages

The Waikīkī and Ala Wai Canal sub-watersheds are located on low-lying coastal land, and data from two stage gages were used in these areas, as shown in Figure 3-4. Stage gage data was essential for calibrating the Ala Wai Canal sub-watershed model detailed in Section 4.6. The nearest stage gage in the ocean was the National Oceanic and Atmospheric Agency's (NOAA's) tide level station 1612340 at Honolulu Harbor, which was used to calibrate the model. The other gage used was USGS 16247130 at Ala Wai Elementary School. These stage gages are located west of the study area as shown in Figure 3-2. Although there are no public published stage records, the local USGS office provided Oceanit with continuous stage data for the October 30, 2004, storm for calibration purposes (see Section 4).

Characteristics of Stream Gages Used									
Gage Location	**Waihī**	**Waiakeakua**	**Lowrey**	**Kānewai**	**Pūkele**	**Waiʻōmaʻo**	**Pālolo**	**Makiki**	**Mānoa-Pālolo**
Gage Number	16238500	16240500	16241500	16242500	1624400	16246000	16247000	16238000	16247100
Gage Location, Latitude	21°19'55"	21°19'52"	21°18'53"	21°17'47"	21°18'36"	21°18'34"	21°17'35"	21°17'02"	21°17'24"
Gage Location, Longitude	157°48'12"	157°48'08"	157°48'41"	157°48'56"	157°47'27"	157°47'11"	157°48'25"	157°50'22"	157°49'17"
Gage Elevation (ft)	289.84	294.5	294.5	38	344.78	373.66	95	10	5
Drainage Area (USGS, mi^2)	1.14	1.06	4.02	5.05	1.18	1.04	3.63	2.23	10.6
Drainage Area (mi^2)	1.19	1.07	4.22	5.643	1.146	1.036	3.62	2.49	10.34
Period of Continuous Record	1913–1983	1913–Present	---	1999–Present	1927–2004	1927–1971	1953–Present	---	1967–Present
Peak Flow Record Only	---	---	2003-2004	---	---	---	---	2003-2004	---
Number of Annual Peaks Available for Analysis	63	88	3	6	59	39	32	2	40

Table 3-2. Characteristics of Stream Gages Used

Characteristics of Stage Gages Used		
Gage Location	**Honolulu Harbor**	**Ala Wai Elementary School**
Gage Number	1612340	16247130
Gage Location, Latitude	21° 18.4'	21°17'16"
Gage Location, Longitude	157° 52.0'	157°49'51"
Gage Elevation (ft)	B.M. ELV. 8.06 Feet	5
Period of Continuous Record	1905-present	2003-2004

Table 3-3. Characteristics of Stage Gages Used

Note: B.M. ELV.= Bench Mark Elevation

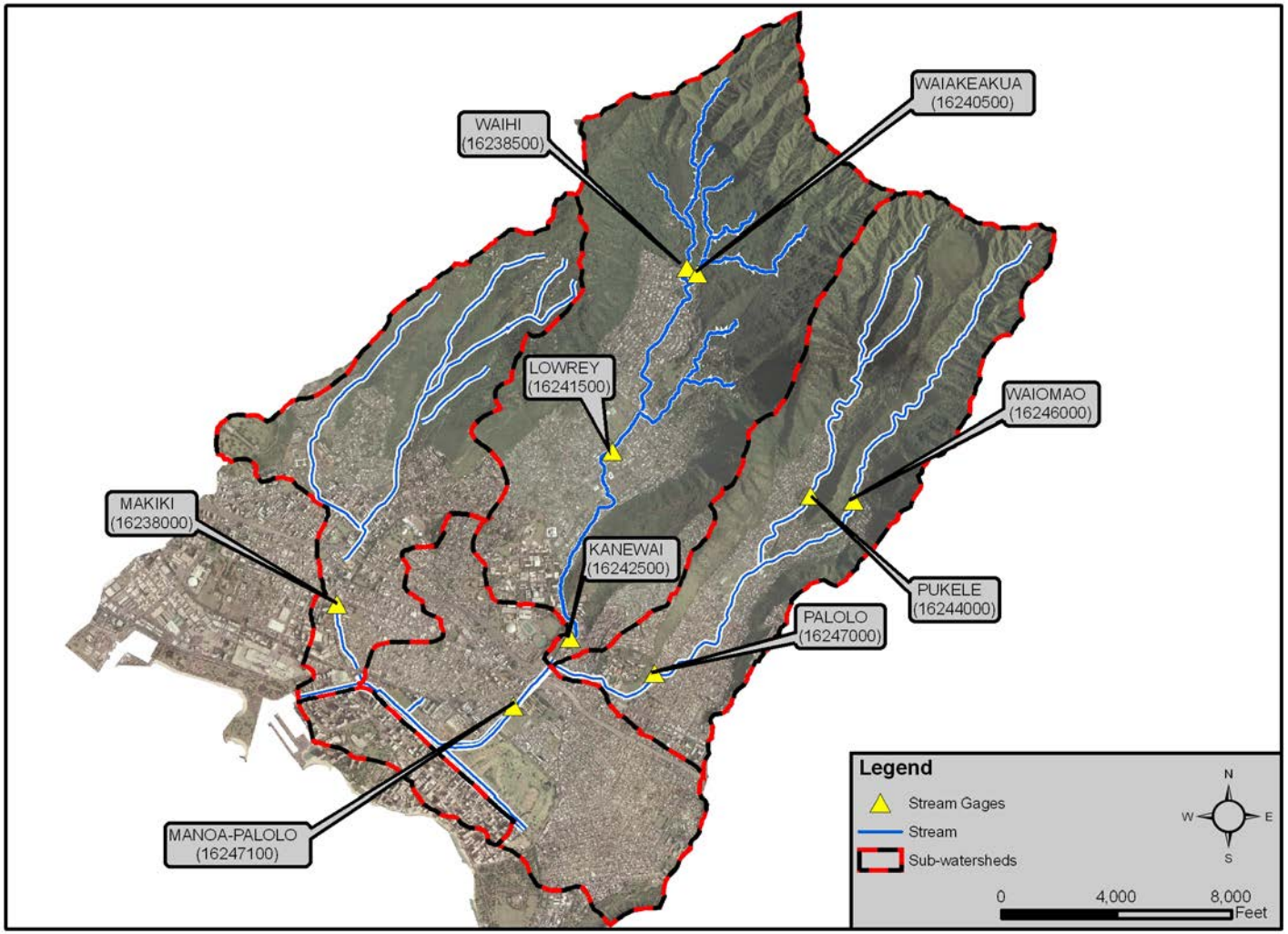

Figure 3-3. Ala Wai Watershed Stream Gages Used by ID Number

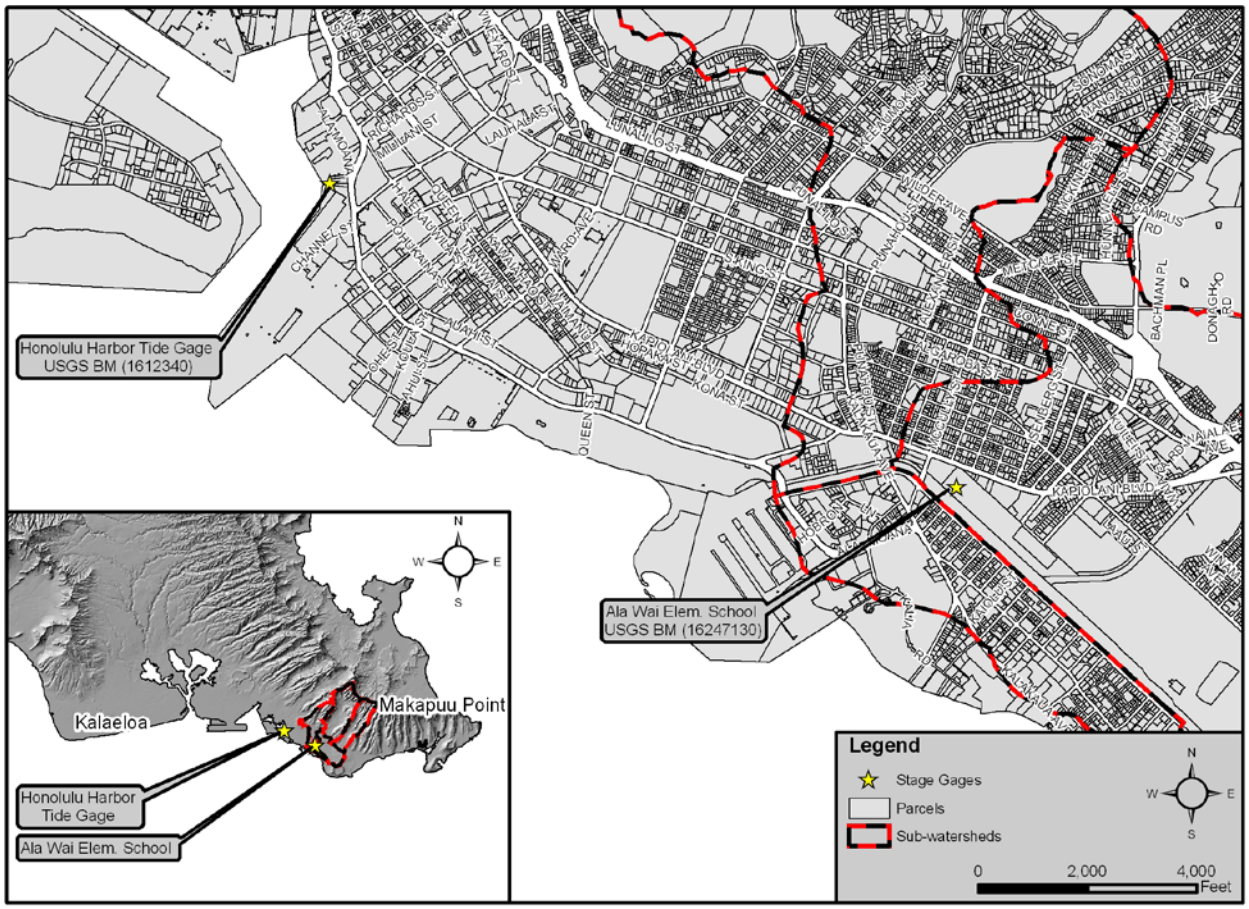

Figure 3-4. Ala Wai Watershed Stage Gages Used (with ID Number)

3.4 Drainage Systems

The City's municipal storm drainage system drains the sub-watersheds of the study area. Runoff from storms flows into the streams or drainage systems throughout the study area. The City's drainage maps were used to identify the locations of the existing storm drainage system. These maps provided information about the characteristics of drainage system segments, including whether the segments are natural or channelized and the size of outlets throughout the system. The drainage systems evaluation results were used in determining the sub-basins boundaries. For example, the boundaries of sub-basin K4 were mainly determined from drainage evaluation.

University of Hawai'i at Mānoa provided utility maps showing the drainage systems through the campus area. Existing conditions of the UHM's storm drainage system, such as the size of relevant culverts, were gathered from these maps. Detailed drainage systems information can be found in the *Final Drainage Evaluation Report Ala Wai Watershed Project* (Oceanit 2008a). The drainage systems information within the UHM upper campus was used to determine the boundaries of sub-basin M12. Based on this information, the boundaries of sub-basins M12 were changed slightly. As a result, this sub-watershed's drainage area was different from the Manoa Watershed Study—it changed from 0.672 to 0.749 square miles.

3.5 Geospatial Data

Geospatial information [1] and field survey observations were used to determine hydrologic conditions, such as terrain roughness characteristics and stream channel cross sections. Information collected included LiDAR data and aerial maps. Numerous field visits to the various sub-watersheds of the study area were made over the course of January 2008 until September 2008 to confirm and/or describe any relevant existing condition of a drainage system facility or the existing conditions in a sub-basin.

LiDAR data were inputted into ArcView GIS 3.3 with the HEC-GeoHMS 1.1 extension to create a geospatial model of the Ala Wai Watershed. The HEC-GeoHMS (USACE 2003) model was used to delineate the initial sub-watershed boundaries, calculate sub-watershed areas, and determine flow path lengths and slopes. However, the sub-watersheds within the study area were not completely delineated by the HEC-GeoHMS model alone. The existing drainage infrastructure and the locations of potential conceptual design measures were important factors for sub-watershed delineation. The final sub-watershed delineation was the result of a combination of the HEC-GeoHMS model, an evaluation of the existing storm drainage system, and the potential locations of the conceptual design measures. LiDAR data were used to approximate the boundaries of sub-basins and sub-watersheds. In addition, ArcView GIS 3.3 and drainage maps were used to determine the boundaries of urbanized areas of the sub-watersheds' drainage areas because better resolution was available for evaluation.

3.6 Sub-Basin Delineation

For the purposes of this study, sub-watershed refers to the larger watershed areas of Makiki, Mānoa, Pālolo, and Waikīkī, and the term "sub-basin" refers to the smaller sub-watersheds within these sub-watersheds. These terms are used to avoid confusion. Also the term "sub-basin" is commonly accepted for the HEC-HMS model delineation of small drainage areas. Sub-basins provide clear boundaries for hydrologic study, and sub-basins were delineated according to a couple of assumptions. The key assumption is that the City's drainage systems, the underground storm sewers, does not cross a topographic sub-basin boundary for all return periods from 2-year through 500-year storms.

This assumption takes into account all the storm runoff for storms, but not all storm runoff necessarily flows through storm drainage systems. According to the United States Department of Agriculture (1990; Module 206A), "Storm sewers generally handle only a small portion of a large event. The rest of the peak flow travels by street, lawns, and so on to the outlet." This suggests that

[1] The aerial images that were used for the hydrologic analysis are from the National Geospatial-Intelligence Agency (NGA) supplied by the USGS. The specifications for these images are 0.3 meter pixel size, rectified natural color image orthoimage. The working image was re-sampled to 1-meter pixel size.

The digital elevation LiDAR data used in this hydrologic analysis were obtained from AIRBORNE 1, with an accuracy of 4 elevation points per square meter. The original data were reprojected to North American Datum (NAD) 83 HARN 1993 Universal Transverse Mercator (UTM) Zone 4 meters. The grid size was 2 meters by 2 meters.

storm runoff flows along the natural geographic flow path and not necessarily through the storm drainage system. Based on the City's storm drainage standards, the drainage capacities with catchment areas greater than 100 acres should meet 100-year storm drainage standards; the drainage capacities with catchment areas equal to or less than 100 acres should meet 10-year storm drainage standards. Consequently, at junctions with contributing drainage systems, peak discharges may be lower than predicted. Similarly, at junctions where drainage system catchment areas are not considered, actual peak discharges may be higher than predicted.

Some delineations of sub-basins and assumptions about sub-basins were necessary for the low-lying areas of Mānoa-Pālolo Canal, Ala Wai Canal sub-watershed, and Waikīkī sub-watershed. Because Mānoa-Pālolo Canal receives drainage from other sub-watersheds with relatively large drainage systems, only the junctions in the Mānoa-Pālolo Canal were examined and there were no sub-basins delineated around the canal itself. Also, delineation for the Waikīkī sub-watershed was particularly problematic because some of its sub-basins drain directly into the ocean with a relatively small flow directed through the outfalls designated on the drainage maps.

It should be noted that all the hydrologic analysis results in this study for Mānoa sub-watershed were exactly the same as performed in the *Mānoa Watershed Project Final Hydrology Report* (Oceanit 2008b) to keep consistency with the previous Mānoa Watershed Project hydrologic study. Another assumption was made about the UHM area in the Mānoa sub-watershed. The drainage area of sub-watershed M12 (UHM upper campus) was changed from the previous 0.672 square miles (Oceanit 2008) to 0.747 square miles. This drainage area determination accounts for the contribution of a 96-inch culvert storm drainage system at Dole Street Bridge. The characteristics of the storm sewer network were collected from the UHM Utility Map (2008).

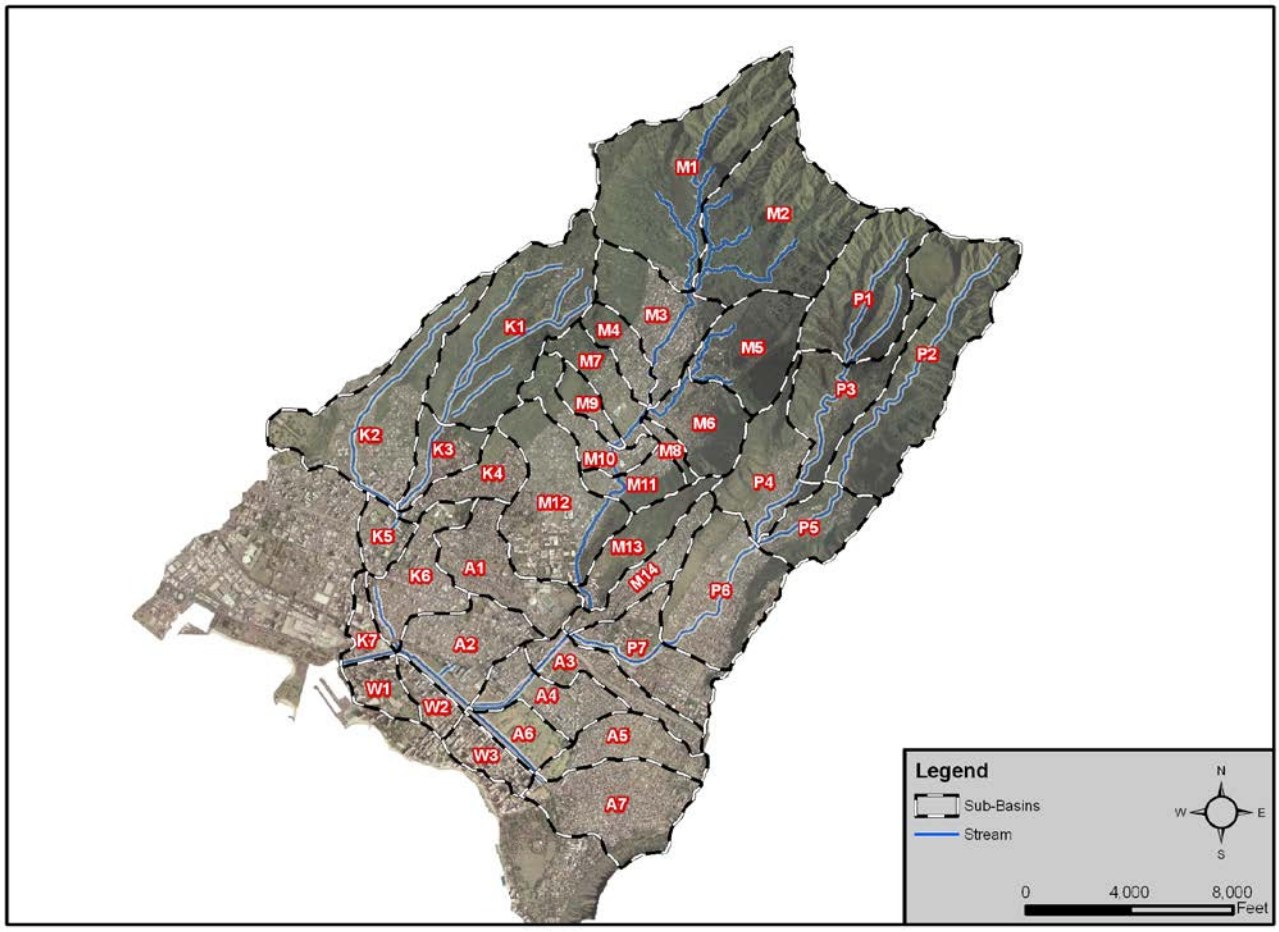

Figure 3-5. Ala Wai Watershed Sub-Basin Delineation

Ala Wai Watershed delineation of sub-basins was based on the junctions that are confluences of study area streams. The following table of sub-basin delineations designates the respective sub-watershed by the following.

- 'J' for junctions, or stream confluences, throughout the watershed
- 'K' for sub-basins in the Makiki sub-watershed
- 'M' for sub-basins in the Mānoa sub-watershed
- 'P' for sub-basins in the Pālolo sub-watershed
- Note that Mānoa-Pālolo Canal sub-watershed has junctions only and not sub-basins because other sub-basins empty into this canal but it does not drain its surrounding area
- 'A' for sub-basins in the Ala Wai sub-watershed; assumed to be a reservoir for the purposes of this study (see earlier discussion in Section 3.6)
- 'W' for sub-basins in the Waikīkī sub-watershed

Ala Wai Watershed Sub-Basin Delineation		
Sub-Basin/Junction	Sub-Basin or Junction Name	Drainage Area (mi^2)
MAKIKI		
KI	Upper Makiki Stream	1.00
K2	Kanahā Stream	0.85
K3	Middle Makiki Stream	0.22
K4	East Mānoa Road	0.25
JK1	Confluence of Makiki and Kanahā Streams	2.33
K5	Lower Makiki Stream	0.16
JK2	USGS Stream Gage near King St. 16238000	2.49
K6	Washington Middle School	0.40
JK3	Confluence of Makiki Stream and Ala Wai Canal	2.89
MĀNOA		
M1	Waihī	1.20
M2	Waiakeakua	1.07
JM1	Confluence of Waihī and Waiakeakua Streams	2.27
M3	Pawaina	0.51
M4	Poelua	0.18
M5	Woodlawn_Ditch 1	0.50
M6	Woodlawn_Ditch 2	0.35
JM2	Confluence of Mānoa Stream & Woodlawn Ditch	3.81
M7	Park	0.25
M8	Kahaloa	0.06
M9	Lowrey	0.11
JM3	Lowrey Ave. Bridge	4.22
M10	Woodlawn	0.26
JM4	Woodlawn Dr. Bridge	4.48
M11	Noelani	0.19
JM5	Mānoa Stream near Noelani Elementary School	4.67
M12	Dole (UHM campus)	0.75
JM6	Dole Street Bridge	5.42
M13	Kānewai	0.30
JM7	Kānewai Field Gage	5.72
M14	Saint Louis Heights	0.25
JM8	Just Upstream of the Confluence of Mānoa & Pālolo Streams	5.97

Table 3-4. Ala Wai Watershed Sub-Basin Delineation

Ala Wai Watershed Sub-Basin Delineation (Continued)		
Sub Basin or Junction Number	Sub Basin or Junction Name	Drainage area (mi^2)
PĀLOLO		
	Confluence of Pūkele and Waiʻōmaʻo Streams	
	Just Upstream of the Confluence of Mānoa &	
	Confluence of Mānoa and Pālolo Streams	10.04
	H1 Freeway	0.30
	USGS Stream Gage 16247100	10.34
	Date Street	0.34
	Confluence of Mānoa-Pālolo and Ala Wai Canals	10.68
ALA WAI & WAIKĪKĪ		
	Kaimukī	0.32
	Diamond Head Drainage System	0.62
	Ala Wai Golf Course	0.20
	Kuhio	0.18
	UHM lower campus and Punahou School	0.45
	Mōʻiliʻili	0.47
	Kālakaua	0.13
	Hawaii Convention Center	0.12
	Ala Moana Blvd.	0.16
	Mouth of Ala Wai Canal	16.21

Table 3-4 (Continued). Ala Wai Watershed Sub-Basin Delineation

Drainage systems collect the majority of runoff in Waikīkī, and thus, information about these systems was used to delineate the Waikīkī sub-watersheds. Most of the runoff flows through the City's drainage systems and discharges into the Ala Wai Canal. However, a small portion of runoff flows directly into the ocean. This small portion is overland flow or is emptied directly into the ocean by drainage pipes.

3.7 Storm Records Used for Calibration

Calibration of the HEC-HMS model relied on sub-basin analysis that used available records of three storms in December 17-18, 1967; October 30, 2004; and March 31, 2006. However, partial stream flow data were available for some gages and junctions had different recording equipment. Below is a list of the records available by location and storm. The locations refer to the HEC-HMS model layout.

- A partial data set from JM3 (Lowrey Ave. Bridge) from the 2004 storm was used for calibration
- At M2 (Waiakeakua sub-basin), peak flow data were used for the 1967 storm, and real-time data were used for the 2004 and 2006 storms
- At JMP2 (USGS stream gage 17247100 at Kaimukī High School), peak flow data were used for the 1967 storm, and real-time data were used for the 2004 and 2006 storms.
- At JP1 (USGS Pūkele Stream gage), peak flow data from the 1967 storm were used, and real-time data from the 2004 storm were used
- At JP3 (USGS stream gage 17247000 at Pālolo Stream), peak flow data from all three storms were used, but some of these data were discarded because they were clearly inaccurate—comparison to other gage readings downstream during the same storm showed clear inconsistencies

3.7.1 December 1967 Storm

On December 16, 1967, a surface weather front appeared to be stationary west of Hawai'i (DLNR 1968). Torrential rains started falling on O'ahu around the middle of the night on December 17. Many rainfall stations reported excessive rainfall during the storm. Pālolo Valley, Wai'alae-Kāhala, Niu Valley, and Waimānalo suffered extensive flood damage. Rainfall amounts registered in the windward area had a rainfall frequency of about a 25-year storm (DLNR, 1968). The Tantalus Peak rain gage registered 5 inches of rainfall for a 3-hour period ending at 3:00 AM. The Pālolo Tunnel rain gage, maintained by the BWS, recorded 10.06 inches between the middle of the night and 8:00 AM hours, with 2.4 inches from 4:00 AM to 5:00 AM. The rainfall intensity was almost uniformly distributed from the coastal area to the Ko'olau Mountains. The USGS stream gage 16247000 at the Pālolo Stream recorded a record high peak discharge of 4,270 cubic feet per second (cfs); the USGS stream gage 16247100 at the Mānoa-Pālolo Drainage Canal recorded its highest estimated discharge at 10,100 cfs.

3.7.2 October 2004 Storm

A storm on October 30, 2004, that caused flooding in the Mānoa Valley was characterized as about a 20-year storm (NWS 2005). This return period corresponds to a 5% probability of occurrence. The persistent and heavy rainfall created swift and high stream flows that were recorded throughout the Mānoa Stream by various rain and stream gages. The heaviest rainfall happened around 7:30 PM, at which time the Lyon Arboretum rain gage recorded 1.29 inches in 15 minutes. The gage records for the October 2004 storm were used to calibrate the HEC-HMS model.

3.7.3 March 2006 Storm

On March 31, 2006, a strong storm caused the NWS to issue flash flood warnings for O'ahu because rain fell on already saturated ground. The storm moved over the windward (eastern) half of O'ahu during the late morning, and rainfall of 1 to 2 inches were recorded within one-hour periods by several NWS gages (NWS 2006). The NWS Waimānalo rain gage recorded over 3 inches of rainfall within a two-hour period. During the six weeks prior to this storm, O'ahu had experienced heavy rains that saturated lands on the windward side of the island. The March 31 rainfall, coupled with the saturated character of the land, produced flash floods throughout the island (NWS 2006). The Moanalua, Makiki, and Mānoa Streams overtopped their banks, and residents of Mānoa valley were alerted of flash flooding in the area. Various intersections and flooding forced the partial closure of the area's major highway, H-1 Freeway, and downtown streets were clogged with traffic (Pacific Business News 2006).

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4 Hydrologic Analysis Procedure

Hydrologic analysis of sub-watersheds of the Ala Wai Watershed utilized up to five hydrologic modeling methods. Given the HEC-HMS model layout for the Ala Wai Watershed, the hydrologic analyses for sub-watersheds were completed on the basis of the existing conditions—particularly whether or not sub-watersheds are urbanized. For the sub-watersheds without much urbanized area, hydrologic models were calibrated using the storm records outlined in Section 3.8. The hydrologic model, as shown in Figure 4-1 was based on the sub-watersheds delineated. These sub-watersheds include the upper Makiki, upper Mānoa, and upper Pālolo. Thus, Sections 4.2 through 4.5 outline the necessary parameters that were calculated: rainfall amount, time of concentration, and curve numbers. As mentioned earlier, the Clark Unit Hydrograph was used as the transform method for these areas that are not urbanized.

For the sub-watersheds with more urbanized area, the hydrologic models used the Kinematic Wave Transform Method. Section 4.7 provides the Kinematic Wave Transform Method analyses of the urbanized areas of the Ala Wai Canal and Waikīkī sub-watersheds, alongside the Mānoa-Pālolo Canal junctions considered.

4.1 Hydrologic Model Layout

Stream junctions of interest that are listed in Table 3-3 are illustrated as the final hydrologic model layout as shown below in Figure 4-1.

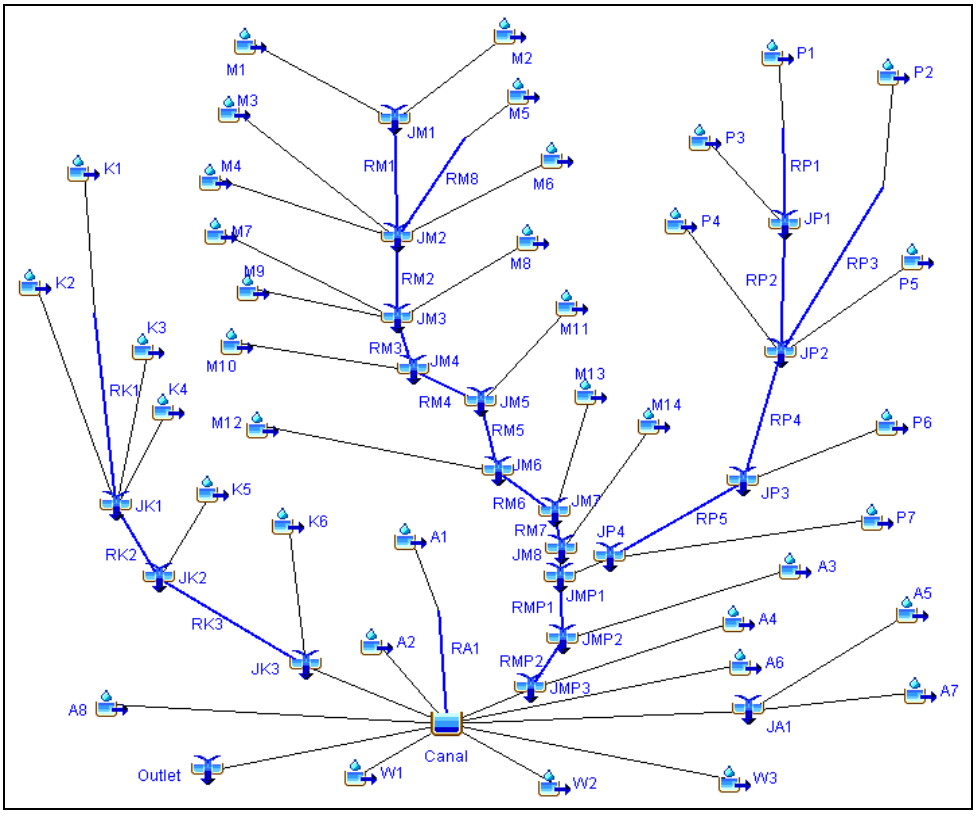

Figure 4-1. Ala Wai Watershed HEC-HMS Model Layout

4.2 Meteorological Model

The storm rainfall amounts that were the input for the hydrologic model are considered the meteorological model. The rainfall and stream flow data were collected from rain gage and stream flow gage records as available for the study area (see Sections 3.1 through 3.2).

4.2.1 Rainfall Amount Determination

Rainfall amount determination was necessary for 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent chance exceedance storms. These amounts were interpolated and/or extrapolated from "Rainfall Frequency Study for O'ahu", Report R-73, by Giambelluca, Lau, Fok and Schroeder (1984). For the 1-, 6-, and 24-hour rainfall amounts for the recurrence periods of 50, 10, 2, and 1 percent chance exceedance, values (shown in Table 4-1) were obtained directly from R-73 (Giambelluca 1984). The rainfall depths from R-73 were plotted, and the resulting smooth curve-function was used to estimate the rainfall depths that were not directly shown in R-73. Thus, for the percent chance exceedance storms less than the 1 percent storm, the rainfall amounts for various durations between 1 hour and 24 hours were determined from the duration nomographs presented in R-73. These curves are shown in Figure 4-3. The 0.5 and 0.2 percent chance exceedance storms' rainfall amounts were estimated by extrapolation using the rainfall depths relationships above the 1 percent chance exceedance storm. Rainfall values less than 1-hour were computed using 1-hour value. According to R-73, the 30-, 15-, and 5-minute rainfall values were determined by multiplying the 1-hour value by 0.714, 0.539, and 0.264, respectively.

Flow in the upper sub-watersheds may be underestimated due to sudden rainfall events that concentrate quickly as runoff because of high amounts of rainfall. Conversely, low rainfall is apparent in the lower sub-watersheds, and the relatively flat topography lends to underestimates of peak flows because runoff along the coastal areas may flow directly into the ocean. Thus, rainfall presented here is an average, based on the center point of the sub-basin and interpolated and extrapolated from the rainfall data available. The center point of each sub-basin was determined using the geospatial data discussed in Section 3.5. It should be noted that the 2001 Ala Wai Flood Study (USACE 2001) used a different approach for determining one rainfall value by averaging rainfall in the upper watershed and lower watershed rather than by averaging by the entire watershed.

Rainfall Intensity Duration Values for the Ala Wai Watershed

Percent Chance Exceedance	Recurrence Interval Year	Duration								
		5-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
50%	2	0.40	0.81	1.07	1.50	2.20	2.65	3.50	4.40	5.30
20%	5	0.49	1.00	1.32	1.85	2.80	3.40	4.45	5.70	7.15
10%	10	0.63	1.28	1.70	2.38	3.35	4.10	5.50	7.00	8.60
5%	20	0.70	1.43	1.89	2.65	3.80	4.65	6.25	8.05	10.05
2%	50	0.83	1.70	2.25	3.15	4.35	5.35	7.20	9.45	11.80
1%	100	0.91	1.86	2.46	3.45	4.85	6.00	8.25	10.90	13.65
0.5%	200	1.02	2.08	2.75	3.85	5.35	6.55	9.15	12.10	15.20
0.2%	500	1.16	2.37	3.14	4.40	6.10	7.55	10.40	13.65	17.00

Reference: Giambelluca and others, 1984, DLNR Report R-73

Table 4-1. Determined Rainfall Intensity Duration Values in inches for Ala Wai Watershed, Oahu, Hawaii. Note: rainfall intensity frequency data determined from maps and nomographs in Giambelluca and others, 1984, DLNR Report R-73.

4.2.2 Rainfall Intensity-Duration-Frequency Curves

The rainfall-depth duration curves graph in Figure 4-2 shows the rainfall data as determined in average amounts for the percent chance exceedance storms. The rainfall amounts are for a 24-hour period, and were converted to intensity-duration-frequency (IDF) curves to offer rainfall intensities according to the range of storms examined (see Figure 4-3). The IDF curve is a crucial input into the HEC-HMS model analysis.

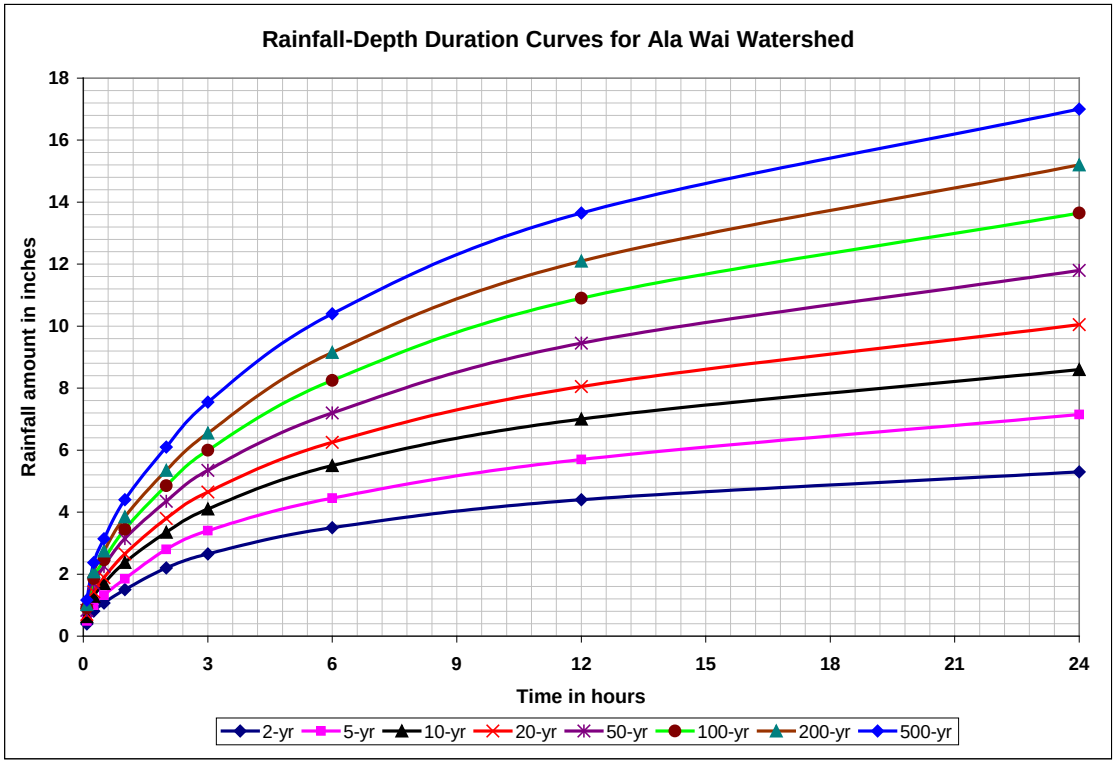

Figure 4-2. Rainfall-Depth Duration Curves for Ala Wai Watershed

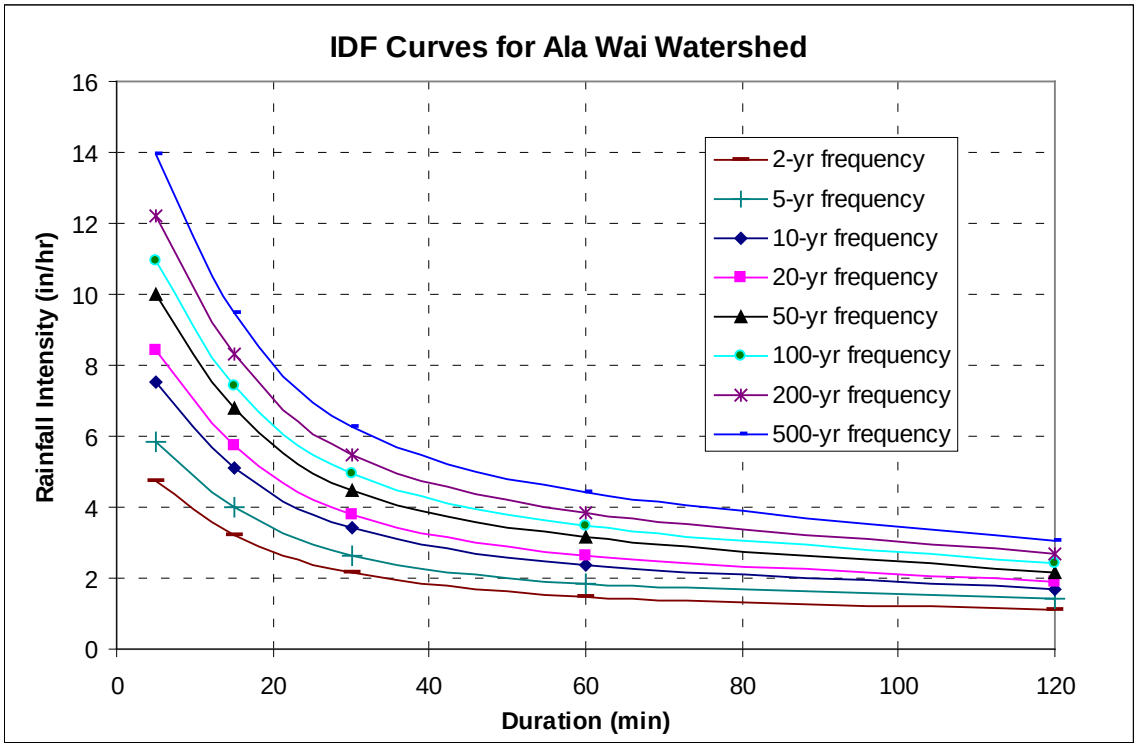

Figure 4-3. IDF curves for Ala Wai Watershed

4.2.3 Time of Concentration Calculation

The Clark Unit Hydrograph requires the parameter of the time of concentration (T_c) for each sub-basin. According to the TR-55 method, three types of flow path constitute the water flow: sheet flow, shallow concentrated flow, and channel flow; these three flows were added together to calculate time of concentration. According to the NRCS's Technical Report 55 (1986), "Time of concentration is the time for runoff to travel from the hydraulically most distant point of watershed to a point of interest within the watershed." The majority of the flow path may be channel flow as appropriate. Calculation of time of concentration is necessary for preparing the transform method for a unit hydrograph. The TR-55 velocity approach method was used to calculate time of concentration; that means the traveling time is a function of watercourse length and the velocity. The average velocity is a function of watercourse, slope, and type of channel.

A certain number of assumptions were made regarding sheet flow. The sheet flow segment describes the time period from raindrop impact until overland flow accumulates to a depth of about 0.1 foot, and one assumption made for time of concentration calculations was that the flow length for the stream reaches analyzed were not longer than 100 feet. The sheet flow segment T_c is calculated using Manning's kinematic solution, dependent on Manning's roughness coefficient *n*, the flow length, the rainfall amount, and the land slope. According to the SCS training material module 206A, "in most watersheds the overland [sheet] flow length is probably about 50 ft." (USDA, 1990) A maximum length of 100 feet is allowed in WinTR-55, and SCS suggests that a visit to the watershed is the best manner of determining the appropriate sheet flow length. Because this study lacked the appropriate observations for sheet flow during site visits, and considering previous studies and engineering judgement, a sheet flow length of 80 feet was set for all sub-watersheds in the Ala Wai Watershed for the calculation of time of concentration.

Overall, the flow length was determined from the City drainage maps and the known characteristics of the stream reach. Also, estimated flow length and land slope data were gathered from the geospatial data collected (see Section 3.5) using ArcView GIS 3.3. LiDAR topographic data and 5-foot elevation contours were used to calculate the slope of each sub-watershed.

4.2.4 Manning's *n* Roughness Coefficients

The surface Manning's roughness coefficients, based on the ground surface conditions, were determined as either 0.4 (woods with light underbrush) or 0.24 (dense grasses) using Table 3-1 from TR-55 (NRCS 1986). Where storm drainage systems are present in the sub-watershed, the appropriate flow path was used to estimate the time of concentration. Drainage pipe flow not under a pressure condition is treated as a portion of channel flow. The wetted perimeter condition assumes the full-flow condition for the drainage system pipes and the natural channel of the streambed. Altogether, the Manning's roughness coefficient for storm drainage facilities was selected as 0.015.

TR-55 Method Time of Concentration Parameters

Sheet Flow Characteristics					Shallow Concentrated Flow			Channel Flow Characteristics					Time of Concentration
Sub-Basin	**Manning's *n***	**Flow Length (ft)**	**Two-Year 24-hour Rainfall (in)**	**Land Slope**	**Surface Description**	**Flow Length (ft)**	**Slope**	**Flow Length (ft)**	**Cross-Section Area (ft^2)**	**Wetted Perimeter(ft)**	**Channel Slope**	**Manning's *n***	**T_c (hr)**
K1	0.4	80	5.3	0.450	Unpaved	1200	0.218	7200	30	19	0.174	0.035	**0.202**
K2	0.4	80	5.3	0.375	Unpaved	1150	0.278	9900	20	18	0.090	0.035	**0.311**
K3	0.24	80	5.3	0.313	Paved	1850	0.305	3100	30	19	0.042	0.035	**0.170**
K4	0.24	80	5.3	0.405	Paved	1450	0.365	5200	7.07	9.42	0.042	0.015	**0.165**
M14	0.24	50	5.3	0.250	Paved	1200	0.150	4150 1200	4.91 160	7.85 48	0.128 0.017	0.015 0.035	**0.152**
P1	0.4	80	5.3	0.260	Unpaved	1600	0.450	4850	40	24	0.159	0.040	**0.189**
P2	0.4	80	5.3	0.200	Unpaved	1850	0.172	9200	40	24	0.090	0.035	**0.313**
P3	0.24	80	5.3	0.306	Unpaved	2300	0.321	5500	48	20	0.061	0.035	**0.203**
P4	0.24	80	5.3	0.280	Unpaved	2800	0.285	1950 2400	3.14 48	6.28 20	0.115 0.0375	0.015 0.035	**0.215**
P5	0.24	80	5.3	0.260	Paved	800	0.285	700 4050	1.77 48	4.7 20	0.236 0.0395	0.015 0.035	**0.163**
P6	0.24	80	5.3	0.270	Paved	1150	0.550	800 5600	4.9 120	7.85 48	0.0625 0.0187	0.015 0.018	**0.168**
P7	0.24	80	5.3	0.180	Paved	700	0.040	3100 3500	4.9 160	7.85 48	0.03 0.02	0.015 0.018	**0.218**

Table 4-2. TR-55 Method Time of Concentration Parameters

Table 4-2 shows the values for sheet flow, shallow concentrated flow, and channel flow that were used to calculate the times of concentration. The times of concentration range from 0.152 hours in the Mānoa 14 sub-basin to 0.313 hours in the Pālolo 2 sub-basin, as shown in Table 4-3.

4.3 Curve Numbers Calculation

Runoff curve numbers, according to the TR-55 method (NRCS 1986), were used to determine the loss method of the HEC-HMS. Soil types in the study area were identified, and assigned to their appropriate hydrologic soil group (HSG in Table 4-3) classification. Geospatial data collected were used to determine land cover appropriate to each sub-basin, and for the various sub-watersheds. The different types of land cover and associated curve numbers are shown in Table 4-3. For the specific sub-basins, curve numbers were multiplied by the areas of the soil types by sub-watershed. For each sub-watershed, the product of these calculations was averaged over the total sub-watershed area to arrive at a composite curve number.

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Calculation of Composite Curve Numbers for Ala Wai Watershed

Sum of WS_Acre		New HydroGrp HSG (All D and blank to C)				Curve Number			Area x CN			Composite
SUB-BASIN	**LAND USE**	**A**	**B**	**C**	**Total**	**A**	**B**	**C**	**A**	**B**	**C**	**CN**
A1	Bare Land	0.0	3.1	1.0	5.0	72	82	87	0.0	253.0	89.8	
	Evergreen Forest	0.5	0.2	0.2	0.8	30	55	70	13.6	11.2	11.2	
	Grassland	3.2	4.7	4.4	12.3	39	61	74	126.4	287.4	323.2	
	High Intensity Developed	13.9	73.8	34.6	122.3	89	92	94	1240.5	6791.8	3249.2	
	Low Intensity Developed	62.6	55.4	22.6	140.7	77	85	90	4821.2	4710.6	2036.1	
	Scrub/Shrub	2.1	3.2	3.4	8.7	30	48	65	63.4	152.5	222.4	
A1 Total		83.3	140.4	66.2	289.9	A1 Composite CN						**84**
A2	Bare Land		1.6	6.1	7.7	72	82	87	0.0	132.6	527.6	
	Cultivated Land			0.2	0.2	77	86	91	0.0	0.0	20.2	
	Evergreen Forest		0.1	0.4	0.6	30	55	70	0.0	6.9	30.8	
	Grassland		4.1	12.5	16.6	39	61	74	0.0	250.9	926.5	
	High Intensity Developed		106.5	109.9	216.4	89	92	94	0.0	9799.5	10327.7	
	Low Intensity Developed		13.0	19.8	32.8	77	85	90	0.0	1105.8	1781.7	
	Scrub/Shrub		2.1	7.2	9.2	30	48	65	0.0	99.5	465.2	
	Water		0.1	15.1	15.1	98	98	98	0.0	8.0	1476.0	
A2 Total			127.5	171.1	298.7	A2 Composite CN						**90**
A3	Bare Land		1.9	0.0	1.9	72	82	87	0.0	157.9	0.0	
	Evergreen Forest		0.2	0.0	0.2	30	55	70	0.0	12.2	0.0	
	Grassland		5.6	0.0	5.6	39	61	74	0.0	342.0	0.0	
	High Intensity Developed		143.8	0.0	143.8	89	92	94	0.0	13229.4	0.0	
	Low Intensity Developed		38.5	0.0	38.5	77	85	90	0.0	3276.0	0.0	
	Scrub/Shrub		3.8	0.0	3.8	30	48	65	0.0	183.9	0.0	
A3 Total			193.9	0.0	193.9	A3 Composite CN						**89**
A4	Bare Land		3.0	0.9	3.9	72	82	87	0.0	244.7	79.4	
	Evergreen Forest		0.2	0.1	0.2	30	55	70	0.0	8.8	4.4	
	Grassland		23.6	6.0	29.6	39	61	74	0.0	1440.7	441.8	
	High Intensity Developed		122.7	5.0	127.8	89	92	94	0.0	11290.6	472.8	
	Low Intensity Developed		29.1	7.6	36.8	77	85	90	0.0	2477.6	685.8	
	Scrub/Shrub		7.9	6.5	14.3	30	48	65	0.0	378.5	419.3	
	Water		0.2	3.6	3.8	98	98	98	0.0	18.0	349.9	
A4 Total			186.7	29.6	216.3	A4 Composite CN						**85**
A5	Bare Land		1.2	0.2	1.4	72	82	87	0.0	98.4	19.3	
	Evergreen Forest		0.2	0.0	0.2	30	55	70	0.0	12.2	0.0	
	Grassland		12.2	2.2	14.5	39	61	74	0.0	745.9	165.1	
	High Intensity Developed		131.9	0.8	132.7	89	92	94	0.0	12138.5	72.6	
	Low Intensity Developed		48.7	4.7	53.4	77	85	90	0.0	4140.4	422.9	
	Scrub/Shrub		0.9	0.6	1.5	30	48	65	0.0	43.8	38.8	
	Water			0.4	0.4	98	98	98	0.0	0.0	38.4	
A5 Total			195.2	8.9	204.1	A5 Composite CN						**88**
A6	Bare Land		2.7	5.0	7.7	72	82	87	0.0	223.0	437.4	
	Evergreen Forest			0.5	0.5	30	55	70	0.0	0.0	32.1	
	Grassland		52.8	18.6	71.3	39	61	74	0.0	3219.5	1372.7	
	High Intensity Developed			5.1	5.1	89	92	94	0.0	0.0	478.9	
	Low Intensity Developed		0.1	3.1	3.1	77	85	90	0.0	5.9	275.9	
	Scrub/Shrub		4.5	15.0	19.5	30	48	65	0.0	215.9	977.5	
	Water		1.2	17.5	18.7	98	98	98	0.0	116.1	1714.1	
A6 Total			61.2	64.7	126.0	A6 Composite CN						**72**
A7	Bare Land		1.5	2.5	3.9	72	82	87	0.0	120.8	214.5	
	Evergreen Forest		2.0	0.1	2.1	30	55	70	0.0	111.6	4.2	
	Grassland	0.2	12.8	1.1	14.1	39	61	74	7.7	783.5	79.1	
	High Intensity Developed	0.0	238.4	3.8	242.3	89	92	94	3.5	21935.1	361.6	
	Low Intensity Developed	0.3	67.2	10.3	77.9	77	85	90	25.4	5715.0	928.2	
	Scrub/Shrub	0.8	15.5	38.1	54.4	30	48	65	24.3	744.6	2478.1	
	Water		0.0	2.2	2.2	98	98	98	0.0	0.3	211.5	
A7 Total		1.4	337.5	58.0	396.9	A7 Composite CN						**85**
A8	Bare Land			0.1	0.1	72	82	87	0.0	0.0	12.4	
	Grassland		0.1	0.4	0.6	39	61	74	0.0	8.7	32.9	
	High Intensity Developed		28.8	37.8	66.6	89	92	94	0.0	2647.5	3556.8	
	Low Intensity Developed		1.4	3.0	4.4	77	85	90	0.0	120.1	271.4	
	Scrub/Shrub		0.7	2.4	3.1	30	48	65	0.0	32.0	159.0	
	Water			4.3	4.3	98	98	98	0.0	0.0	424.2	
A8 Total			31.0	48.2	79.2	A8 Composite CN						**92**
K1	Evergreen Forest	268.5	1.4	66.9	336.8	30	55	70	8056.1	75.6	4681.3	
	Grassland	3.3		1.4	4.8	39	61	74	129.7	0.0	106.4	
	Low Intensity Developed	30.9	0.0	3.9	34.9	77	85	90	2382.0	0.7	354.0	
	Scrub/Shrub	216.6		48.9	265.5	30	48	65	6499.0	0.0	3178.2	
K1 Total		519.4	1.4	121.1	642.0	K1 Composite CN						**40**
K2	Bare Land	0.7		0.4	1.1	72	82	87	48.0	0.0	38.7	
	Evergreen Forest	97.2		51.4	148.6	30	55	70	2917.0	0.0	3595.5	
	Grassland	69.3	0.5	19.5	89.3	39	61	74	2702.9	27.6	1443.9	
	High Intensity Developed	34.4	29.8	14.5	78.7	89	92	94	3062.2	2742.4	1363.0	
	Low Intensity Developed	103.2	10.2	43.3	156.7	77	85	90	7949.2	863.6	3901.4	
	Scrub/Shrub	47.3	0.0	22.5	69.8	30	48	65	1419.1	1.1	1461.9	
K2 Total		352.2	40.4	151.7	544.3	K2 Composite CN						**62**

Table 4-3. Calculation of Composite Curve Numbers for Ala Wai Watershed

			B	C	Total							
			7.3	4.4	28.9							
	Grassland	5.7	2.2	0.7	8.6	39	61	74	221.6	131.5	52.9	
			11.1	0.0	13.4							
	Low Intensity Developed	55.4	18.0	2.9	76.3	77	85	90	4267.4	1533.9	258.1	
			1.2	7.1	16.0							
			39.9	15.1	143.2	K3 Composite CN						
				0.0	1.1							
	Evergreen Forest	3.1	0.3	0.0	3.4	30	55	70	93.4	15.9	0.0	
			1.0	0.3	15.0							
	High Intensity Developed	4.8	6.2	0.0	11.0	89	92	94	426.9	573.0	2.0	
			9.9	0.0	110.0							
	Scrub/Shrub	18.9	1.1	0.0	20.0	30	48	65	566.2	52.9	0.0	
			18.5	0.4	160.5	K4 Composite CN						
			0.4	0.0	0.4							
			0.4	0.0	0.4							
	Grassland		4.4	0.0	4.4	39	61	74	0.0	266.0	0.0	
			73.3	0.0	73.3							
	Low Intensity Developed		21.6	0.0	21.6	77	85	90	0.0	1839.8	0.0	
			3.2	0.0	3.2							
			103.4	0.0	103.4	K5 Composite CN						
			0.7	0.2	1.2							
	Evergreen Forest	2.6		0.0	2.6	30	55	70	77.6	0.0	0.0	
			7.6	3.2	11.2							
	High Intensity Developed	3.1	141.2	53.6	197.9	89	92	94	271.8	12991.1	5041.6	
			22.3	3.9	33.8							
	Scrub/Shrub	4.6	5.8	0.3	10.6	30	48	65	137.4	276.9	18.8	
				0.0	0.0							
			177.6	61.3	257.3	K6 Composite CN						
			48.4	80.4	253.4							
	Grassland	3.2	6.2	4.2	13.7	39	61	74	125.3	379.7	313.8	
			0.7	0.9	1.5							
	Low Intensity Developed	0.3	7.6	5.4	13.4	77	85	90	26.2	643.0	490.4	
			40.2	393.3	485.1							
			103.1	484.3	767.1	M1 Composite CN						
				1.1	1.7							
	Evergreen Forest	19.6		0.5	20.1	30	55	70	588.4	0.0	32.0	
			0.1	3.0	8.3							
	High Intensity Developed	4.5	3.5	17.5	25.5	89	92	94	400.8	323.4	1641.2	
			4.3	33.4	77.9							
	Scrub/Shrub	24.9		9.2	34.1	30	48	65	746.9	0.0	600.2	
			7.9	64.6	167.6	M10 Composite CN						
				0.4	0.4							
			1.0	11.4	12.3							
	Grassland	0.0	4.8	0.8	5.6	39	61	74	0.6	292.0	56.8	
			1.2	4.7	5.9							
	Low Intensity Developed	5.1	17.4	23.8	46.2	77	85	90	389.1	1480.0	2139.9	
			1.2	49.9	51.1							
			25.5	91.0	121.6	M11 Composite CN						
			0.5	0.6	4.0							
	Evergreen Forest	12.9	2.3	4.9	20.1	30	55	70	387.8	125.0	344.2	
			9.6	6.8	36.9							
	High Intensity Developed	12.9	59.2	5.0	77.1	89	92	94	1150.7	5446.9	469.0	
			61.9	9.5	222.9							
	Scrub/Shrub	49.0	15.9	53.1	118.0	30	48	65	1471.2	761.7	3452.9	
			149.3	79.9	479.1							
			1.0	0.2	1.2							
			31.1	46.5	77.6							
	Grassland		1.0	3.1	4.0	39	61	74	0.0	60.4	226.4	
			7.4	3.1	10.5							
	Low Intensity Developed		14.4	11.7	26.2	77	85	90	0.0	1226.4	1056.9	
			17.9	51.3	69.2	30	48	65	0.0	858.6	3334.6	
			72.8	115.9	188.7	M13 Composite CN						**68**

Table 4-3 (Continued). Calculation of Composite Curve Numbers for Ala Wai Watershed

Calculation of Composite Curve Numbers for Ala Wai Watershed (Continued)

Sum of WS_Acre		New HydroGrp HSG (All D and blank to C)				Curve Number			Area x CN			Composite
SUB-BASIN	LAND USE	A	B	C	Total	A	B	C	A	B	C	CN
M14	Bare Land		1.2	0.7	1.9	72	82	87	0.0	99.5	63.2	
	Evergreen Forest		0.3	0.2	0.4	30	55	70	0.0	14.0	13.3	
	Grassland		6.3	1.7	8.1	39	61	74	0.0	387.3	126.8	
	High Intensity Developed		47.7	4.1	51.8	89	92	94	0.0	4389.8	387.0	
	Low Intensity Developed		76.8	12.4	89.2	77	85	90	0.0	6526.7	1118.4	
	Scrub/Shrub		7.6	3.5	11.2	30	48	65	0.0	366.4	229.7	
M14 Total			139.9	22.7	162.7	M14 Composite CN						**84**
M2	Evergreen Forest		92.1	91.6	183.7	30	55	70	0.0	5063.4	6414.8	
	Grassland		0.4	12.3	12.7	39	61	74	0.0	26.3	910.0	
	Low Intensity Developed		0.2	2.5	2.7	77	85	90	0.0	15.3	227.4	
	Scrub/Shrub		29.0	458.6	487.6	30	48	65	0.0	1392.0	29806.5	
M2 Total			121.7	565.0	686.7	M2 Composite CN						**64**
M3	Bare Land		0.2	0.0	0.2	72	82	87	0.0	18.2	0.0	
	Evergreen Forest	6.6	14.7	12.0	33.4	30	55	70	199.3	810.7	841.2	
	Grassland	7.9	20.1	3.3	31.3	39	61	74	309.9	1227.1	242.7	
	High Intensity Developed	13.4	20.7	5.2	39.3	89	92	94	1191.5	1907.7	488.2	
	Low Intensity Developed	20.5	54.6	14.0	89.1	77	85	90	1578.9	4637.3	1262.7	
	Scrub/Shrub	36.6	37.7	57.1	131.3	30	48	65	1096.7	1809.9	3709.0	
M3 Total		85.0	148.1	91.6	324.7	M3 Composite CN						**66**
M4	Evergreen Forest	2.1	0.3	1.7	4.1	30	55	70	63.1	15.2	117.1	
	Grassland	2.9	0.1	3.5	6.6	39	61	74	113.1	8.9	261.2	
	High Intensity Developed	14.7	0.1	7.0	21.7	89	92	94	1306.2	6.4	656.1	
	Low Intensity Developed	20.1	0.2	11.3	31.6	77	85	90	1547.9	16.3	1015.4	
	Scrub/Shrub	25.1	0.0	25.5	50.6	30	48	65	752.3	0.6	1655.4	
M4 Total		64.9	0.7	48.9	114.5	M4 Composite CN						**66**
M5	Bare Land		0.2	0.0	0.2	72	82	87	0.0	18.2	0.0	
	Evergreen Forest		56.1	27.3	83.3	30	55	70	0.0	3083.8	1909.6	
	Grassland		4.2	0.0	4.2	39	61	74	0.0	254.6	0.0	
	High Intensity Developed		1.2	0.0	1.2	89	92	94	0.0	113.0	0.0	
	Low Intensity Developed		27.5	0.0	27.5	77	85	90	0.0	2336.1	0.0	
	Scrub/Shrub		40.4	163.1	203.6	30	48	65	0.0	1940.8	10603.9	
M5 Total			129.6	190.4	320.0	M5 Composite CN						**63**
M6	Bare Land		0.2	0.0	0.2	72	82	87	0.0	18.2	0.0	
	Evergreen Forest		18.2	7.8	25.9	30	55	70	0.0	999.4	543.3	
	Grassland		9.1	0.6	9.7	39	61	74	0.0	554.6	42.6	
	High Intensity Developed		2.9	1.5	4.5	89	92	94	0.0	269.8	144.3	
	Low Intensity Developed		67.7	5.2	72.9	77	85	90	0.0	5754.8	471.5	
	Scrub/Shrub		40.0	72.8	112.8	30	48	65	0.0	1919.1	4730.1	
M6 Total			138.1	87.9	226.0	M6 Composite CN						**68**
M7	Bare Land	0.4		1.1	1.5	72	82	87	32.0	0.0	95.3	
	Evergreen Forest	13.7		1.8	15.5	30	55	70	411.9	0.0	123.5	
	Grassland	2.8		24.1	26.9	39	61	74	110.2	0.0	1780.6	
	High Intensity Developed	9.5		5.2	14.7	89	92	94	843.2	0.0	489.6	
	Low Intensity Developed	13.9		22.8	36.7	77	85	90	1072.0	0.0	2049.7	
	Scrub/Shrub	25.7		36.4	62.1	30	48	65	771.4	0.0	2366.4	
M7 Total		66.1		91.3	157.4	M7 Composite CN						**64**
M8	Bare Land		0.4	0.0	0.4	72	82	87	0.0	29.9	1.9	
	Evergreen Forest			1.7	1.7	30	55	70	0.0	0.0	117.6	
	Grassland		0.7	1.3	2.1	39	61	74	0.0	44.1	98.4	
	High Intensity Developed		0.5	3.2	3.7	89	92	94	0.0	44.3	300.0	
	Low Intensity Developed		10.4	7.8	18.2	77	85	90	0.0	881.5	703.6	
	Scrub/Shrub		1.0	8.0	9.0	30	48	65	0.0	47.0	523.2	
M8 Total			12.9	22.1	35.0	M8 Composite CN						**80**
M9	Bare Land	0.4		0.5	0.8	72	82	87	25.7	0.0	39.4	
	Evergreen Forest	2.3		1.2	3.5	30	55	70	68.7	0.0	87.4	
	Grassland	2.7		2.4	5.1	39	61	74	106.2	0.0	176.6	
	High Intensity Developed	0.5		5.3	5.8	89	92	94	40.7	0.0	497.7	
	Low Intensity Developed	5.0		21.2	26.1	77	85	90	382.1	0.0	1903.9	
	Scrub/Shrub	6.2		23.9	30.0	30	48	65	184.9	0.0	1551.0	
M9 Total		17.0		54.4	71.4	M9 Composite CN						**71**
P1	Evergreen Forest		27.6	8.6	36.1	30	55	70	0.0	1517.2	598.6	
	Grassland		0.2	12.0	12.2	39	61	74	0.0	12.0	891.1	
	Scrub/Shrub		11.9	365.5	377.5	30	48	65	0.0	573.4	23759.2	
P1 Total			39.7	386.1	425.8	P1 Composite CN						**64**

Table 4-3 (Continued). Calculation of Composite Curve Numbers for Ala Wai Watershed

												CN
	Evergreen Forest		37.9	51.3	89.2	30	55	70	0.0	2084.9	3590.3	
	High Intensity Developed		1.5	0.0	1.5	89	92	94	0.0	133.5	0.0	
	Scrub/Shrub		29.8	513.0	542.8	30	48	65	0.0	1432.6	33343.	
	Grassland		6.7	3.5	10.2	39	61	74	0.0	407.5	258.1	
	Low Intensity Developed		9.9	0.6	10.6	77	85	90	0.0	841.7	58.5	
	Evergreen Forest		5.2	31.6	36.8	30	55	70	0.0	284.5	2215.1	
	High Intensity Developed		17.8	12.2	30.1	89	92	94	0.0	1642.0	1147.2	
	Scrub/Shrub		12.4	138.0	150.3	30	48	65	0.0	593.0	8969.7	
	Grassland		1.8	4.2	6.0	39	61	74	0.0	107.7	310.4	
	Low Intensity Developed		19.6	41.4	61.0	77	85	90	0.0	1667.5	3721.7	
	Evergreen Forest			1.0	1.0	30	55	70	0.0	0.0	73.1	
	High Intensity Developed		35.3	172.3	207.6	89	92	94	0.0	3248.2	16199.	
	Scrub/Shrub		1.3	89.4	90.7	30	48	65	0.0	60.4	5813.3	
	Evergreen Forest		0.2	0.2	0.4	30	55	70	0.0	12.2	15.6	
	High Intensity Developed		145.3	50.3	195.6	89	92	94	0.0	13369.	4724.6	
	Scrub/Shrub		12.2	0.6	12.8	30	48	65	0.0	585.6	41.8	
	High Intensity Developed	9.4		60.2	69.6	89	92	94	833.4	0.0	5661.4	
	Water			0.0	0.0	98	98	98		0.0	2.9	
	High Intensity Developed	8.4		63.0	71.4	89	92	94	749.3	0.0	5918.8	
	Scrub/Shrub			0.0	0.0	30	48	65	0.0	0.0	0.1	
	Evergreen Forest	0.9		0.9	1.7	30	55	70	26.4	0.0	60.3	
	High Intensity Developed	57.7	0.1	41.6	99.5	89	92	94	5137.	12.1	3910.8	
	Water			0.6	0.6	98	98	98		0.0	54.4	
W3 Total		63.3	0.1	48.5	112.0	W3 Composite CN						**90**
Grand Total		2053.8	3345	4979	10377.3	Ala Wai Watershed Composite CN						**70**

Table 4-3 (Continued). Calculation of Composite Curve Numbers for Ala Wai Watershed

4.4 Mānoa-Pālolo Model Calibration

The final HEC-HMS model for the Ala Wai Watershed consisted of 38 sub-basins. The model used the SCS runoff curve number method as the loss method to be consistent with the previous Mānoa Watershed Project hydrologic study. The model for the Ala Wai Watershed used the Clark Unit Hydrograph as the transform method for the sub-basins that are not fully urbanized. The Clark Unit Hydrograph was used as the transform method for the sub-basins in Makiki Valley (K1-K4), Mānoa Valley (M1 to M14), and Pālolo Valley (P1 to P7). The urbanized sub-basins of lower Makiki, Ala Wai Canal, and Waikīkī applied the Kinematic Wave Transform Method. Because there are insufficient rainfall and stream flow data in the low-lying areas of the Ala Wai Watershed, it was difficult to calibrate the sub-basin parameters within in the Ala Wai Canal and Waikīkī sub-watersheds. Most of the parameters of the Kinematic Wave Transform Method were based on physical measurements; it is assumed that the peak discharges of the urbanized sub-basins are correct. The actual calibration models are those of Mānoa and Pālolo valleys (Section 4.4), a pilot calibration model for Makiki valley (Section 4.5), and a reservoir calibration model for Ala Wai Canal (Section 4.7). This last model represents the calibration for the entire watershed. Figure 4-4 shows the calibration model layout for the Manoa-Palolo valleys.

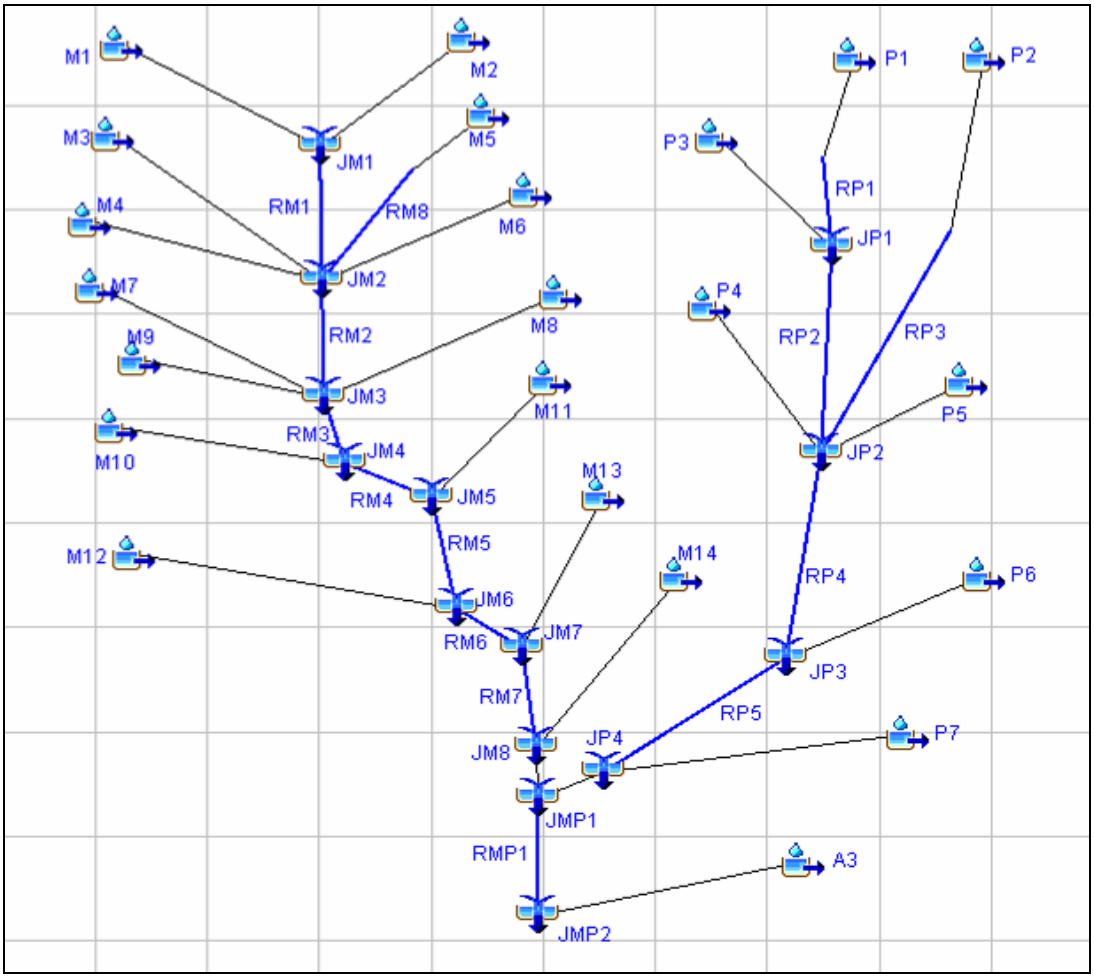

Figure 4-4. HEC-HMS Mānoa-Pālolo Calibration Model Layout

4.4.1 October 2004 Storm Calibration for Mānoa-Pālolo Area

The calibration for the storm of October 30, 2004, was based on the method used in the previous Mānoa Watershed Project hydrologic study. The calibration parameters used for the Mānoa sub-watershed in the Mānoa Watershed Project hydrologic study were used for the HEC-HMS model in the Ala Wai Watershed hydrologic study. The gage weights for sub-basins in Mānoa valley were the same as those used in the Mānoa Watershed Project described earlier. The main task of the calibration for the Ala Wai Watershed hydrologic study focused on the Pālolo sub-watershed and the area downstream of Kānewai Field gage, to the USGS stream gage 16247100. This stream gage is located on Kaimukī High School and had full stream flow records for the event. Gage weights were used for calibration purposes. The Thiessen polygon method was initially applied to determine the gage weight for each sub-basin. Figure 4-5 shows the Thiessen polygons for the October 2004 storm for the Ala Wai Watershed. The Thiessen polygon method does not account for orthographic rainfall effect in mountain areas. After taking into consideration the rainfall pattern, data quality, and storm movement and distribution, the final gage weights and relevant 24-hour rainfall of the October 2004 storm for each sub-basin were determined as shown in Table 4-4. (Note: 'MP' is used to abbreviate the Mānoa-Pālolo area.)

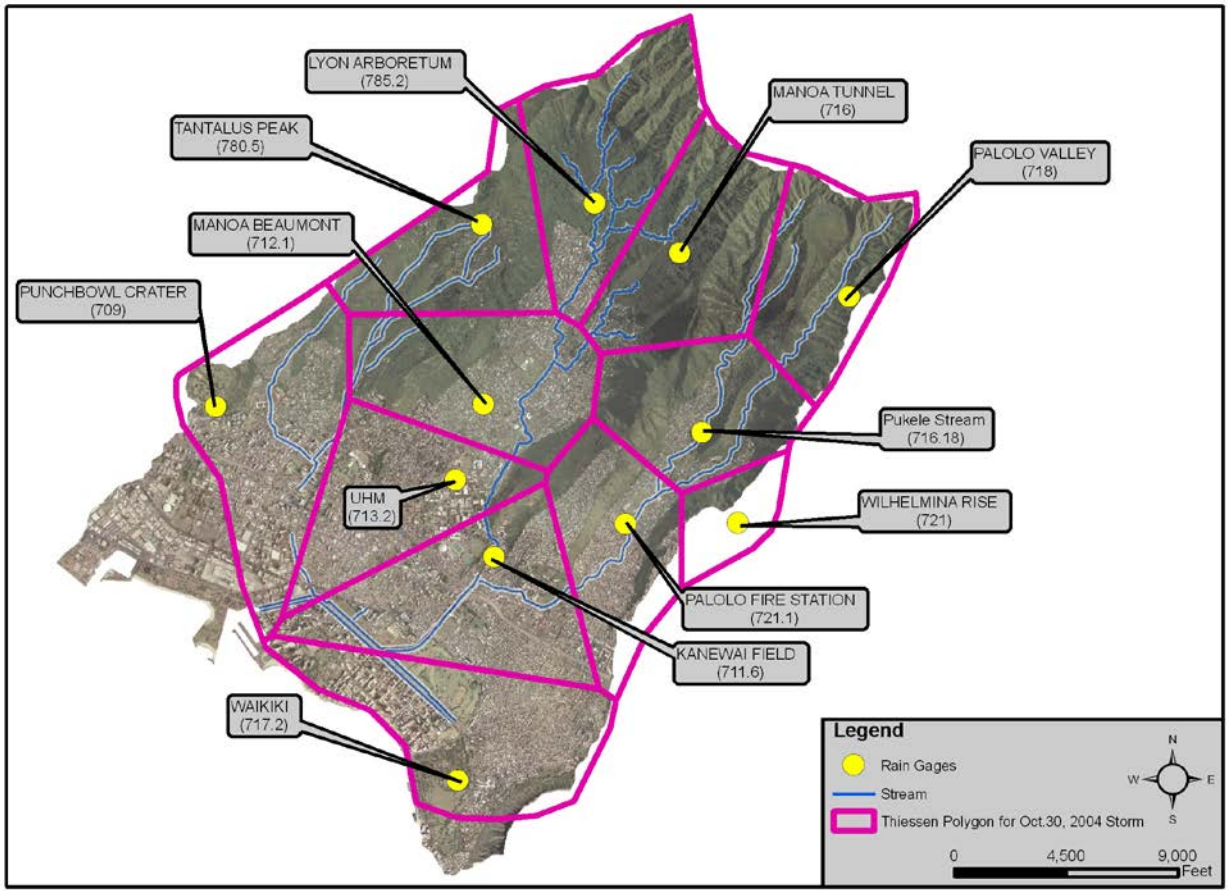

Figure 4-5. Rain Gages and Thiessen Polygons for the October 30, 2004

Meteorological Model: Gage Weights for October 30, 2004, Storm for MP

Gage weights	Thiessen Polygon (Gages in red are real time recording)											
Sub-basin	**Lyon Arboretum**	**Manoa Tunnel**	**Kanewai**	**Manoa Beaumont**	**UHM**	**Palolo Fire Sta**	**Palolo Valley**	**Pūkele**	**Tantalus Peak**	**Waikiki**	**Wilhemina Rise**	**24hr Rain (in)**
ID	785.2	716	711.6	712.1	713.2	721.1	718	Pukele	780.5	717.2	721	
Total Rainfall (in)	10.08	11.14	1.67	4.62	2.4	2.13	6.21	4.07	7.8	0.05	1.64	(in)
A3			0.7			0.2				0.1		1.60
M1	0.8	0.2										10.29
M2	0.3	0.5					0.2					9.84
M3	0.6	0.2							0.2			9.84
M4	0.5	0.2							0.3			9.61
M5	0.3	0.4					0.3					9.34
M6	0.4	0.3		0.1				0.2				8.65
M7	0.4			0.3					0.3			7.76
M8	0.3			0.4				0.3				6.09
M9	0.3			0.4					0.3			7.21
M10	0.3			0.4					0.3			7.21
M11	0.3			0.4				0.3				6.09
M12			0.1	0.5	0.4							3.44
M13			0.3	0.2	0.2	0.3						2.57
M14			0.5			0.5						1.9
P1		0.3					0.5	0.2				7.26
P2		0.1					0.6	0.3				6.06
P3		0.1					0.3	0.6				5.42
P4		0.2				0.1		0.7				5.29
P5						0.1		0.5			0.4	2.9
P6						0.9					0.1	2.08
P7			0.5			0.5						1.9

Table 4-4. Meteorological Model: Gage Weights for October 30, 2004, Storm for MP

The HEC-HMS meteorological model's parameters were calibrated using the October 30, 2004, storm data. Table 4-5 lists the final parameters for the HEC-HMS model in the Mānoa and Pālolo sub-watersheds. The parameters of the calibrated times of concentration are close to those calculated using the TR-55 method. The meteorological model used storm hydrographs for calibration and frequency based rainfall to compute the synthetic flood events.

	Loss Method --- SCS Curve Number		Transform--Clark Unit Hydrograph	
Sub-basin	Initial Abstraction (inch)	Curve Number	Time of Concentration (hour)	Storage Coefficient (hour)
A3 (Plane 1)	0.75	83	Kinematic Wave Transform	
A3 (Plane 2)	0.10	98		
M1	0.60	62	0.24	0.42
M10	0.60	76	0.26	0.60
M11	0.60	75	0.50	0.30
M12	0.30	73	0.25	0.65
M13	0.60	68	0.27	0.40
M14	1.00	84	0.15	0.30
M2	0.60	64	0.23	1.10
M3	0.60	69	0.25	0.70
M4	0.60	73	0.23	0.80
M5	0.60	63	0.31	0.90
M6	0.60	68	0.25	0.85
M7	0.60	71	0.19	1.50
M8	0.60	80	0.16	1.80
M9	0.60	75	0.17	1.50
P1	2.20	64	0.10	0.40
P2	1.20	65	0.30	0.55
P3	3.20	62	0.10	0.68
P4	1.20	72	0.10	0.30
P5	1.20	73	0.16	0.30
P6	1.20	85	0.10	0.25
P7	1.20	88	0.18	0.30

Table 4-5. Calibrated Model Parameters for October 2004 Storm for MP

At junctions JP1 and JMP2, the observed rainfall from the October 2004 storm and the modeled stream flows are shown in Figures 4-6 and 4-7. The modeled peak flows occur slightly after the observed peak flows; and the peak flow for junction JP1, Pūkele Stream gage, was modeled at a higher amount than the observed peak flow in 2004. The time of concentration values may be too high in this case. For the October 2004 storm, real-time data from M2, partial data from JM3, partial real-time data from JM7, real-time data from JP1, peak flow data from JP3, and continuous data from JMP2 were used. Because the HEC-HMS model was calibrated using the October 2004 storm

data in the Mānoa Watershed Project hydrologic study (Oceanit 2008), the parameters for all Mānoa sub-basins except M14 in the Ala Wai Watershed hydrologic study were kept the same as they were in the Mānoa Watershed Project study.

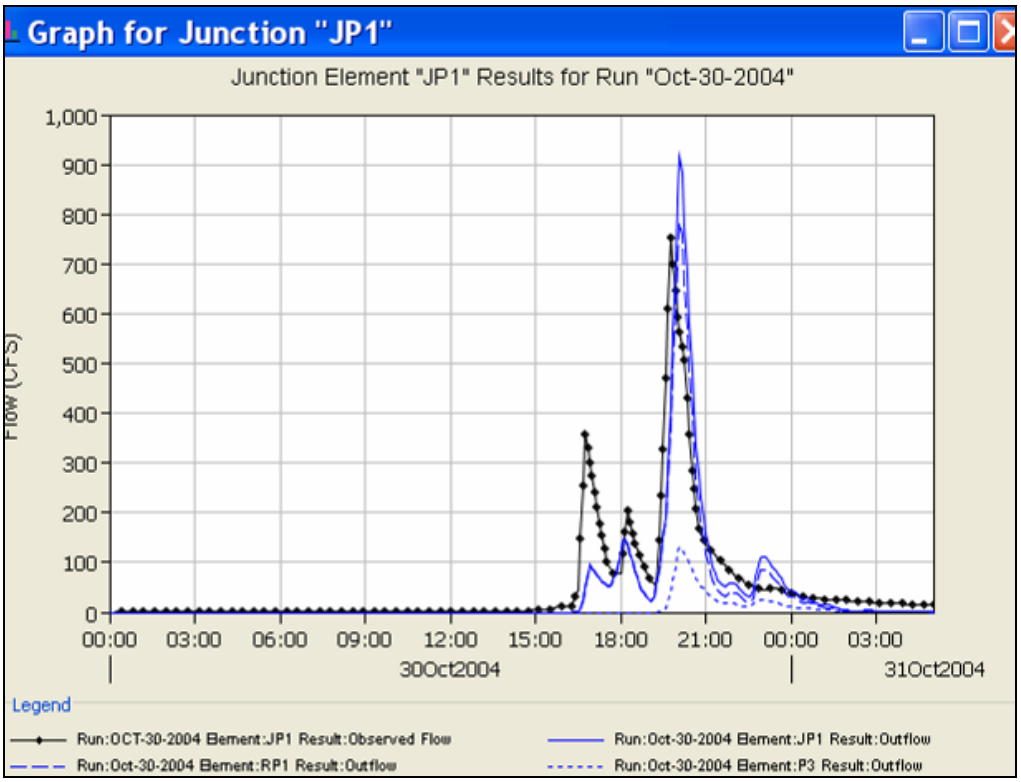

Figure 4-6. Observed and Modeled Stream Flows at Junction JP1 (Pūkele Gage [2440]) October 2004 Storm [calibration parameters: Simulated peak flow=775 cfs; observed peak flow=753 cfs; percent difference of peak discharge=2.9; percent difference of runoff volume=-15.4; peak-weighted root mean square error=96.6 cfs; Nash-Sutcliffe efficiency coefficient=0.256]

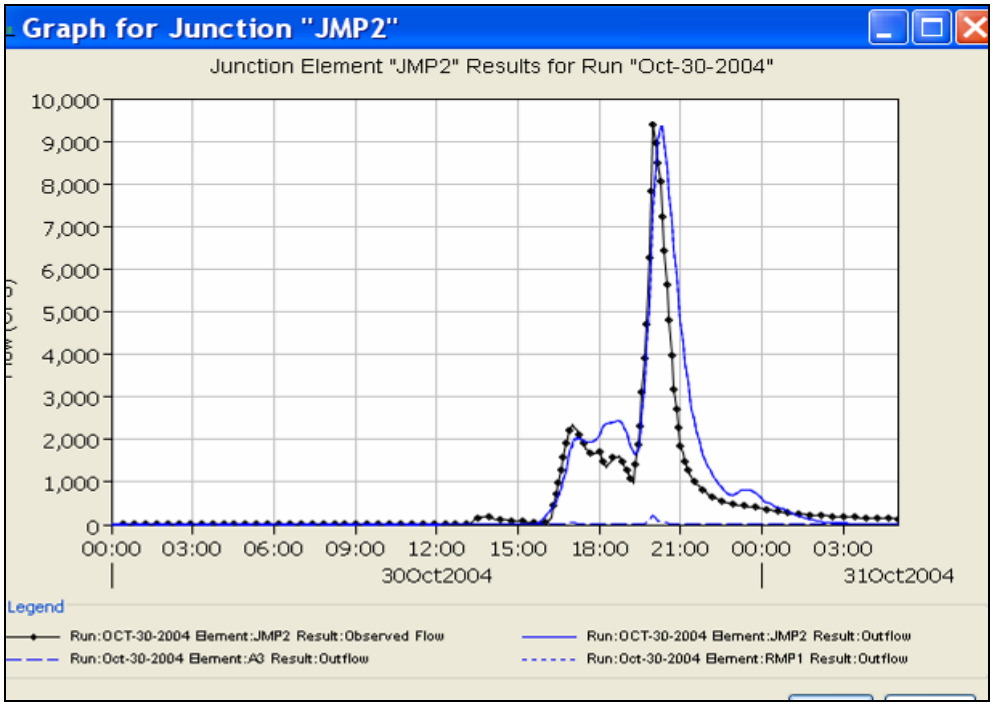

Figure 4-7. Observed and Modeled Flows at Junction JMP2 (Mānoa-Pālolo Gage [2471]) October 2004 Storm [calibration parameters: Simulated peak discharge=9,670 cfs; observed peak discharge=9,380 cfs; percent difference of peak discharge=3.1; percent difference of runoff volume=-24.6; peak-weighted root mean square error=571.2 cfs; Nash-Sutcliffe efficiency coefficient=0.826]

4.4.2 December 1967 Storm Calibration for Mānoa-Pālolo Area

The calibration for the storm of December 17–18, 1967, was based on the method used in the previous Mānoa Watershed Project hydrologic study. The calibration parameters in the Mānoa Watershed Project study for the Mānoa sub-watershed were not changed. The gage weights for sub-basins in the Mānoa sub-watershed were the same as that in the Mānoa Watershed Project study. The Thiessen polygon method was initially applied to determine the gage weight for each sub-basin. Figure 4-8 shows the Thiessen polygons for the December 1967 storm for the Ala Wai Watershed. After taking into consideration the rainfall pattern, data quality, and storm movement and distribution, the final gage weights and relevant 24-hour rainfall of the December 1967 storm for each sub-basin were determined as shown in Table 4-6. (Note: 'MP' is used to abbreviate the Mānoa-Pālolo area.)

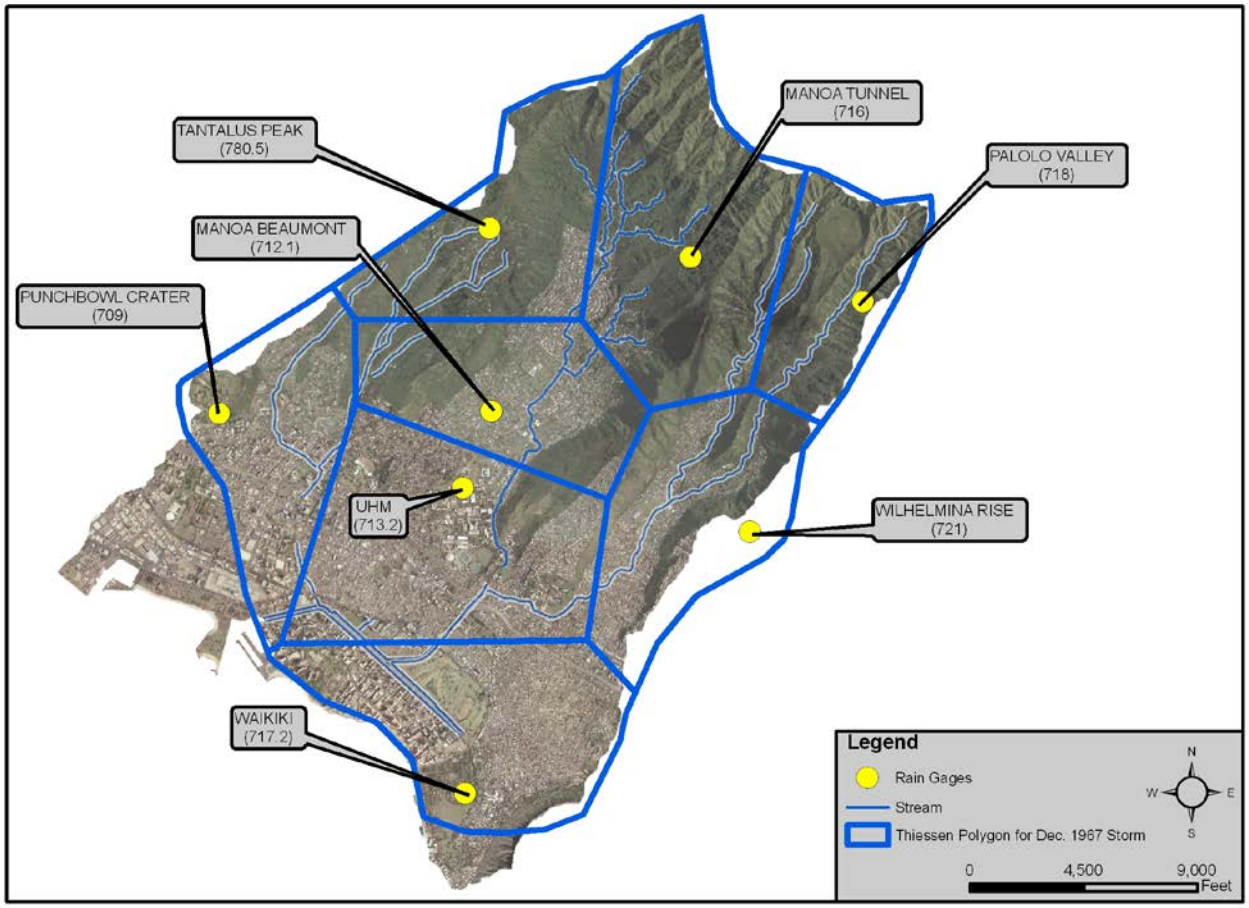

Figure 4-8. Rain Gages and Thiessen Polygons for December 1967 Storm for MP

The gage weights for the December 1967 storm, shown in Table 4-6, were calculated by considering the Thiessen polygons shown in Figure 4-8, the rainfall pattern, and the storm movement and distribution.

Meteorological Model: Gage Weights for December 17–18, 1967, Storm for MP								
Gage weights	Thiessen Polygon							
Sub-Basin	Mānoa Tunnel	Mānoa Beaumont	UHM	Pālolo Valley	Tantalus Peak	Waikīkī	Wilhemina Rise	24-hr Rain (in)
ID	716	712.1	713.2	718	780.5	717.2	721	
Total Rainfall (in)	10.42	9.43	9.5	10.88	8.1	8.21	9.56	
A3			0.6		0.1	0.3		8.97
M1	0.4				0.6			9.03
M2	0.6			0.2	0.2			10.05
M3	0.2	0.2			0.6			8.83
M4	0.2	0.2			0.6			8.83
M5	0.5			0.3	0.2			10.09
M6	0.3	0.5			0.2			9.46
M7		0.6			0.4			8.90
M8		0.8			0.2			9.16
M9		0.7			0.3			9.03
M10		0.8			0.2			9.16
M11		0.6	0.2		0.2			9.18
M12		0.4	0.5		0.1			9.33
M13		0.2	0.7		0.1			9.35
M14		0.2	0.6		0.1		0.1	9.35
P1	0.5			0.4	0.1			10.37
P2				0.7	0.1		0.2	10.34
P3	0.3			0.4	0.1		0.2	10.2
P4	0.3				0.1		0.6	9.68
P5					0.1		0.9	9.41
P6			0.2		0.1		0.7	9.4
P7			0.45		0.1	0.15	0.3	9.18

Table 4-6. Meteorological Model: Gage Weights for December 17–18, 1967, Storm for MP

The meteorological model used storm hydrographs for calibration and frequency based rainfall to compute the synthetic flood events. For creating the peak discharges for various return periods, the frequency storm with an intensity position at 50% was used in computing the peaks and hydrographs. Table 4-7 lists the final parameters for the HEC-HMS model in the Mānoa and Pālolo sub-watersheds. The parameters of the calibrated time of concentrations are close to those calculated using the TR-55 method. At junctions JP1, JP3, and JMP2, the modeled stream flows for the December 1967 storm show a series of stream flow peaks as shown in Figures 4-9 to 4-11. For the December 1967 storm, peak flow data from M2, data from JP1, peak flow data from JP3, and continuous data from JMP2 were used.

	Loss Method --- SCS Curve Number		Transform--Clark Unit Hydrograph	
Sub-basin	Initial Abstraction (inches)	Curve Number	Time of Concentration (hour)	Storage Coefficient (hour)
A3 (Plane 1)	1.50	83	Kinematic Wave Transform	
A3 (Plane 2)	0.15	98		
M1	0.70	62	0.22	0.30
M10	0.70	76	0.26	0.25
M11	0.70	75	0.19	0.25
M12	0.70	73	0.26	0.22
M13	0.70	68	0.26	0.30
M14	1.80	84	0.10	0.68
M2	0.50	64	0.22	0.22
M3	0.70	69	0.22	0.30
M4	0.70	73	0.22	0.30
M5	0.70	63	0.23	0.30
M6	0.70	68	0.22	0.30
M7	0.70	71	0.18	0.30
M8	0.70	80	0.15	0.30
M9	0.70	75	0.17	0.30
P1	1.20	64	0.21	0.30
P2	1.80	65	0.30	0.20
P3	1.20	62	0.16	0.25
P4	0.72	72	0.25	0.23
P5	0.65	73	0.30	0.34
P6	0.73	85	0.24	0.31
P7	1.80	88	0.10	0.80

Table 4-7. Calibrated Model Parameters for December 1967 Storm for MP

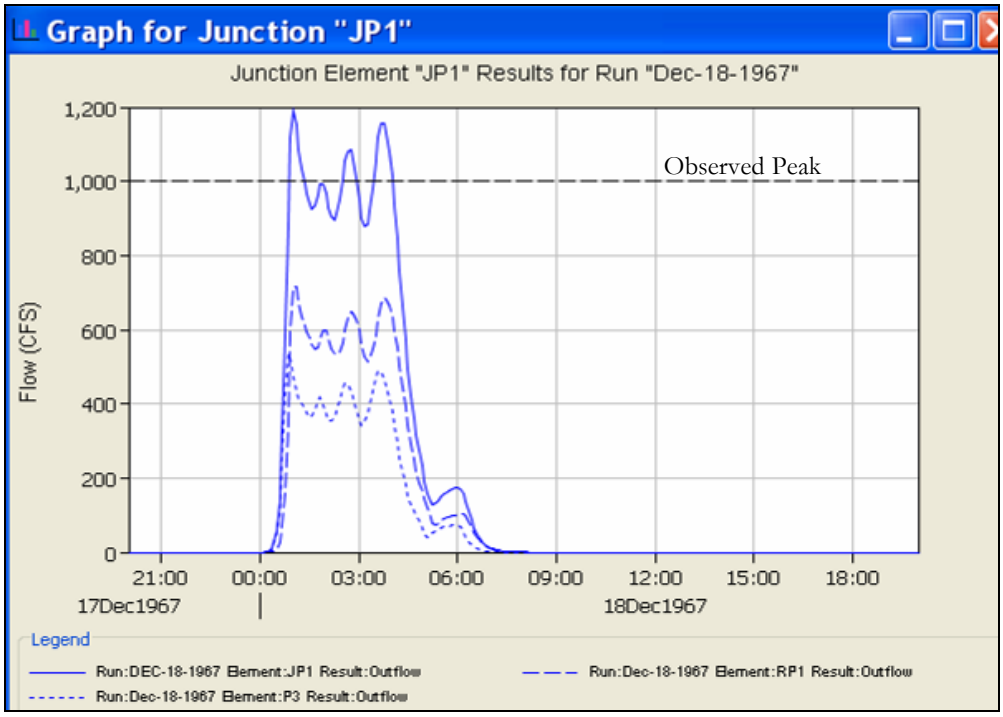

Figure 4-9. Modeled Stream Flows at Junction JP1 (Pūkele Gage [2440]) December 1967 Storm [Simulated peak discharge =1,190 cfs; observed peak discharge=1,000 cfs]

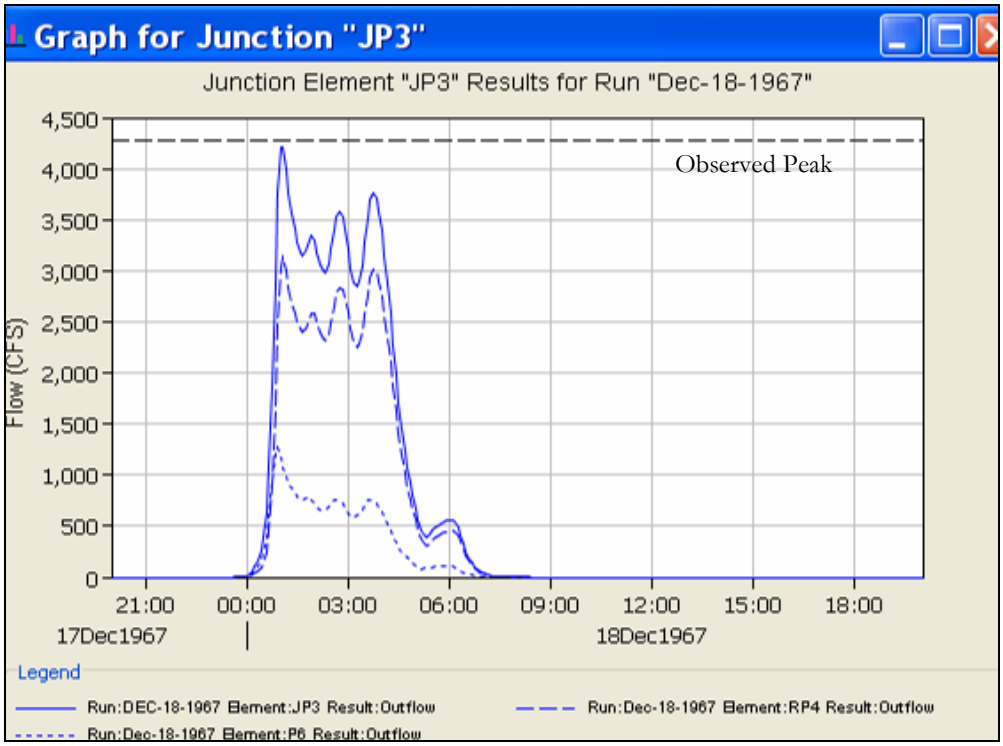

Figure 4-10. Modeled Stream Flows at JP3 (USGS Pālolo Gage [16247000]) December 1967 Storm [Simulated peak discharge =4,220 cfs; observed peak discharge=4,270 cfs]

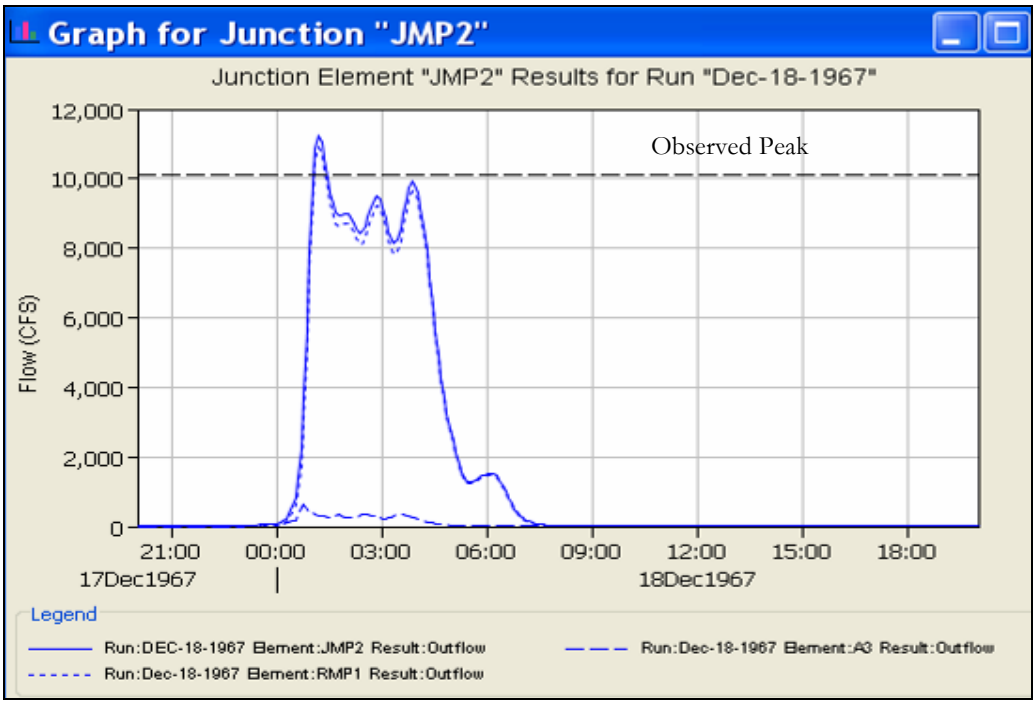

Figure 4-11. Modeled Stream Flows at JMP2 (USGS Stream Gage [16247100]) December 1967 Storm [Simulated peak discharge =11,200 cfs; observed peak discharge=10,100 cfs]

4.4.3 March 2006 Storm Calibration for Mānoa-Pālolo Area

The Thiessen polygon method was initially applied to determine the gage weight. Figure 4-12 shows the Thiessen polygons for the March 31, 2006, storm for the Ala Wai Watershed. After taking into consideration the rainfall pattern, data quality, and storm movement and distribution, the final gage weights and relevant 24-hour rainfall of the March 2006 storm for each sub-basin were determined as shown in Table 4-8. The March 31, 2006, storm is a significant example because the storm produced a small amount of rain that generated a large amount of runoff because the soils in the study area were already saturated from six weeks of heavy rains. (Note: 'MP' is used to abbreviate the Mānoa-Pālolo area.)

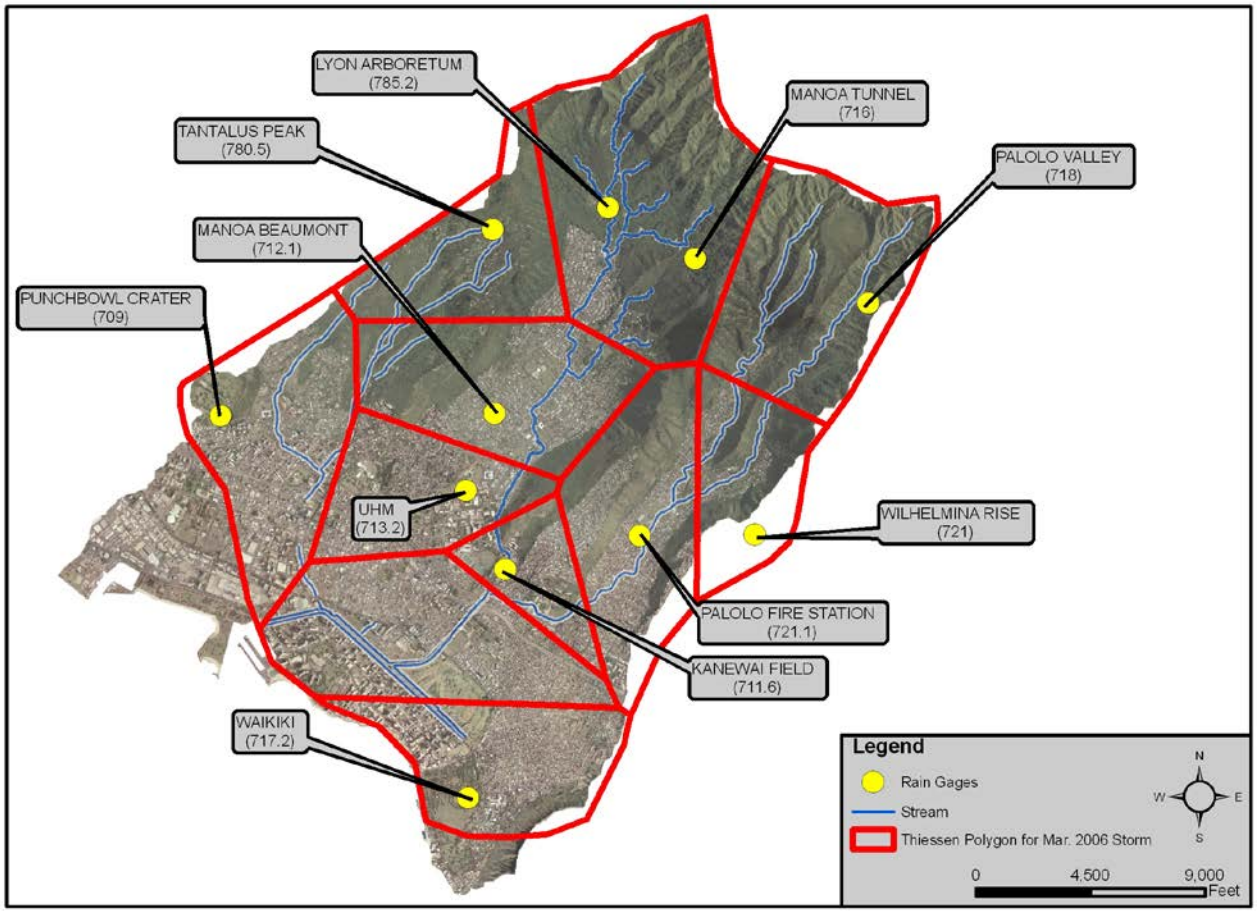

Figure 4-12. Rain Gages and Thiessen Polygons for March 2006 Storm for MP

Table 4-8. Meteorological Model: Gage Weights for March 2006 Storm for MP

The HEC-HMS meteorological model's parameters were calibrated using the March 31, 2006, storm data. Table 4-9 lists the final parameters for the HEC-HMS model in the Mānoa and Pālolo sub-watersheds. The parameters of the calibrated time of concentrations are close to those calculated using the TR-55 method. The meteorological model used storm hydrographs for calibration and frequency based rainfall to compute the synthetic flood events.

	Loss Method --- SCS Curve Number		Transform Method --- Clark Unit Hydrograph	
Sub-basin	Initial Abstraction (inches)	Curve Number	Time of Concentration (hour)	Storage Coefficient (hour)
A3 (Plane 1)	0	92	Kinematic Wave Transform	
A3 (Plane 2)	0	98		
M1	0	88	0.20	0.10
M10	0	92	0.18	0.10
M11	0	92	0.10	0.10
M12	0	92	0.20	0.10
M13	0	90	0.10	0.10
M14	0	90	0.12	0.10
M2	0	70	0.32	0.12
M3	0	92	0.20	0.10
M4	0	92	0.10	0.10
M5	0	72	0.20	0.10
M6	0	75	0.15	0.10
M7	0	80	0.15	0.10
M8	0	92	0.10	0.10
M9	0	92	0.10	0.10
P1	0	64	0.10	0.10
P2	0	65	0.10	0.10
P3	0	62	0.10	0.10
P4	0	72	0.10	0.10
P5	0	73	0.10	0.10
P6	0	85	0.10	0.11
P7	0	90	0.10	0.10

Table 4-9. Calibrated Model Parameters for March 2006 Storm

The modeled stream flow for the March 2006 storm in M2 and at JMP2 show a small flow peak flow followed by a higher peak flow, as shown in Figures 4-13 and 4-14. The modeled peak flows are higher and earlier than the observed flows; however, the highest peaks match well. Due to the extremely saturated soil within the study area during this storm, the sub-basins' curve numbers were allowed to change to match the peak at JMP2 for calibration.

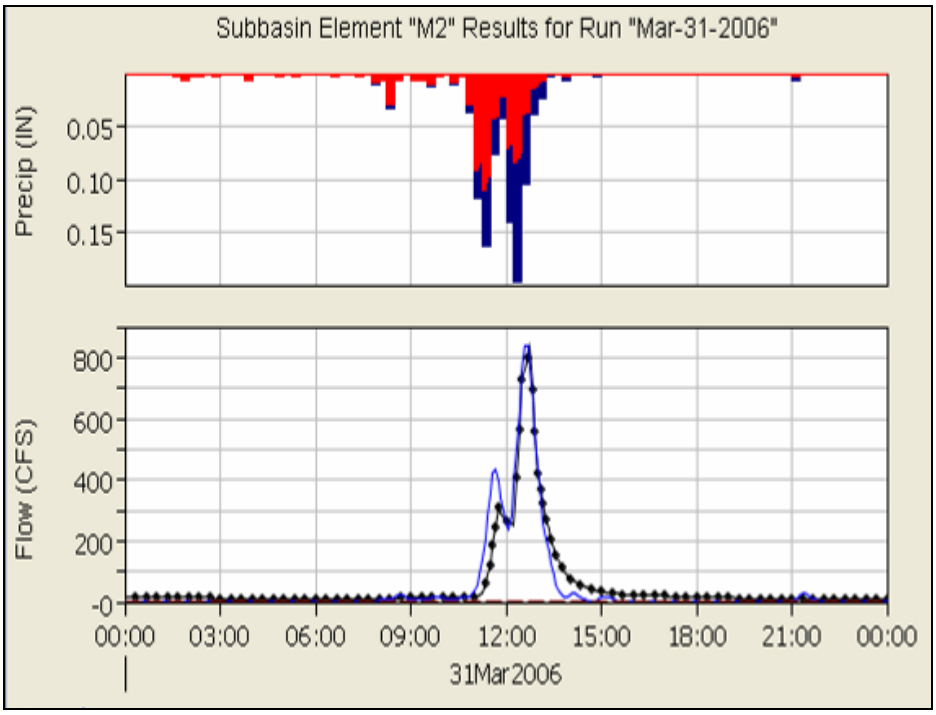

Figure 4-13. Observed and Modeled Stream Flows at Waiakeakua Stream (Sub-basin M2), March 2006 Storm [calibration parameters: Simulated peak discharge=837 cfs; observed peak discharge=832 cfs; percent difference of peak discharge=0.6; percent difference of runoff volume=-8.7; peak-weighted root mean square error=36.2 cfs; Nash-Sutcliffe efficiency coefficient=0.914]

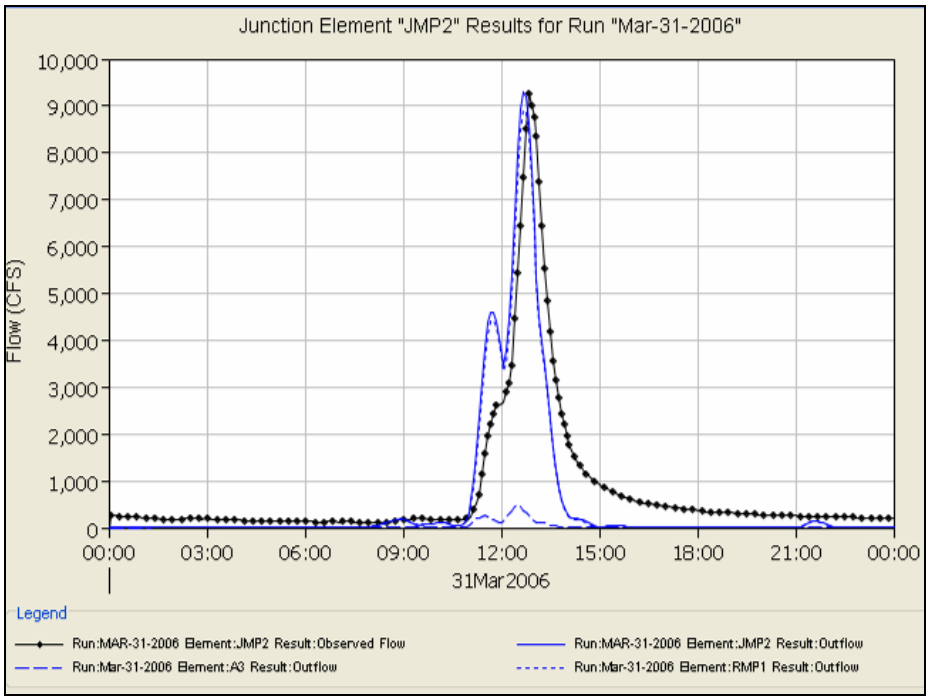

Figure 4-14. Observed and Modeled Stream Flows at JMP2 (USGS Stream Gage [16247100]), March 2006 Storm [calibration parameters: Simulated peak discharge=9,200 cfs; observed peak discharge=9,260cfs; percent difference of peak discharge=-0.7; percent difference of runoff volume=-28.6; peak-weighted root mean square error=734.2 cfs; Nash-Sutcliffe efficiency coefficient=0.776]

4.4.4 Final Loss and Transform Parameters for Mānoa-Pālolo Area

The loss method was determined by using the NRCS runoff CN method to take advantage of the results from the Mānoa Watershed Project hydrologic study. The parameters of initial abstraction were optimized for the Waiakeakua sub-basin and then were assigned to all the other sub-basins. Impervious parameters were set to zero because the percentage of the sub-basin that is impervious is specified in the CN. The optimization was used in each individual calibration (see Section 4.2). The final model parameters were the weighted average ones.

There is more confidence with the storms of October 30, 2004, and December 17–18, 1967, and less confidence with the storm of March 31, 2006. More weighting values were given to the calibrated parameters of the storm events of October 2004 and December 1967. The calibrated parameters of the October 2004 and December 1967 storm events were assigned twice the weight of the calibrated parameters for the March 31, 2006, storm. The finalized calibrated parameters of the HEC-HMS model were weighted as (2*2004 + 2*1967 + 1* 2006)/5. The weighted averaged loss method and transform method parameters for the Mānoa-Pālolo area are listed in Tables 4-10 and 4-11.

Curve Number Loss Method Calibration: Manoa-Palolo basin model								
	October-30-2004		December-18-1967		March-31-2006		Weighted Average	
Sub-basin	Initial Abstraction (inch)	Curve Number	Initial Abstraction (inch)	Curve Number	Initial Abstraction (inch)	Curve Number	Initial Abstraction (inch)	Curve Number
A3 (Plane 1)	0.75	83	1.50	83	0	92	**0.90**	**85**
A3 (Plane 2)	0.10	98	0.15	98	0	98	**0.10**	**98**
M1	0.60	62	0.70	62	0	88	**0.52**	**67**
M10	0.60	76	0.70	76	0	92	**0.52**	**79**
M11	0.60	75	0.70	75	0	92	**0.52**	**78**
M12	0.30	73	0.70	73	0	92	**0.40**	**77**
M13	0.60	68	0.70	68	0	90	**0.52**	**72**
M14	1.00	84	1.80	84	0	90	**1.12**	**85**
M2	0.60	64	0.50	64	0	70	**0.44**	**65**
M3	0.60	69	0.70	69	0	92	**0.52**	**74**
M4	0.60	73	0.70	73	0	92	**0.52**	**77**
M5	0.60	63	0.70	63	0	72	**0.52**	**65**
M6	0.60	68	0.70	68	0	75	**0.52**	**69**
M7	0.60	71	0.70	71	0	80	**0.52**	**73**
M8	0.60	80	0.70	80	0	92	**0.52**	**82**
M9	0.60	75	0.70	75	0	92	**0.52**	**78**
P1	2.20	64	1.20	64	0	64	**1.36**	**64**
P2	1.20	65	1.80	65	0	65	**1.20**	**65**
P3	3.20	62	1.20	62	0	62	**1.76**	**62**
P4	1.20	72	0.72	72	0	72	**0.77**	**72**
P5	1.20	73	0.65	73	0	73	**0.74**	**73**
P6	1.20	85	0.73	85	0	85	**0.77**	**85**
P7	1.20	88	1.80	88	0	90	**1.20**	**88**

Table 4-10. Final HEC-HMS Model Loss Method Parameters

Clark Unit Hydrograph Transform Method Calibration: Manoa-Palolo basin model								
	October-30-2004		December-18-1967		March-31-2006		Average Values	
Sub-basin	T_c (Hour)	S_c (Hour)	T_c (Hour)	S_c (Hour)	T_c (Hour)	S_c (Hour)	T_c (Hour)	S_c (Hour)
M1	0.24	0.42	0.22	0.30	0.20	0.10	**0.22**	**0.31**
M2	0.23	1.10	0.22	0.22	0.32	0.12	**0.24**	**0.55**
M3	0.25	0.70	0.22	0.30	0.20	0.10	**0.23**	**0.42**
M4	0.23	0.80	0.22	0.30	0.10	0.10	**0.20**	**0.46**
M5	0.31	0.90	0.23	0.30	0.20	0.10	**0.26**	**0.50**
M6	0.25	0.85	0.22	0.30	0.15	0.10	**0.22**	**0.48**
M7	0.19	1.50	0.18	0.30	0.15	0.10	**0.18**	**0.74**
M8	0.16	1.80	0.15	0.30	0.10	0.10	**0.14**	**0.86**
M9	0.17	1.50	0.17	0.30	0.10	0.10	**0.16**	**0.74**
M10	0.26	0.60	0.26	0.25	0.18	0.10	**0.24**	**0.36**
M11	0.50	0.30	0.19	0.25	0.10	0.10	**0.30**	**0.24**
M12	0.25	0.65	0.26	0.22	0.20	0.10	**0.24**	**0.37**
M13	0.27	0.40	0.26	0.30	0.10	0.10	**0.23**	**0.30**
M14	0.15	0.30	0.10	0.68	0.12	0.10	**0.12**	**0.41**
P1	0.10	0.40	0.21	0.30	0.10	0.10	**0.14**	**0.30**
P2	0.30	0.55	0.30	0.20	0.10	0.10	**0.26**	**0.32**
P3	0.10	0.68	0.16	0.25	0.10	0.10	**0.12**	**0.39**
P4	0.10	0.30	0.25	0.23	0.10	0.10	**0.16**	**0.23**
P5	0.16	0.30	0.30	0.34	0.10	0.10	**0.20**	**0.28**
P6	0.10	0.25	0.24	0.31	0.10	0.11	**0.16**	**0.25**
P7	0.18	0.30	0.10	0.80	0.10	0.10	**0.13**	**0.46**

Table 4-11. Final HEC-HMS Transform Method Parameters
Note: T_c is the time of concentration, S_c is the storage coefficient

4.5 Makiki Model Calibration

Data from the USGS Makiki Stream Gage (16238000) at King Street Bridge was used to calibrate the Makiki HEC-HMS model. This gage measured two peaks in 2004. One peak was 487 cfs recorded on February 28, 2004, and the other peak was 1,000 cfs recorded on October 30, 2004. There were no sufficient rainfall data for February 28, 2004, so the 1,000 cfs peak on October 30, 2004, was used to calibrate the Makiki HEC-HMS model. The Thiessen polygons for October 30, 2004, in the Makiki sub-watershed can be seen in Figure 4-15, and they are the same as those for the Mānoa-Pālolo calibration of the October 30, 2004 storm. Because there was no timing rainfall gage within the Makiki sub-watershed, the Lyon Arboretum rainfall gage (785.2) was selected as the time weight gage for all sub-basins in the sub-watershed (see Table 3.1 for rainfall gage information). (Note: 'K' is used to abbreviate for the Makiki sub-watershed.)

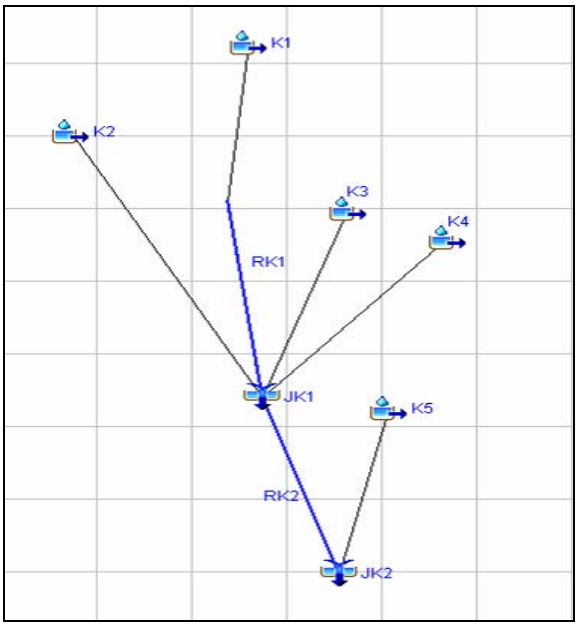

Figure 4-15. HEC-HMS Makiki Sub-Watershed Calibration Model Layout

4.5.1 October 2004 Storm Calibration for the Makiki Sub-Watershed

Due to the limited data available for the Makiki sub-watershed, the October 30, 2004, storm data were the only storm data used to calibrate the Makiki meteorological model. The calibration was based on the peak discharge of 1,000 cfs at King Street Bridge (USGS stream gage 16238000). Figure 4-5 shows the Thiessen polygons for the October 2004 storm for the Ala Wai Watershed. The Thiessen polygon method does not account for orthographic rainfall effect in mountain areas. The rainfall pattern, data quality, and storm movement and distribution were taken into consideration for the final gage weights. For the Makiki sub-watershed, the final gage weights for the 24-hour rainfall of the October 2004 storm were calculated and are given in Table 4-12.

Gage Weights for Makiki Sub-Watershed October 30, 2004, Storm						
Gage Weights	Thiessen Polygons (Gages in red recorded)					
Sub-Basin ID	Lyon Arboretum	Mānoa Beaumont	UHM	Tantalus Peak	Punchbowl Crater	24-hr Rain (inch)
	785.2	712.1	713.2	780.5	709	
Total Rainfall (in)	**10.08**	**4.62**	**2.4**	**7.8**	**0.05**	
K1	0.1	0.3		0.5	0.1	**6.39**
K2	0.1			0.2	0.7	**3.23**
K3	0.1	0.4	0.2		0.3	**3.62**
K4	0.1	0.4	0.4		0.1	**3.91**
K5	0.1		0.3		0.6	**2.30**

Table 4-12. Gage Weights for October 2004 Storm Makiki Sub-Watershed

The HEC-HMS meteorological model's parameters were calibrated using the October 30, 2004, storm data for the Makiki sub-watershed. Table 4-13 lists the calibrated parameters for the HEC-HMS model in the Makiki sub-watershed. The parameters of the calibrated times of concentration are close to those calculated using the TR-55 method. The meteorological model used storm hydrographs for calibration and frequency-based rainfall to compute the synthetic flood events. The final model parameters for the Makiki sub-watershed are given in Table 4-14.

Sub-basin	Initial Loss (inch)	Curve Number	Time of Concentration (hour)	Storage Coefficient (hour)
K1	1	42	0.18	0.45
K2	1	62	0.23	0.25
K3	1	68	0.12	0.2
K4	1	68	0.12	0.25
K5 (Plane 1)	0.7	85		
K5 (Plane 2)	0.1	98		

Table 4-13. Calibrated Parameters of Makiki Sub-Watershed

Sub-basin	Initial Loss (inch)	Curve Number	Time of Concentration (hour)	Storage Coefficient (hour)
K1	1	42	0.18	0.45
K2	1	62	0.23	0.35
K3	1	68	0.12	0.32
K4	1	68	0.12	0.35
K5 (Plane 1)	0.7	85		
K5 (Plane 2)	0.1	98		

Table 4-14. Finalized Parameters in HEC-HMS Model Makiki Sub-Watershed

The calibrated and final parameters of the HEC-HMS Model for the Makiki sub-watershed only differ by a few storage coefficients. These differences are due to the differing use and character of land in upper versus lower Makiki. The land use of the upper Makiki sub-watershed, a natural area with preservation land use, is similar to those of the upper Mānoa and Pālolo sub-watersheds. This similarity is reflected in the storage coefficient calculated. That is, the calibrated Clark Unit Hydrograph storage coefficient of the K1 sub-basin is 0.45 hour (hr), as shown in Tables 4-13 and 4-14, and the calibrated Clark Unit Hydrograph storage coefficients of sub-basins M5, P2, and M2, are 0.50, 0.32, and 0.57 hr respectively. In contrast, for lower Makiki sub-basins of K2, K3, and K4, the storage coefficients were increased slightly to match the calibrated storage coefficients in the Mānoa and Pālolo sub-watersheds. Figure 4-16 shows the modeled stream flows for JK2.

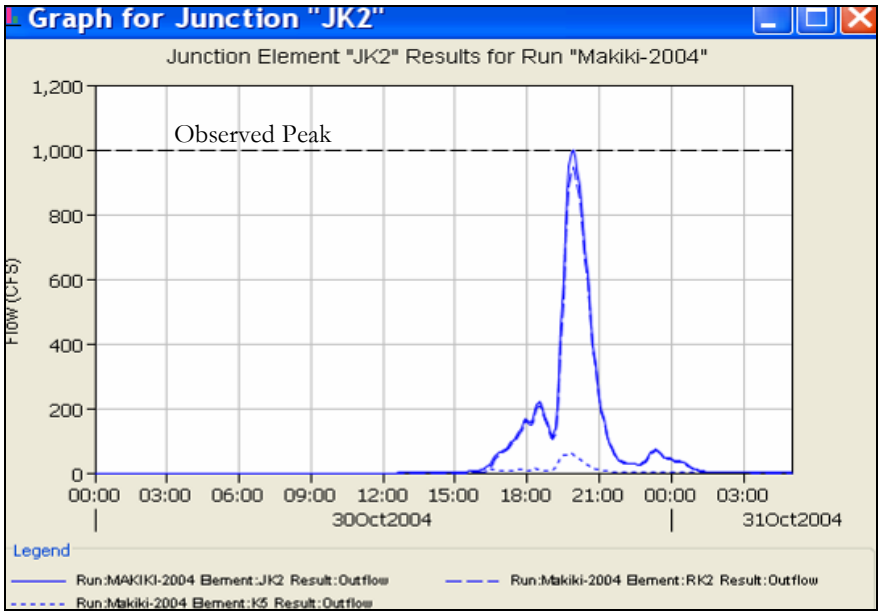

Figure 4-16. Modeled Stream Flows at JK2 (King Street Bridge, USGS stream gage 16238000) [Simulated peak discharge =1,000 cfs; observed peak discharge=1,000 cfs]

4.6 Kinematic Wave Transform Method Parameters

The Kinematic Wave Transform Method was used for the urbanized sub-basins. The Kinematic Wave technique is widely accepted for use in urbanized runoff modeling (USACE, 2001) because the parameters for various elements constituting the model are directly related to measurable, physical basin features. Parameters such as storm drain catchment length, drainage area, roughness, slope, and channel geometry are used to define the flow of water over basin surfaces into the stream channel. For the urbanized sub-basins, two overland flow plane elements were used to represent pervious land areas such as lawns and gardens and impervious areas such as streets and roofs. In this study, a sub-basin was modeled by combining two overland planes, a collector channel, and a main channel. The lengths, slopes, and roughness coefficients of the overland flow planes were based on the average of several values within the sub-watershed. Table 4-15 lists the values of the flow planes. Urbanized watersheds typically have various storm drainage systems, man-made channels, and natural channels. To model complex urban systems in a manageable fashion, the concept of typical collector channels was employed. The collector system was formulated from average parameters, in the sub-watershed. Tables 4-16 and 4-17 summarize the values of the collector channels and main channels.

In order to use the composite runoff curve number in a kinematic wave model, the sub-watershed must be divided into its pervious and impervious components. A curve number of 98 was used for the impervious areas (USACE 1973). The following equation can be applied to calculate the adjusted pervious curve number. The adjusted pervious curve number was used as the loss rate for the pervious areas.

$$X = \frac{CNc - 98 \times f}{1 - f}$$

Where $X = Adjusted\ \ pervious\ curve\ number$

$CNc = Composite\ curve\ number$

$f = total\ \ percent\ impervious, 0 \le f \le 1$

Kinematic Wave Transform Flow Planes for Urbanized Sub-Basins					
Sub-basin	Initial Abstraction (inch)	CN	Area (%)	Composite CN	Adjusted Pervious CN
A1 (Plane 1)	1.00	78	70	84	78
A1 (Plane 2)	0.10	98	30		
A2 (Plane 1)	0.75	86	65	90	86
A2 (Plane 2)	0.05	98	35		
A3 (Plane 1)	0.90	83	60	89	83
A3 (Plane 2)	0.10	98	40		
A4 (Plane 1)	0.75	76	60	85	76
A4 (Plane 2)	0.10	98	40		
A5 (Plane 1)	0.75	81	60	88	81
A5 (Plane 2)	0.10	98	40		
A6 (Plane 1)	1.00	69	90	72	69
A6 (Plane 2)	0.10	98	10		
A7 (Plane 1)	1.00	76	60	85	76
A7 (Plane 2)	0.10	98	40		
A8 (Plane 1)	0.75	86	50	92	86
A8 (Plane 2)	0.10	98	50		
K5 (Plane 1)	1.00	85	75	88	85
K5 (Plane 2)	0.10	98	25		
K6 (Plane 1)	1.20	80	60	87	80
K6 (Plane 2)	0.10	98	40		
W1 (Plane 1)	0.80	83	60	89	83
W1 (Plane 2)	0.10	98	40		
W2 (Plane 1)	1.00	86	50	92	86
W2 (Plane 2)	0.10	98	50		
W3 (Plane 1)	0.95	82	50	90	82
W3 (Plane 2)	0.10	98	50		

Table 4-15. Kinematic Wave Transform Flow Planes for Urbanized Sub-Basins

Kinematic Wave Collector Channels

Sub-basin	Length (ft)	Slope (ft/ft)	Manning's n	Area (mi^2)	Shape	Diameter (ft)	Width (ft)	Side Slope (xH:1V)
A1 (Sub-Collector)								
A1 (Collector)	1200	0.015	0.016	0.0207	Circle	3		
A2 (Sub-Collector)								
A2 (Collector)	2500	0.01	0.015	0.03	Circle	4		
A3 (Sub-Collector)								
A3 (Collector)	2800	0.06	0.018	0.03	Circle	3		
A4 (Sub-Collector)								
A4 (Collector)	2200	0.004	0.014	0.03	Circle	4		
A5 (Sub-Collector)								
A5 (Collector)	1200	0.035	0.018	0.03	Circle	2.5		
A6 (Sub-Collector)								
A6 (Collector)	750	0.006	0.06	0.01	Trapezoid		2	10
A7 (Sub-Collector)								
A7 (Collector)	1200	0.035	0.018	0.03	Circle	1.5		
A8 (Sub-Collector)								
A8 (Collector)	2400	0.003	0.015	0.03	Circle	4		
K5 (Sub-Collector)								
K5 (Collector)	1000	0.005	0.016	0.02	Circle	2		
K6 (Sub-Collector)								
K6 (Collector)	2600	0.005	0.018	0.035	Circle	3		
W1 (Sub-Collector)								
W1 (Collector)	1200	0.0015	0.015	0.025	Circle	1.5		
W2 (Sub-Collector)								
W2 (Collector)	800	0.0025	0.015	0.015	Circle	3		
W3 (Sub-Collector)								
W3 (Collector)	900	0.002	0.015	0.015	Circle	3		

Table 4-16. Kinematic Wave Collector Channels

Kinematic Wave Main Channels

Sub-basin	Route Upstream	Length (ft)	Slope (ft/ft)	Shape	Manning's n	Diameter (ft)	Width (ft)	Slope (xH:1V)
A1	No	1200	0.067	Circle	0.016	3		
A2	Yes	3600	0.001	Trapezoid	0.015		255	0
A3	Yes	800	0.0075	Trapezoid	0.03		50	5
A4	Yes	3100	0.001	Trapezoid	0.035		50	5
A5	No	5800	0.021	Circle	0.015	4		
A6	No	3650	0.001	Trapezoid	0.022		255	0
A7	No	6200	0.0267	Circle	0.015	4		
A8	Yes	2200	0.0015	Trapezoid	0.015		155	0
K5	Yes	700	0.056	Trapezoid	0.035		20	0
K6	Yes	3050	0.049	Trapezoid	0.035		20	0
W1	No	2800	0.0015	Circle	0.016	2		
W2	No	1500	0.0028	Circle	0.014	3		
W3	No	2100	0.0028	Circle	0.015	3		

Table 4-17. Kinematic Wave Main Channels

4.7 Reservoir and Reach Modeling

A number of assumptions were made during hydrologic modeling using the HEC-HMS method. These assumptions were made regarding the reservoir, reach, and junction modeling for the Ala Wai Watershed study area. Building upon the other sub-watershed model calibration, this final model represents the calibration of the entire watershed.

4.7.1 Ala Wai Canal as Reservoir

In order to consider backwater effect caused by the ocean tides, the Ala Wai Canal was modeled as a reservoir by assuming there is an imaginary boundary between the mouth of Canal and the ocean. "A reservoir is an element with one or more inflow and one computed outflow and is modeled by the assumption that water surface in the reservoir is level" (USACE 2008). The routing method was selected as the outflow structure. The size and type of imaginary outlet structure were mainly selected based on the cross section at the mouth of Ala Wai Canal. Noda and Associates (1994) study showed that the channel is a rectangular shape with a dimension of 152 feet x 14 feet near Ala Moana Bridge. The GeoRAS model also created similar cross sections at the mouth of the canal. The inlet elevation for this outlet structure was selected as -6.2 feet which was obtained from the October 30, 2004 storm calibration; then the rise of structure should be about 8 ft. The span of the structure was selected as 152 ft to match the field measurement. Figure 4-17 lists the reservoir model settings and Figure 4-18 shows its related outflow structure. There is no tide gage at the Ala Wai Canal mouth, the tide gage in Honolulu Harbor (NOAA tide level station 1612340) was used to represent the tail water effect. Consequently, the specified stage method was used to represent the main tail water. The elevation-storage function for the reservoir (Ala Wai Canal) was estimated by applying the bathymetric survey data for Ala Wai Canal conducted by Oceanit (2008c) and the LiDAR data for surrounding areas, as show in Table 4-18 and Figure 4-18.

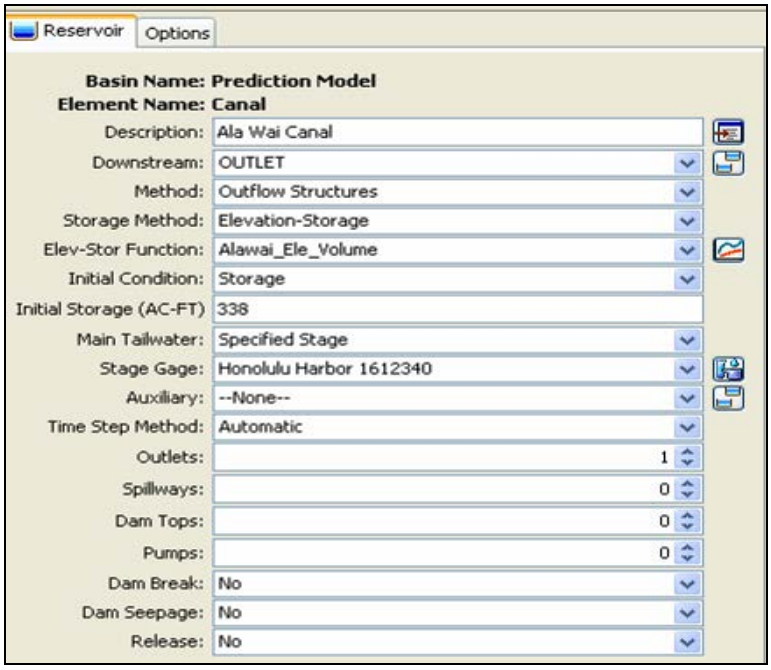

Figure 4-17. Model Settings for Reservoir (Ala Wai Canal)

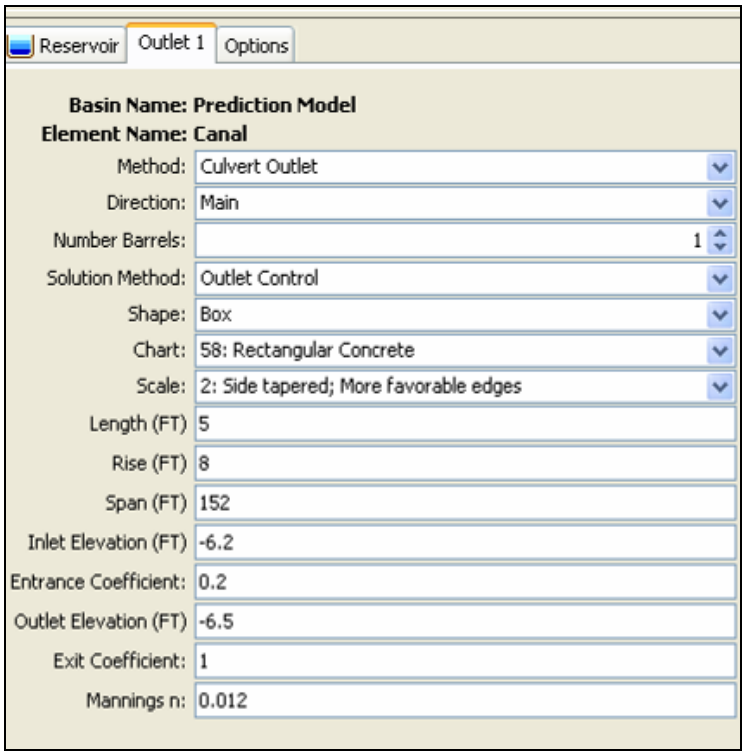

Figure 4-18 Model Settings for the Outflow Structure of Ala Wai Reservoir

Elevation-Storage Function Data

Elevation (ft)	Storage (acre-ft)	Elevation (ft)	Storage (acre-ft)	Elevation (ft)	Storage (acre-ft)
-15.5	0	-7.5	46.21	1	374.51
-15	0.01	-7	58.81	1.5	399.14
-14.5	0.03	-6.5	72.87	2	424.53
-14	0.09	-6	88.32	2.5	451.72
-13.5	0.22	-5.5	105.22	3	481.35
-13	0.43	-5	123.38	3.5	516.12
-12.5	0.74	-4.5	142.62	4	565.43
-12	1.2	-4	162.89	4.5	649.36
-11.5	1.89	-3.5	183.98	5	790.16
-11	2.99	-3	205.54	5.5	994.63
-10.5	4.89	-2.5	227.5	6	1260.41
-10	8.01	-2	249.61	6.5	1576.57
-9.5	12.49	-1.5	271.72	7	1930.93
-9	18.44	-1	293.83	7.5	2313.63
-8.5	25.97	-0.5	315.94	8	2718.57
-8	35.25	0	338.05		
-7.5	46.21	0.5	350.41		

Table 4-18. Elevation-Storage Curve Function Data

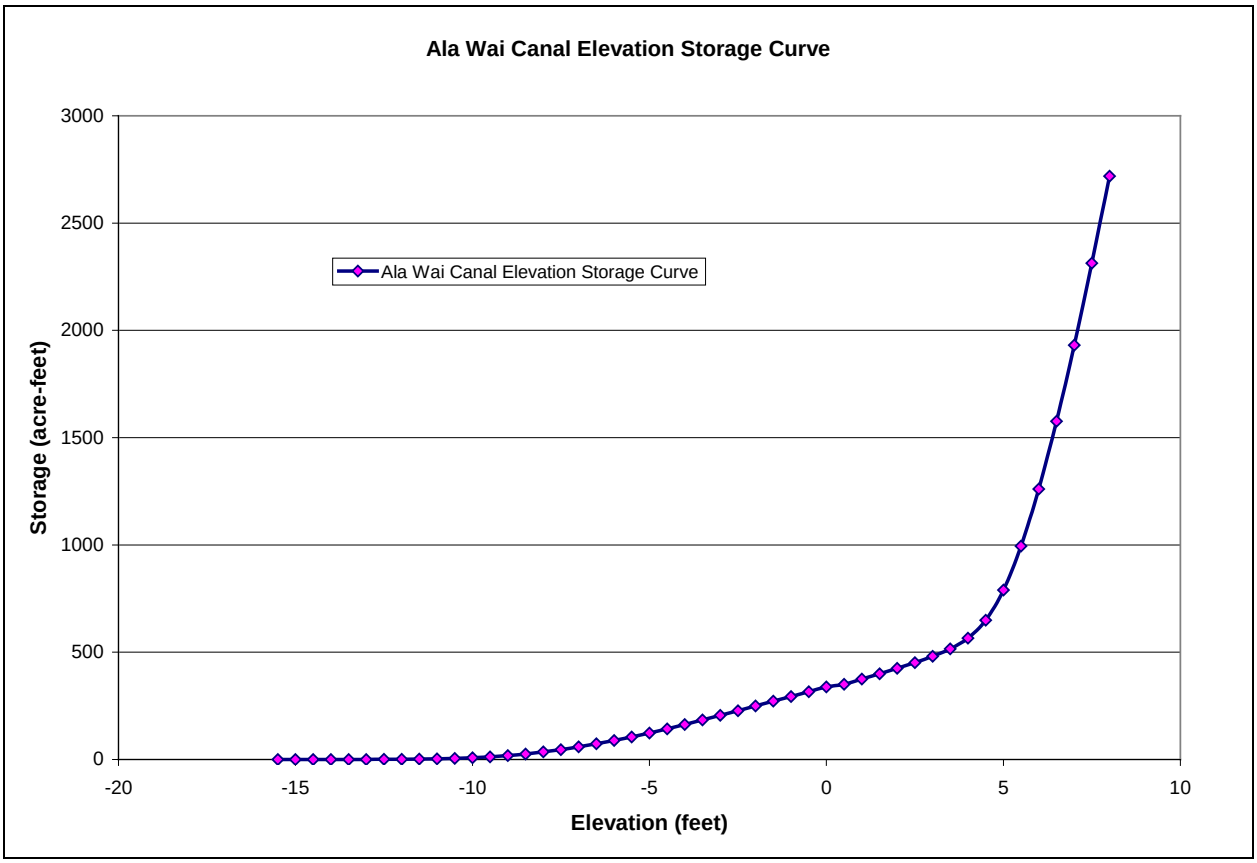

Figure 4-19. Elevation Storage Curve for Ala Wai Canal

The reservoir model was calibrated using the observed stage in the Ala Wai Canal from the October 2004 and December 1967 storm events. For modeling of the 2004 storm, the recorded stream flow hydrograph at USGS stream gage 16247100 was used to represent the inflow from upstream of Manoa and Palolo Streams; and Makiki calibrated model hydrograph at JK2 (USGS stream gage 16238000) was used to represent the inflow from Makiki area. Figure 4-20 illustrates the HEC-HMS model layout for October 30, 2004 storm calibration. Figure 4-21 shows the modeled and observed stages in Ala Wai Canal. The stage peak time matched very well at about 20:15pm with only 0.1 foot difference between the observed stage and the modeled stage.

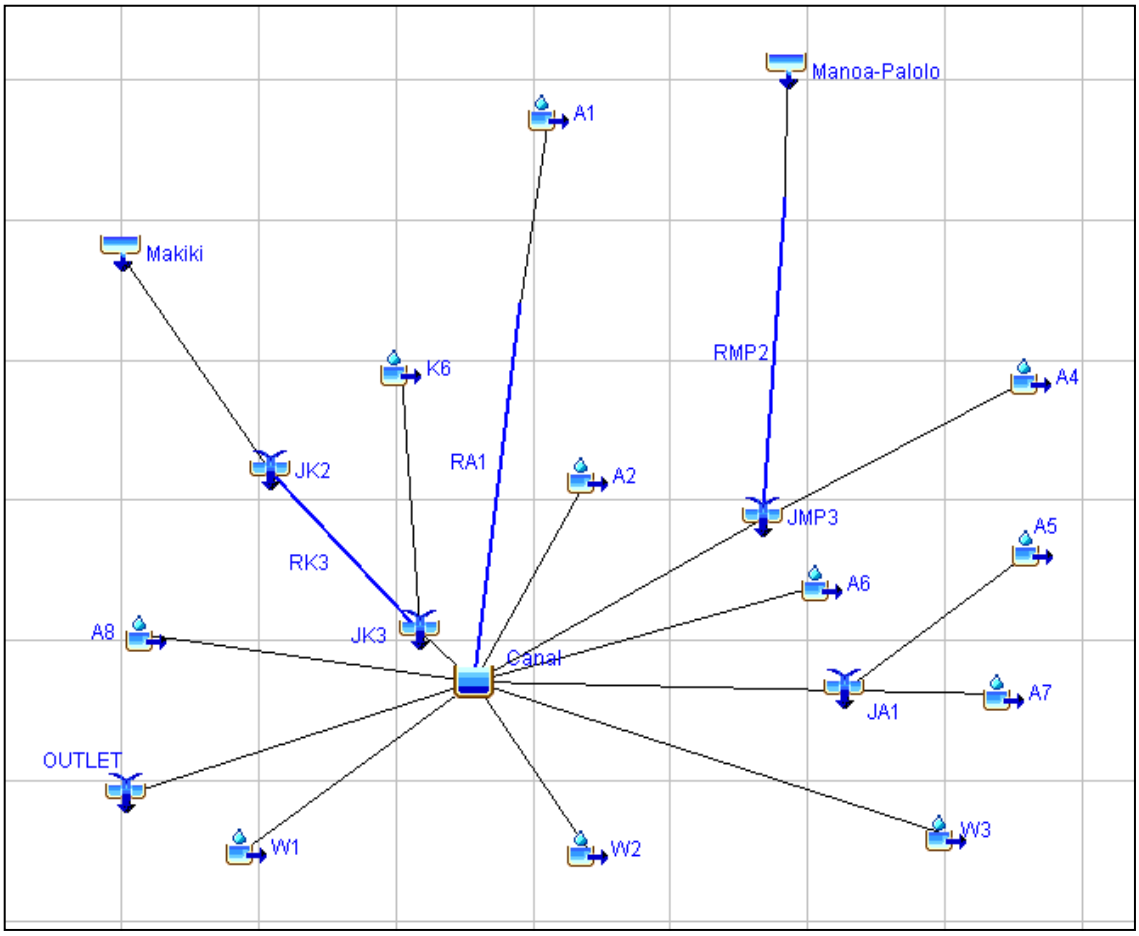

Figure 4-20. Model Layout for 2004

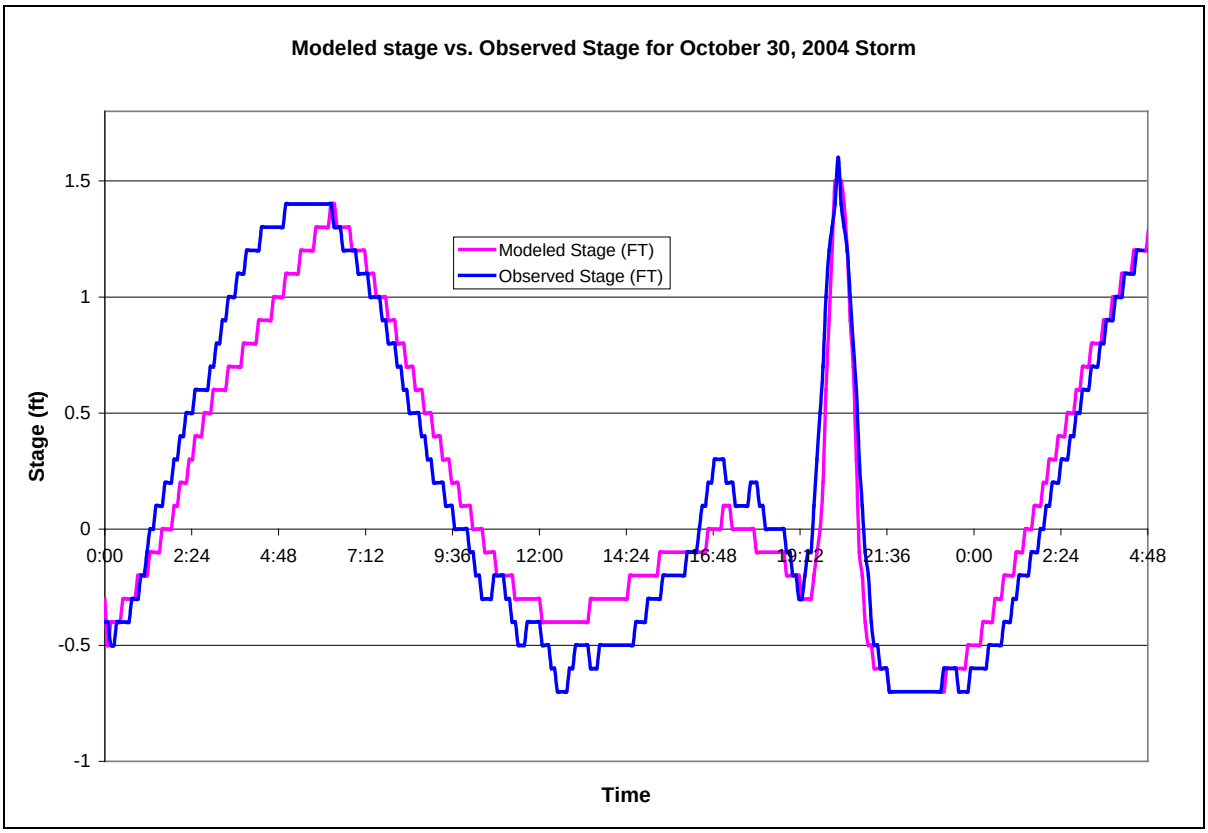

Figure 4-21. Calibrated Water Elevation vs. Observed Stage for Ala Wai Canal on October 30, 2004 Storm

For modeling of the December 17—18, 1967 storm, the calibrated Mānoa-Pālolo model hydrograph at USGS stream gage 16247100 was used to represent the upstream inflow. The finalized Makiki model described in Section 4.5 was used to represent the Makiki sub-watershed. Figure 4-22 shows the HEC-HMS model layout for calibrating this storm. The DLNR post flood report (1968) noted that Ala Wai Canal in Waikiki overflowed at the confluence with Mānoa-Pālolo Drainage Canal. Ala Wai Boulevard and adjacent streets near the confluence were flooded with water up to two feet deep (DLNR, 1968). The modeled peak stage was about 4.4 feet, or about 2.2 feet above Ala Wai Boulevard. Figure 4-23 shows the modeled stage in feet.

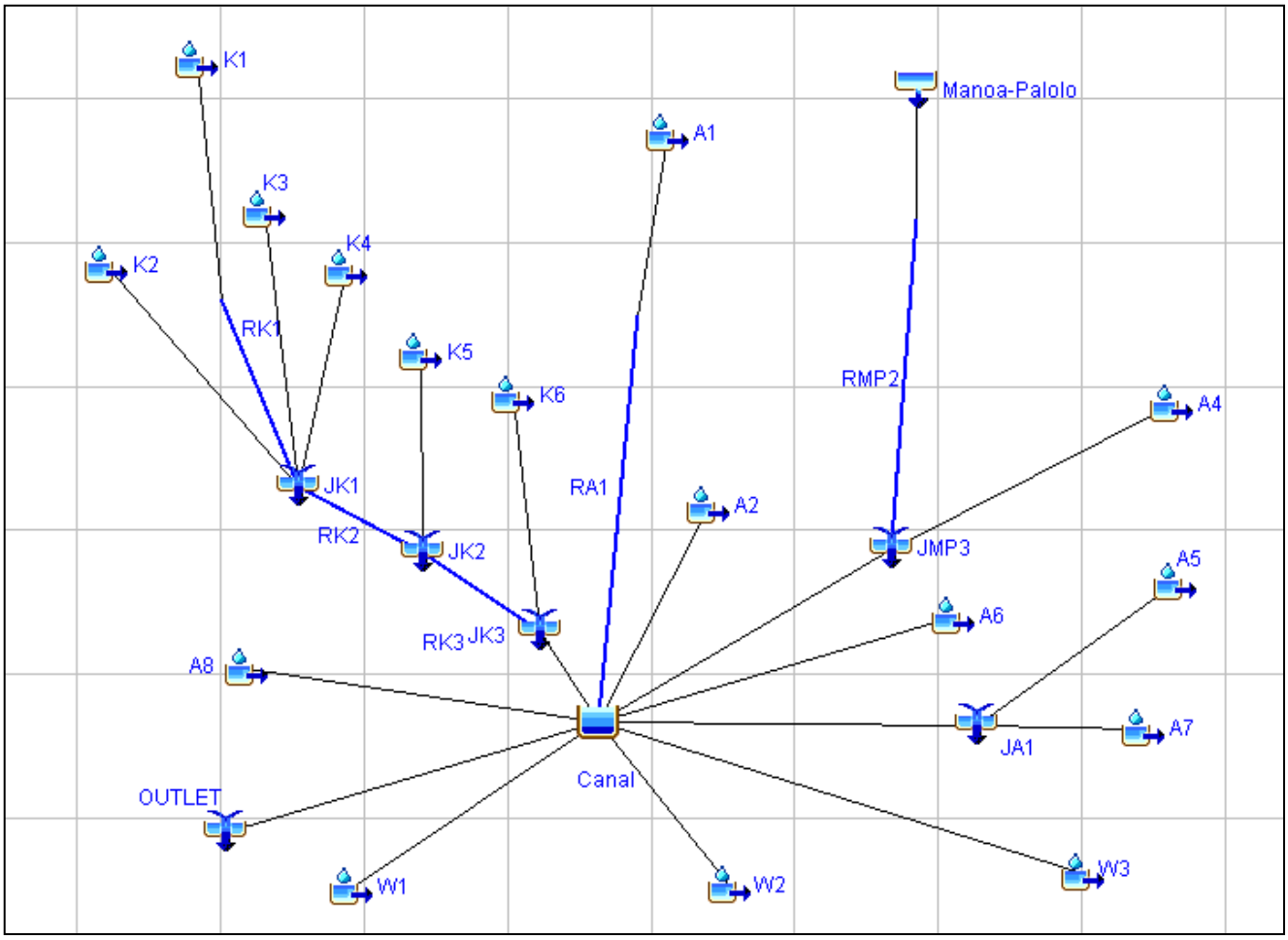

Figure 4-22. Model Layout for 1967

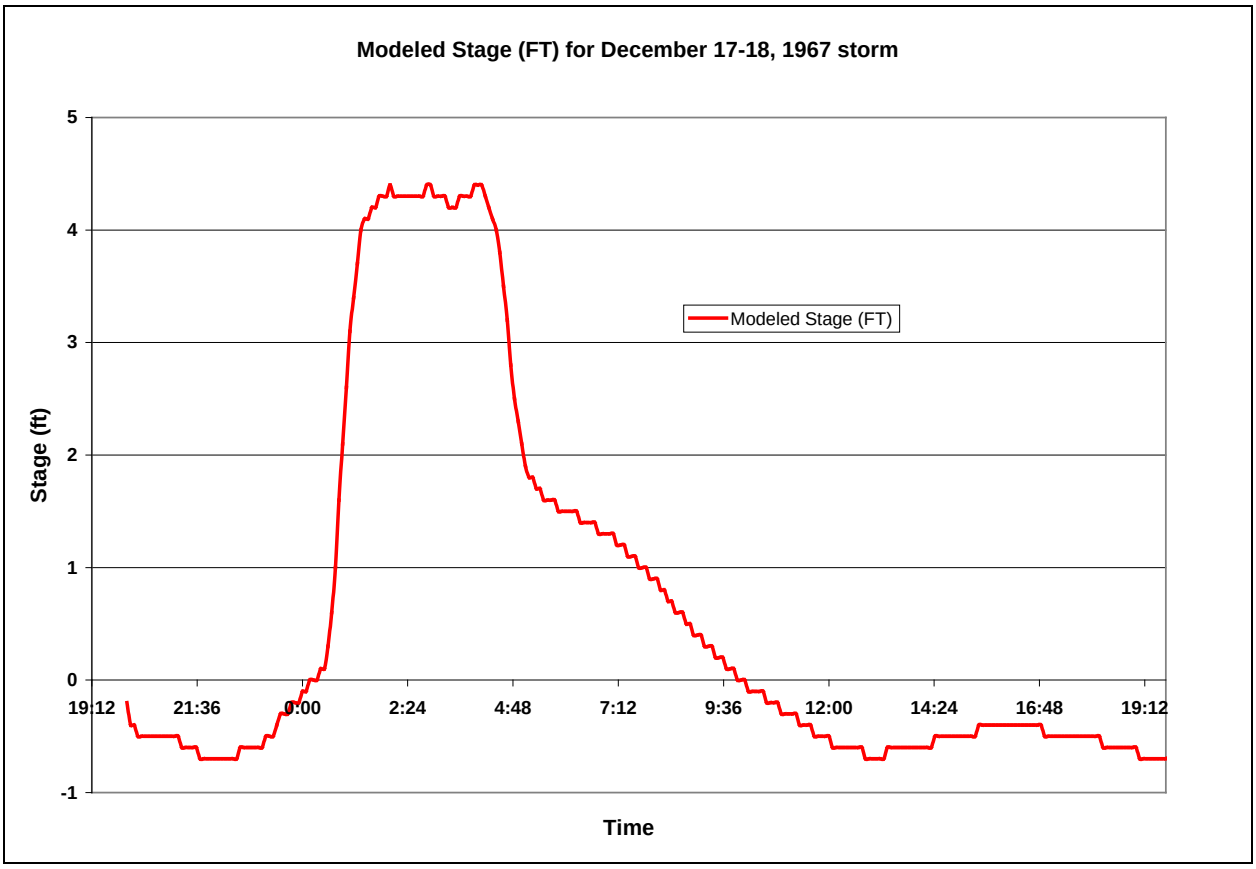

Figure 4-23. Calibrated Water Elevation at Ala Wai Canal for December 17-18, 1967 Storm

4.7.2 Reaches: Muskingum-Cunge and Modified Puls Channel Routing

The Muskingum-Cunge channel routing parameters were used and included the Manning's *n* values, length, slope, and cross-sections. The Manning's *n* values for the stream channel and its banks were determined using Chow's (1959) guidelines and channel conditions. The length of each reach was determined using GIS Arcview 3.3 maps; the slopes were estimated using contours generated from LiDAR data; and the widths were determined from field measurements and the cross-sectional data obtained from GeoRAS. The channel routing parameters are shown in Table 4-19.

Muskingum-Cunge Channel Routing for HEC-HMS Model

Reach	Length (ft)	Slope (ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:V)
RK1	4350	0.0415	0.05	Trapezoid	10	2
RK2	2650	0.0101	0.03	Trapezoid	20	2
RM7	1180	0.008	0.035	Trapezoid	50	2
RMP1	1900	0.0053	0.04	Trapezoid	50	2
RP1	5900	0.056	0.046	Trapezoid	15	2
RP2	3300	0.015	0.04	Trapezoid	15	2
RP3	4350	0.04	0.04	Trapezoid	12	2
RP4	5950	0.0185	0.0162	Rectangle	30	----
RP5	4300	0.0186	0.0162	Rectangle	30	----

Table 4-19. Muskingum-Cunge Channel Routing for HEC-HMS Model

The Modified Puls Routing Method was used for the Ala Wai Canal modeling to take backwater effects into consideration. The Modified Puls Routing Method is also called storage routing or level pool routing and is most often applied to reservoir routing. Because the Ala Wai Canal was modeled as a reservoir, the stream reaches that discharge into the reservoir were modeled using the Modified Puls Routing Method. The storage-discharge functions for reaches RMP2 (Mānoa-Pālolo Canal) and RK3 (Makiki Stream) were defined based on the elevation-discharge measurements of stream gages 16247100 at the Mānoa-Pālolo Canal and 16238000 at King Street bridge. The storage-discharge function for reach RA1 (Alanaio Stream) was defined by using Manning's equation. Figure 4-24 shows the locations of these three reaches. Figures 4-25, 4-26, and 4-27 Show the storage-discharge curves for these three reaches, respectively.

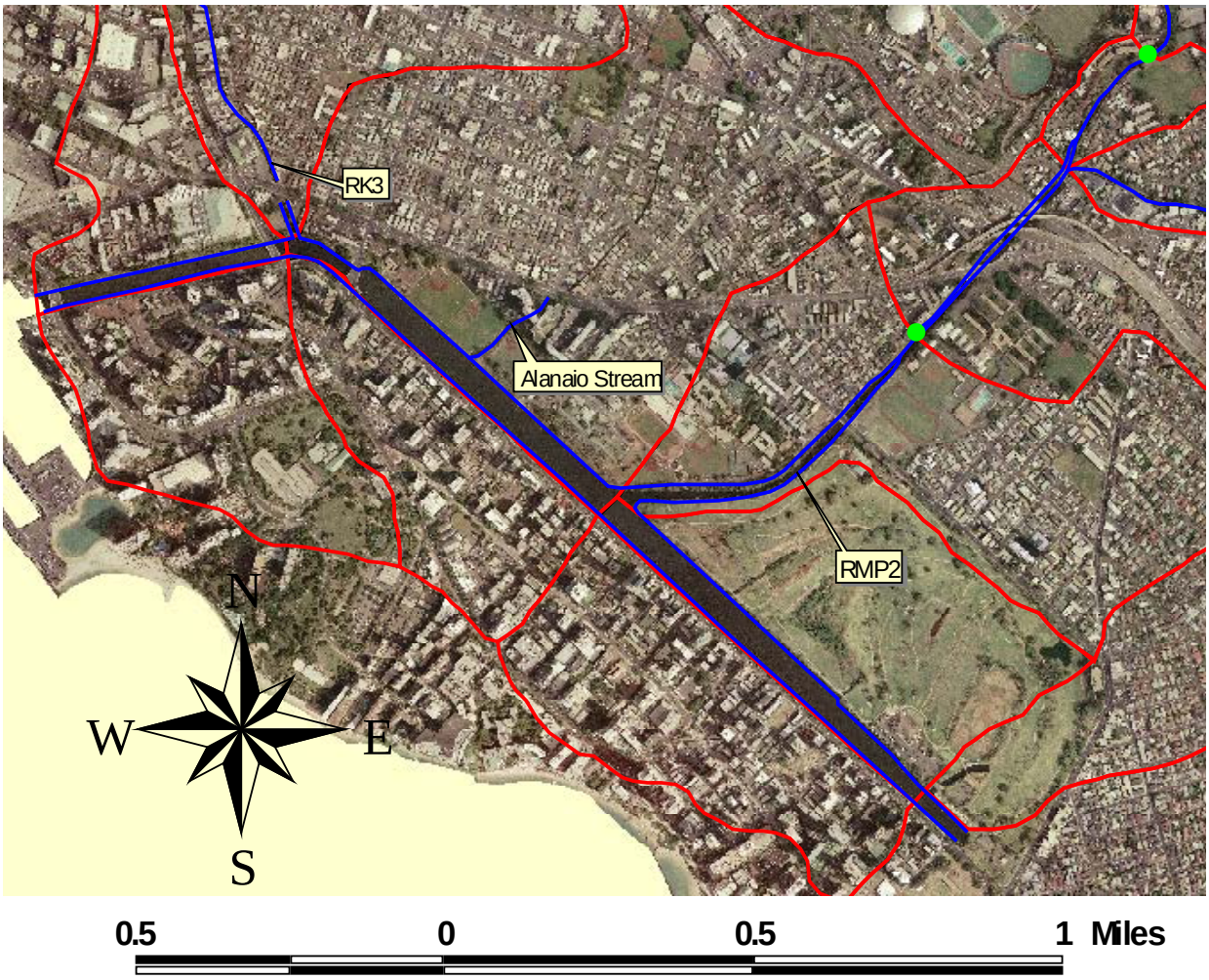

Figure 4-24. Reach locations for Modified Puls Routing Method

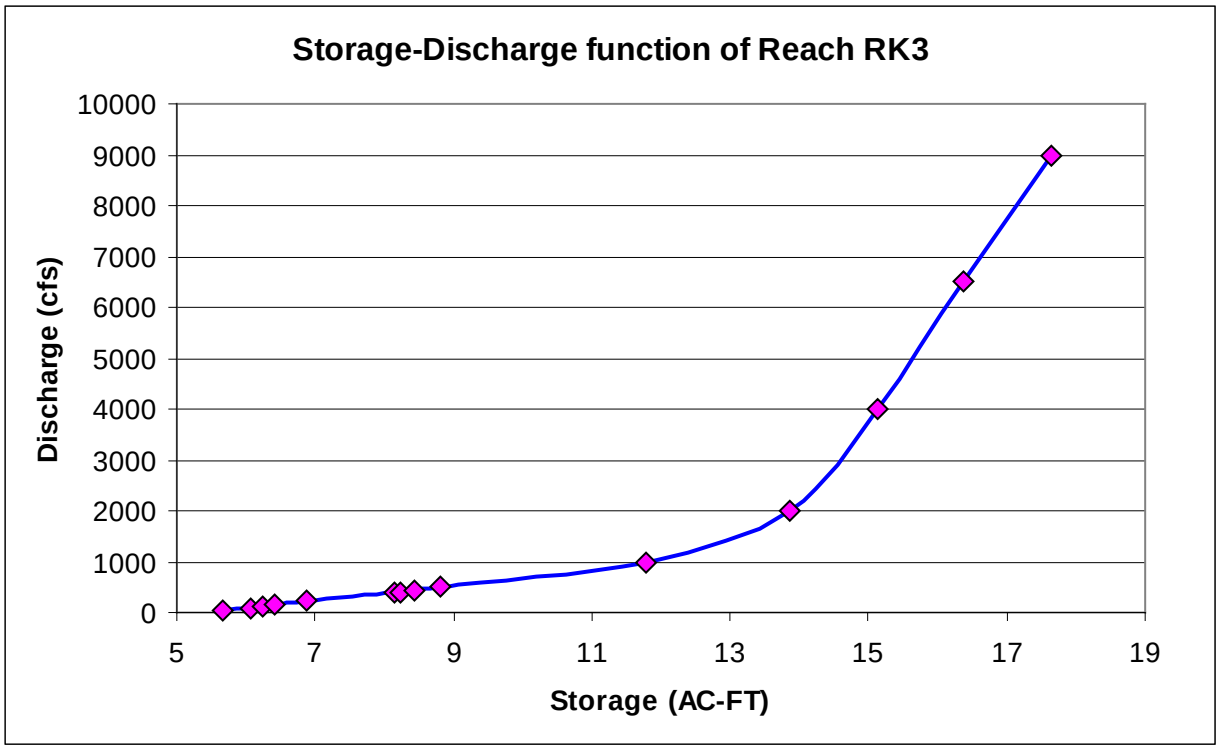

Figure 4-25. Storage-Discharge Curve for Reach RK3

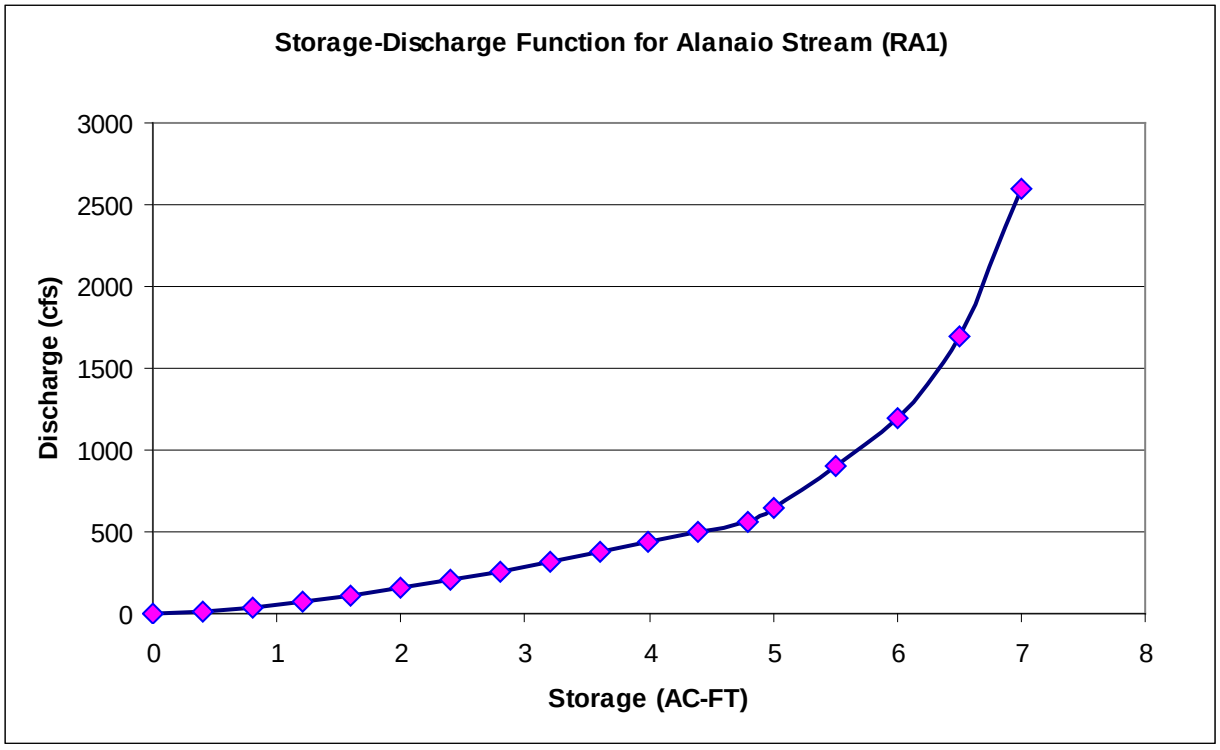

Figure 4-26. Storage-Discharge for Reach RA1

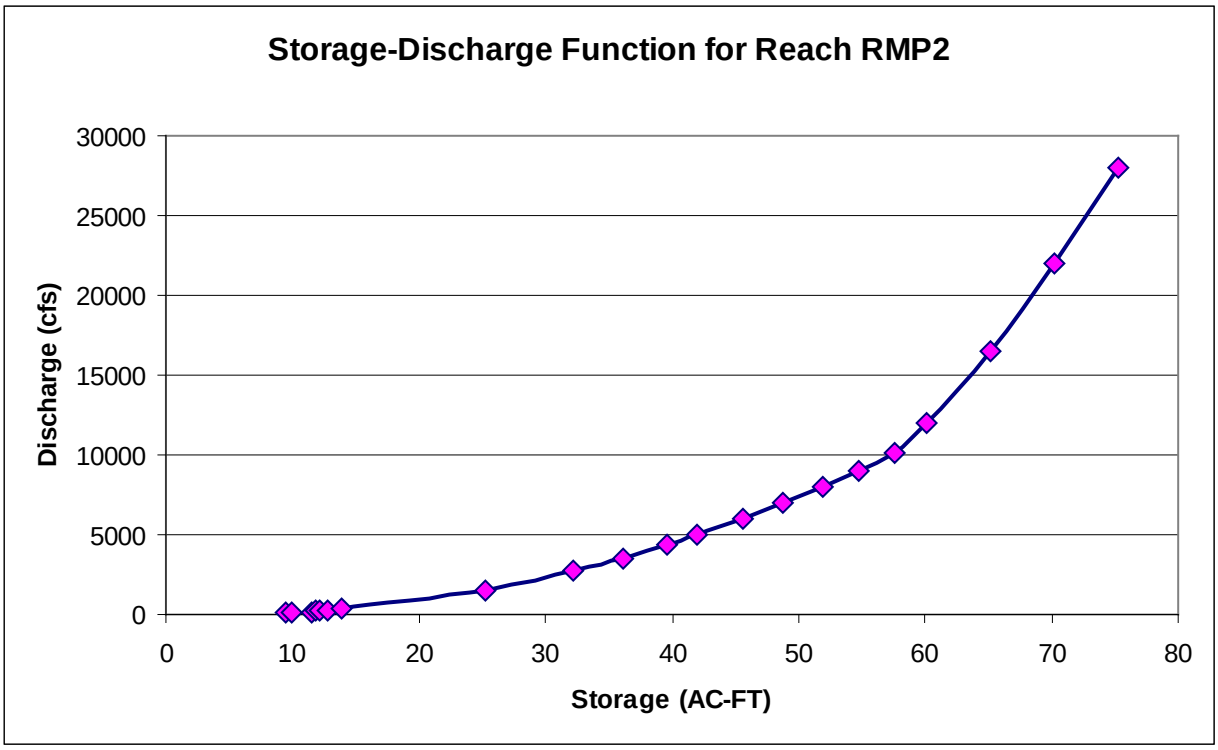

Figure 4-27. Storage-Discharge for Reach RMP2

4.8 Inflow Hydrographs at Kānewai Gage

For consistency with the previous Mānoa Watershed Project hydrologic study, the final results from that study were used to represent the whole Mānoa sub-watershed at the Kānewai Field stream gage. Inflow hydrographs were obtained from the HEC-HMS model of the Mānoa Watershed Project study for the storm chance exceedances of 50 through 0.2 percent. Table 4-20 lists the peak discharges at the Kānewai Field stream gage (USGS 16242500). Figures 4-28 and 4-29 provide the modeled stream flow at Kānewai Field, based on the results from the Mānoa Watershed Project hydrologic study (Oceanit 2008).

Peak Discharges at Kānewai Field Stream Gage from Mānoa Watershed Project								
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceeded	50%	20%	10%	5%	2%	1%	0.5%	0.2%
Peak Discharges (cfs)	2,500	4,300	6,000	7,600	9,500	10,700	12,000	14,000

Table 4-20. Peak discharges at Kānewai Field Stream Gage from Mānoa Watershed Project Hydrologic Study

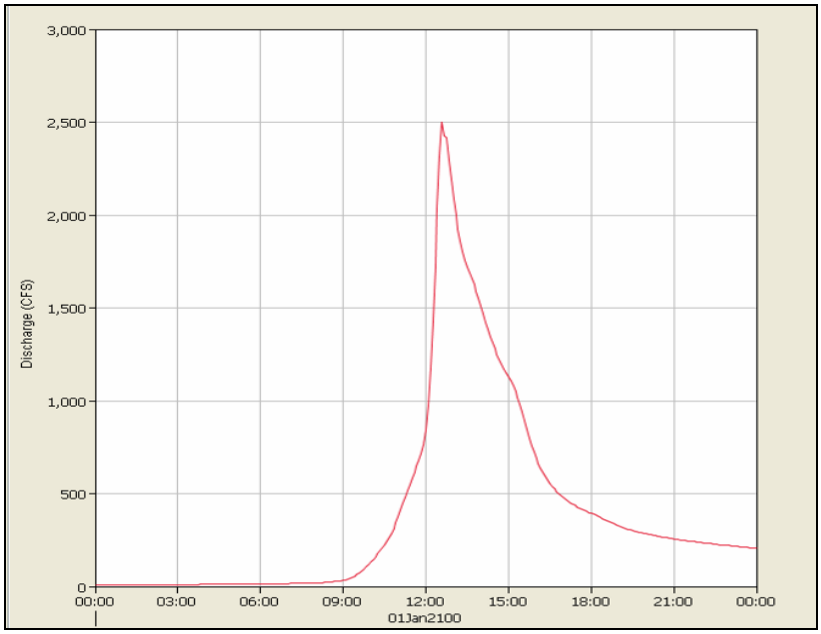

Figure 4-28. Inflow Hydrograph for the 50-percent Chance Flood Used to Represent the Manoa Sub-Watershed in the Ala Wai Watershed HEC-HMS Model (at Kānewai Field)

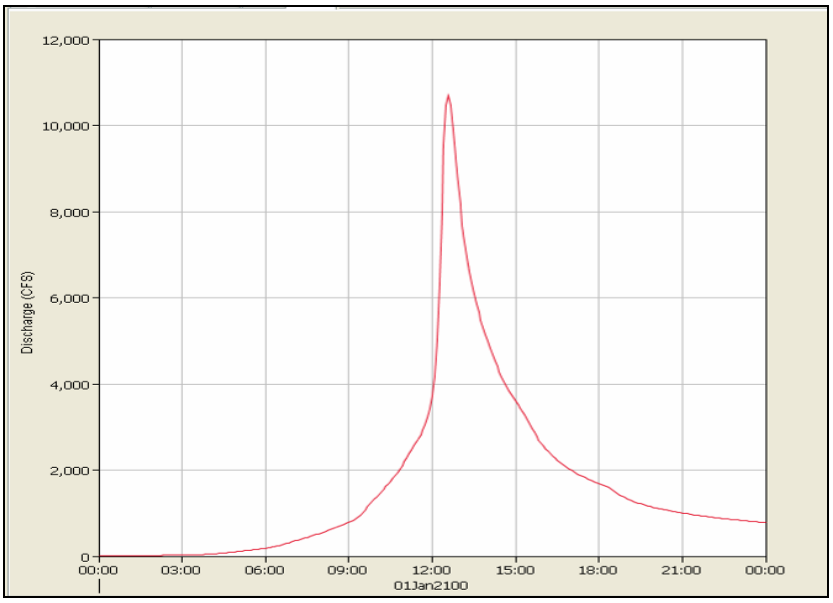

Figure 4-29. Inflow Hydrograph for the 1-percent Chance Flood Used to Represent the Manoa Sub-Watershed in the Ala Wai Watershed HEC-HMS Model (at Kānewai Field)

4.9 Peak Flow Results

For predicting the peak discharges for various return periods, the frequency storm with an intensity position at 50 percent was used in computing the peaks and hydrographs. The HEC-HMS model predicted peak discharges at various junctions in the Ala Wai Watershed are listed in Table 4-21. The final HEC-HMS model layout is shown below in Figure 4-30.

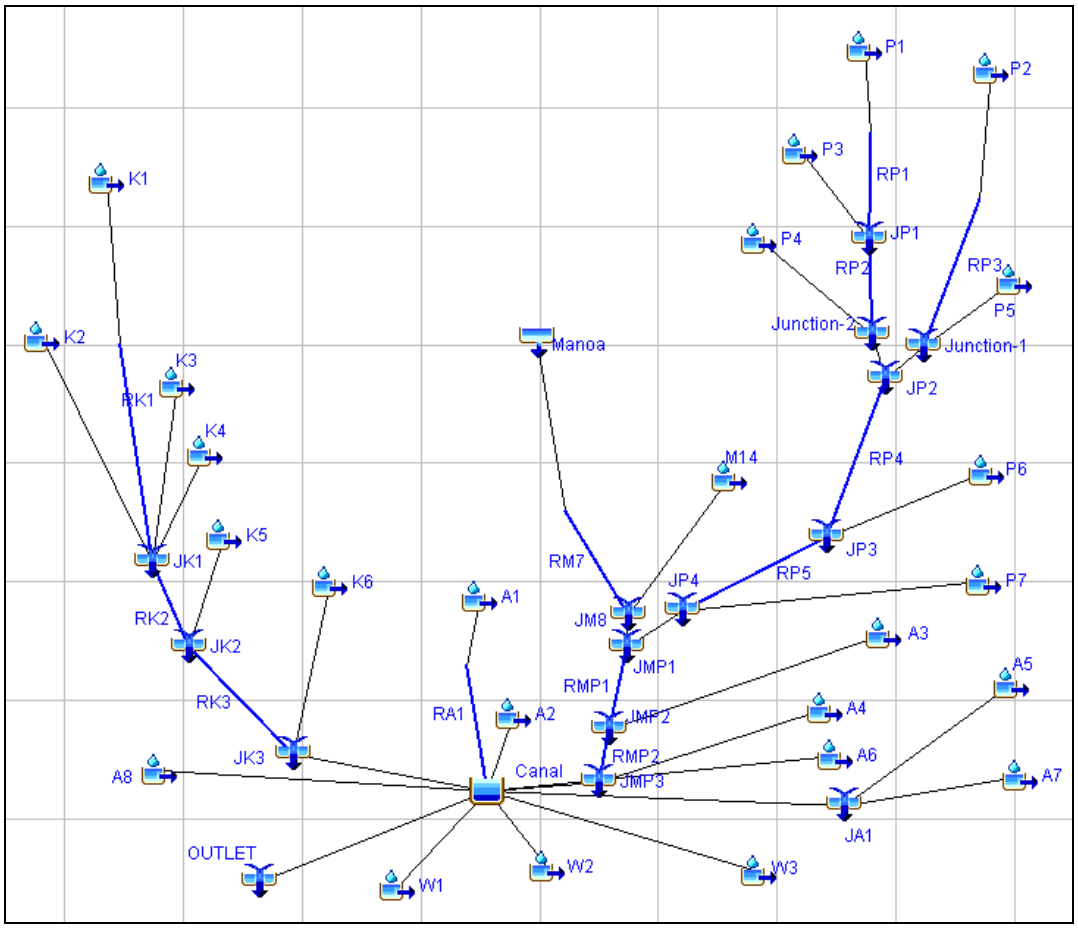

Figure 4-30. Ala Wai Watershed HEC-HMS Model

HEC-HMS Model Results—Peak Flow Discharges at Junctions

Table 4-21 HEC-HMS Model Peak Flow Discharges at Junctions								
	Peak flow discharge (cfs)							
Return Period (yr)	2	5	10	20	50	100	200	500
Percent Chance Exceedance	50%	20%	10%	5%	2%	1%	0.5%	0.2%
JK1	570	1,200	1,890	2,400	3,150	3,740	4,380	5,240
JK2	660	1,360	2,110	2,650	3,440	4,060	4,730	5,630
JK3	890	1,770	2,690	3,340	4,280	5,000	5,790	6,850
JM8	2,560	4,450	6,210	7,860	9,810	11,100	12,400	14,500
JP1	320	730	1,150	1,460	1,900	2,220	2,590	3,110
JP2	940	2,030	3,190	4,010	5,180	6,040	6,980	8,320
JP3	1,330	2,710	4,170	5,180	6,620	7,670	8,850	10,500
JP4	1,550	3,120	4,720	5,810	7,400	8,550	9,860	11,600
JMP1	4,020	7,170	10,300	12,900	16,100	18,500	20,900	24,400
JMP2	4,090	7,340	10,500	13,000	16,300	18,700	21,100	24,700
JMP3	4,220	7,450	10,700	13,300	16,600	18,900	21,400	24,900
Ala Wai Canal	6,000	10,100	13,400	15,200	16,700	17,700	18,700	20,500

Table 4-21. HEC-HMS Model Predicted Peak Discharges at Junctions

4.10 USGS Regression Equations and City and County's Plate 6

Regional regression equations developed by the USGS (Wong, 1994) for estimating peak discharges for the 50-, 20- 10-, 4-, 2-, and 1-percent chance exceedance probabilities at gaged and ungaged sites were used to calculate peak flows in the sub-watersheds. The equations for Leeward O'ahu were used for the sub-watersheds in this study. The drainage area (DA) and median annual rainfall (P) in these equations are independent parameters. These regression equations are valid for ungaged sites when (1) the drainage areas are between 0.03 and 45.7 square miles; (2) where less than 36 percent of the area is urbanized; and (3) the median rainfall is between 29 and 239 inches. The median annual rainfall for each sub-watershed was determined from DLNR (1982). The median annual rainfall amounts for the junctions were calculated by the weighting mean method with respect to the sub-watershed areas. The equations used bias-correction factors along with the accuracy of the estimates in equivalent years of record (Wong, 1994). The peak discharges calculated using these regression equations and Plate 6 of the City's drainage standards (2000) for each junction are presented in Table 4-22. The accuracy of these results is 16 years for the 1 percent chance exceedance event and 15 years for the other storm events.

The City storm drainage standards (2000) specify the use of the rational method for drainage areas of 100 acres or less and Plate 6 for drainage areas greater than 100 acres, and this method was used for some of the sub-basins in the Ala Wai Watershed study area. Plate 6 is an envelope curve developed from maximum known peaks and regression analysis of 100-year peak flows. This curve is assumed to represent a 100-year peak flow but actually has a slightly higher return period (Wong 1994). The accuracy of this curve is based not on the average years of recorded data but by the

standard error of regression. The accuracy of data used for peak determination of the 100-year envelope is unknown. In the absence of accurate data, an equivalent years of record of 10 years is assigned (Interagency Advisory Committee on Water Data 1982).

Plate 6 was applied to calculate the 100-year peak discharges in all sub-basins because the corresponding drainage areas exceed 100 acres. Plate 6 provides three curves relating to the peak discharge of the 100-year return period storm (1 percent chance exceedance probability). Curve B from Plate 6 was used for the Mānoa sub-watershed.

USGS Regression Equations and Plate 6 Calculation in cubic feet per second (cfs) for junctions, Ala Wai Watershed, Oahu, Hawaii.

Percent Chance Flood	Equation with BCF	JK1	JK2	JM8	JP1	JP2	JP3	JP4	JMP1	JMP2	Accuracy in Years of Record
50	$Q_2=3.635\ (DA)^{0.634}\ P^{1.08}$	660	670	1,660	650	1,035	1,040	1,040	2,120	2,110	**4.2**
20	$Q_5=27.58\ (DA)^{0.642}\ P^{0.773}$	1,340	1,370	3,100	1,160	1,930	2,020	2,060	4,060	4,080	**5.8**
10	$Q_{10}=77.32\ (DA)^{0.646}\ P^{0.621}$	1,960	2,000	4,330	1,580	2,700	2,870	2,970	5,760	5,800	**8.2**
4	$Q_{25}=225.7\ (DA)^{0.646}\ P^{0.464}$	2,900	2,980	6,120	2,200	3,830	4,150	4,330	8,240	8,320	**11.4**
2	$Q_{50}=440.7\ (DA)^{0.645}\ P^{0.368}$	3,840	3,960	7,870	2,810	4,940	5,410	5,690	10,680	10,810	**13.7**
1	$Q_{100}=788.3\ (DA)^{0.643}\ P^{0.286}$	4,680	4,840	9,330	3,320	5,880	6,500	6,860	12,740	12,910	**15.8**
	Plate 6 (100-yr)	5,300	5,600	11,000	3,200	6,500	7,700	8,100	15,500	16,000	**10**

Table 4-22. USGS Regression Equations and Plate 6 Calculation

4.11 FEMA Flood Insurance Study

The hydrologic and hydraulic analysis for the original Flood Insurance Study (FIS) for the City and County of Honolulu was performed by R.M. Towill Corporation in 1976. FEMA revised the previous FIS for the City and published the most updated FIS in 1979.

For Makiki Stream, USGS regression equations were used to obtain peak flow discharges for the 10-, 50-, and 100-year flooding events (FEMA, 2004). The 500-year flood was determined by a regression equation utilizing the same basic data and regression techniques as applied by USGS. These regression equations applied the ratio of the drainage area covered by forests and vegetation to total drainage area in percent instead of the median rainfall that current USGS regression equations applied to determine the peaks. Figure 18 in FIS (FEMA, 2004) was the results that only applied to one place with the drainage area as about 2.49 square miles. This drainage area is equal to the drainage area of junction JK2; in other words, only junction JK2 is available to have FEMA flood insurance analysis peak flow discharges.

For Palolo Stream, peak discharges were based on a statistical analysis results by using the 25-year recording annual peaks at USGS Gaging Station 16247000. The analysis followed the standard log-Pearson type III method procedures as outlined by the Water Resources Council. So the FEMA FIS analysis for Palolo Stream is only applied to junction JP3 that USGS gage 16247000 located.

For Manoa-Palolo and Ala Wai Canals, the peak discharges were determined by using SCS hydrograph method. Probably because of the higher proportion of urbanized areas, the SCS method resulted in slightly higher peak discharges.

For JM8, which is part of Manoa sub-watershed, same analysis was used as previous Manoa watershed study conducted by Oceanit (2008b).

Table 4-23 shows the FEMA flood insurance study analysis for Makiki, Palolo, Manoa-Palolo Canal and Ala Wai Canal.

Peak Flow Discharges in cfs Calculated by FEMA				
Return Period (yr)	10	50	100	500
Percent Chance Exceedance	10%	2%	1%	0.2%
JK2	1,850	3,250	3,950	5,950
JM8	7,600	11,500	13,600	17,000
JP3	2,790	4,510	5,340	7,530
JMP2	12,000	19,200	23,000	28,500
Ala Wai Canal	13,700	23,000	28,200	36,200

Table 4-23. Peak Flow Discharges Calculated by FEMA

4.12 Flow Frequency Analysis

HEC-SSP version 1.0 Beta was used to perform the flow frequency analysis. This software is limited to performing flood flow frequency analysis based on Bulletin 17B, "Guidelines for Determining Flood Flow Frequency" (Interagency Advisory Committee on Water Data 1982). Three USGS stream gages that have sufficient data to perform the flow frequency analysis are within the study area. The USGS stream gage 16247100 at the Mānoa-Pālolo Canal (Junction JMP2), adjacent to the Kaimukī High School, has a drainage area of 10.34 square miles. Thirty-eight effective annual peaks were used in the HEC-SSP model to predict the peaks for the various return periods at this junction. The USGS Pālolo Stream gage 16247000 (Junction JP3) has a drainage area of 3.62 square miles. Thirty-two effective annual peaks were used at this junction. The USGS Pūkele Stream (tributary of Pālolo Stream) gage 16244000 (Junction JP1) has a drainage area of 1.15 square miles. Fifty-nine effective annual peaks were used at this junction. The following figures and tables show the flow frequency results from HEC-SSP model (Figures 4-31-33 and Tables 4-24 through 4-26).

At USGS Gaging Station 16247000, there are 32 effective annual peaks available to perform the statistical frequency analysis. The continuous recorded annual peaks are from 1953 to 1979 and from 2003 to 2007, but no data is available between 1980 and 2002. The recorded annual peaks from 2003 to 2007 seem incorrect for the following two reasons.

(1) On October 30, 2004, the recorded peak at this gage was 776 cfs. The tributary stream gage upstream (Pukele) recorded a 753 cfs peak, and another tributary (Waiomao Stream) received the same rain as Pukele Stream received. At USGS gage 16247100 downstream, the recorded peak was 9,380 cfs and the Manoa Stream at Kanewai gage recorded a peak at 5,860 cfs. Thus, the peak flow at the Palolo gage should be in a range of 1,500 to 3,000 cfs rather than the 776 recorded because it received similar rainfall as Manoa.

(2) The peak for March 31, 2006 storm at Palolo Stream Gage was 1,390 cfs, at downstream gage USGS 16247100, the recorded peak was 9,320 cfs, the rainfall was uniformly distributed into the study area, the Palolo valley should have generated a range 2,000 to 3,000 cfs peak flow. Since there was possible channel conditions changed during the last 50 years, the data in this gage may be lower than actual stream flows, as a result, the HEC-SSP and FEMA analysis (used 25-year annual peaks) got lower peak discharges.

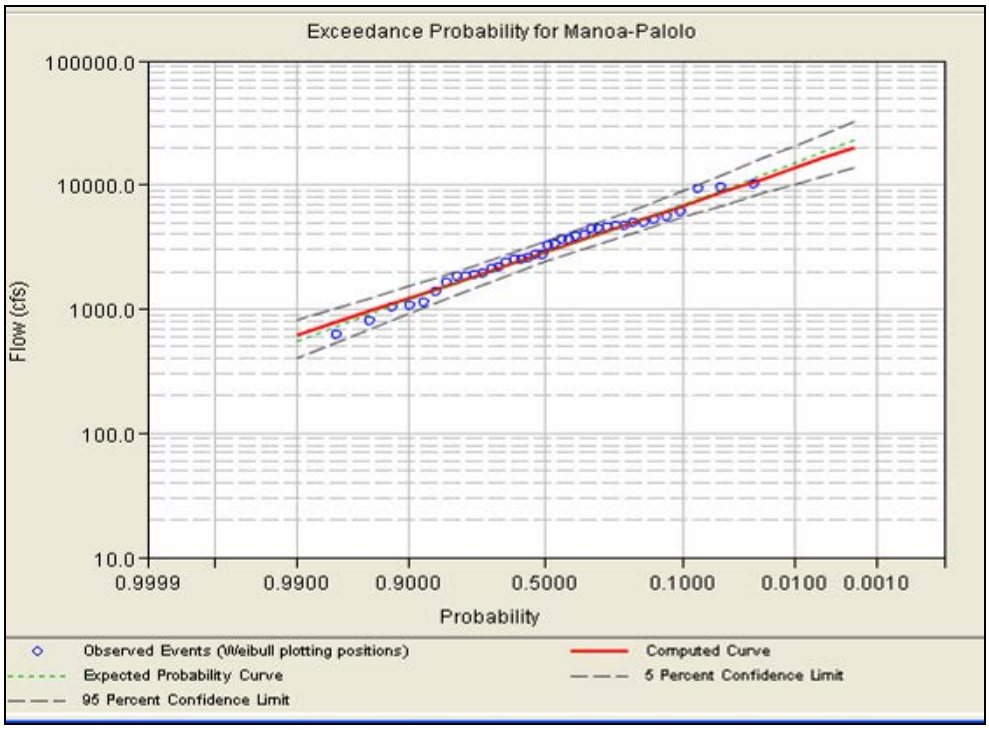

Figure 4-31. Exceedance Probability for Mānoa-Pālolo Canal Stream Gage JMP2 (USGS Stream Gage[16247100])

Percent Chance Exceedance	Return Period (year)	Computed Flow (cfs)	Confidence Limits Flow (cfs)	
			0.05	0.95
0.2	500	19,800	32,538	13,949
0.5	200	16,200	25,443	11,719
1	100	13,700	20,783	10,143
2	50	11,400	16,677	8,654
5	20	8,670	12,017	6,804
10	10	6,800	9,013	5,475
20	5	5,070	6,407	4,179
50	2	2,880	3,459	2,404

Table 4-24. Flood Flow Frequency Results for Mānoa-Pālolo Canal Stream Gage JMP2 (USGS Stream Gage [16247100])

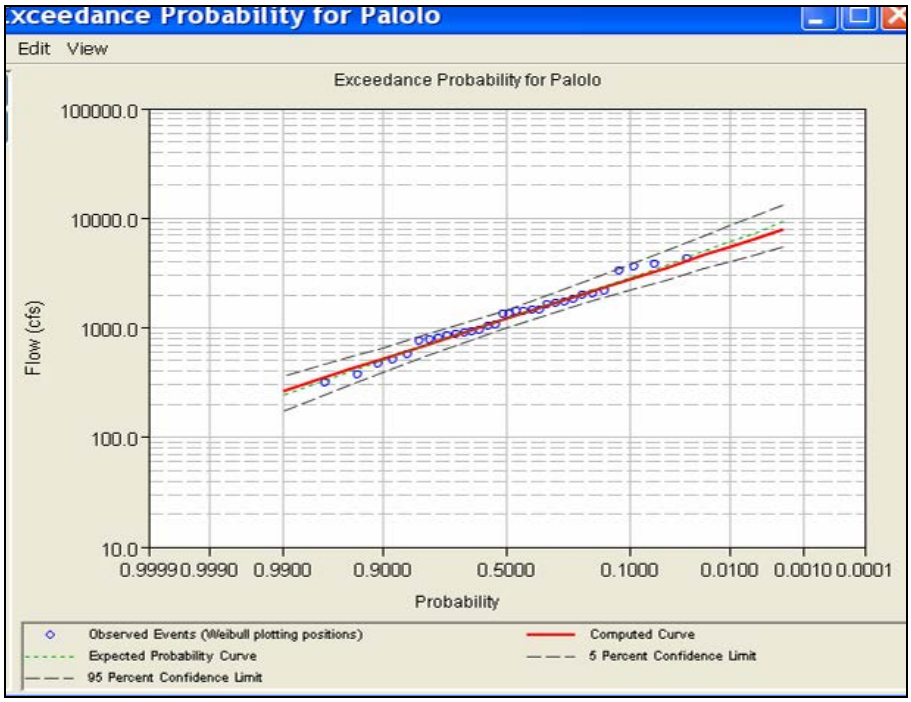

Figure 4-32. Exceedance Probability for Pālolo Stream Gage JP3 (USGS Pālolo Gage [16247000])

Percent Chance Exceedance	Return Period (year)	Computed Flow (cfs)	Confidence Limits Flow (cfs)	
			0.05	0.95
0.2	500	7,820	13,366	5,422
0.5	200	6,430	10,478	4,589
1	100	5,470	8,578	3,996
2	50	4,580	6,900	3,433
5	20	3,510	4,991	2,725
10	10	2,780	3,757	2,212
20	5	2,090	2,683	1,705
50	2	1,210	1,466	997

Table 4-25. Flood Flow Frequency Results for Pālolo Stream Gage JP3 (USGS Pālolo Gage [16247000])

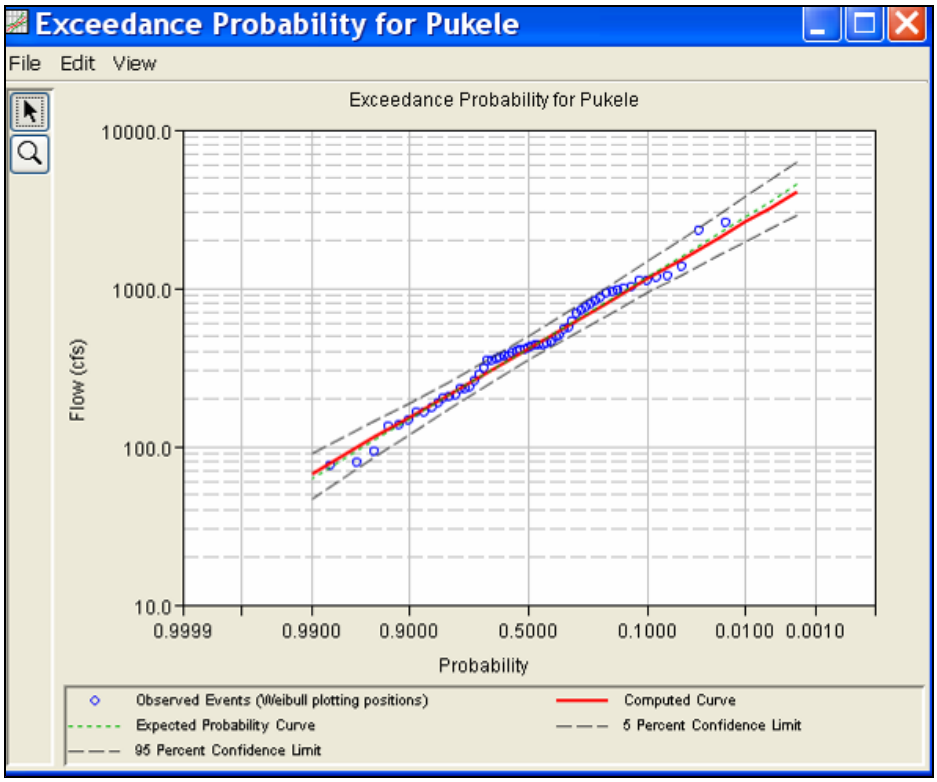

Figure 4-33. Exceedance Probability for Pūkele Stream Gage JP1 (USGS Pūkele Gage [16244000])

Percent Chance Exceedance	Return Period (year)	Computed Flow (cfs)	Confidence Limits Flow (cfs)	
			0.05	0.95
0.2	500	4,050	6,330	2,880
0.5	200	3,190	4,800	2,330
1	100	2,620	3,820	1,960
2	50	2,110	2,980	1,620
5	20	1,530	2,060	1,210
10	10	1,150	1,490	930
20	5	810	1,010	680
50	2	420	500	350

Table 4-26. Flood Flow Frequency Results for Pūkele Stream JP1 (USGS Pūkele Gage [16244000])

5 Results of Hydrologic Model

All of the hydrologic analysis methodologies estimate peak flow discharges (cfs) for return periods (percent chance exceedance storms) by junction; the methodologies include the HEC-HMS modeling, the USGS regression method, City Plate 6, FEMA Flood Insurance Study, and the HEC-SSP model. Each of these methodologies provides a predictive measure for peak discharges, and used together they offer a clear and accurate depiction of where peak flows will occur during 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent chance exceedance storms.

5.1 Determination of Final Peak Flow Discharges

The USACE Engineer Manual (EM) 1110 – 2 -1619 (1996, Table 4-5, page 4-5) provides guidelines to assign accuracies to flood frequency estimates determined by various methods in term of equivalent years of record. Estimates assigned higher equivalent years of record are considered more reliable than those with lower equivalent years of record. Equivalent years of record is an assigned unit of accuracy. In comparing methodologies, those with higher equivalent years of record were considered more accurate and given greater weight. Based on engineering judgment following the guidelines, the HEC-SSP model is the most reliable with equivalent years of record 59, 32, and 38 for junctions JP1, JP3, and JMP2, respectively. The HEC-HMS model was calibrated to three historical storms for Manoa and Palolo sub-watersheds, two historical storms for Ala Wai Canal reservoir model, and one historical storm event for Makiki sub-watershed. Although there was no calibration to the urbanized sub-basins, the parameters physical measurable Kinematic Wave transform method was applied. An equivalent record length of 20 years was assigned to the results generated by HEC-HMS model based on guidelines provided in EM 110-2-1619 (USACE, 1996) and the confidence in the calibration data sets.

FEMA flood insurance study within Ala Wai watershed area applied various methods to determine the peak discharges, based on the analysis done with equivalent record lengths of 15 years and were assigned to FEMA results in junctions JK2, JM8, JMP2, and Ala Wai Canal. An equivalent record length of 25 years was assigned to FEMA results in junction JP3 in response to its statistic analysis using 25-year recorded annual peaks. The weighting factors for the HEC-HMS modeling, the USGS regression, City Plate 6, FEMA Flood Insurance Study, and the HEC-SSP methodologies are shown in Table 5-1.

Weighting Factors for Peak Discharges Development								
Methodology	Accuracy in Equivalent Years of Record							
Percent Chance Exceedance	50%	20%	10%	5%	2%	1%	0.5%	0.2%
HEC-HMS	20	20	20	20	20	20	20	20
Regression	15	15	15	15	15	16		
Plate 6						10		
FEMA			15 25(JP3)		15 25(JP3)	15 25(JP3)		15 25(JP3)
HEC-SSP	59(JP1) 32 (JP3) 38(JMP2)	59(JP1) 32 (JP3) 38(JMP2)	59(JP1) 32 (JP3) 38(JMP2)	59(JP1) 32 (JP3) 38(JMP2)	59(JP1) 32 (JP3) 38(JMP2)	59(JP1) 32 (JP3) 38(JMP2)	59(JP1) 32 (JP3) 38(JMP2)	59(JP1) 32 (JP3) 38(JMP2)

Table 5-1. Weighting Factors Used To Develop Final Peak Flow Values

Determination of the final peak flow discharges at junctions of interest for the sub-watersheds studied was conducted in three steps: (1) the peak flow discharge values produced by each method were weighted; (2) all the available peak flow discharge values were plotted on log probabilistic graph paper by percent chance exceedence; and (3) the best fit curve of the peak flow discharges was graphed assuming watershed linearity, that is, that the peak flow discharge-frequency curves should be defined by a single function (illustrated as a smooth curve) for each sub-watershed. Engineering judgment was used in the selection of the best fit curve to account for the relative accuracies of each method and for the up and downstream relationships to determine the resulting final peak flow discharge values.

The determination of final peak flow discharges assumes that the sub-watersheds examined in this study exhibit linearity, meaning that a single function may describe the runoff from a sub-watershed. Sub-watershed linearity is based on the concept that peak flow discharge frequency curves serve their descriptive purpose as continuous, smooth curves. Thus, even after peak flow discharges were weighted and plotted on log-probabilistic graph paper, the best curve fit for these discharge values was determined using engineering judgment. The best fit curve was the final step in determining peak flow discharge values at the junctions of interest.

5.2 Makiki Peak Flow Discharges

Peak flow discharges at junctions of interest in the Makiki sub-watershed were weighted according to the process detailed in Section 5.1, plotted on log-probabilistic graph paper, and a best fit curve was analyzed. Table 5-2 provides peak flow discharge results for the Makiki sub-watershed at junctions of interest by methodology, the weighted values, and the 'FINAL' best fit values.

Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
JK1 (Confluence of Makiki and Kanaha Streams, A=2.328 mi²)								
HEC-HMS	570	1,200	1,890	2,400	3,150	3,740	4,380	5,240
Regression	660	1,350	1,960	2,900	3,840	4,680		
Plate 6						5,300		
Weighted	610	1,260	1,920	2,620	3,450	4,410	4,380	5,240
FINAL	**650**	**1,300**	**1,900**	**2,550**	**3,400**	**4,100**	**4,800**	**5,700**
JK2 (USGS Stream Gage at King St. 16238000, A= 2.49 mi²)								
HEC-HMS	660	1,360	2,110	2,650	3,440	4,060	4,730	5,630
Regression	670	1,370	2,000	2,980	3,960	4,850		
Plate 6						5,600		
FEMA			1,850		3,250	3,950		5,950
Weighted	660	1,360	2,000	2,790	3,540	4,490	4,730	5,770
FINAL	**660**	**1,330**	**1,960**	**2,580**	**3,500**	**4,250**	**4,950**	**5,900**
JK3 (Confluence of Makiki Stream and Ala Wai Canal, A=2.892 mi²)								
HEC-HMS	890	1,770	2,690	3,340	4,280	5,000	5,790	6,850
Plate 6						6,100		
Weighted	890	1,770	2,690	3,340	4,280	5,370	5,790	6,850
FINAL	**760**	**1,600**	**2,400**	**3,200**	**4,300**	**5,250**	**6,100**	**7,200**

Table 5-2. Peak Flow Discharges at Makiki Junctions by Methodology

The junction near the confluence of the Makiki Stream and Ala Wai Canal (JK3) received the highest amount of peak flow discharge in the Makiki sub-watershed. This was expected, because JK3 represents the flow exiting the entire Makiki sub-watershed. The peak discharge values attained by the Plate 6 and Regression methods appear higher than the peak discharge values attained through HEC-HMS modeling, as seen in Figures 5-1 through 5-3. As mentioned in Section 5.1, the peak discharge values were not only weighted, but also the final values were determined by the best fit curve shown in Figures 5-1 through 5-3. This best fit curve takes into account all of the methods used. In short, the final best fit curve was used to calculate the final peak discharges. Figures 5-1 through 5-3 graph the peak flow discharge by methodology over the percent chance exceedance for Makiki junctions of interest.

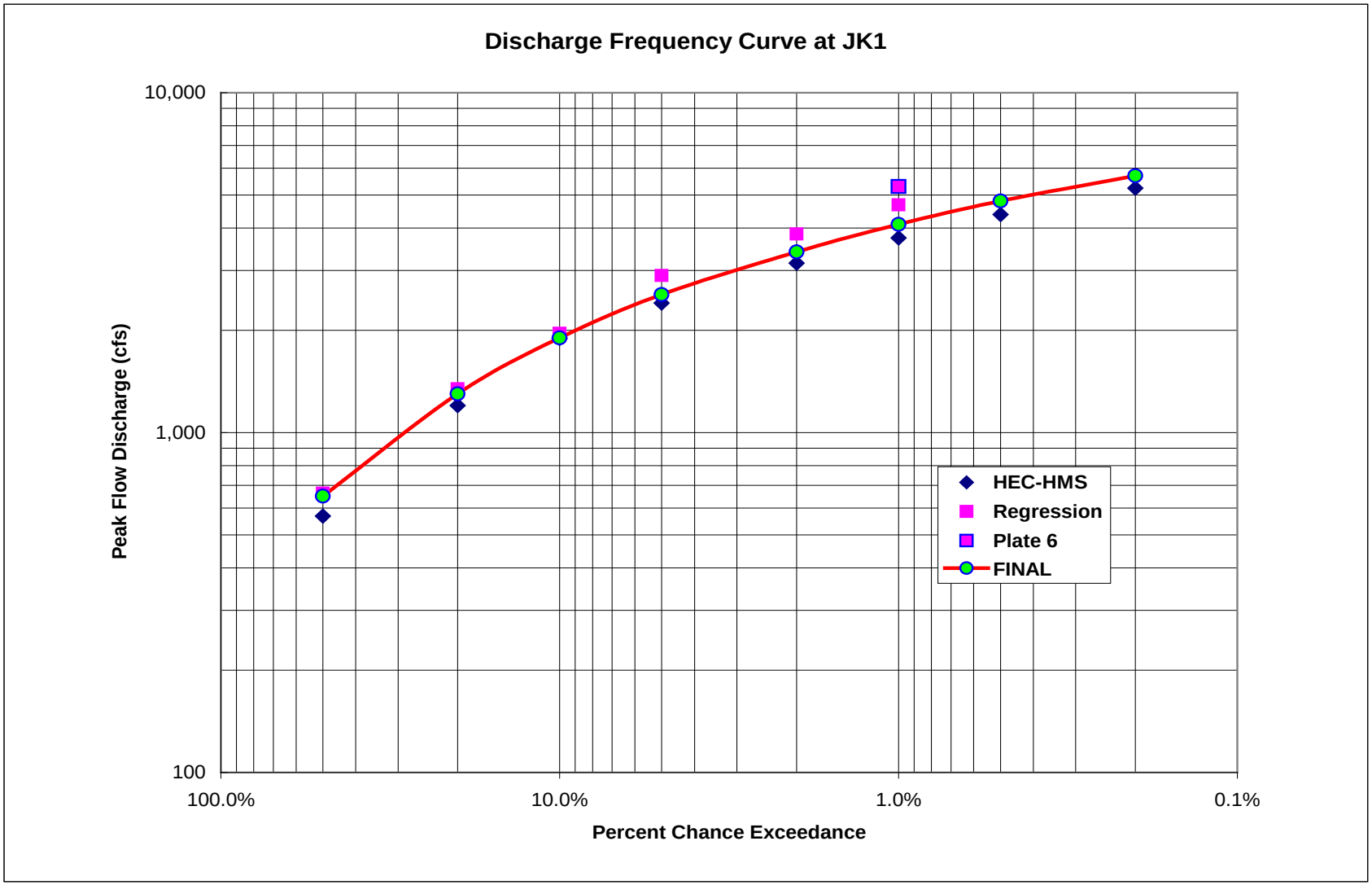

Figure 5-1. Final Discharge Frequency Curve at JK1 (Confluence of Makiki and Kanahā Streams)

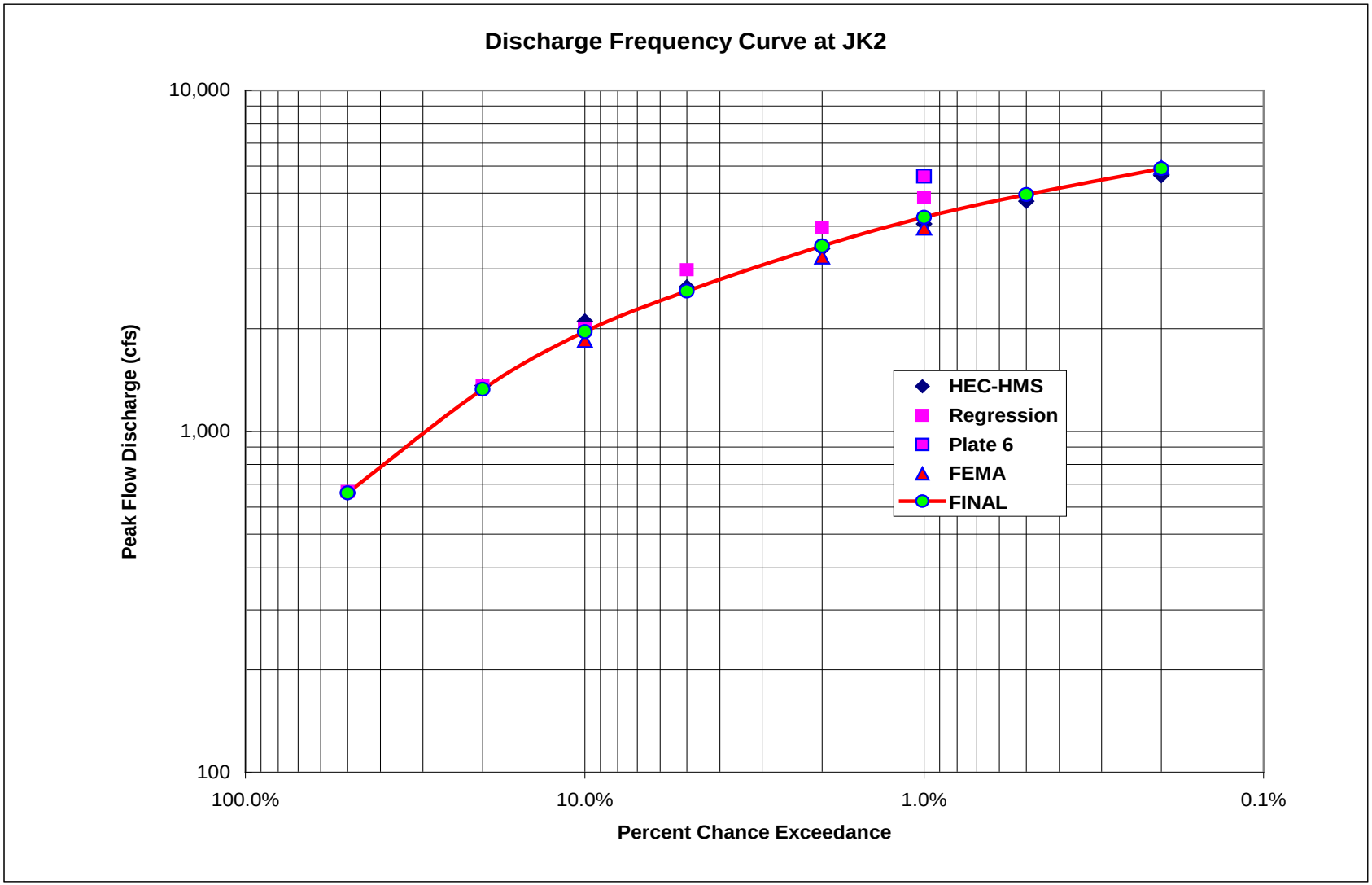

Figure 5-2. Final Discharge Frequency Curve at JK2 (USGS Stream Gage [16238000])

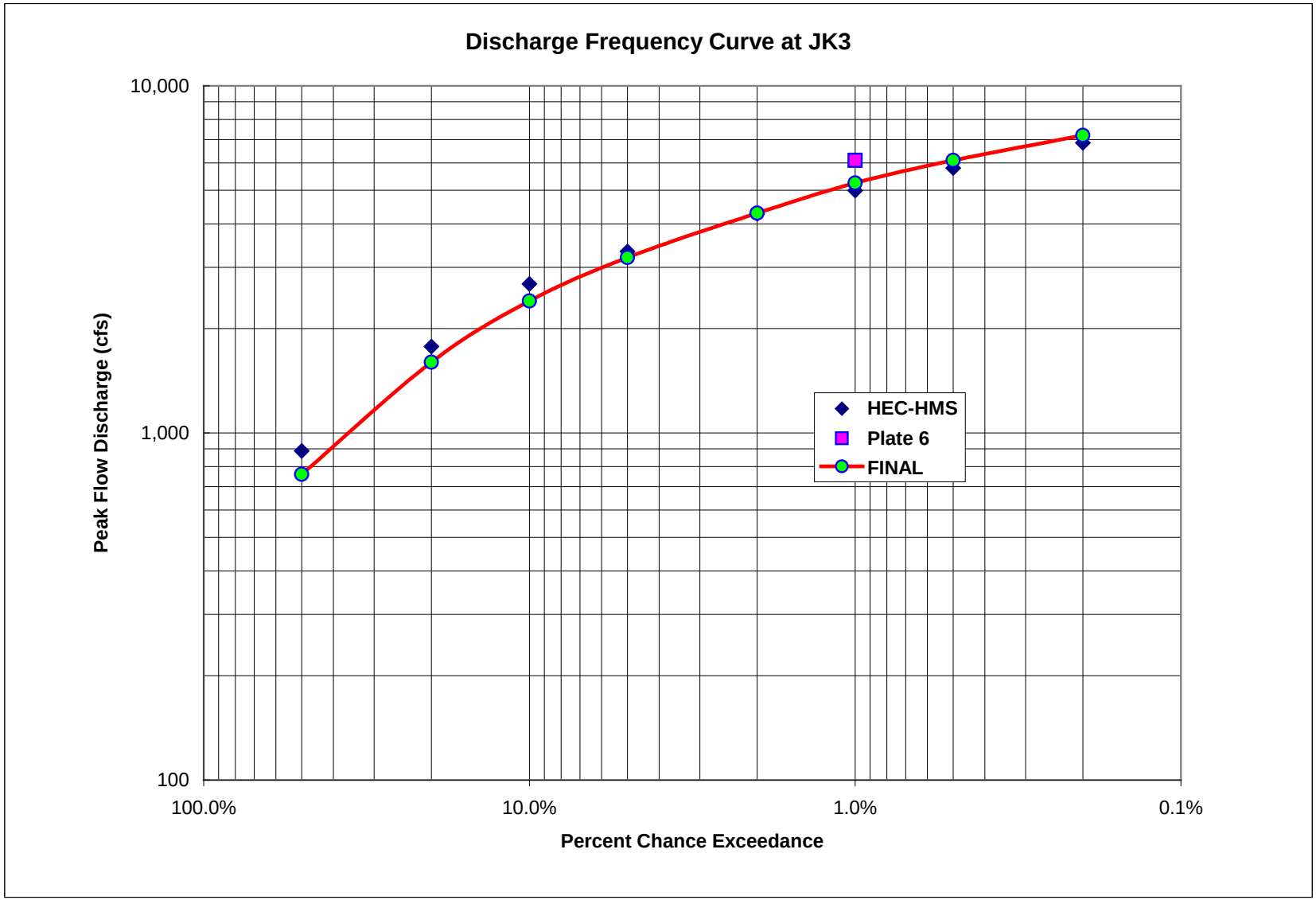

Figure 5-3. Final Discharge Frequency Curve at JK3 (Confluence of Makiki Stream and Ala Wai Canal)

5.3 Mānoa Peak Flow Discharges

Peak flow discharges for the Mānoa sub-watershed were determined in a previous study, and these values were used for the current study. The HEC-HMS peak flow discharges calculated in the Mānoa Watershed Project hydrology report (Oceanit 2008b) at the junction just upstream of the confluence of the Mānoa and Pālolo Streams (JM8) were used. This junction, JM8, is where flow exits the Mānoa sub-watershed, and thus this peak discharge value accounts for all the runoff exiting the Mānoa sub-watershed. Table 5-3 provides the peak flow discharge results by methodology and the 'FINAL' values. The final peak flow discharges from this study are plotted in Figure 5-4.

Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
JM8 (Right above Confluence of Manoa and Palolo Streams, A=5.972 mi^2)								
HEC-HMS	2,560	4,450	6,210	7,860	9,810	11,100	12,400	14,500
Regression	1,660	3,100	4,330	6,120	7,870	9,330		
Plate 6						11,000		
FEMA			7,600		11,500	13,600		17,000
Weighted	2,180	3,870	6,060	7,110	9,730	11,200	12,400	15,600
FINAL	**2,600**	**4,450**	**6,150**	**7,800**	**9,700**	**11,000**	**12,400**	**14,400**

Table 5-3. Peak Flow Discharges at Mānoa Junctions by Methodology

The junction that is just upstream of the confluence of the Mānoa and Pālolo streams (JM8) receives the highest amount of peak flow discharge in the Mānoa sub-watershed. Figure 5-4 illustrates the peak flow discharge results at the Mānoa junctions of interest.

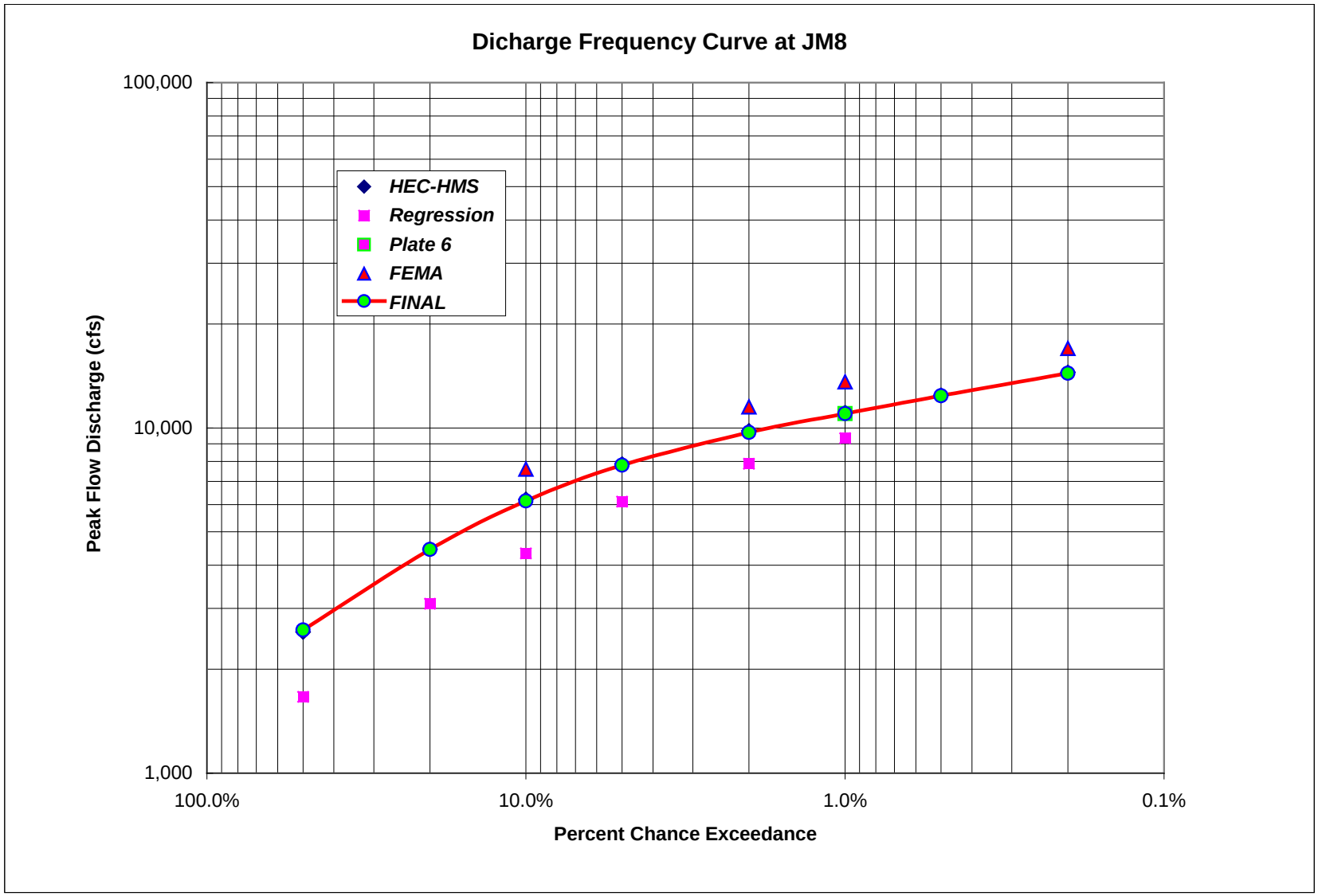

Figure 5-4. Final Discharge Frequency Curve at Junction JM8 (Upstream of the Confluence of Mānoa & Pālolo Streams)

5.4 Pālolo Peak Flow Discharges

Pālolo peak flow discharges at junctions of interest were determined through the process described in Section 5.1. Table 5-4 provides peak flow discharge results for the sub-watershed by methodology and weighted followed by 'FINAL' values.

Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
JP1 (Pukele Stream Gage 16244000, A= 1.146 mi²)								
HEC-HMS	320	730	1,150	1,460	1,900	2,220	2,590	3,110
Regression	650	1,160	1,580	2,200	2,810	3,320		
Plate 6						3,400		
HEC-SSP	420	810	1,150	1,530	2,110	2,620	3,190	4,050
Weighted	440	850	1,220	1,620	2,180	2,720	3,040	3,810
FINAL	**400**	**800**	**1,150**	**1,550**	**2,100**	**2,500**	**2,900**	**3,400**
JP2 (Confluence of Pukele and Waiomao Streams, A=2.938 mi²)								
HEC-HMS	940	2,030	3,190	4,010	5,180	6,040	6,980	8,320
Regression	1,035	1,930	2,700	3,828	4,940	5,880		
Plate 6						6,200		
Weighted	980	1,990	2,980	3,930	5,080	6,020	6,980	8,320
FINAL	**950**	**1,850**	**2,700**	**3,650**	**4,900**	**5,900**	**6,900**	**8,000**
JP3 (Palolo Stream Gage 16247000, A=3.62 mi²)								
HEC-HMS	1,330	2,710	4,170	5,180	6,620	7,670	8,850	10,500
Regression	1,040	2,020	2,870	4,150	5,410	6,500		
Plate 6						7,700		
FEMA			2,790		4,510	5,340		7,530
HEC-SSP	1,210	2,090	2,780	3,510	4,580	5,470	6,430	7,820
Weighted	1,210	2,260	3,100	4,150	5,140	6,240	7,360	8,410
FINAL	**1,200**	**2,100**	**3,000**	**4,000**	**5,500**	**6,500**	**7,500**	**8,600**
JP4 (Right above the confluence of Manoa and Palolo Streams, A= 4.065 mi²)								
HEC-HMS	1,550	3,120	4,720	5,810	7,400	8,550	9,860	11,600
Regression	1,040	2,060	2,970	4,330	5,690	6,860		
Plate 6						8,100		
Weighted	1,330	2,660	3,970	5,180	6,660	7,870	9,860	11,600
FINAL	**1,250**	**2,200**	**3,100**	**4,200**	**5,700**	**6,900**	**7,900**	**9,100**

Table 5-4. Peak Flow Discharges at Pālolo Junctions by Methodology

The junction that is just upstream the confluence of the Mānoa and Pālolo streams (JP4) receives the highest amount of peak flow discharge in the Pālolo sub-watershed, as it is situated at the downstream (*makai*) end of the watershed and drainage system. In the Pālolo sub-watershed, at the Pūkele Stream gage junction (JP1), the regression method calculates higher flow discharge values than other methods, and the HEC-HMS model seems to underestimate the peak flow discharges for many of the storms under study; the discharge frequency curve fit closely mirrors the findings of the

HEC-SSP analysis which applied 59 historical annual peaks. However, at the next junction downstream, the confluence of the Pūkele and Waiʻōmaʻo Streams (JP2), all the methodologies used provide similar peak flow discharge values. The HEC-SSP analysis was not used for this junction. The discharge frequency curve for the junction at the Pālolo Stream gage (JP3) seems to be higher than HEC-SSP findings at lower exceedance probabilities, this is probably due to the shorter historical annual peak records and the incontinuous and incorrect records. Downstream at the junction just upstream of the confluence of the Mānoa and Pālolo Stream (JP4), the frequency curve fit is close to the low regression equation values. All of these results are illustrated by junction for the Pālolo sub-watershed in Figures 5-5 through 5-8. These figures graph the peak flow discharge by method over the percent chance exceedance storm.

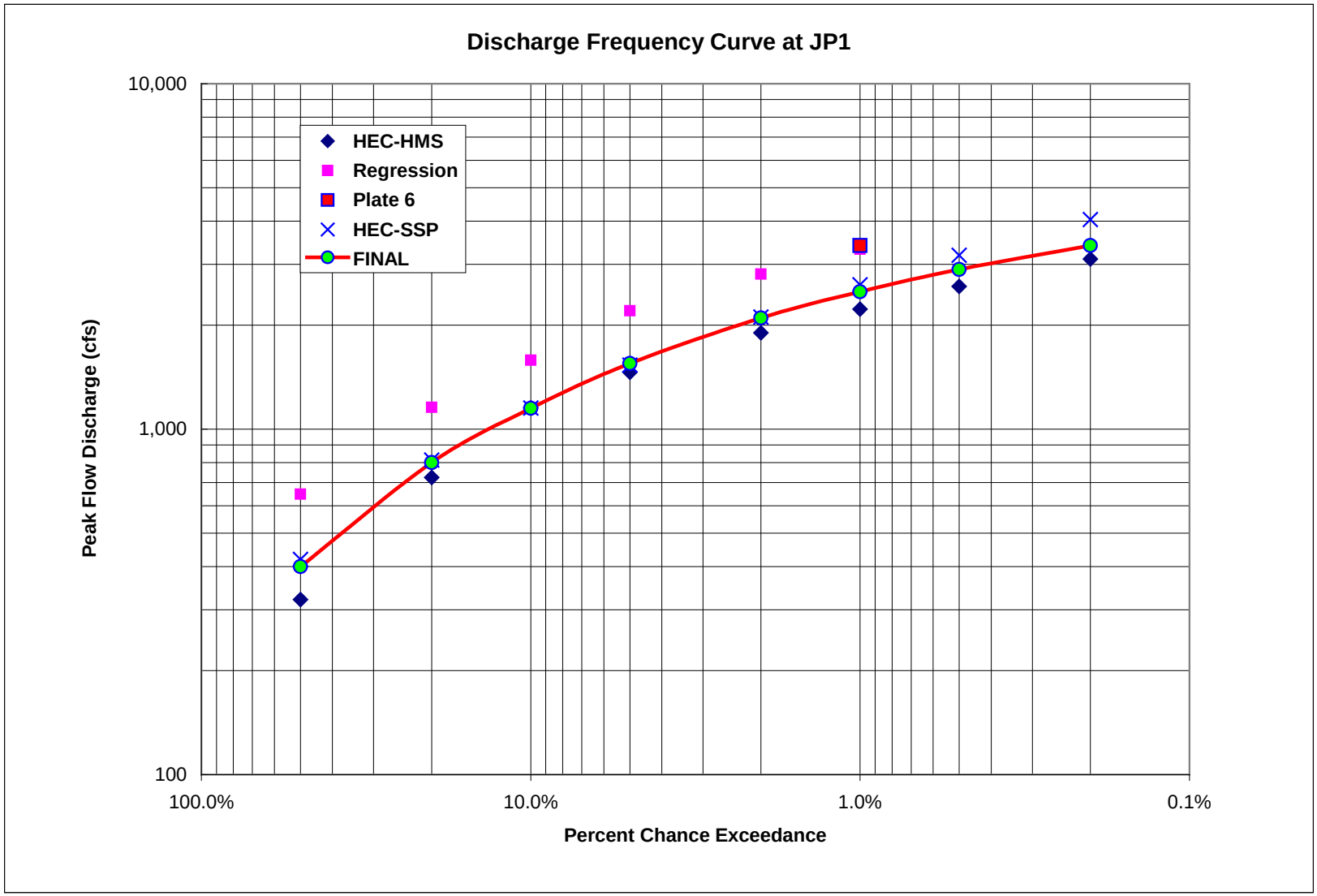

Figure 5-5. Final Discharge Frequency Curve at JP1 (USGS Pūkele Gage [16244000])

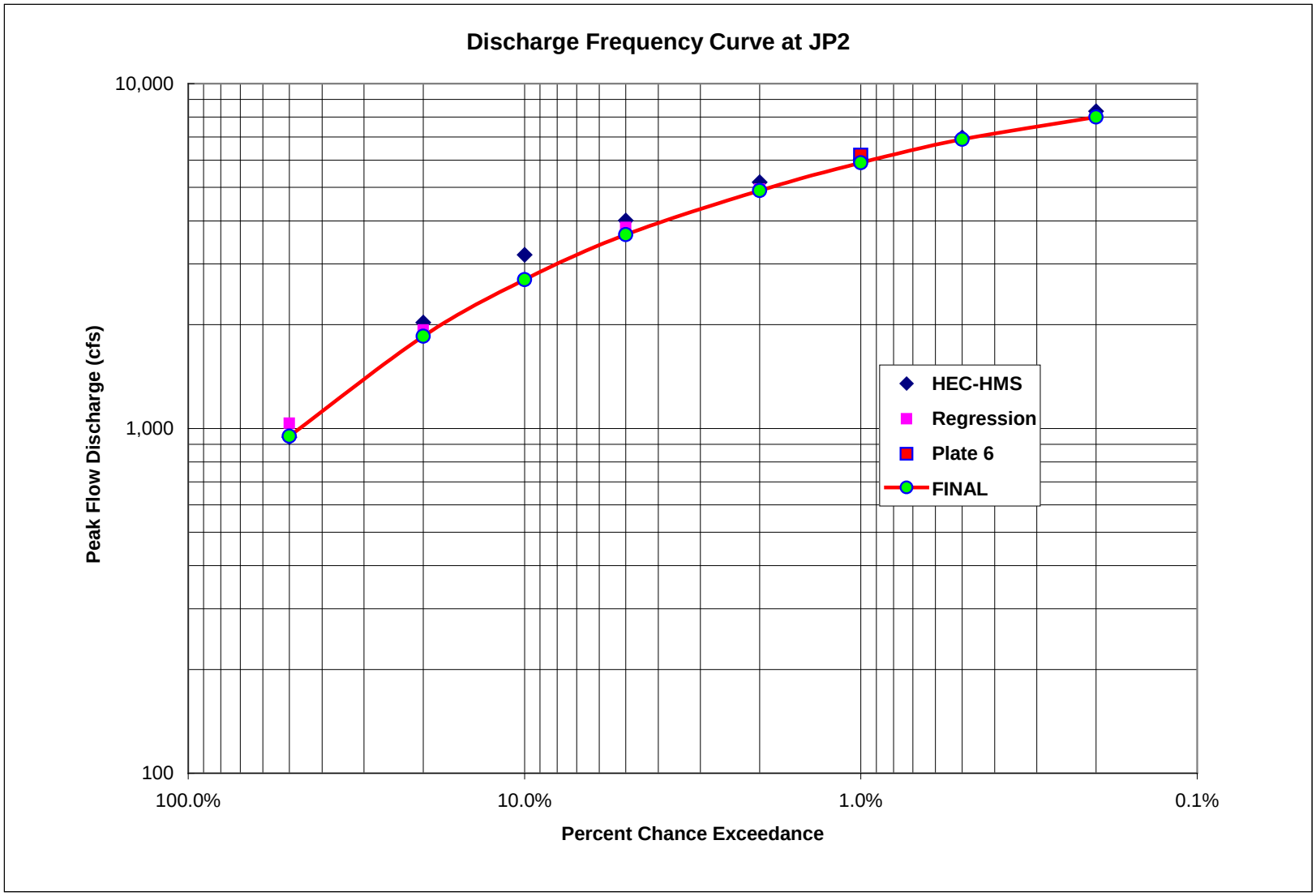

Figure 5-6. Final Discharge Frequency Curve at JP2 (Confluence of Pūkele and Waiʻōmaʻo Streams)

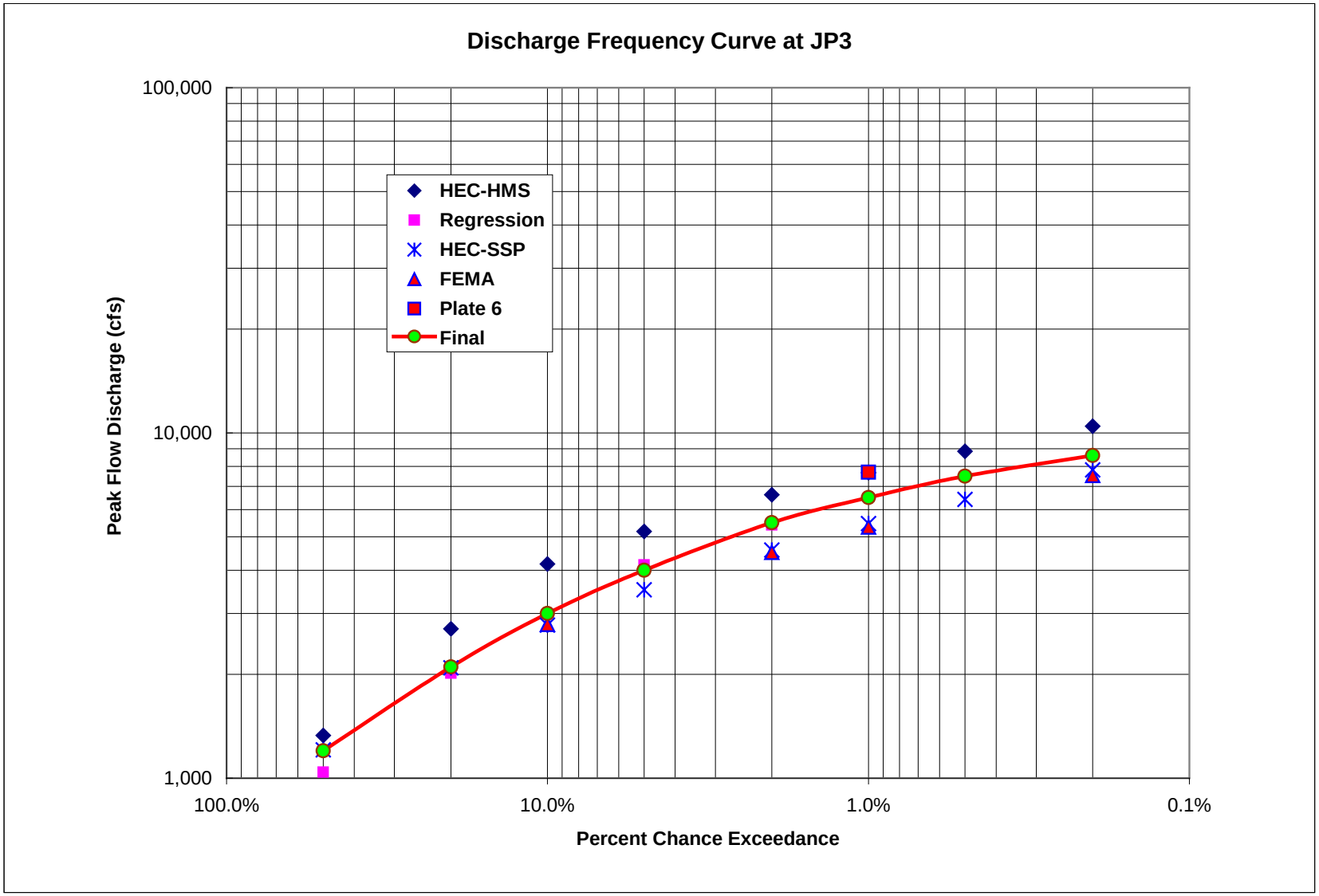

Figure 5-7. Final Discharge Frequency Curve at JP3 (USGS Pālolo Gage [16247000])

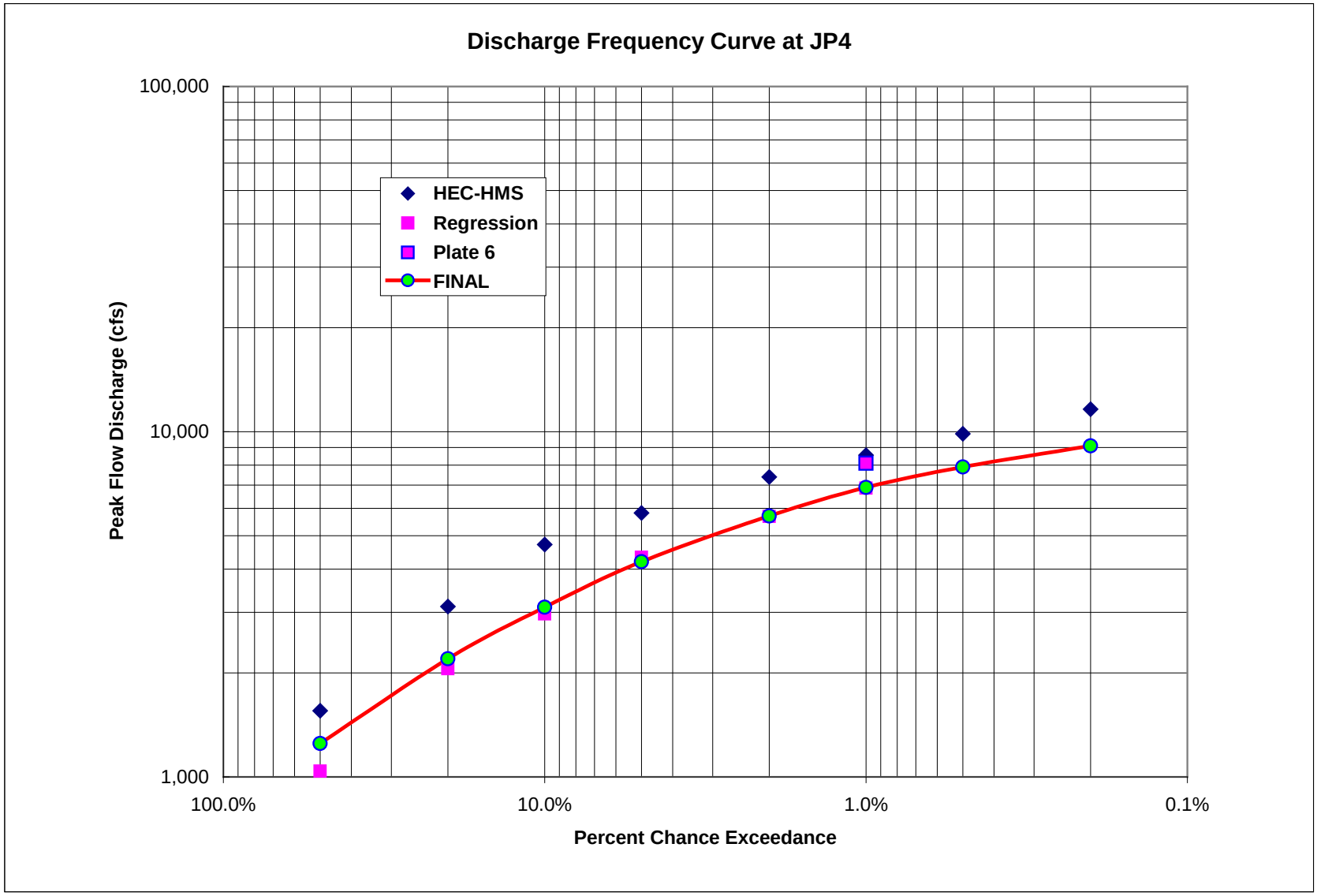

Figure 5-8. Final Discharge Frequency Curve at JP4 (Upstream of the Confluence of Mānoa & Pālolo Streams)

5.5 Mānoa-Pālolo Peak Flow Discharges

Weighting of methodologies were used where peak flow discharges for multiple methodologies were available. Table 5-5 provides peak flow discharge results for the Mānoa-Pālolo Canal by methodology and then as 'FINAL' values through the weighting process described.

Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
JMP1 (Confluence of Manoa and Palolo Streams, A= 10.037 mi²)								
HEC-HMS	4,020	7,170	10,300	12,900	16,100	18,500	20,900	24,400
Regression	2,120	4,060	5,760	8,240	10,700	12,700		
Plate 6						15,500		
Weighted	3,210	5,840	8,360	10,900	13,800	15,800	20,9000	24,400
FINAL	**3,350**	**6,000**	**8,400**	**10,900**	**14,100**	**16,500**	**18,700**	**21,800**
JMP2 (Manoa-Palolo Stream Gage 16247100, A= 10.34 mi²)								
HEC-HMS	4,090	7,340	10,500	13,000	16,300	18,700	21,100	24,700
Regression	2,110	4,080	5,800	8,320	10,800	12,900		
Plate 6						16,000		
FEMA			12,000		19,200	23,000		28,500
HEC-SSP	2,883	5,065	6,800	8,670	11,400	13,700	16,200	19,800
Weighted	3,070	5,520	8,470	9,890	13,900	16,400	18,100	23,200
FINAL	**3,400**	**6,100**	**8,500**	**11,150**	**14,400**	**16,800**	**19,000**	**22,100**
JMP3 (Right above the confluence of Manoa-Palolo and Ala Wai Canals, A=10.678 mi²)								
HEC-HMS	4,220	7,450	10,700	13,300	16,600	18,900	21,400	24,900
Plate 6						16,500		
Weighted	4,220	7,450	10,660	13,260	16,560	18,100	21,400	24,900
FINAL	**3,450**	**6,200**	**8,700**	**11,400**	**14,700**	**17,100**	**19,300**	**22,400**

Table 5-5. Peak Flow Discharges at Mānoa-Pālolo Junctions by Methodology

The junction directly upstream of the confluence of the Mānoa-Pālolo and Ala Wai Canals (JMP3) receives the highest amount of peak flow discharge in the Mānoa-Pālolo Canal sub-watershed. This junction is located at the downstream (*makai*) end of the watershed and drainage system, and so it is not surprising that peak flow discharge would occur at the 'bottom' of the sub-watershed as the water flows down toward sea level. For the Mānoa-Pālolo Canal junctions studied (JMP1 and JMP3), the HEC-HMS modeling results provide higher peak flow discharges than the other methodologies used, particularly the Regression method and HEC-SSP calculation. At junction JMP2 (USGS gage 16247100), the final *best* estimates are lower than HEC-SSP findings but parallel to those values. Noda and Associates (1994) used 24 historical annual peaks to determine the peak flow discharges; their result for 100 year was at 12,429 cfs, whereas in this study, HEC-SSP provided 13,700 cfs. These results are illustrated in the final discharge frequency curves Figures 5-9 through 5-11. These figures show the peak flow discharge by method and junction, and dependent on the percent chance exceedance storm.

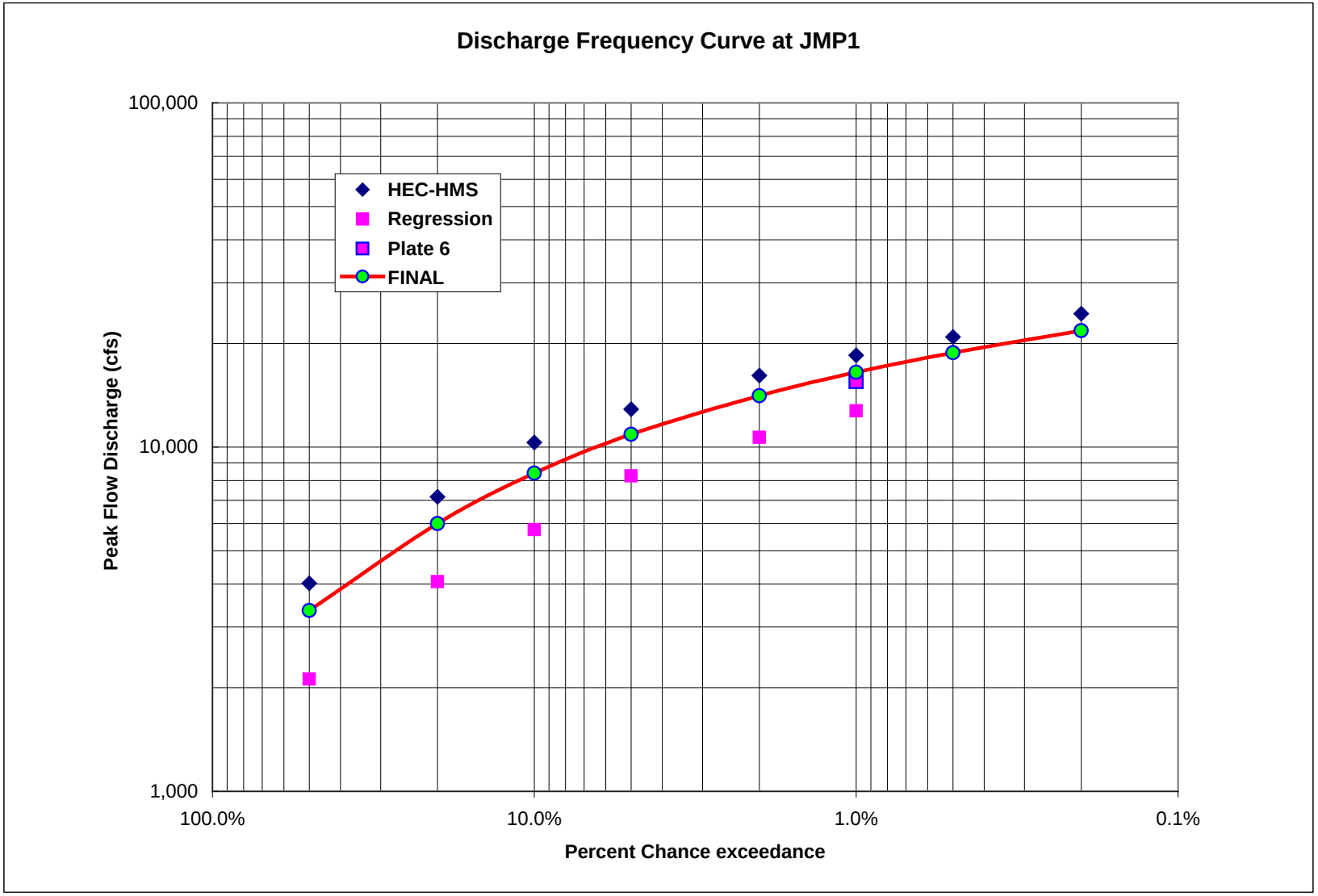

Figure 5-9. Final Discharge Frequency Curve at JMP1 (Confluence of Mānoa & Pālolo Streams)

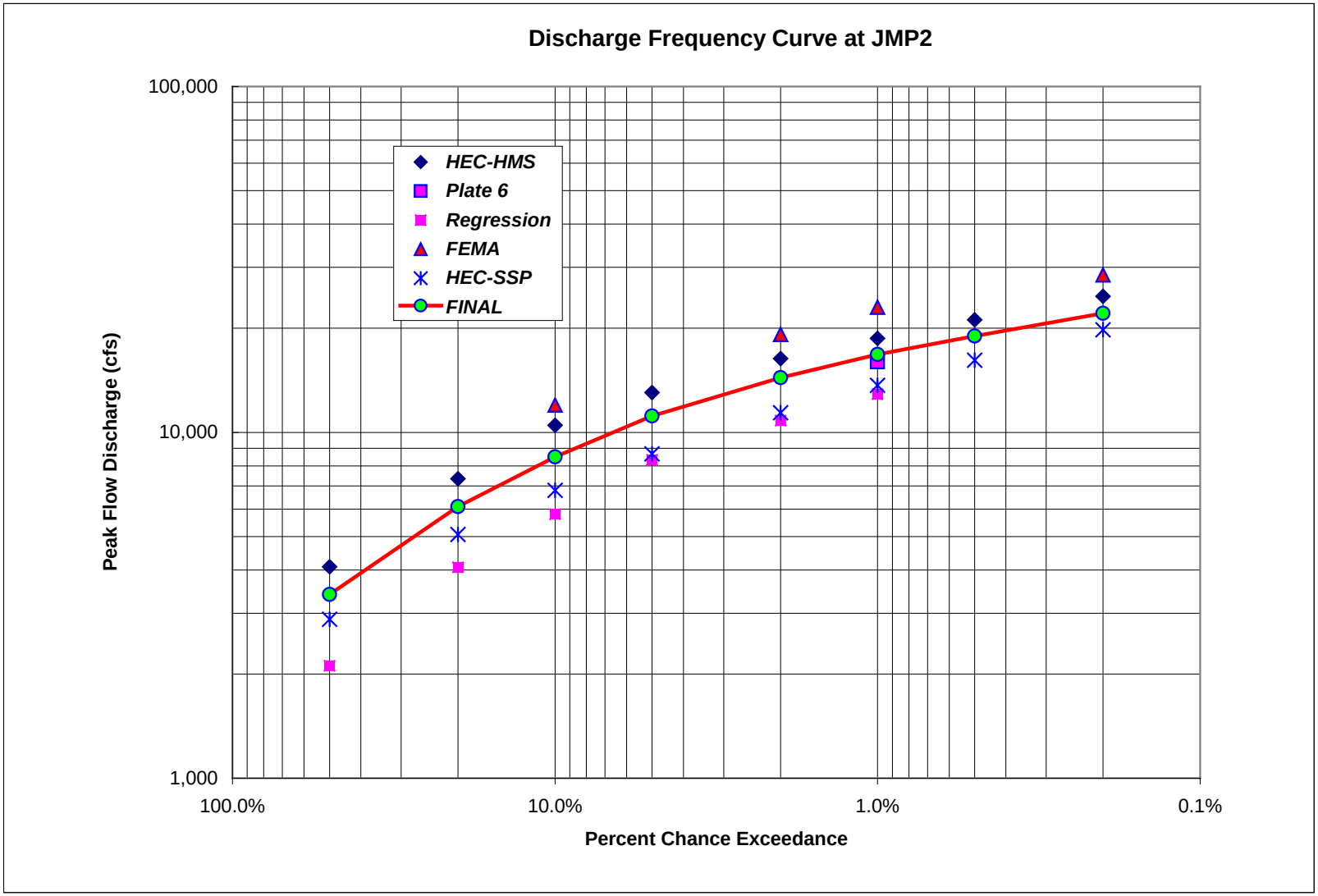

Figure 5-10. Final Discharge Frequency Curve at JMP2 (USGS Stream Gage [16247100])

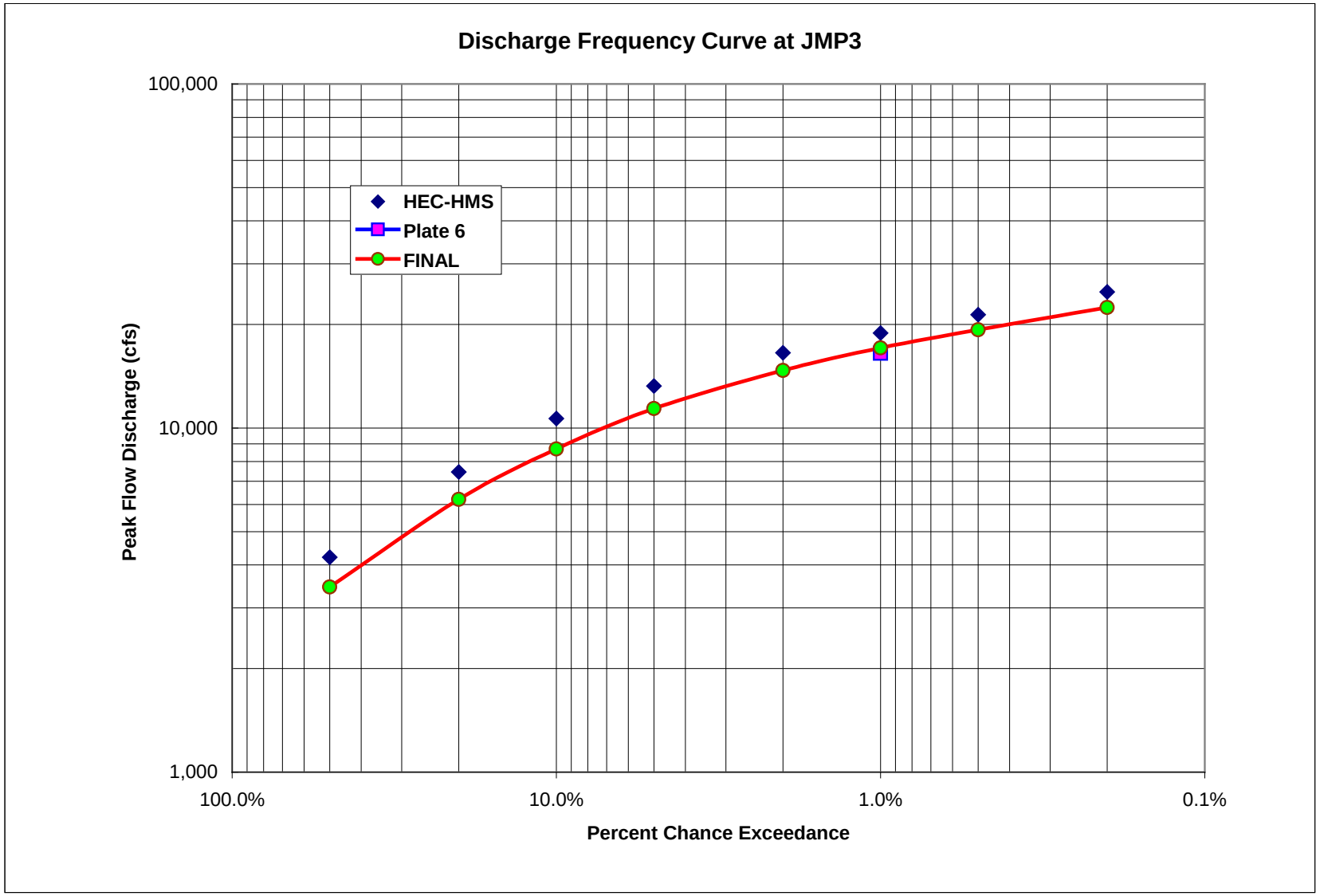

Figure 5-11. Final Discharge Frequency Curve at JMP3 (Confluence of Mānoa -Pālolo and Ala Wai Canals)

5.6 Ala Wai Canal Peak Flow Discharges

As mentioned earlier, Ala Wai Canal was modeled as a reservoir, considering backwater effects caused by the tides due to the sub-watershed location near mean sea level. The reservoir model treated Ala Wai Canal and the adjacent lower area as a detention basin. As the modeled flood wave passes through the reservoir, storage occurs that can greatly reduce the peak flow. The magnitude of this reduction depends on the boundary setting of the modeled reservoir. The storage-elevation function for the Ala Wai Canal reservoir model was determined using bathymetric survey data for the channel and LiDAR data for the surrounding area (Section 4.6.1). No other method accounted for analysis of the surrounding storage area; consequently, the flow peaks determined by other methods are much higher than those determined by the reservoir model. In conclusion, the HEC-HMS results that modeled Ala Wai Canal as a reservoir are considered the most accurate.

Table 5-6 provides peak flow discharge results for Ala Wai Canal sub-watersheds by methodology and then weighted followed by 'FINAL' values through the best fit curve process.

Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.5%**	**0.2%**
Ala Wai Canal (Mouth of Ala Wai Canal, A=16.215 mi^2)								
HEC-HMS	6,000	10,100	13,400	15,200	16,700	17,700	18,700	20,500
Plate 6						22,500		
FEMA			13,700		23,000	28,200		36,200
Weighted	6,000	10,100	13,500	15,200	19,400	22,300	18,700	27,200
FINAL	**6,000**	**9,500**	**12,500**	**15,200**	**17,500**	**18,500**	**19,500**	**20,500**

Table 5-6. Peak Flow Discharges at the Ala Wai Canal Mouth by Methodology

The inflows to Ala Wai Canal increased, whereas the outflow did not increase significantly. For example, at the 50-year frequency storm, inflow was estimated as 24,850 cfs from HEC-HMS model, and the outflow from the Ala Wai Canal was estimated as 16,700 cfs with a peak elevation of 5.4 feet. At the 100-year frequency storm, HMS model shows that inflow was 28,200 cfs, and outflow was 17,700 cfs at a peak elevation at 5.8 feet. The canal will be overtopped at this storm condition and the water will be stored in the adjacent areas. Figure 5-12 shows the peak flow discharge over the percent chance exceedance by methodology at the mouth of the Ala Wai Canal.

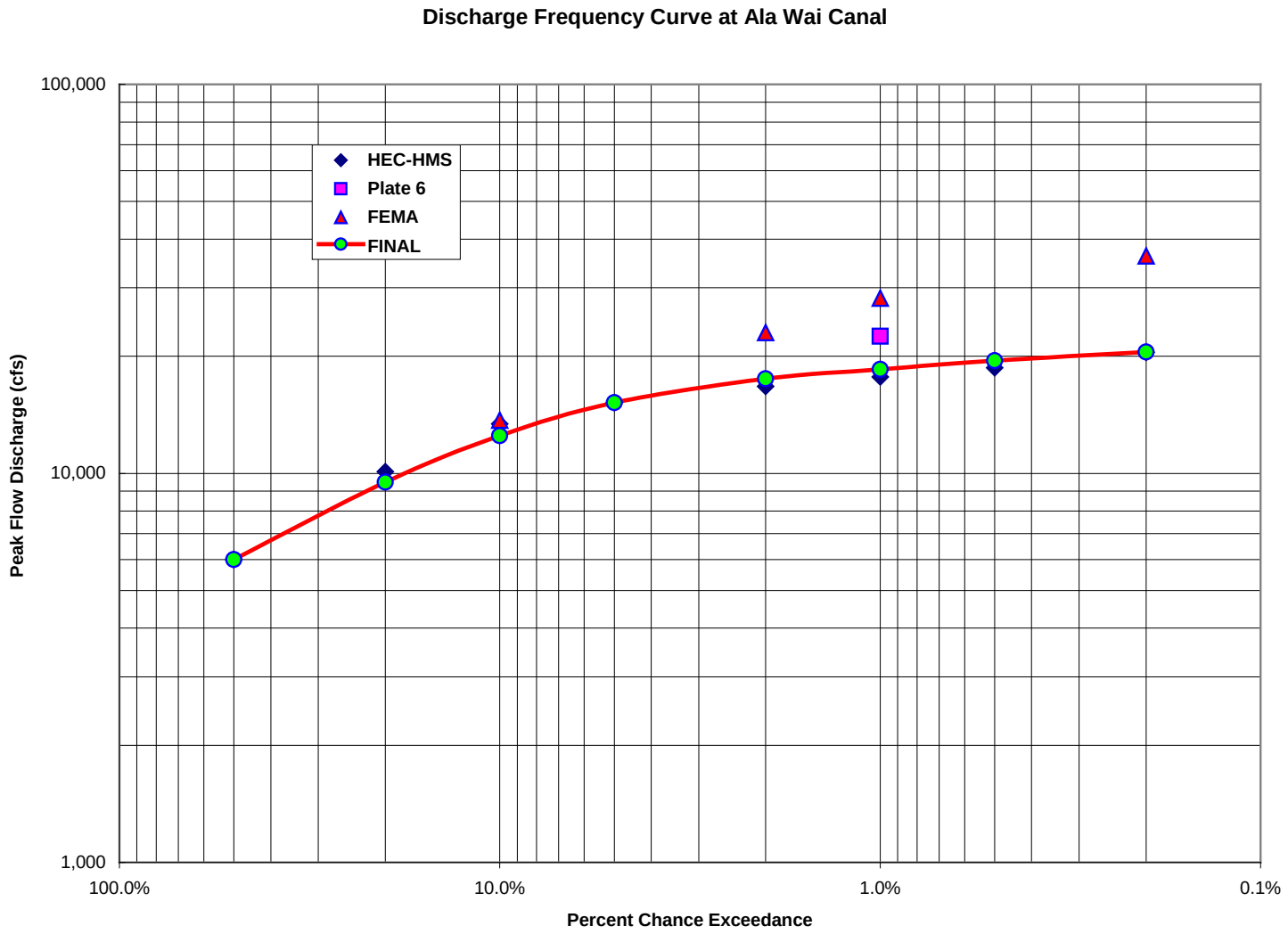

Figure 5-12. Final Discharge Frequency Curve at the Mouth of the Ala Wai Canal

5.7 Peak Flow Discharge Update (March 2016)

As discussed in Hydraulic Appendix, peak flow values were updated and adjusted based on new rainfall-frequency-intensity data and regional regression equations. When the hydrologic studies for Manoa and Ala Wai Watersheds were conducted, the 1984 rainfall frequency data for Oahu was used in the rainfall-runoff modeling (Giambelluca and others, 1984). In March 2009, the updated rainfall frequency data for the State of Hawaii was released as the Precipitation Frequency Data Server (PFDS) which is part of National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 4, Version 2.0, Hawaiian Islands, released March 30, 2009. Atlas 14 is official documentation of precipitation frequency estimates for the United States. Documentation can be found at: http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas14_Volume4.pdf, last accessed September 28, 2009 while the actual; server is located at: http://hdsc.nws.noaa.gov/hdsc/pfds/hi/hi_pfds.html. This tool computes the rainfall frequency and intensity with 90 percent confidence limits for the 1- to 100-year storms for durations from 5 minutes to 60 days. The updated rainfall frequency values are presented in Table 5-7. A comparison between the previous (Table 4-1) and newer NOAA rainfall frequency duration values, indicated that the newer intensity values were higher than the older data by an average of 4 to 13 percent depending on the rainfall recurrence interval and duration. Only the lower rainfall intensity durations at the 50- and 10-percent chance storms showed the Report R-73 values to be consistently higher. In general the 10- and 1-percent (10- and 100-year) rainfall intensities, all durations (5 minutes to 24-hours) were on average higher by 0.04 inches and 0.44 inches. The NOAA values also tended to be higher in general compared to the Report R-73 for the Manoa watershed as well. Manoa watershed values were higher on average by 0.10 inches and 0.62 inches for the 10- and 1-percent chance storms. In general, the shorter frequency time periods had a larger change then the longer rainfall time periods.

The NOAA rainfall frequency duration values were used in the same HEC-HMS model as the Report R-73 rainfall frequency duration values to generate updated peak flow discharges for all frequency storm events. The average percent difference between the newer HEC-HMS peak flow values compared with the older (2008) range varied from minus 7 percent for the Manoa Stream 10-percent chance flood to plus 36 percent for the non-Manoa Stream 50-percent chance floods. In general, the Manoa watershed peak flow values did not show significant changes as the Report R-73 rainfall frequency duration values tended to be higher than the NOAA rainfall frequency duration values for the 20 to 2 percent annual chance exceedence flood events. For the non-Manoa watersheds, the NOAA rainfall frequency duration values generated peak flow values from 7 to 36 percent larger than the Report R-73 rainfall frequency duration values depending on recurrence interval. Results of the updated HEC-HMS model with the prior peak flow computations by junction are presented in Table 5-8. Table 5-8 presents all the prior data in Table 28 from the Manoa Watershed Report (Oceanit, 2008b) and Tables 5-2, 5-3, 5-4, 5-5, and 5-6 of this report. Two methods used in the Manoa Watershed study (Oceanit, 2008b) but not used in this study for the Ala Wai Watershed were the TR-55 method and FLO-2D model.

Also after the hydrologic studies for the Manoa and Ala Wai watersheds were completed, the USGS released newer regional regression equations for the State of Hawaii in 2010 (Oki and others, 2010). The newer regional regression equations for Leeward O'ahu, used the same independent variables, drainage area and mean annual precipitation, as the older 1994 Leeward O'ahu equations (Table 4-

22). Changes were in the independent variable coefficients (Oki and others, 2010, Table 13). The standard error of prediction in percent and coefficient of determination, R^2, were similar among the two sets of equations. The 1994 equations had an average standard error of prediction of 40-percent and R^2 of 0.72. The 2010 equations had an average standard error of predication of 42-percent and an R^2 of 0.75. The 2010 equations, as presented in table 5-9, provided an equation for the 0.2-percent chance flood which the 1994 equations did not. The same independent variables used with the 1994 equators were used in the 2010 equations and these results by junction are presented in Table 5-8. Note that at junctions JK3 and JMP3, the 2008 analysis did not compute regression equation results so these were added to the update in Table 5-8. Also note that the regional regression equations are provided for the 4-percent chance (25-year) flood but presented here in the various tables as the 5-perecnt chance (20-year) flood. For use of these regression equations, the two recurrence intervals were considered sufficiently close for comparison purposes in this report. Peak flow discharge values from using the 2010 regression equations resulted in values all lower than values derived from the 1994 regression equations.

Percent Chance Exceedance	Return Period (years)	Depth (inches) for Specified Duration								
		5-min	15-min	30-min	1-hour	2-hours	3-hours	6-hours	12-hours	24-hours
99	1	0.38	0.66	0.97	1.40	1.87	2.12	2.74	3.35	3.92
50	2	0.47	0.80	1.19	1.72	2.33	2.71	3.49	4.29	5.18
20	5	0.61	1.04	1.54	2.22	3.04	3.54	4.58	5.68	6.96
10	10	0.72	1.24	1.83	2.64	3.61	4.21	5.46	6.80	8.39
5	20	0.81	1.49	2.11	3.05	4.15	4.94	6.28	8.00	9.95
4	25	0.89	1.52	2.25	3.24	4.42	5.16	6.69	8.36	10.42
2	50	1.02	1.75	2.59	3.74	5.09	5.94	7.69	9.61	12.05
1	100	1.16	1.99	2.95	4.25	5.78	6.74	8.74	10.92	13.77
0.5	200	1.31	2.25	3.34	4.82	6.53	7.61	9.86	12.30	15.60
0.2	500	1.53	2.62	3.88	5.61	7.57	8.82	11.42	14.23	18.18

Rainfall Intensity Frequency data determined from NOAA Atlas 14 Precipitation Frequency Data Server using watershed centroid of 21.3092 N, 157.8071 W. Values for the 5-percent chance storm are interpolated.

Revision of data in Table 4-1

Table 5-7. Updated Rainfall Intensity Frequency Data for the Ala Wai Watershed, Oahu, Hawaii

As part of the update, the same weighting equations and factors (Table 5-1) were used with both the HEC-HMS computations with the NOAA rainfall frequency duration values and the USGS 2010 equation values along with prior Plate 6, FEMA, and HEC-SSP results were applicable, to provided new weighted results (Table 5-8). These newer results along with the prior computed peak flow estimates were used to determine new peak flow estimates. In many cases, for Manoa and Palolo Streams, only the rarer 0.5-percent and 0.2-perecent chance flood were revised by increasing the peak flow values. In other cases at Makiki Stream and the Ala Wai Canal, all flood frequency events were increased from the prior 2008 computed values (Table 5-8).

The updated adjusted peak discharge values by junction are listed in Table 5-8 with all computed values and more succinctly with just the final determined values in Table 5-10. As discussed prior in Section 5.1, the final determination of the peak flow discharges was based upon engineering judgment incorporating both the weighted equation values and the graphical adjustments. These values were then adjusted by location, as described in the Hydraulic Appendix for use in the HEC-RAS model. The uncertainty of the peak flow discharge values, as discussed in Section 5.1, is based on the equivalent years of record. The final equivalent years of record (EYOR) used in the risk and uncertainty HEC-FDA model is based on stream reach and is presented in Table 5-11. The Makiki Watershed with the least amount of available data was given the lowest EYOR of 18 years, while the remaining sub-watersheds were assigned values from 25 to 30 years. The highest values were from sub-basins where the peak flow discharges were almost entirely based on gaged data; Pukele and Waiomao Streams. The assigned EYOR is based on the overall confidence in the reliability or accuracy of the peak flow discharge estimates and as applied in HEC-FDA constrains the confidence limits of the sampling of peak flow discharge estimates. The HEC-FDA analytical frequency curve data is initial values and may be changed as part of the hydraulic and economic modeling efforts as described in the hydraulic and economic appendices. The analytical curve frequency values in Table 5-11 were determined from the final output discharges computed by HEC-RAS for the intermediate sea-level rise scenario (Appendix A2 and Appendix A3) and methodology in Bulletin 17B, Appendix 5 (Interagency Advisory Committee on Water Data, 1982) to match HEC-RAS input data into HEC-FDA. Actual use of analytical frequency curve values versus graphical curve values is discussed in the Economic Appendix.

Table 5-8: Peak Flow Discharge Values Update								
Methodology	**Peak Flow Discharge (cfs)**							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.50%**	**0.20%**
JM1 (confluence of Waihī and Waiakeakua Streams, A=2.27 mi²)								
TR-55	1,270	2,040	2,580	3,170	3,820	4,270	4,800	5,590
HEC-HMS (R-73)	*1,120*	*2,140*	*2,870*	*3,570*	*4,340*	*5,010*	*5,610*	*6,600*
HEC-HMS (Atlas 14)	*1,270*	*2,000*	*2,630*	*3,340*	*4,340*	*5,160*	*6,060*	*7,330*
FLO-2D	1,260	2,920	3,800	4,740	6,010	6,950	7,670	8,800
Regression (1994)	1,010	1,800	2,470	3,430	4,380	5,160	---	---
Regression (2010)	*780*	*1,460*	*2,080*	*2,900*	*3,640*	*4,460*	---	*6,820*
Plate 6	---	---	---	---	---	5,400	---	---
FEMA	---	---	3,750	---	5,600	6,500	---	8,100
Weighted (2008)	1,160	2,240	3,130	3,780	4,900	5,630	6,180	7,430
Weighted (2016)	*1,130*	*2,110*	*3,000*	*3,570*	*4,740*	*5,520*	*6,350*	*7,450*
FINAL (2008)	1,200	2,000	2,800	3,600	4,600	5,400	6,100	6,900
FINAL (2016)	**1,200**	**2,000**	**2,800**	**3,600**	**4,600**	**5,500**	**6,200**	**7,400**
JM2 (confluence of Mānoa Stream and Woodlawn Ditch, A=3.81 mi²)								
TR-55	2,210	3,500	4,410	5,410	6,500	7,260	8,140	9,470
HEC-HMS (R-73)	1,870	3,590	4,800	5,960	7,210	8,320	9,280	10,900
HEC-HMS (Atlas 14)	*2,140*	*3,350*	*4,400*	*5,540*	*7,200*	*8,530*	*9,980*	*12,100*
FLO-2D	1,730	3,670	5,040	6,330	7,920	8,710	9,100	9,800
Regression (1994)	1,490	2,630	3,580	4,930	6,250	7,320	---	---
Regression (2010)	*1,190*	*2,170*	*3,050*	*4,210*	*5,230*	*6,360*	---	*9700*
Plate 6	---	---	---	---	---	7,800	---	---
FEMA	---	---	5,500	---	8,400	9,800	---	12,100
Weighted (2008)	1,790	3,330	4,680	5,680	7,310	8,270	8,930	10,670
Weighted (2016)	*1,780*	*3,140*	*4,490*	*5,370*	*7,090*	*8,120*	*9,190*	*10,700*
FINAL (2008)	1,700	3,200	4,600	5,700	7,150	8,150	9,000	10,300
FINAL	**1,700**	**3,200**	**4,600**	**5,700**	**7,150**	**8,200**	**9,000**	**10,500**
JM3 (Lowrey Avenue Bridge, A=4.22 mi²)								
TR-55	2,500	3,930	4,940	6,040	7,260	8,100	9,070	10,500
HEC-HMS (R-73)	2,110	3,990	5,330	6,620	8,010	9,230	10,300	12,100
HEC-HMS (Atlas 14)	*2,310*	*3,640*	*4,790*	*6,040*	*7,840*	*9,290*	*10,900*	*13,100*
FLO-2D	1,820	3,610	4,760	5,930	7,190	7,330	7,540	10,200
Regression (1994)	1,560	2,770	3,780	5,220	6,630	7,780	---	---
Regression (2010)	*1,250*	*2,290*	*3,200*	*4,460*	*5,550*	*6,750*	---	*10400*
Plate 6	---	---	---	---	---	8,400	---	---
FEMA	---	---	5,700	---	9,000	10,500	---	13,000
Weighted (2008)	1,950	3,540	4,900	5,940	7,640	8,580	8,960	11,540
Weighted (2016)	*1,920*	*3,320*	*4,660*	*5,580*	*7,380*	*8,390*	*9,180*	*11,500*
FINAL (2008)	1,900	3,500	4,800	6,000	7,350	8,350	9,300	10,800
FINAL	**1,900**	**3,500**	**4,800**	**6,000**	**7,400**	**8,350**	**9,300**	**11,000**
JM4 (Woodlawn Drive Bridge, A=4.49 mi²)								
TR-55	2,690	4,220	5,290	6,470	7,750	8,640	9,680	11,200
HEC-HMS (R-73)	2,270	4,270	5,700	7,020	8,410	9,790	10,900	12,800
HEC-HMS (Atlas 14)	*2,500*	*3,880*	*5,090*	*6,380*	*8,320*	*9,780*	*11,500*	*13,900*
FLO-2D	2,000	4,060	4,760	6,730	7,900	8,020	8,550	11,300
Regression (1994)	1,580	2,830	3,880	5,380	6,850	8,040	---	---
Regression (2010)	*1,280*	*2,350*	*3,310*	*4,590*	*5,720*	*6,980*	---	*10,700*
Plate 6	---	---	---	---	---	8,900	---	---
FEMA	---	---	6,000	---	9,400	11,000	---	13,700
Weighted (2008)	2,080	3,810	5,110	6,390	8,080	9,090	9,710	12,350
Weighted (2016)	*2,070*	*3,570*	*4,860*	*6,000*	*782*	*8,880*	*9,940*	*12,200*
FINAL (2008)	2,000	3,700	5,000	6,300	7,700	8,700	9,800	11,600
~~**FINAL**~~	~~**2,000**~~	~~**3,700**~~	~~**5,000**~~	~~**6,300**~~	~~**7,700**~~	~~**8,800**~~	~~**9,900**~~	~~**11,700**~~

Table 5-8: Peak Flow Discharge Values Update -- Continued								
Methodology	Peak Flow Discharge (cfs)							
Return Period (yr)	2	5	10	20	50	100	200	500
Percent Chance Exceedance	50%	20%	10%	5%	2%	1%	0.50%	0.20%
JM5 (Noelani Bend, A=4.68 mi^2)								
TR-55	2,830	4,420	5,540	6,760	8,110	9,030	10,100	11,700
HEC-HMS (R-73)	2,370	4,440	5,940	7,310	8,800	10,200	11,300	13,400
HEC-HMS (Atlas 14)	*2,620*	*4,050*	*5,320*	*6,680*	*8,710*	*10,210*	*12,000*	*14,500*
FLO-2D	2,060	4,190	5,850	7,480	8,900	9,500	9,890	14,400
Regression (1994)	1,600	2,880	3,950	5,490	6,990	8,220	---	---
Regression (2010)	*1,290*	*2,380*	*3,370*	*4,680*	*5,840*	*7,130*	---	*11,000*
Plate 6	---	---	---	---	---	9,100	---	---
FEMA	---	---	6,200	---	9,700	11,400	---	14,200
Weighted (2008)	2,160	3,940	5,490	6,760	8,530	9,620	10,470	13,580
Weighted (2016)	*2,140*	*3,700*	*5,240*	*6,370*	*8,260*	*9,410*	*10,700*	*13,300*
FINAL (2008)	2,100	3,800	5,200	6,700	8,200	9,350	10,500	12,000
FINAL	**2,100**	**3,800**	**5,200**	**6,700**	**8,200**	**9,400**	**10,600**	**12,400**
JM6 (Dole Street Bridge, A=5.35 mi^2)								
TR-55	3,280	5,110	6,390	7,790	9,320	10,400	11,600	13,500
HEC-HMS (R-73)	2,780	5,140	6,860	8,390	10,200	11,700	13,100	15,400
HEC-HMS (Atlas 14)	*3,070*	*4,710*	*6,160*	*7,660*	*10,000*	*11,760*	*13,800*	*16,700*
FLO-2D	2,060	4,260	5,990	7,860	9,000	9,520	9,970	14,500
Regression (1994)	1,640	3,000	4,160	5,830	8,870	8,820	---	---
Regression (2010)	*1,330*	*2,490*	*3,550*	*5,000*	*6,230*	*7,630*	---	*11,900*
Plate 6	---	---	---	---	---	10,000	---	---
FEMA	---	---	6,700	---	10,500	12,500	---	15,600
Weighted (2008)	2,430	4,270	5,930	7,260	9,600	10,610	12,090	14,510
Weighted (2016)	*2,360*	*4,060*	*5,710*	*7,010*	*8,990*	*10,300*	*11,800*	*14,500*
FINAL (2008)	2,300	4,100	5,700	7,200	9,000	10,100	11,400	13,200
FINAL	**2,300**	**4,100**	**5,700**	**7,200**	**9,000**	**10,200**	**11,800**	**13,600**
JM7 (Kānewai Field Gage, A=5.64 mi^2)								
TR-55	3,450	5,380	6,730	8,210	9,830	10,900	12,200	14,200
HEC-HMS (R-73)	2,920	5,410	7,190	8,820	10,700	12,300	13,700	16,200
HEC-HMS (Atlas 14)	*3,220*	*4,930*	*6,470*	*8,040*	*10,500*	*12,300*	*14,400*	*17,500*
FLO-2D	2,120	4,380	6,090	7,900	9,000	9,610	10,100	14,900
Regression (1994)	1,660	3,050	4,250	5,980	7,670	9,070	---	---
Regression (2010)	*1,340*	*2,530*	*3,620*	*5,090*	*6,390*	*7,840*	---	*12,300*
Plate 6	---	---	---	---	---	10,200	---	---
FEMA	---	---	6,900	---	10,900	12,900	---	16,100
Weighted (2008)	2,450	4,480	6,200	7,680	9,610	10,840	11,980	15,450
Weighted (2016)	*2,500*	*4,210*	*5,910*	*7,230*	*9,300*	*10,600*	*12,200*	*15,100*
FINAL (2008)	2,500	4,300	6,000	7,600	9,500	10,700	12,000	14,000
FINAL	**2,500**	**4,300**	**6,000**	**7,600**	**9,500**	**10,700**	**12,100**	**14,500**
JM8 (Right above Confluence of Manoa and Palolo Streams, A=5.97 mi^2)								
HEC-HMS (R-73)	2,560	4,450	6,210	7,860	9,810	11,100	12,400	14,500
HEC-HMS (Atlas 14)	*3,360*	*5,170*	*6,760*	*8,400*	*10,900*	*12,800*	*15,000*	*18,200*
Regression (1994)	1,660	3,100	4,330	6,120	7,870	9,330	---	---
Regression (2010)	*1,350*	*2,570*	*3,690*	*5,200*	*6,550*	*8,050*	---	*12,700*
Plate 6	---	---	---	---	---	11,000	---	---
FEMA	---	---	7,600	---	11,500	13,600	---	17,000
Weighted (2008)	2,180	3,870	6,060	7,110	9,730	11,200	12,400	15,600
Weighted (2016)	*2,440*	*4,110*	*6,100*	*7,240*	*9,660*	*11,200*	*13,300*	*15,400*
FINAL (2008)	2,600	4,450	6,150	7,800	9,700	11,000	12,400	14,400
FINAL	**2,600**	**4,450**	**6,150**	**7,800**	**9,700**	**11,200**	**12,500**	**15,300**

Table 5-8: Peak Flow Discharge Values Update -- Continued								
Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.50%**	**0.20%**
JK1 (Confluence of Makiki and Kanaha Streams, A=2.33 mi^2)								
HEC-HMS (R-73)	570	1,200	1,890	2,400	3,150	3,740	4,380	5,240
HEC-HMS (Atlas 14)	*800*	*1,430*	*1,990*	*2,630*	*3,570*	*4,360*	*5,240*	*6,480*
Regression (1994)	660	1,350	1,960	2,900	3,840	4,680	---	---
Regression (2010)	*510*	*1,070*	*1,610*	*2,400*	*3,120*	*3,960*	---	*6,500*
Plate 6	---	---	---	---	---	5,300	---	---
Weighted (2008)	610	1,260	1,920	2,620	3,450	4,410	4,380	5,240
Weighted (2016)	*680*	*1,280*	*1,830*	*2,530*	*3,380*	*4,190*	---	*6,490*
FINAL (2008)	650	1,300	1,900	2,550	3,400	4,100	4,800	5,700
FINAL	**650**	**1,300**	**1,900**	**2,550**	**3,400**	**4,200**	**4,800**	**6,400**
JK2 (USGS Stream Gage at King St. 16238000, A= 2.49 mi^2)								
HEC-HMS (R-73)	*660*	*1,360*	*2,110*	*2,650*	*3,440*	*4,060*	*4,730*	*5,630*
HEC-HMS (Atlas 14)	*930*	*1,610*	*2,220*	*2,900*	*3,900*	*4,730*	*5,660*	*6,960*
Regression (1994)	*670*	*1,370*	*2,000*	*2,980*	*3,960*	*4,850*	---	---
Regression (2010)	*520*	*1,090*	*1,650*	*2,460*	*3,220*	*4,090*	---	*6,750*
Plate 6	---	---	---	---	---	5,600	---	---
FEMA	---	---	1,850	---	3,250	3,950	---	5,950
Weighted (2008)	660	1,360	2,000	2,790	3,540	4,490	4,730	5,770
Weighted (2016)	750	1,390	1,940	2,710	3,500	4,520	---	6,870
FINAL (2008)	660	1,330	1,960	2,580	3,500	4,250	4,950	5,900
FINAL	**700**	**1,400**	**2,000**	**2,700**	**3,500**	**4,500**	**5,600**	**6,700**
JK3 (Confluence of Makiki Stream and Ala Wai Canal, A=2.89 mi^2)								
HEC-HMS (R-73)	*890*	*1,770*	*2,690*	*3,340*	*4,280*	*5,000*	*5,790*	*6,850*
HEC-HMS (Atlas 14)	*1,220*	*2,110*	*2,930*	*3,710*	*4,890*	*5,870*	*6,910*	*8,430*
Regression (2010)	*540*	*1,150*	*1,750*	*2,640*	*3,470*	*4,420*	---	*7,390*
Plate 6	---	---	---	---	---	6,100	---	---
Weighted (2008)	890	1,770	2,690	3,340	4,280	5,370	5,790	6,850
Weighted (2016)	930	1,700	2,420	3,250	4,280	5,440	---	7,980
FINAL (2008)	760	1,600	2,400	3,200	4,300	5,250	6,100	7,200
FINAL	**900**	**1,700**	**2,600**	**3,300**	**4,500**	**5,700**	**6,800**	**8,000**

Table 5-8: Peak Flow Discharge Values Update -- Continued								
Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.50%**	**0.20%**
JP1 (Pukele Stream Gage 16244000, A= 1.15 mi^2)								
HEC-HMS (R-73)	320	730	1,150	1,460	1,900	2,220	2,590	3,110
HEC-HMS (Atlas 14)	*380*	*770*	*1,130*	*1,520*	*2,080*	*2,530*	*3,060*	*3,780*
Regression (1994)	650	1,160	1,580	2,200	2,810	3,320	---	---
Regression (2010)	*490*	*920*	*1,310*	*1,850*	*2,320*	*2,860*	---	*4,330*
Plate 6	---	---	---	---	---	3,400	---	---
HEC-SSP	420	810	1,150	1,530	2,110	2,620	3,190	4,050
Weighted (2008)	440	850	1,220	1,620	2,180	2,720	3,040	3,810
Weighted (2016)	*420*	*820*	*1,170*	*1,580*	*2,140*	*2,710*	*3,160*	*4,040*
FINAL (2008)	400	800	1,150	1,550	2,100	2,500	2,900	3,400
FINAL	**440**	**820**	**1,200**	**1,600**	**2,100**	**2,700**	**3,000**	**3,900**
JP2 (Confluence of Pukele and Waiomao Streams, A=2.94 mi^2)								
HEC-HMS (R-73)	940	2,030	3,190	4,010	5,180	6,040	6,980	8,320
HEC-HMS (Atlas 14)	*1,300*	*2,350*	*3,300*	*4,350*	*5,800*	*7,000*	*8,320*	*10,100*
Regression (1994)	1,035	1,930	2,700	3,828	4,940	5,880	---	---
Regression (2010)	*810*	*1,570*	*2,270*	*3,220*	*4,090*	*5,050*	---	*7,920*
Plate 6	---	---	---	---	---	6,200	---	---
Weighted (2008)	980	1,990	2,980	3,930	5,080	6,020	6,980	8,320
Weighted (2016)	*1,090*	*2,020*	*2,860*	*3,870*	*5,070*	*6,170*	*8,320*	*9,170*
FINAL (2008)	950	1,850	2,700	3,650	4,900	5,900	6,900	8,000
FINAL	**1000**	**2,000**	**2,900**	**3,900**	**5,100**	**6,100**	**7,600**	**9,200**
JP3 (Palolo Stream Gage 16247000, A=3.62 mi^2)								
HEC-HMS (R-73)	1,330	2,710	4,170	5,180	6,620	7,670	8,850	10,500
HEC-HMS (Atlas 14)	*1,860*	*3,200*	*4,360*	*5,660*	*7,460*	*8,940*	*10,600*	*12,800*
Regression (1994)	1,040	2,020	2,870	4,150	5,410	6,500	---	---
Regression (2010)	*820*	*1,640*	*2,410*	*3,480*	*4,460*	*5,560*	---	*8,930*
Plate 6	---	---	---	---	---	7,700	---	---
FEMA	---	---	2,790	---	4,510	5,340	---	7,530
HEC-SSP	1,210	2,090	2,780	3,510	4,580	5,470	6,430	7,820
Weighted (2008)	1,210	2,260	3,100	4,150	5,140	6,240	7,360	8,410
Weighted (2016)	*1,320*	*2,320*	*3,070*	*4,150*	*5,170*	*6,350*	*8,030*	*10,800*
FINAL (2008)	1,200	2,100	3,000	4,000	5,500	6,500	7,500	8,600
FINAL	**1,200**	**2,200**	**3,100**	**4,100**	**5,500**	**6,600**	**8,000**	**10,000**
JP4 (Right above the confluence of Manoa and Palolo Streams, A= 4.07 mi^2)								
HEC-HMS (R-73)	1,550	3,120	4,720	5,810	7,400	8,550	9,860	11,600
HEC-HMS (Atlas 14)	*2,170*	*3,700*	*4,970*	*6,350*	*8,350*	*9,980*	*11,800*	*14,200*
Regression (1994)	1,040	2,060	2,970	4,330	5,690	6,860	---	---
Regression (2010)	*820*	*1,670*	*2,480*	*3,620*	*4,670*	*5,850*	---	*9,540*
Plate 6	---	---	---	---	---	8,100	---	---
Weighted (2008)	1,330	2,660	3,970	5,180	6,660	7,870	9,860	11,600
Weighted (2016)	*1,590*	*2,830*	*3,900*	*5,180*	*6,770*	*8,190*	*11,800*	*12,200*
FINAL (2008)	1,250	2,200	3,100	4,200	5,700	6,900	7,900	9,100
FINAL	**1,300**	**2,600**	**3,500**	**4,800**	**6,300**	**7,600**	**9,400**	**12,000**

Table 5-8: Peak Flow Discharge Values Update -- Continued								
Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.50%**	**0.20%**
JMP1 (Confluence of Manoa and Palolo Streams, A= 10.04 mi^2)								
HEC-HMS (R-73)	4,020	7,170	10,300	12,900	16,100	18,500	20,900	24,400
HEC-HMS (Atlas 14)	*5,400*	*8,620*	*11,400*	*14,300*	*18,600*	*21,900*	*25,700*	*31,200*
Regression (1994)	2,120	4,060	5,760	8,240	10,700	12,700	---	---
Regression (2010)	*1,760*	*3,400*	*4,930*	*7,020*	*8,890*	*11,000*	---	*17,700*
Plate 6	---	---	---	---	---	15,500	---	---
Weighted (2008)	3,210	5,840	8,360	10,900	13,800	15,800	20,900	24,400
Weighted (2016)	*3,840*	*6,380*	*8,630*	*11,200*	*14,400*	*16,800*	*25,700*	*25,400*
FINAL (2008)	3,350	6,000	8,400	10,900	14,100	16,500	18,700	21,800
FINAL	**3,400**	**6,200**	**8,400**	**11,000**	**14,200**	**16,700**	**20,500**	**22,900**
JMP2 (Manoa-Palolo Stream Gage 16247100, A= 10.34 mi^2)								
HEC-HMS (R-73)	4,090	7,340	10,500	13,000	16,300	18,700	21,100	24,700
HEC-HMS (Atlas 14)	*5,560*	*8,800*	*11,600*	*14,600*	*19,000*	*22,400*	*26,300*	*31,700*
Regression (1994)	2,110	4,080	5,800	8,320	10,800	12,900	---	---
Regression (2010)	*1,760*	*3,420*	*5,000*	*7,080*	*9,000*	*11,100*	---	*18,000*
Plate 6	---	---	---	---	---	16,000	---	---
FEMA	---	---	12,000	---	19,200	23,000	---	28,500
HEC-SSP	2,883	5,065	6,800	8,670	11,400	13,700	16,200	19,800
Weighted (2008)	3,070	5,520	8,470	9,890	13,900	16,400	18,100	23,200
Weighted (2016)	*3,390*	*5,750*	*8,470*	*9,970*	*13,800*	*16,700*	*19,700*	*22,690*
FINAL (2008)	3,400	6,100	8,500	11,150	14,400	16,800	19,000	22,100
FINAL	**3,600**	**6,400**	**8,600**	**11,200**	**14,500**	**17,000**	**20,900**	**23,200**
JMP3 (Right above the confluence of Manoa-Palolo and Ala Wai Canals, A=10.68 mi^2)								
HEC-HMS (R-73)	4,220	7,450	10,700	13,300	16,600	18,900	21,400	24,900
HEC-HMS (Atlas 14)	*5,760*	*9,130*	*12,000*	*15,100*	*19,700*	*23,100*	*27,100*	*32,700*
Regression (2010)	*1,780*	*3,470*	*5,050*	*7,200*	*9,150*	*11,300*	---	*18,400*
Plate 6	---	---	---	---	---	16,500	---	---
Weighted (2008)	4,220	7,450	10,660	13,260	16,560	18,100	21,400	24,900
Weighted (2016)	*4,050*	*6,700*	*9,020*	*11,700*	*15,200*	*17,700*	*27,100*	*26,600*
FINAL (2008)	3,450	6,200	8,700	11,400	14,700	17,100	19,300	22,400
FINAL	**4,000**	**6,700**	**9,000**	**11,700**	**15,000**	**17,500**	**21,500**	**24,000**
Ala Wai Canal (Mouth of Ala Wai Canal, A=16.22 mi^2)								
HEC-HMS (R-73)	6,000	10,100	13,400	15,200	16,700	17,700	18,700	20,500
HEC-HMS (Atlas 14)	*8,080*	*12,000*	*14,400*	*16,000*	*17,800*	*19,100*	*20,700*	*22,200*
Plate 6	---	---	---	---	---	22,500	---	---
FEMA	---	---	13,700	---	23,000	28,200	---	36,200
Weighted (2008)	6,000	10,100	13,500	15,200	19,400	22,300	18,700	27,200
Weighted (2016)	*8,080*	*12,000*	*14,100*	*16,000*	*20,000*	*22,900*	*20,700*	*28,200*
FINAL (2008)	6,000	9,500	12,500	15,200	17,500	18,500	19,500	20,500
FINAL	**8,000**	**11,500**	**13,500**	**16,000**	**18,000**	**19,500**	**20,500**	**22,000**

Table 5-8: Peak Flow Discharge Values Update -- Continued								
Methodology	Peak flow discharge (cfs)							
Return Period (yr)	**2**	**5**	**10**	**20**	**50**	**100**	**200**	**500**
Percent Chance Exceedance	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**	**0.50%**	**0.20%**
JMP1 (Confluence of Manoa and Palolo Streams, A= 10.04 mi^2)								
HEC-HMS (R-73)	4,020	7,170	10,300	12,900	16,100	18,500	20,900	24,400
HEC-HMS (Atlas 14)	*5,400*	*8,620*	*11,400*	*14,300*	*18,600*	*21,900*	*25,700*	*31,200*
Regression (1994)	2,120	4,060	5,760	8,240	10,700	12,700	---	---
Regression (2010)	*1,760*	*3,400*	*4,930*	*7,020*	*8,890*	*11,000*	---	*17,700*
Plate 6	---	---	---	---	---	15,500	---	---
Weighted (2008)	3,210	5,840	8,360	10,900	13,800	15,800	20,900	24,400
Weighted (2016)	*3,840*	*6,380*	*8,630*	*11,200*	*14,400*	*16,800*	*25,700*	*25,400*
FINAL (2008)	3,350	6,000	8,400	10,900	14,100	16,500	18,700	21,800
FINAL	**3,400**	**6,200**	**8,400**	**11,000**	**14,200**	**16,700**	**20,500**	**22,900**
JMP2 (Manoa-Palolo Stream Gage 16247100, A= 10.34 mi^2)								
HEC-HMS (R-73)	4,090	7,340	10,500	13,000	16,300	18,700	21,100	24,700
HEC-HMS (Atlas 14)	*5,560*	*8,800*	*11,600*	*14,600*	*19,000*	*22,400*	*26,300*	*31,700*
Regression (1994)	2,110	4,080	5,800	8,320	10,800	12,900	---	---
Regression (2010)	*1,760*	*3,420*	*5,000*	*7,080*	*9,000*	*11,100*	---	*18,000*
Plate 6	---	---	---	---	---	16,000	---	---
FEMA	---	---	12,000	---	19,200	23,000	---	28,500
HEC-SSP	2,883	5,065	6,800	8,670	11,400	13,700	16,200	19,800
Weighted (2008)	3,070	5,520	8,470	9,890	13,900	16,400	18,100	23,200
Weighted (2016)	*3,390*	*5,750*	*8,470*	*9,970*	*13,800*	*16,700*	*19,700*	*22,690*
FINAL (2008)	3,400	6,100	8,500	11,150	14,400	16,800	19,000	22,100
FINAL	**3,600**	**6,400**	**8,600**	**11,200**	**14,500**	**17,000**	**20,900**	**23,200**
JMP3 (Right above the confluence of Manoa-Palolo and Ala Wai Canals, A=10.68 mi^2)								
HEC-HMS (R-73)	4,220	7,450	10,700	13,300	16,600	18,900	21,400	24,900
HEC-HMS (Atlas 14)	*5,760*	*9,130*	*12,000*	*15,100*	*19,700*	*23,100*	*27,100*	*32,700*
Regression (2010)	*1,780*	*3,470*	*5,050*	*7,200*	*9,150*	*11,300*	---	*18,400*
Plate 6	---	---	---	---	---	16,500	---	---
Weighted (2008)	4,220	7,450	10,660	13,260	16,560	18,100	21,400	24,900
Weighted (2016)	*4,050*	*6,700*	*9,020*	*11,700*	*15,200*	*17,700*	*27,100*	*26,600*
FINAL (2008)	3,450	6,200	8,700	11,400	14,700	17,100	19,300	22,400
FINAL	**4,000**	**6,700**	**9,000**	**11,700**	**15,000**	**17,500**	**21,500**	**24,000**
Ala Wai Canal (Mouth of Ala Wai Canal, A=16.22 mi^2)								
HEC-HMS (R-73)	6,000	10,100	13,400	15,200	16,700	17,700	18,700	20,500
HEC-HMS (Atlas 14)	*8,080*	*12,000*	*14,400*	*16,000*	*17,800*	*19,100*	*20,700*	*22,200*
Plate 6	---	---	---	---	---	22,500	---	---
FEMA	---	---	13,700	---	23,000	28,200	---	36,200
Weighted (2008)	6,000	10,100	13,500	15,200	19,400	22,300	18,700	27,200
Weighted (2016)	*8,080*	*12,000*	*14,100*	*16,000*	*20,000*	*22,900*	*20,700*	*28,200*
FINAL (2008)	6,000	9,500	12,500	15,200	17,500	18,500	19,500	20,500
FINAL	**8,000**	**11,500**	**13,500**	**16,000**	**18,000**	**19,500**	**20,500**	**22,000**

Percent Chance Flood	USGS 2010 Equation	Coefficient of Determination R^2	Standard Error of Prediction in percent	Standard Model Error in percent
50	$Q_2=2.339\ (DA)^{0.679}\ P^{1.113}$	0.74	51	48
20	$Q_5=17.58\ (DA)^{0.668}\ P^{0.820}$	0.76	42	40
10	$Q_{10}=49.09\ (DA)^{0.664}\ P^{0.674}$	0.77	40	38
4	$Q_{25}=145.2\ (DA)^{0.657}\ P^{0.520}$	0.76	40	37
2	$Q_{50}=290.4\ (DA)^{0.652}\ P^{0.422}$	0.76	40	37
1	$Q_{100}=539.5\ (DA)^{0.646}\ P^{0.335}$	0.75	41	38
0.2	$Q_{500}=1841\ (DA)^{0.633}\ P^{0.162}$	0.73	44	40

Table 5-9. Updated USGS 2010 Leeward O'ahu Regression Equations

HEC-HMS Model Junction		Peak Flow Discharge (cfs)							
		2	5	10	20	50	100	200	500
		50%	20%	10%	5%	2%	1%	0.50%	0.20%
Manoa Watershed Model	JM1	1,200	2,000	2,800	3,600	4,600	5,500	6,200	7,400
	JM2	1,700	3,200	4,600	5,700	7,150	8,200	9,000	10,500
	JM3	1,900	3,500	4,800	6,000	7,400	8,350	9,300	11,000
	JM4	2,000	3,700	5,000	6,300	7,700	8,800	9,900	11,700
	JM5	2,100	3,800	5,200	6,700	8,200	9,400	10,600	12,400
	JM6	2,300	4,100	5,700	7,200	9,000	10,200	11,800	13,600
	JM7	2,500	4,300	6,000	7,600	9,500	10,700	12,100	14,500
	JM8	2,600	4,450	6,150	7,800	9,700	11,200	12,500	15,300
Ala Wai Watershed Model	JK1	650	1,300	1,900	2,550	3,400	4,200	4,800	6,400
	JK2	700	1,400	2,000	2,700	3,500	4,500	5,600	6,700
	JK3	900	1,700	2,600	3,300	4,500	5,700	6,800	8,000
	JP1	440	820	1,200	1,600	2,100	2,700	3,000	3,900
	JP2	1,000	2,000	2,900	3,900	5,100	6,100	7,600	9,200
	JP3	1,200	2,200	3,100	4,100	5,500	6,600	8,000	10,000
	JP4	1,300	2,600	3,500	4,800	6,300	7,600	9,400	12,000
	JMP1	3,400	6,200	8,400	11,000	14,200	16,700	20,500	22,900
	JMP2	3,600	6,400	8,600	11,200	14,500	17,000	20,900	23,200
	JMP3	4,000	6,700	9,000	11,700	15,000	17,500	21,500	24,000
	Ala Wai	8,000	11,500	13,500	16,000	18,000	19,500	20,500	22,000

Table 5-10. Updated Peak Flow Discharges for the Ala Wai Watershed by HEC-HMS Model Junction

Table 5-11. Peak Flow Discharge Analytical Frequency Data for Without Project Intermediate Future based on HEC-RAS output discharges and Uncertainty in Equivalent Years of Record for use in HEC-FDA, Ala Wai Watershed, Oahu, Hawaii

Stream or Sub-Watershed	HEC-HMS Model Sub-Basin or Junction	HEC-RAS Reach Name	HEC-FDA Reach Name	HEC-FDA Analytical Frequency Curve Data (Log Units)			EYOR
				Mean	Std. Dev.	Skew	
Ala Wai, Waikiki	Ala Wai	Ala Wai Lower	ALA 1	3.8294	0.2534	-1.8690	30
		Ala Wai Middle	ALA 2	3.5409	0.2649	-0.3489	
		Ala Wai Upper	ALA 3	2.9837	0.1965	-0.5220	
Makiki	K2	Kanaha Ditch	KAH 1 KAH 2	2.4314	0.3201	-0.0040	18
	----	Kanaha Split	KAO 1	----	----	----	
	JK3	Makiki Lower	MAK 1	2.8525	0.2267	0.5912	
	JK2		MAK 2	2.7785	0.2470	0.4437	
	JK1	Makiki Upper	MAK 3	2.3610	0.4448	-0.4781	
	K1, K3		MAK 4	2.1310	0.4945	-0.5551	
Manoa	JM7, JM 8	Manoa Stream Main Reach	MAN 1	3.3937	0.3197	-0.3843	25
	JM 6		MAN 2	3.2937	0.3434	-0.5271	
	JM 4, JM 5		MAN 3 MAN 4	3.2428	0.3610	-0.6361	
	JM 3		MAN 5	3.1836	0.4043	-0.6881	
	JM 1, JM 2		MAN 6 MAN 7	3.0792	0.2842	-0.0140	
	----	UH_Split	UNI 1 UNI 2	----	----	----	18
Manoa-Palolo Canal	JMP 1 to JMP 3	Palolo Lower	MPC 1 MPC 2	3.5232	0.3127	-0.1657	30
Palolo	JP 4	Palolo Main	PAL 1	3.1106	0.3353	-0.0573	27
	JP 4	Palolo Main	PAL 2	3.0792	0.3183	-0.0158	27
	JP 3	Palolo Main	PAL 3 PAL 4	2.9809	0.3823	-0.3210	27
	Junction 2	Pukele Tributary	PUK 1	2.6725	0.3980	-0.6359	44
	Junction 1	Waiomao Ditch	WAI 1	2.7077	0.3936	-0.4793	35

EYOR = Equivalent Years of Record; ----, not a separate sub-basin in HEC-HMS model

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Ala Wai Canal Project
Feasibility Study
Honolulu, Hawaii

Existing Without-Project Hydraulic and With-Project Hydrologic and Hydraulic Appendix

Appendix A2

U.S. ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
FORT SHAFTER, HAWAII
March 2017

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1 INTRODUCTION

Through a cooperative effort undertaken by the State of Hawaii Department of Land and Natural Resources (DLNR) Engineering Division and the U.S. Army Corps of Engineers (USACE) as part of the Ala Wai Canal Project Feasibility Study, a hydrologic and hydraulic study of the Ala Wai Canal Watershed was initiated in 2001 and was amended in 2006. A large portion of this watershed is highly susceptible to flooding. The purpose of this study is to determine the feasibility of flood damage reduction alternatives for the Ala Wai Canal Watershed. This report presents a description of the analytical approach, analyses performed, and the results obtained for a detailed without-project hydraulic study and a with-project hydrologic and hydraulic study of the approximately 19 square miles of the Ala Wai Canal Watershed. Results of this study include water surface profiles for the 50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% Annual Chance Exceedance (ACE) storm events for the existing without-project conditions, future without-project conditions, and for several respective with-project alternatives.

2 GENERAL

2.1 Scope of Work

An analysis of the watershed and stream hydrology and hydraulics was performed using the U.S. Army Corps of Engineers' (HEC-HMS) Hydrologic Engineering Center's-Hydrologic Modeling System in conjunction with the (HEC-RAS) Hydrologic Engineering Center's-River Analysis System. The results of this modeling effort were used to develop depth-duration-frequency rating curves for each portion of the study. The watershed was first analyzed under current development conditions assuming no implementation of any flood damage reduction alternatives. These scenarios were then modified to include an initial array of five project alternatives aimed at reducing flood damages at different areas in the watershed. Three alternatives are described in this Appendix, Alternatives 1A, 2A, and 3A. 10% level of designs were created for Alternatives 2A and 3A.

The study area extends from the ridge of the Ko'olau Mountains to the nearshore waters of Mamala Bay and includes Makiki, Manoa, and Palolo streams. These streams all drain to the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands, thus allowing development of the Waikiki district.

2.2 Previous Hydrologic and Hydraulic Models and Studies

Varieties of studies have been previously conducted in the Ala Wai Canal Watershed and were reviewed as part of this project. These studies include the following:

- **Federal Emergency Management Agency's National Flood Insurance Program Study (*FEMA, 1979*).** The Federal Emergency Management Agency (FEMA) contracted the U.S. Army Corps of Engineers to determine flood hazards for the McCully and Moiliili areas that encompass the Ala Wai Canal and the

Manoa-Palolo Drainage Canal. This study delineated the 1-percent ACE (100-year) floodplains and was completed in February 1979. The discharge of 28,300 cfs (cubic feet per second) at the canal mouth was used to delineate the 1-percent ACE floodplains.

- **Ala Wai Canal Improvement Project, Storm Water Capacity Study (*Edward K. Noda and Associates, 1994).*** The State of Hawaii contracted Edward K. Noda and Associates to conduct this study to determine the hydraulic effects associated with dredging the Ala Wai Canal. This study concluded that by lowering the canal invert elevation to -12.0 and -10.0 feet mean lower low water at strategic locations, the maximum 1-percent ACE (100-year) flood elevation would be at approximately 5.0 feet mean sea level near the top of the ocean side canal bank. The 1-percent ACE flow used in this study was 22,389 cfs at the mouth of the canal.
- **Ala Wai Flood Study (*USACE, 2001*).** Conducted under the Planning Assistance to States Program (Section 22, WRDA of 1974), this study investigated and recommended appropriate solutions to resolve flooding from the Ala Wai Canal. The Land Division of DLNR was the non-Federal sponsor of the study. The analysis demonstrated that there are possible structural measures that could be implemented to mitigate flooding by increasing the flood carrying capacity of the Canal. Specific measures included dredging, levees and floodwalls, and detention/sedimentation basins. The study indicated that dredging would increase the flood capacity of the channel, but would not provide full protection against a 1-percent ACE (100-year) flood.
- **Ala Wai Watershed Analysis (*Townscape Inc. and Dashiell, 2003*).** The purpose of this effort was to review existing literature and evaluate existing data to identify the water resource problems, studies, and recommended actions to improve watershed health, as related to water supply, flood control, and ecosystem restoration. This document was prepared as a component of the USACE/DLNR Ala Wai Watershed Feasibility Study.
- **Hydrology and Hydraulics Study, Flood of October 30, 2004, Mānoa Stream (*USACE, 2006*).** A storm on October 30, 2004, caused significant flooding in Mānoa Valley, especially in areas adjacent to Mānoa District Park and Woodlawn Drive Bridge. A post-flood analysis was conducted using rainfall-runoff and the 1977 stream hydraulic computer modeling (older HEC-2 model), the results of which were used to assess the feasibility of several short-term flood mitigation measures. Alternatives analyzed included construction of levees or floodwalls along sections of the channel between Mānoa District Park and Woodlawn Drive and installation of an artificial channel between East Mānoa Road and Woodlawn Drive. Of these alternatives, the channel drop structure at Woodlawn Drive Bridge was determined to have the best potential for increasing the capacity with the least amount of maintenance, aesthetic, bridge structure, and drainage impacts to mitigate. DLNR was the non-Federal sponsor of the study.
- **Final Hydrology Report, Manoa Watershed Project (*Oceanit, 2008a*).** The Natural Resources Conservation Service (NRCS) contracted Oceanit through the USACE to develop conceptual designs and prepare a feasibility report, watershed plan, and a preliminary draft environmental impact statement

(PDEIS) for alternate flood hazard reduction schemes aimed at preventing similar flooding in the future. Several rainfall runoff models and frequency-based methods were used to estimate the peak discharges at various junctions in the watershed. Rainfall runoff models included Technical Release 55 (TR-55) from the NRCS, Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS) from the USACE, and FLO-2D, a distributed model. Frequency-based methods included the Plate 6 of the City and County of Honolulu drainage standards, USGS regression equations, and FEMA peak discharge-frequency drainage area curves. Peak discharges calculated using the above methods were compared, and best estimates of the peak discharges for the following return periods were determined: 50-, 20-, 10-, 5-, 2-, 1-, 0.5-, and 0.2-percent ACE.

- **Final Hydraulic Analysis Report, Manoa Watershed Project (*Oceanit, 2008b*).** The NRCS contracted Oceanit through the USACE to explore alternatives for flood reduction along the Manoa Stream corridor. In order to qualify the effects of each proposed alternative, the existing extent of flood inundation must be known. The Hydrologic Engineering Center-River Analysis System (HEC-RAS) was used to analyze the extent of the inundated areas from Manoa Stream for these eight storm events: 50-, 20-, 10-, 5-, 2-, 1-, 0.5-, and 0.2-percent ACE (2-, 5-, 10-, 20-, 50-, 100-, 200-, and 500-year). The 50-, 5-, 1-, and 0.2-percent ACE storms were mapped. Peak flow data at critical junctions along the stream were supplied by the Final Hydrology Report, Manoa Watershed Project (*Oceanit, 2008a*). The hydraulic analysis was conducted without debris blockages at bridge openings.
- **Technical Summary Report, Mānoa Watershed Project (*Oceanit, 2008c*).** Following the October 30, 2004, flooding event in Mānoa Valley new LiDAR data was obtained. NRCS initiated the Mānoa Watershed Project, which included development of hydrologic and hydraulic models using HEC-HMS and HEC-RAS, and design of conceptual flood reduction measures, based on the work completed as part of the Mānoa Stream Hydrology and Hydraulics Study (*USACE, 2006*). The intent of the project was to prepare a Watershed Plan and EIS under the NRCS Watershed Program (PL83-566). However, the funds needed to complete the EIS were not received, and thus the scope of the project was reduced to technical reports and conceptual measures to mitigate flooding. The results of this effort were eventually incorporated, with expansion of the hydrology and hydraulics modeling, into the Ala Wai Watershed Project.
- **Final Hydrology Report, Ala Wai Watershed Project (*Oceanit, 2008d).*** This study estimated peak flow discharges at particular drainage junctions in the Ala Wai Watershed corresponding to the following storm return periods: 50-, 20-, 10-, 5-, 2-, 1-, 0.5-, and 0.2-percent ACE (2-, 5-, 10-, 20-, 50-, 100-, 200-, and 500-year). Updates were done in November 2010 and March 2016 (Appendix A1).
- **Final Drainage Evaluation Report, Ala Wai Canal Watershed Project (*Oceanit, 2008e*).** This study evaluates the existing Ala Wai Watershed drainage facilities to determine the existing capacity of the drainage system. The existing discharge capacity is compared with the 2000 City and County of Honolulu's

Storm Drainage Standards to determine whether or not each drainage facility (mostly culverts can pass a 10-, 50-, or 100-year storm, depending on the drainage area serviced by the outlet.

- **Conceptual Engineering Report, Ala Wai Canal Flushing System & Ala Wai Golf Course Detention System (*Mitsunaga & Associates, Inc., 2014*).** The Department of Land and Natural Resources of the State of Hawaii proposes to improve the water quality of the Ala Wai Canal to standards acceptable for water recreational activities including canoeing, kayaking, fishing and minimal power boating. The specific objectives of the proposed project are to: decrease sources of pollution through detention ponds and/or filters on tributaries to the canal and improve watershed management, increase water flow and circulation in the canal while addressing environmental concerns, and define and implement maintenance management practices for the canal. This Conceptual Engineering Report developed alternatives to address the diversion of the off-site storm water through Ala Wai Golf Course and a flushing system or the Ala Wai Canal.

3 WITHOUT PROJECT HYDRAULIC MODELING

3.1 Overview

The HEC-RAS (Hydrologic Engineering Center - River Analysis System) computer program, version 4.1.0 was used for hydraulic modeling (*U.S. Army Corps of Engineers, 2010*). This HEC-RAS model was created by joining separate HEC-RAS models of Makiki, Manoa, and Palolo Streams and Manoa-Palolo Drainage and Ala Wai Canals together. The HEC-RAS model of Manoa Stream is documented in Oceanit (*2008b*) and the separate models for the Makiki and Palolo Streams and the Manoa-Palolo Drainage and Ala Wai Canals were originally created by Oceanit and West Consultants by July 2009 and then corrected and merged together by the U.S. Army Corps of Engineers by November 2009. In 2013 the merged model was then updated again to be more accurate. This model consisted of 8 rivers, 13 reaches, 1,287 cross sections, of which 476 are interpolated, 49 bridges (this includes culverts), 2 inline weirs, and 16 lateral weirs. The model was developed using data that was considered the best available at the time.

3.1.1 Study Reach Descriptions

The Makiki Stream portion of the HEC-RAS model starts from the confluence with the Ala Wai Canal to a point approximately 2.0 miles upstream and includes the Kanaha Ditch Tributary from its confluence with Makiki Stream to a point approximately 0.8 miles upstream. Due to the dominate effect of the Ala Wai Canal during high flows, the downstream reach of Makiki Stream downstream of Fern Street was not modeled in detail; both the Kapiolani Boulevard and pedestrian walkway bridges were ignored in the model. The stream channels of both Makiki and Kanaha Streams have been highly modified with concrete and confined from the point when they enter the urbanized area and include sections when the stream channel is confined to sections entirely underground.

The Manoa HEC-RAS model was modified from the Oceanit (*2008b*) by adding the potential for split flow to leave Manoa Stream near Woodlawn Drive Bridge and enter the University of Hawaii at Manoa Campus. Also the Dole Street Bridge was added to the model for completeness, although its effect on flow is very minimal as the low chord of the bridge is still about 10 ft higher than the 0.2-percent ACE flood water-surface elevation. The Manoa Stream reach extends from the confluence with Manoa-Palolo Drainage Canal upstream about 3.1 miles to the point where the Waihi and Waiakeakua Stream tributaries meet. The Manoa Stream channel is mostly natural with some segments modified by concrete channel or stream bank hardening.

The Palolo Stream Main reach extends upstream approximately 1.9 miles from the confluence with the Manoa-Palolo Drainage Canal. Upstream of Palolo Stream, the Pukele Stream and Waiomao Stream tributaries were modeled, extending 1.1 and 0.9 miles upstream. The Palolo Stream Main reach Channel is mostly confined to one large concrete channel.

The Manoa-Palolo Drainage Canal is called the Palolo Stream Lower reach in the model and extends about 0.9 miles from the Ala Wai Canal to the confluence of the Manoa and Palolo Stream. This canal consists of a modified channel with segments of natural bed and banks, but mostly hardened stream banks.

The Ala Wai Canal section is modeled using three reaches from the mouth of the to the Makiki Stream confluence (Lower), from Makiki Stream to the Manoa-Palolo Drainage Canal confluence (Middle), and from the Manoa-Palolo Drainage Canal confluence to the upstream end (Upper). The reach lengths are approximately 2490, 3365, and 4260 ft respectively. The Ala Wai Canal channel has a natural bottom with hardened banks and has tidal influence. Bathymetric data was collected by Oceanit in 2008 and used to compute the cross-section data for the canal.

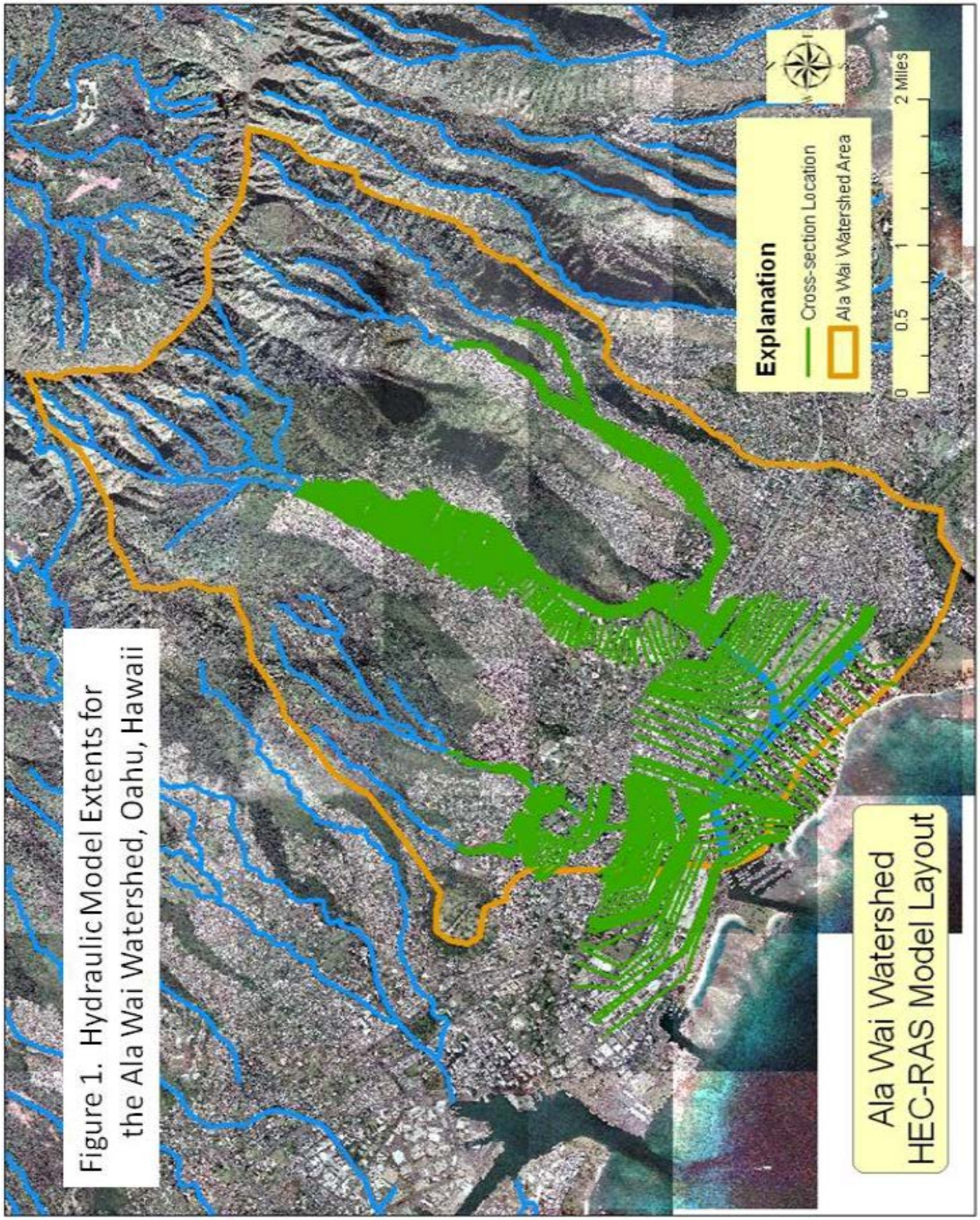

Figure 1: Hydraulic Model Extents for the Ala Wai Canal Watershed, Oahu, Hawaii

3.1.2 Terrain Data

Topographic data for the hydraulic model is primarily based on airborne light detection and ranging (LIDAR) data. The LIDAR data was collected, processed, and verified by Oceanit and their sub consultants in late 2006 and early 2007. The LIDAR data has an accuracy of 45 cm (1.5 ft) horizontal, 37 cm (1.2 ft) vertical and was processed with 1.4 m (5 ft) horizontal point spacing. Datum of data is NAD 1983 HARN projected into Stateplane_Hawaii_3_FIPS_5103_Feet horizontal and mean sea level, local tidal datum, vertical. The current approved National Geodetic Survey (NGS) National Spatial Reference System (NSRS) vertical datum for Oahu is Local Tidal Datum, mean sea level, tidal epoch 1983-2001, geoid 2012A. Horizontal datum is NAD 83 (PA 11). The bare ground LIDAR data was then converted into a Triangular Irregular Network (TIN) format using Geographical Information Systems (GIS) software. The TIN format is needed for using HEC-GeoRAS version 10.1 for ArcGIS version 10.1 to extract the necessary spatial and elevation data for the hydraulic model (*U.S. Army Corps of Engineers, 2011*). The HEC-RAS model schematic layout is illustrated in **Figure 2**.

Elevations used in the hydraulic model were extracted from the TIN. Further refinement to the extracted topographic data especially along and near the stream channels and in other critical areas with large amounts of vegetation overgrowth was done within the HEC-RAS program. Therefore, the Manning's n-values were adjusted and refined where needed. At selected stream cross-section locations conventional land surveys or site investigations and field measurements were done to confirm channel inverts, top of bank locations, bridge dimensions, and other elements relevant to hydraulic modeling. This information was collected and originally entered into the HEC-RAS model by Oceanit and their sub-consultants. Most of the refinements to the cross-sections in the model were based on channel and bridge plans, especially in the Makiki and Palolo areas where the majority of the streams have been channelized. For the upper Manoa Stream area, where much of the stream channel is privately owned, cross-section adjustments were done based on field observations or measurements and not surveyed cross-sections. Cross-section data in the Ala Wai Canal were based on the bathymetric survey data collected in 2008.

3.1.3 Cross-Section Modeling

Cross-section locations for the HEC-RAS model were determined by the channel slope, channel shape, and location of structures. In general cross-sections were spaced about 100 to 500 feet apart for the Ala Wai and Manoa-Palolo Drainage Canals, about 25 feet apart for the Lower Makiki Stream and Palolo Stream Main reaches, and about 50 to 100 ft apart for all the other stream reaches. Near hydraulic structures, such as bridges and culverts, cross-sections were located closer together. Cross-sections in the area of stream confluences or junctions had to be modified to prevent the cross-section lines from crossing each other. These cross-sections were bent, or "doglegged" to insure the overbank areas were not double-counted or were purposely ignored in the case of Makiki Stream near the Ala Wai Canal. Makiki Stream at the mouth of the stream is heavily influenced from the water surface elevation of the Ala Wai Canal. This backwater effect completely overcomes the downstream cross-sections of Makiki

Stream and can give erroneous results if the cross-section length is cut short to avoid crossing any adjacent section lines. For this reason, it was decided to start the Makiki reach just upstream of Kapiolani Blvd. This provided a balance between the influence of the canal water surface elevation and the necessity to properly model more frequent flow events.

Ineffective flow areas were defined at cross-sections to separate areas of active conveyance from adjacent low lying areas that do not contribute to downstream conveyance due to either the presence of high ground along the reach or the expansion/contraction from another control upstream or downstream, such as a bridge or culvert opening. Levee stations were also used to confine flow to channels for lower flow rates especially where the ground elevations were lower than the top of channel. The contraction coefficients for majority of the cross-sections were 0.1, while 0.3 was used near bridges and culverts. The expansion coefficient was set to 0.3 for most cross-sections except near bridges, culverts or lateral structures where a value of 0.5 was used to account for the potential for greater losses.

An important component of hydraulic modeling is the selection of Manning's n-values (roughness coefficients). Manning's n-values were determined from previous studies and several site surveys conducted by Oceanit to characterize the channel roughness. Reasonable values are usually determined from site visits and the use of guides such as Barnes (*1967*) or Arcement (*1989*). Manning's n-values were further refined based on model calibration. Previous modeling on Manoa Stream (*Oceanit, 2008b*) was calibrated to the 2004 flood event on Manoa Stream. Previous modeling of the Ala Wai Canal (*U.S. Army Corps of Engineers, 2001 and 2005*) was calibrated to the limited data of the 1967 event on Palolo Stream and Manoa-Palolo Drainage Canal. Makiki and Kanaha Streams do not have any calibration or gaged data to aid in calibration or model comparison, but are mostly concrete lined channels so the n-values should be stable. Calibrated n-values are assumed to also account for any sediment or debris "bulking" during those storm events. Manning's n-values for the Ala Wai Canal Watershed HEC-RAS model are presented by modeled River and Reach in **Table 1**.

The range of Manning's n-values used can be roughly characterized by channel description. Natural stream channels with minimal vegetation in the channel, steep banks, trees and brush on banks, and bottoms consisting of gravels, cobbles, and few large boulders were given values from 0.03 to 0.04. Natural channel sections that were uniform and contained smooth graveled beds were given a value of 0.025. The Ala Wai Canal was given an n-value of 0.03. Lined or concrete channels were given a value of 0.018 and smooth overbank areas in parks or the golf course were given values of 0.06. The majority of overbank areas in mixed urban areas or overland flow (split flow) areas were given values of 0.1 to 0.125. Previous channel n-values used were 0.04 for the natural channels with 0.06 for all overbank areas (*M&E Pacific, 1977*) to 0.027 to 0.04 for the Ala Wai Canal and 0.25 for the urban overbank areas (*U.S. Army Corps of Engineers, 2005*).

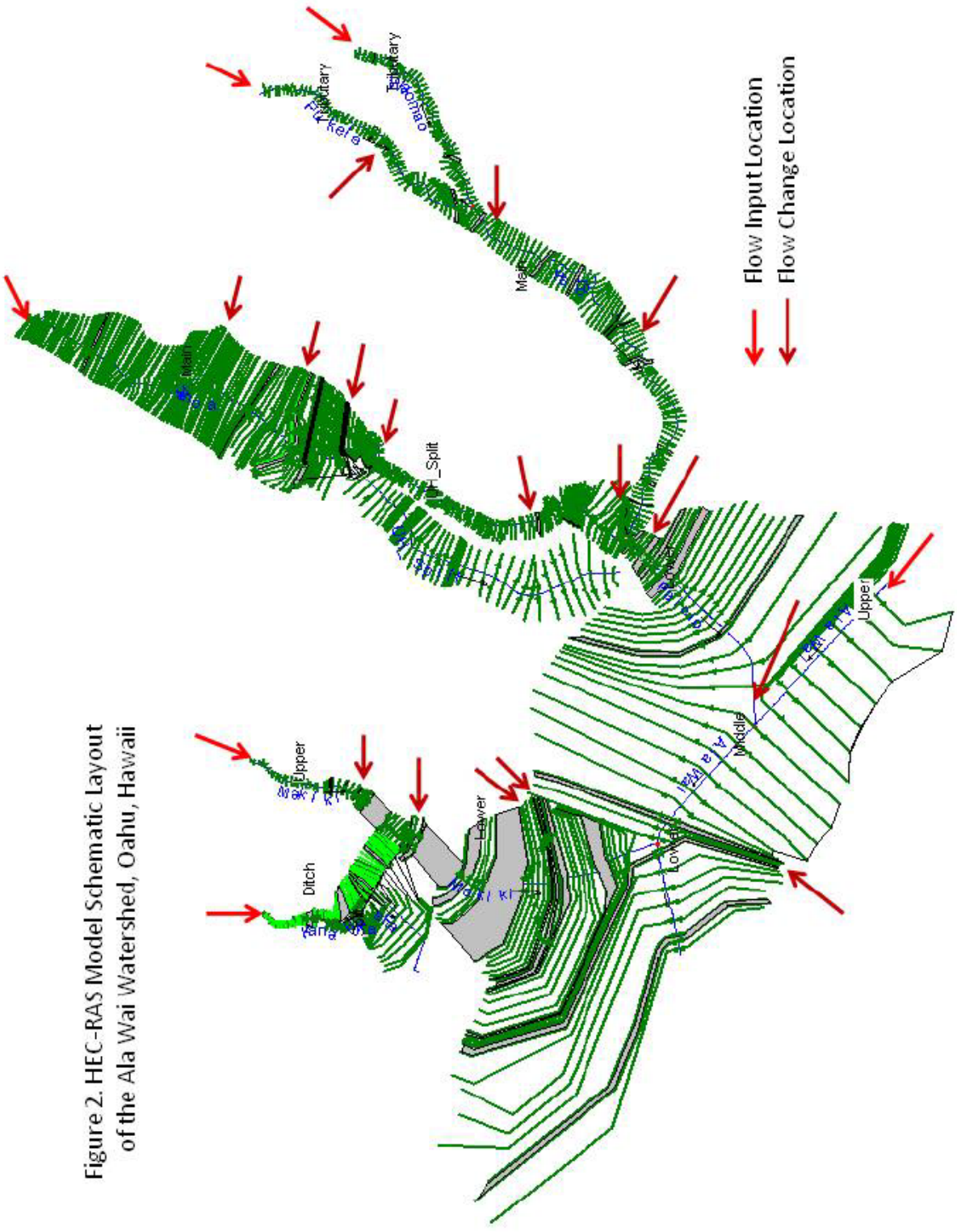

Figure 2: HEC-RAS Model Schematic Layout of the Ala Wai Canal Watershed, Oahu, Hawaii

Table 1. Manning's n-values for roughness used in the Ala Wai Canal Watershed HEC-RAS Model, Honolulu, Hawaii

Table 1. **Manning's n-values for roughness used in the Ala Wai Watershed HEC-RAS Model, Honolulu, Hawaii**						
Model Stream Names		**Model Cross-section Location Range**		**Channel Section**		
River	**Reach**	**From**	**To**	**Left Overbank**	**Main Channel**	**Right Overbank**
Ala Wai	Upper	6370	9724	0.125	0.03	0.125
Ala Wai	Middle	2580	5825	0.125	0.03	0.06 to 0.125
Ala Wai	Lower	33	2324	0.125	0.03	0.125
Kahana	Ditch	3238	4372	0.125	0.04	0.125
Kahana	Ditch	3	3084	0.125	0.025	0.125
Kahana	Split	809	3508	0.125	0.1	0.125
Makiki	Upper	6319	10768	0.125	0.025	0.125
Makiki	Lower	5952	6286	0.125	0.025	0.125
Makiki	Lower	2632	4725	0.125	0.025 to 0.06	0.125
Makiki	Lower	639	2560	0.125	0.025	0.125
Manoa	Main	10592	16506	0.125	0.04	0.125
Manoa	Main	9792	10566	0.125	0.025	0.125
Manoa	Main	8775	9691	0.125	0.018	0.125
Manoa	Main	7734	8699	0.125	0.025	0.125
Manoa	Main	7190	7653	0.125	0.03	0.125
Manoa	Main	6129	7149	0.125	0.035	0.125
Manoa	Main	84	6054	0.125	0.04	0.125
Palolo	Main	8951	15326	0.125	0.018	0.125
Palolo	Main	7102	8838	0.125	0.03	0.125
Palolo	Main	5303	7000	0.125	0.018	0.125
Palolo	Lower	1813	5198	0.125	0.025	0.125
Palolo	Lower	859	1356	0.125	0.025	0.06 to 0.125
Pukele	Tributary	2004	5958	0.125	0.04	0.125
Pukele	Tributary	146	1893	0.125	0.018	0.125
UH_Split	UH_Split	132	6929	0.125	0.125	0.125
Waiomao	Tributary	514	4900	0.125	0.04	0.125
Waiomao	Tributary	110	414	0.125	0.018	0.125

3.1.4 Bridge and Culvert Modeling

Geometric data (culvert diameters and dimensions, culvert length, bridge span, etc.) for all bridges and culverts was obtained by Oceanit and entered into the HEC-RAS model. In many cases, like along Palolo Stream, bridges over concrete channels do not constrict the flow until the flow overtops the banks and thus, have minimal impact to

most of the smaller flow frequency results. In other cases, like Woodlawn Drive Bridge in Manoa, a significant constriction occurs at the smaller flow frequency results. The HEC-RAS model results take these factors into account. A list of bridges and culverts are presented in **Table 2**.

For the Ala Wai Canal Watershed HEC-RAS model all bridges and culverts were modeled using the energy method for low flow if no bridge piers were present. Where bridges had piers, the energy and momentum method was selected and the highest energy answer was then used in the HEC-RAS model for the resulting computations. For the momentum method, the coefficient of drag for the piers was 1.20 at all piers except 1.60 was used at East Manoa Road and Waialae Avenue Bridges, 2.0 was used at the double box culvert at 10th Avenue. For situations where the water surface elevation reaches the low chord of the bridge, the pressure and weir method was selected at all bridges except for those bridges crossing the Ala Wai Canal, Manoa-Palolo Drainage Canal, and Dole Street Bridge on Manoa Stream which used the energy only method due to the flat slopes of these reaches or in the case of Dole Street, where the low chord was 10 feet higher than the 0.2-percent ACE flood elevation.

For determining blocked bridge potential from debris, both from large boulders or floating vegetation, the type of bridge, bridge location, and historical performance was used to determine the percent blockage which was used for all flow modeling. In general, concrete lined channels with supercritical flow tend to wash debris downstream quickly and maintain a “self-cleaning” condition. Most urban debris and trash is small in size with bicycles being the largest observed. Such sized debris has a low potential to create a blockage. In small steep channels, large vegetative debris also has low potential for downstream movement as such debris gets trapped or lodged across the channel and only after being broken up by the force of water will smaller pieces begin to be transported downstream.

The first bridge or culvert in the HEC-RAS model below the forest reserve or undeveloped areas was given a 25% reduction in open area blockage to represent the potential for sediment or debris to constrict these openings. Other percent reductions used were 15% and 45% (see **Table 2**). Two bridges in Manoa, East Manoa Road and Woodlawn Drive have had serious debris problems during the 2004 flood event so were given blocked areas equivalent to those determined from that event. All blockages were modeled in the HEC-RAS model by creating obstructions to a height from the channel bed to an elevation that represents the percent reduction in area. This was done by culvert blockage routines for culverts or cross-section obstructions for bridges in the HEC-RAS model.

Table 2. Bridge and Culvert Location and Information used in the Ala Wai Canal Watershed HEC-RAS Model, Honolulu, Hawaii

Table 2. **Bridge and Culvert Location and Information used in the Ala Wai Watershed HEC-RAS Model, Honolulu, Hawaii**						
Model Stream Names		**Model Cross-section Location**	**Name of Crossing**	**Type of Structure**	**Bed Material under Crossing**	**Percent Blockage used for Debris**
River	**Reach**					
Ala Wai	Middle	3020	McCully St	Bridge w/piers	Natural	----
Ala Wai	Lower	2280	Kalakaua Ave	Bridge w/piers	Natural	----
Ala Wai	Lower	370	Ala Moana Blvd	Bridge w/piers	Natural	----
Kanaha	Ditch	3168	Nehoa St	Box Culvert	Concrete	25
Kanaha	Ditch	2346	Lewalani Dr	Box Culvert	Concrete	----
Kanaha	Ditch	1713	Liholiho St	Bridge	Concrete	----
Kanaha	Ditch	1533	Private Dr upstream of Kewalo	Bridge	Concrete	----
Kanaha	Ditch	1386	Kewalo St	Bridge	Concrete	----
Kanaha	Ditch	798	Keeamoku St	Bridge	Concrete	----
Kanaha	Ditch	237	Makiki St	Arch Culvert	Concrete	----
Kanaha	Ditch	102	Underground section just upstream of Makiki Stream confluence	Bridge	Concrete	----
Makiki	Upper	8575	Makiki St	Bridge	Concrete	25
Makiki	Upper	8290	Oneele Pl	Bridge	Natural	----
Makiki	Upper	7974	Private Dr just downstream of Oneele Pl	Bridge	Natural	----
Makiki	Upper	7330	Nehoa St and underground section	Box Culvert	Concrete	----
Makiki	Lower	6272	Anapuni St	Box Culvert	Concrete	----
Makiki	Lower	6029	Wilder St	Bridge	Concrete	----
Makiki	Lower	5337	Underground Section just downstream of Wilder St	Box Culvert	Concrete	----
Makiki	Lower	4544	Wooden Deck Bridge downstream of underground section	Bridge	Natural	----
Makiki	Lower	3639	Underground Section at S. Beretania St	Box Culvert	Concrete	10
Makiki	Lower	2547	Private Drive just upstream of Phillip St	Bridge	Natural	----
Makiki	Lower	2435	Phillip St	Bridge	Concrete	----

Table 2. **Bridge and Culvert Location and Information used in the Ala Wai Watershed HEC-RAS Model, Honolulu, Hawaii ---- Continued**

Model Stream Names		Model Cross-section Location	Name of Crossing	Type of Structure	Bed Material under Crossing	Percent Blockage used for Debris
River	Reach					
Makiki	Lower	2228	Covered section just downstream of Phillip St	Bridge	Concrete	----
Makiki	Lower	1311	Fern St	Bridge	Concrete	----
Manoa	Main	14686	Pawaina St	Bridge	Natural	----
Manoa	Main	10461	Kahaloa Dr	Bridge	Concrete	----
Manoa	Main	9273	Lowrey Ave	Bridge	Concrete	----
Manoa	Main	8749	East Manoa Rd	Bridge w/piers	Concrete	25
Manoa	Main	7756	Woodlawn Dr	Bridge	Natural	45
Manoa	Main	2520	Dole St	Bridge w/piers	Natural	----
Palolo	Main	15248	Kiwila Rd	Box Culvert	Concrete	----
Palolo	Main	13489	Kahlua Rd	Bridge	Concrete	----
Palolo	Main	12621	Paalea Ave	Box Culvert	Concrete	----
Palolo	Main	11053	Private Rd	Bridge	Concrete	----
Palolo	Main	10863	Private Rd	Bridge	Concrete	----
Palolo	Main	9873	Palolo Ave	Arch Culvert	Concrete	----
Palolo	Main	7515	3rd Ave	Arch Culvert	Concrete	----
Palolo	Main	6578	St Louis Dr	Arch Bridge	Concrete	----
Palolo	Main	6059	Footbridge	Bridge	Concrete	----
Palolo	Main	5343	Koali Rd	Bridge	Concrete	----
Palolo	Lower	5110	Waialae Ave	Bridge w/piers	Natural	----
Palolo	Lower	4732	H-1 Highway	Bridge w/piers	Natural	----
Palolo	Lower	4501	South King St	Bridge w/piers	Natural	----
Palolo	Lower	4031	Kapiolani Blvd	Bridge w/piers	Natural	----
Palolo	Lower	2317	Date St	Bridge	Natural	----
Pukele	Tributary	3172	Palolo Ave/10th Ave	Box Culvert	Natural	25
Pukele	Tributary	355	Ahe St	Box Culvert	Concrete	----
Waiomao	Tributary	1924	10th Pl	Box Culvert	Concrete	25
Waiomao	Tributary	1268	10th Ave	Double Box Culverts	Concrete	10

3.1.5 Peak Flow Data

Peak flow data from the Manoa and Ala Wai hydrologic studies (*Oceanit, 2008a and 2008d*) were used after adjusting these peak flow values with updated rainfall-frequency data at the hydrologic model junctions, see Appendix A1. The peak flow frequency data was then adjusted from the hydrologic model junctions to corresponding cross-section locations in the HEC-RAS model where the flow would enter the stream channel

in order to capture the change in flow that would occur during each of the frequency based events. There were areas where flow left the main stream channel and followed a new path downhill. To account for these split flow areas, lateral weirs were set to enter the split flow reach at specific stream stations. The HEC-RAS program calculates the weir flow leaving the stream and into the split flow "stream" channel. In the flow file the initial flow for the split flow reaches were set to 1 cubic foot per second (cfs) and the split flow optimization algorithm was used to balance the amount of flow being diverted depending on the value of the peak flow frequency. The peak-flow values used and the input model locations are presented in **Table 3**. The 1-percent ACE peak flow for the Ala Wai Canal in this model was 19,500 cfs. Previous estimates of the 1-percent ACE peak flow value at the mouth of the Ala Wai Canal have ranged from 22,900 cfs (*Edward K. Noda and Associates, Inc., 1994*) to 28,200 cfs (*Federal Emergency Management Agency, 2004*).

3.1.6 Split Flow Assumptions

During the development of the Ala Wai Canal Watershed HEC-RAS model, potential locations where peak-flow discharges leave the defined stream channels and do not return were identified by model results, previous models (U.S. Army Corps of Engineers, 2005) or from knowledge of previous flood events. These locations were modeled in HEC-RAS through the use of lateral weirs (structures) and the split-flow optimization routine in steady flow models. In sections of the model where overtopping flow would move parallel to the stream channel or downhill, no lateral weirs were used. Two locations, along Kanaha and Manoa Streams, were modeled as "stream reaches" to account for the floodplain impacts of these flows and at Waikiki the flow was allowed to leave the model to go into the ocean. The use of split-flow optimization reduces the flow in the stream channel downstream of the lateral weir location if peak-flows leave the channel.

Kanaha Ditch is a cross slope man-made drainage channel that carries runoff to Makiki Stream. Between Nehoa Street and Lewalani Drive flood waters in the model overtop the right bank (looking downstream) and would tend to flow away from the ditch to the south (Figure 3).

A number of lateral weirs were created in the HEC-RAS model along the right bank of the Kanaha Ditch Reach. Those weirs were set at the top of the right bank elevations of the ditch and the overflow was assigned to specific cross-sections in the split-flow reach where it was presumed to flow. Weir flow coefficients were set to 1.0. For all lateral weirs in the model, the weir flow coefficient was determined depending on the round roughness conditions near those areas which would represent the most likely overflow conditions. The Kanaha Split reach extends about 2,600 ft down slope past Wilder Avenue to the H-1 Freeway area. Elevation data provided indicates that the flood extent would not cross the freeway. The model of this split flow reach does not account for the collection of the overtopping flows to be collected by the local storm drain system.

Table 3. Input Peak Flow Discharges in cubic feet per second for Ala Wai Canal Watershed HEC-RAS for Existing Conditions, Honolulu, Hawaii

Model Stream		Model Input Cross-section Location	Percent ACE Flood							
River	Reach		50%	20%	10%	5%	2%	1%	0.5%	0.2%
Ala Wai	Upper	9724	1,000	1,400	1,800	2,300	3,040	3600	4320	5300
Ala Wai	Middle	5825	3,600	6,400	8,600	11,200	14,500	17,000	20,900	23,200
Ala Wai	Lower	2324	8,000	11,500	13,500	16,000	18,000	19,500	20,500	22,000
Kanaha	Ditch	4372	270	500	700	930	1,240	1,500	1,800	2,200
Kanaha	Split	3508	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08
Makiki	Upper	10768	250	500	800	1,100	1,400	1,700	2,000	2,400
Makiki	Upper	7674	240	490	770	1,040	1,290	1,510	1,720	1,960
Makiki	Lower	6286	650	1,300	1,900	2,550	3,400	4,200	4,800	6,400
Makiki	Lower	3189	700	1,400	2,000	2,700	3,500	4,500	5,600	6,700
Makiki	Lower	1465	900	1,700	2,600	3,300	4,500	5,700	6,800	8,000
Manoa	Main	16506	1,200	2,000	2,800	3,600	4,600	5,500	6,200	7,400
Manoa	Main	10968	1,700	3,200	4,600	5,700	7,150	8,200	9,000	10,500
Manoa	Main	9274	1,900	3,500	4,800	6,000	7,400	8,350	9,300	11,000
Manoa	Main	7839	2,000	3,700	5,000	6,300	7,700	8,800	9,900	11,700
Manoa	Main	6175	2,100	3,800	5,200	6,700	8,200	9,400	10,600	12,400
Manoa	Main	2477	2,300	4,100	5,700	7,200	9,000	10,200	11,800	13,600
Manoa	Main	1807	2,500	4,300	6,000	7,600	9,500	10,700	12,100	14,500
Manoa	Main	1230	2,600	4,450	6,150	7,800	9,700	11,200	12,500	15,300
Palolo	Main	15526	1,000	2,000	2,900	3,900	5,100	6,100	7,600	9,200
Palolo	Main	9520	1,200	2,200	3,100	4,100	5,500	6,600	8,000	10,000
Palolo	Main	7552	1,300	2,600	3,500	4,800	6,300	7,600	9,400	12,000
Palolo	Lower	5198	3,400	6,200	8,400	11,000	14,200	16,700	20,500	22,900
Pukele	Tributary	5958	440	820	1,200	1600	2,100	2,700	3,000	3,900
Pukele	Tributary	3629	560	1,130	1,710	2,220	2,940	3,500	4,100	5,400
UH_Split	UH_Split	6929	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08
Waioma	Tributary	4900	550	1,050	1,540	1,960	2,550	3,000	3,500	4,700

The Manoa Stream split flow reach is called the UH Split reach in the model. This reach was added along Manoa Stream up- and downstream of Woodlawn Drive Bridge. Lateral weirs were added along the right bank of Manoa Stream to account for the overtopping flows which inundated the University of Hawaii campus in 2004. Weir flow coefficients were set at 2.0. The UH Split reach extends for about 6,900 ft from Woodlawn Drive to the lower campus quarry area where it is assumed that the flow would pond and not flow back into Manoa Stream or to the Manoa-Palolo Drainage Canal. Again, in the model this split-flow reach does not account for the collection of the overtopping flows in the reach to be collected by the local storm drain systems.

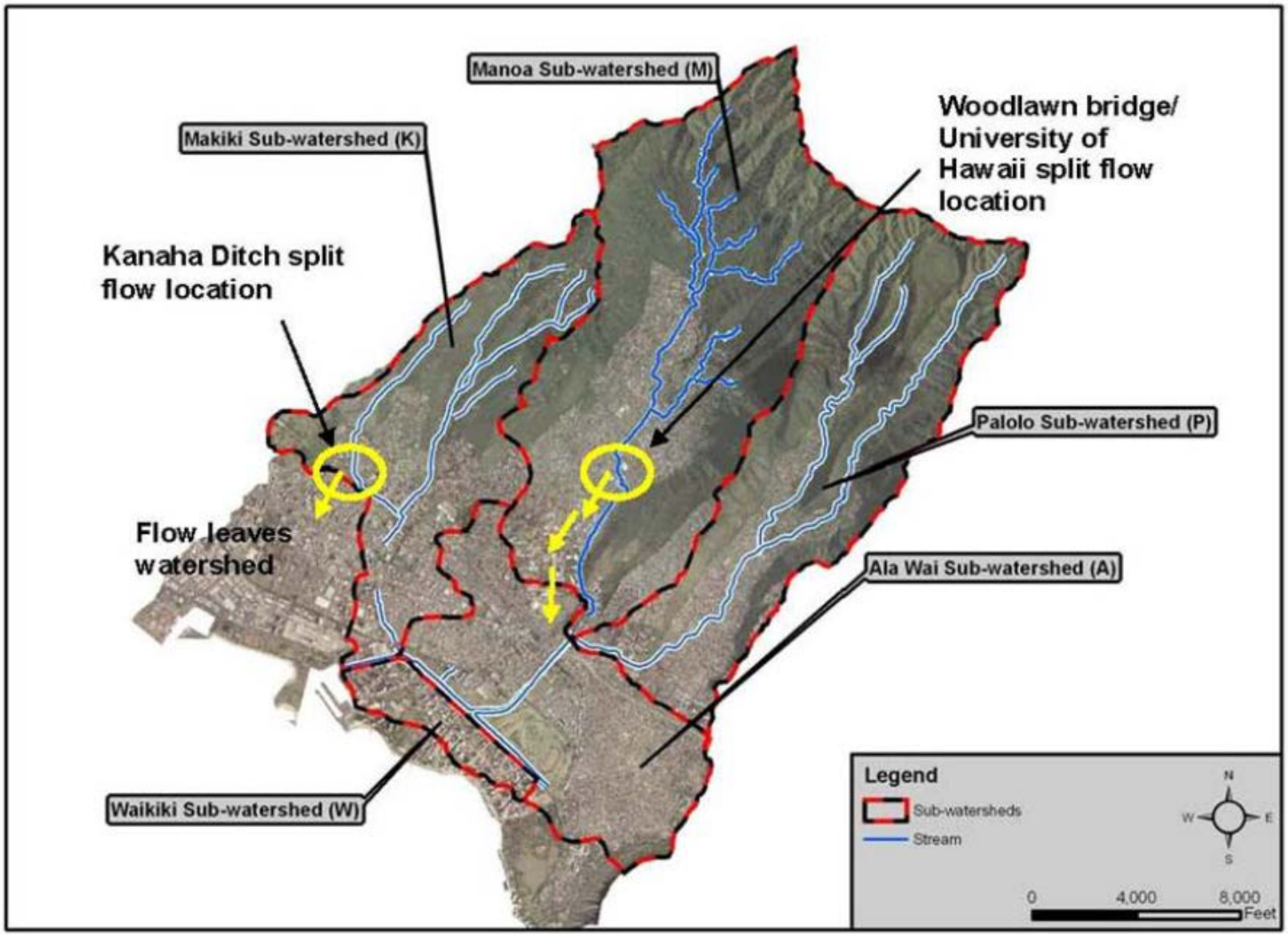

Figure 3: Location of the Split Flow Reaches in the Ala Wai Canal Watershed, Oahu, Hawaii

Along the left overbank of the Ala Wai Canal, from its upstream end down to about McCully Street, flow overtops the “ridge-line” along Waikiki and leaves the model by entering the ocean. This overtopping of the natural topography begins to occur at approximately elevation 6 feet. The flow leaving the system effectively reduces the discharge in the lower end of the canal. To account for the overtopping, lateral weirs were inserted into the model along the Middle and Upper Ala Wai Canal Reaches. Since these weirs are located in an urban environment, weir flow is influenced by the proximity of buildings, automobiles, etc. A weir coefficient of 1.0 was used here. The lateral weirs were set to allow the flow to leave the system (model).

The table below shows all of the lateral structures, the 10-, 2-, 1-, and 0.2-percent (10-, 50-, 100-, and 500-Year) ACE events are shown. The flow upstream (Q US), total flow leaving the structure (Q Leaving Total), and the downstream flow (Q DS) are shown in this table.

Table 4. Lateral Structure Output Table in cubic feet per second for Without-Project Ala Wai Canal Watershed HEC-RAS Model, Honolulu, Hawaii

River	Reach	River Sta	Profile	Q US	Q Leaving Total	Q DS
				(cfs)	(cfs)	(cfs)
Pukele	Tributary	236	10 YR	1710	0	1710
Pukele	Tributary	236	50 YR	2940	0	2940
Pukele	Tributary	236	100 YR	3500	30	3470
Pukele	Tributary	236	500 YR	5400	310	5090
Manoa	Main	7946	10 YR	4800	0	4800
Manoa	Main	7946	50 YR	7400	10	7690
Manoa	Main	7946	100 YR	8350	26	8773
Manoa	Main	7946	500 YR	11000	174	11526
Manoa	Main	7706	10 YR	5000	0	5000
Manoa	Main	7706	50 YR	7690	74	7616
Manoa	Main	7706	100 YR	8773	146	8627
Manoa	Main	7706	500 YR	11526	400	11126
Manoa	Main	1821	10 YR	5700	0	6150
Manoa	Main	1821	50 YR	8916	0	9616
Manoa	Main	1821	100 YR	10027	0	11027
Manoa	Main	1821	500 YR	13025	31	14694

Table 4. Lateral Structure Output Table in cubic feet per second for Without-Project Ala Wai Canal Watershed HEC-RAS Model, Honolulu, Hawaii (cont.)						
River	Reach	River Sta	Profile	Q US	Q Leaving Total	Q DS
				(cfs)	(cfs)	(cfs)
Kanaha	Ditch	3000	10 YR	700	177	521
Kanaha	Ditch	3000	50 YR	1240	537	703
Kanaha	Ditch	3000	100 YR	1500	729	771
Kanaha	Ditch	3000	500 YR	2200	1258	942
Kanaha	Ditch	2770	10 YR	521	121	399
Kanaha	Ditch	2770	50 YR	703	320	382
Kanaha	Ditch	2770	100 YR	771	423	348
Kanaha	Ditch	2770	500 YR	942	768	174
Kanaha	Ditch	2150	10 YR	399	0	399
Kanaha	Ditch	2150	50 YR	382	0	382
Kanaha	Ditch	2150	100 YR	348	45	303
Kanaha	Ditch	2150	500 YR	174	1709	2
Kanaha	Ditch	1660	10 YR	399	13	386
Kanaha	Ditch	1660	50 YR	382	92	291
Kanaha	Ditch	1660	100 YR	303	251	52
Kanaha	Ditch	1660	500 YR	2	907	2
Kanaha	Ditch	1500	10 YR	386	61	237
Kanaha	Ditch	1500	50 YR	291	303	1
Kanaha	Ditch	1500	100 YR	52	616	2
Kanaha	Ditch	1500	500 YR	2	1371	2
Kanaha	Ditch	1300	10 YR	327	40	286
Kanaha	Ditch	1300	50 YR	1	759	1
Kanaha	Ditch	1300	100 YR	2	1365	2
Kanaha	Ditch	1300	500 YR	2	2791	2
Kanaha	Ditch	1170	10 YR	286	87	206
Kanaha	Ditch	1170	50 YR	1	1076	1
Kanaha	Ditch	1170	100 YR	2	1889	2
Kanaha	Ditch	1170	500 YR	2	3783	2

Table 4. Lateral Structure Output Table in cubic feet per second for Without-Project Ala Wai Canal Watershed HEC-RAS Model, Honolulu, Hawaii (cont.)						
River	Reach	River Sta	Profile	Q US	Q Leaving Total	Q DS
				(cfs)	(cfs)	(cfs)
Kanaha	Ditch	990	10 YR	206	69	142
Kanaha	Ditch	990	50 YR	1	743	1
Kanaha	Ditch	990	100 YR	2	1291	2
Kanaha	Ditch	990	500 YR	2	2564	2
Kanaha	Ditch	700	10 YR	142	16	129
Kanaha	Ditch	700	50 YR	1	946	1
Kanaha	Ditch	700	100 YR	2	1802	2
Kanaha	Ditch	700	500 YR	2	3853	2
Kanaha	Ditch	500	10 YR	129	0	129
Kanaha	Ditch	500	50 YR	1	402	1
Kanaha	Ditch	500	100 YR	2	1056	2
Kanaha	Ditch	500	500 YR	2	2776	2
Ala Wai	Upper	9720	10 YR	1800	517	1284
Ala Wai	Upper	9720	50 YR	3040	2072	968
Ala Wai	Upper	9720	100 YR	3600	2798	802
Ala Wai	Upper	9720	500 YR	5300	5219	81
Ala Wai	Middle	5800	10 YR	8084	636	7450
Ala Wai	Middle	5800	50 YR	12344	1964	10380
Ala Wai	Middle	5800	100 YR	14029	2354	11675
Ala Wai	Middle	5800	500 YR	17375	3608	13767

3.1.7 Boundary Conditions

Since the Ala Wai Canal Watershed HEC-RAS model is a steady state hydraulic model, only peak flow data and boundary conditions for each event to be modeled were required. In a steady flow model, peak-flow hydrographs traveling from one stream to the next are assumed to occur peak to peak. Boundary conditions for upstream junctions or tributary streams are based on the model results from the downstream reach. The downstream boundary condition for the entire model is the mouth of the Ala Wai Canal where the starting water-surface elevation of 1.08 feet which is the Mean Higher High Water (MHHW) level at the Honolulu Harbor tide gage. The starting water surface elevation at the canal mouth was changed to incorporate sea-level rise in the

future and the inter-annual variability of the tidal data of 0.4 feet. The computed sea-level rise values in Appendix A3 were added to the MHHW water-surface elevation for the modeling of the sea-level rise scenarios (Table 5). The starting water-surface elevation for the Kanaha Split reach was set to normal depth (slope=0.0171). The starting water-surface elevation for the UH Split reach was set to normal depth (slope=0.0001). The starting water-surface elevations for the remaining streams were determined as a result of the hydraulic calculations of the stream junctions. All junctions were set to compute water-surface elevations using the Energy Method.

Table 5. Starting Backwater Values in Feet at the Ala Wai Canal Mouth in the HEC-RAS Model for the Ala Wai Canal Watershed, Oahu, Hawaii

Year	Condition	Low Sea Level Rise	Intermediate Sea Level Rise	High Sea Level Rise
2025	Base	1.64	1.74	2.05
2075	Future/Design	1.89	2.50	4.44
2125	Future	2.14	3.71	8.69

4 WITHOUT PROJECT MODEL RESULTS AND FLOOD INUNDATION MAPPING

The HEC-RAS model was used to determine the water-surface elevations and floodplain extents for the 50-, 20-, 10-, 5-, 2-, 1-, 0.5-, and 0.2-percent ACE floods (2-5-, 10-, 20-, 50-, 100-, 200-, and 500-year recurrence intervals). Floodplain extents for the 10-, 50-, 100-, and 500-year recurrence intervals are shown on **Figures 4** through **7**. The water-surface elevation data for the 8 flood events are used in the HEC-FDA (Flood Damage Analysis) program to determine flood damages for the economic analyses. The HEC-FDA program uses the water-surface elevations in determining flood damages and not the flood maps, so any irregularities in the presented maps has no impact on the damage calculations.

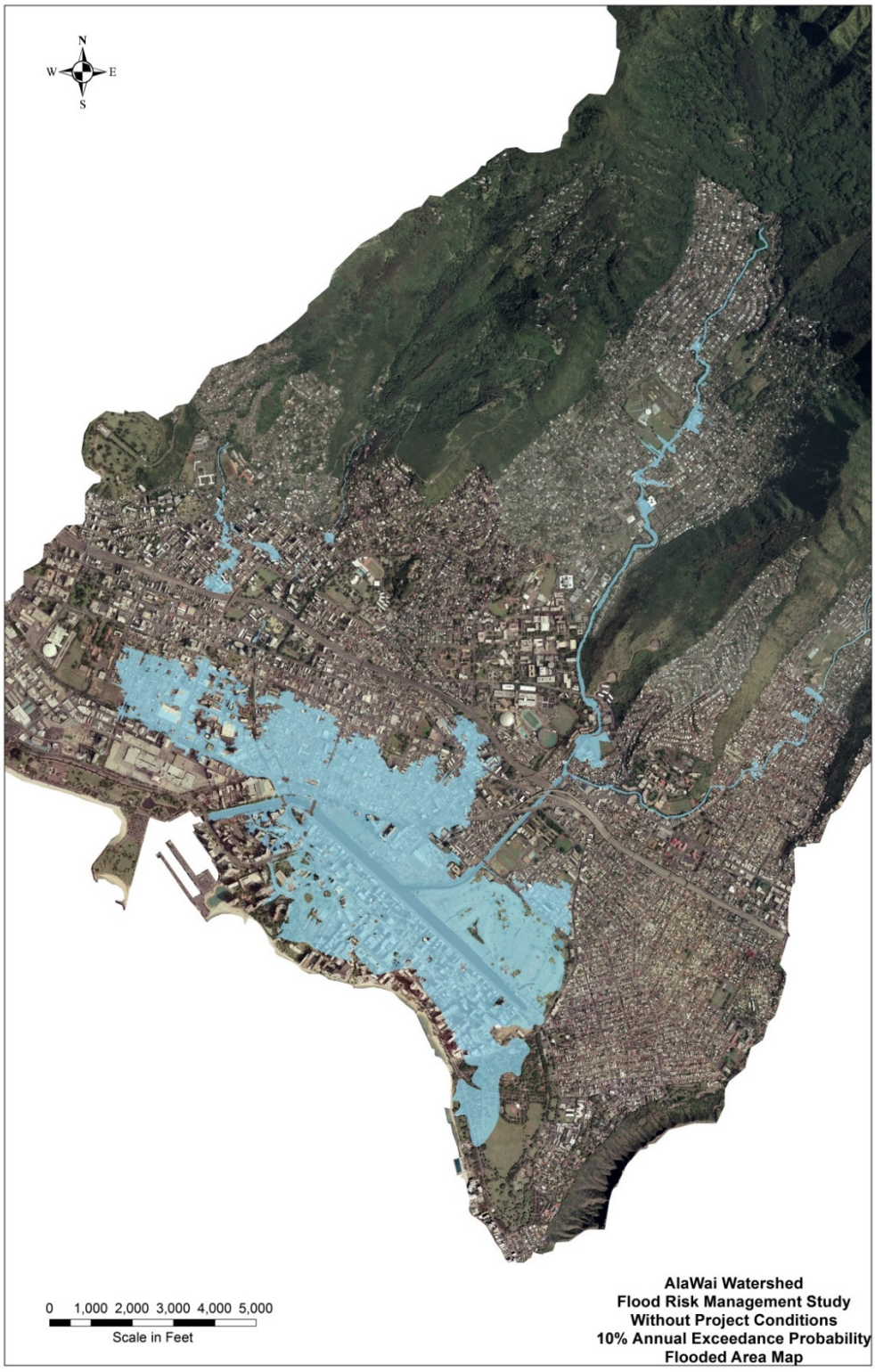

Figure 4: Floodplain Outlines for the 10-Percent ACE (10-year) Flood, Ala Wai Canal Watershed, Oahu, Hawaii.

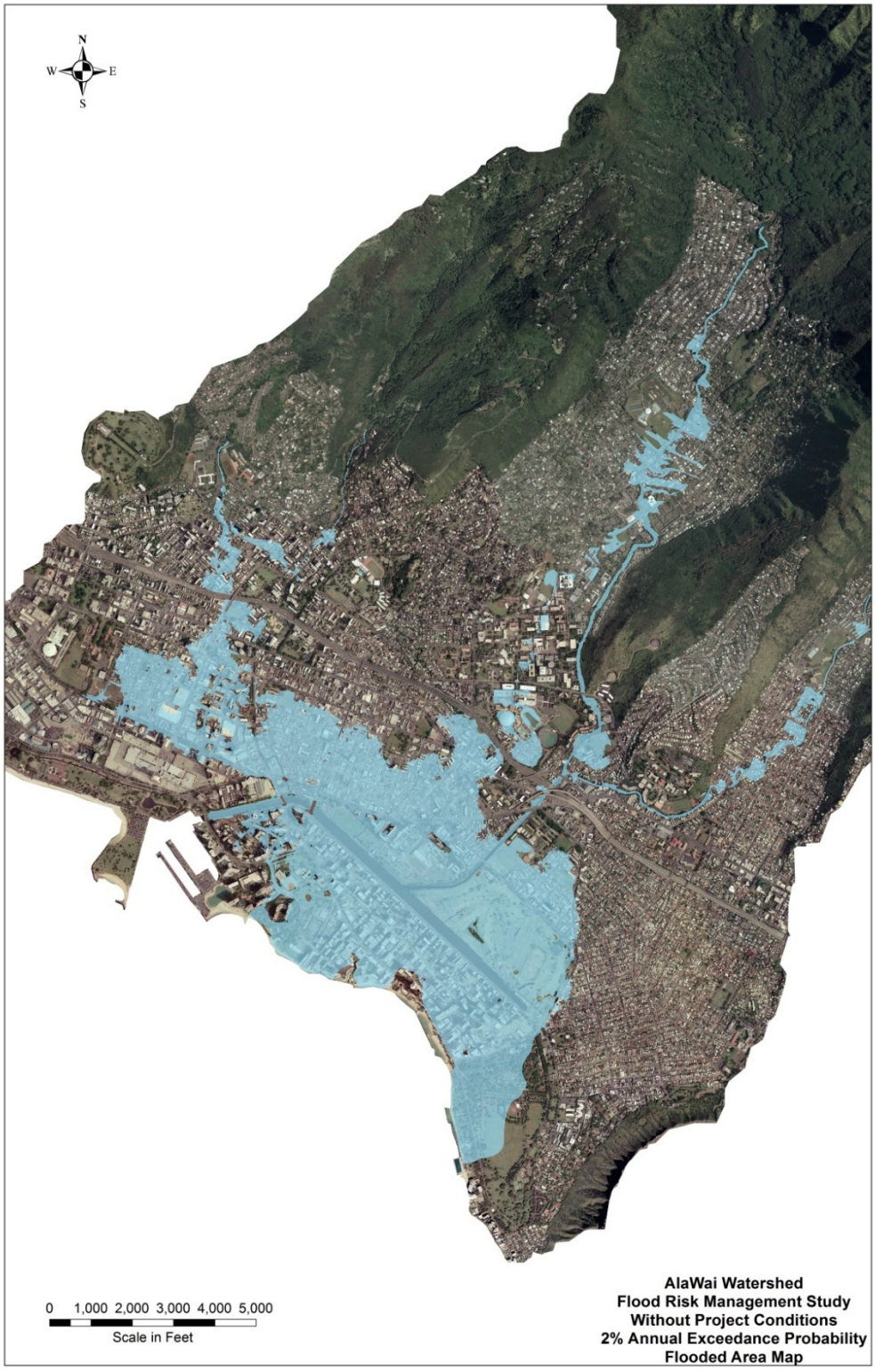

Figure 5: Floodplain Outlines for the 2-Percent ACE (50-year) Flood, Ala Wai Canal Watershed, Oahu, Hawaii.

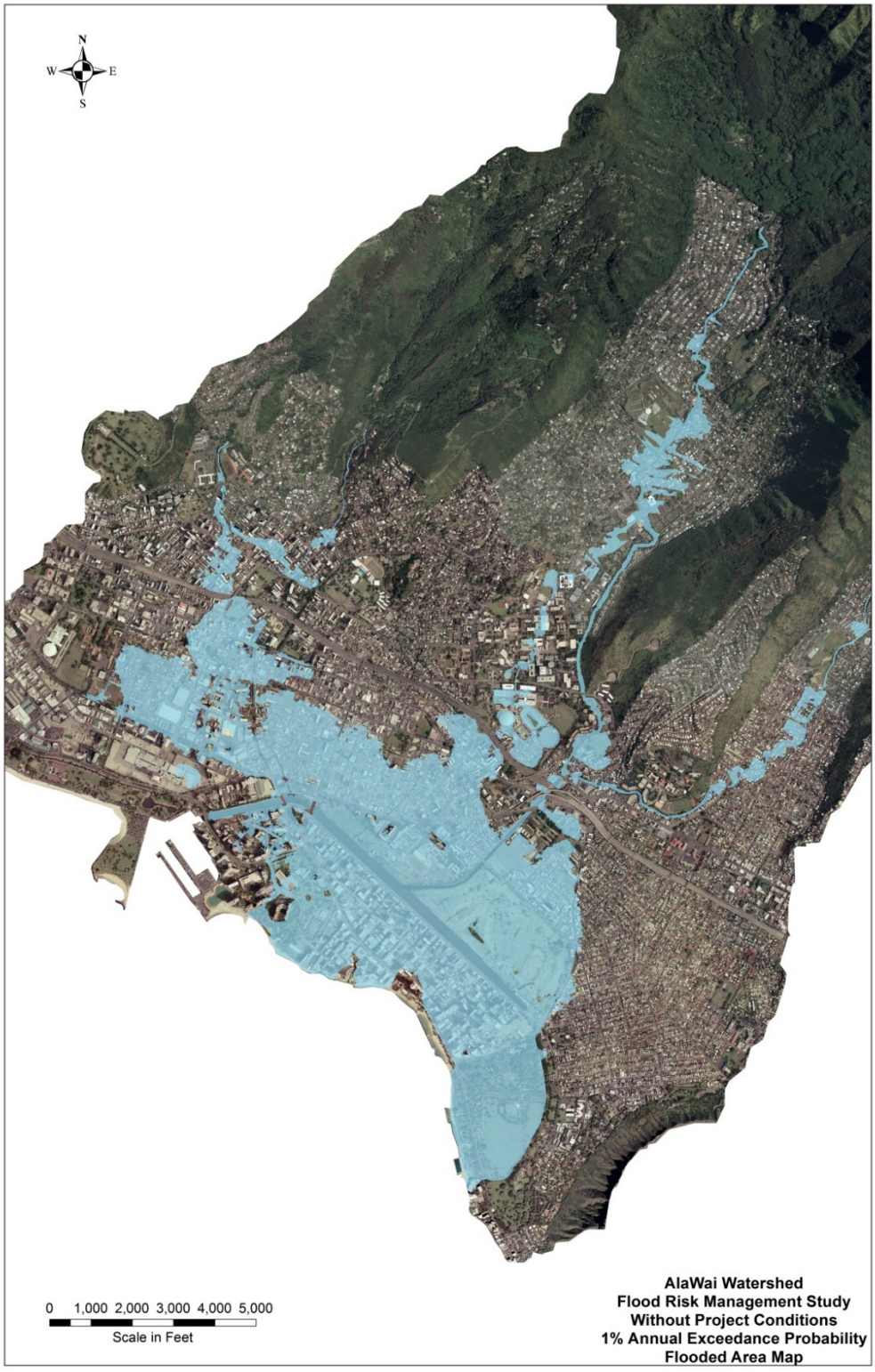

Figure 6: Floodplain Outlines for the 1-Percent ACE (100-year) Flood, Ala Wai Canal Watershed, Oahu, Hawaii.

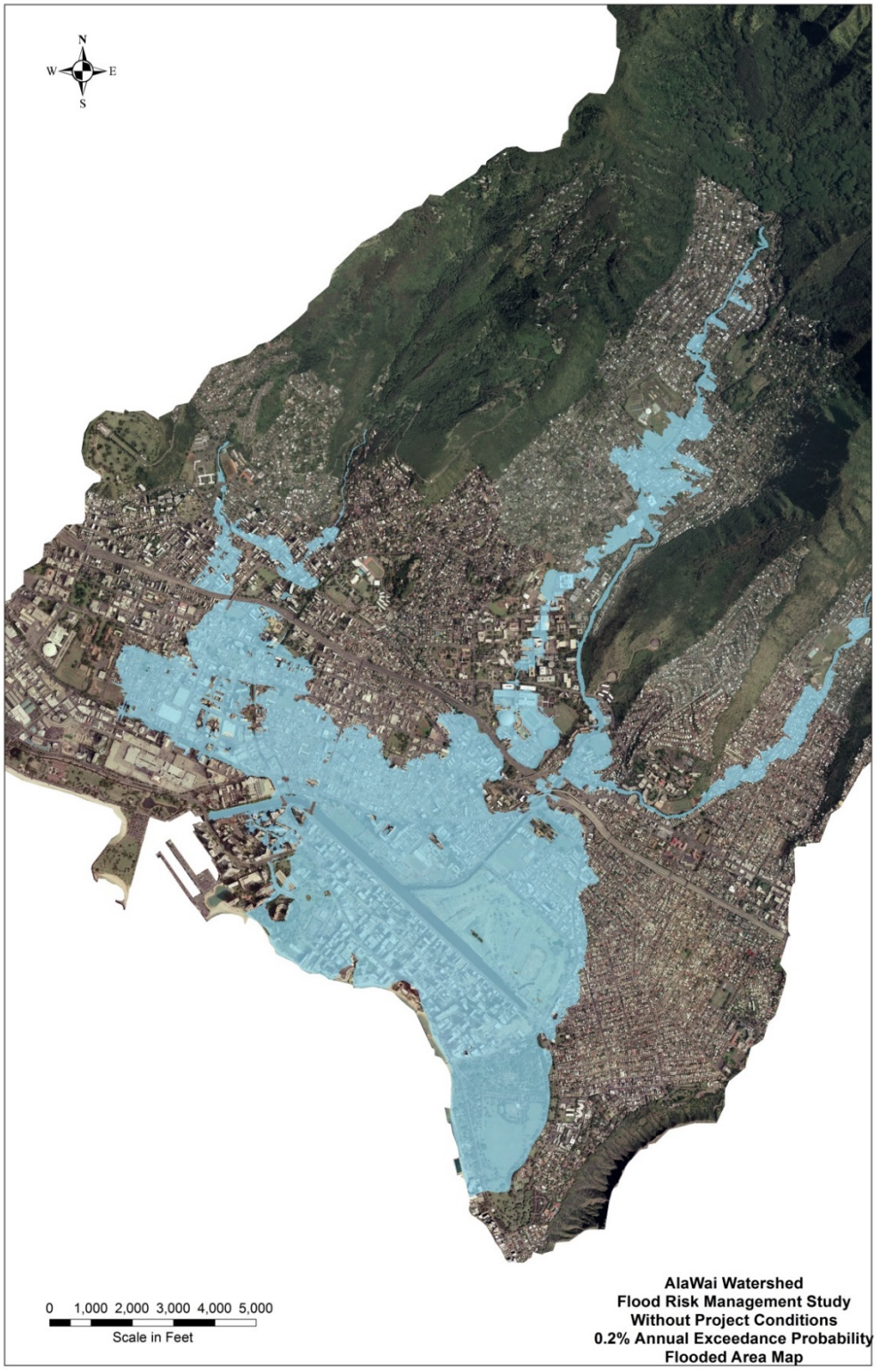

Figure 7: Floodplain Outlines for the 0.2-Percent ACE (500-year) Flood, Ala Wai Canal Watershed, Oahu, Hawaii.

4.1 Model Limitations

The HEC-RAS model was designed as a steady flow model using a mixed flow regime solution. As such, a number of warning messages appeared in several reaches indicating an unbalanced solution at cross sections resulting in critical depth or non-convergence. In steep reaches this message typically indicates the model is defaulting to critical depth because a super-critical flow answer is possible. The subcritical regime provides a conservative estimate of water-surface elevations for evaluating flooding but a mixed flow solution is more accurate. A mixed flow regime uses both subcritical and supercritical regimes. In less steep reaches, the primary reason for warning messages is probably due to the sharp contrast in Manning's n values between the channel at 0.018 to 0.04 and the overbanks at 0.125. The convergence problem seems to be most pronounced at bridges and culverts where the bridge deck and presence of weirs complicate the model solution process. Slight adjustments to ineffective flow limits helped reduce the non-convergences, but there are some locations where the messages could not be avoided for all storm events. One such location is the Makiki Stream between Anapuni Street and Wilder Street (cross sections 6316 to 5952).

Other warning messages such as conveyance ratios exceeding the 0.7 to 1.4 guidelines, velocity head differences exceeding 0.5 feet (ft) and energy losses greater than 1.0 ft between cross sections are due to the cross section geometry of the study area and cannot be avoided. Cross-section spacing can help with the steady flow solution. Average cross-section spacing for the various reaches in the Ala Wai Canal Watershed HEC-RAS model is presented in **Table 6**. In general, cross-section spacing from 50 to 100 ft in steep reaches and from 250 to 750 ft in flat reaches is adequate. In concrete channels such as Makiki Lower and Palolo Main reaches cross-sections were spaced at least 25 ft apart, this is to gain accuracy.

The use of split flow reaches to model areas where there is no flow under normal conditions are difficult to model accurately. The HEC-RAS model as with all hydraulic models, require a flow value to be used for each reach. Zero flow is not an allowable input value. For the Kanaha and UH Split reaches a flow value of 1 cfs was used as the initial input. Even with just a 1 cfs flow there will be a water-surface elevation, when in some cases there should be no water at all. For the 50- to 10-percent ACE floods, when flow is not leaving the main channel, the model results would indicate flood depths, although very low, when none would be present. This is a model artifact which needs to be accounted for when making flood inundation maps or using the data in HEC-FDA. For HEC-FDA, the water-surface elevation input data was changed to ground elevation at certain locations and flood events based on logic.

Split flow optimization was used to allow HEC-RAS to calculate lower flows in the main channel in locations where lateral weirs allow the flow to leave the main channel. Because there are multiple lateral weirs in the model, and in some locations multiple connection, such as the golf course reach, split flow optimization failed to converge. If split flow optimization is not used, results can be more conservative.

Table 6. Cross-section Spacing in the Ala Wai Canal Watershed HEC-RAS Model, Oahu, Hawaii

HEC-RAS River, and Reach Names	Average Cross-section Spacing in Feet
Ala Wai Canal, Upper, Middle, and Lower	286
Kanaha, Ditch (includes interpolated)	47
Kanaha, Split	87
Makiki Stream, Upper	107
Makiki Stream, Lower	31
Manoa Stream, Main	61
Palolo Stream, Main	96
Palolo Stream, Lower (includes Manoa-Palolo Drainage Canal)	180
Pukele Stream, Tributary	97
UH_Split, UH_Split	160
Waiomao Stream, Tributary	90

4.2 Flood Inundation Mapping

The flood inundation maps in **Figures 4** to **7** were generated by the HEC-GeoRAS software using TIN (Triangulated Irregular Network) elevation data and the maximum water-surface elevation profiles computed by HEC-RAS. A raster cell size of 5 feet was used to create the inundation outlines. HEC-GeoRAS converts the TIN elevation data and the maximum water-surface elevation data to raster layers with a 5 foot by 5 foot grid size before comparing them to one another. HEC-GeoRAS evaluates whether the water-surface elevation grid has a higher elevation than the ground-surface elevation grid. If the water-surface elevation was higher than the ground-surface elevation, the cell was considered inundated. The results were in raster datasets of the inundation depths. The inundation depth grid was then converted to a floodplain polygon coverage showing the maximum extents of flooding. The automated delineation process creates areas of no inundation, as the example figure, **Figure 8** shows areas or polygons where inundation is included or not included. As you can see in the figure there are some locations where inundation is not connected to the main inundation extents.

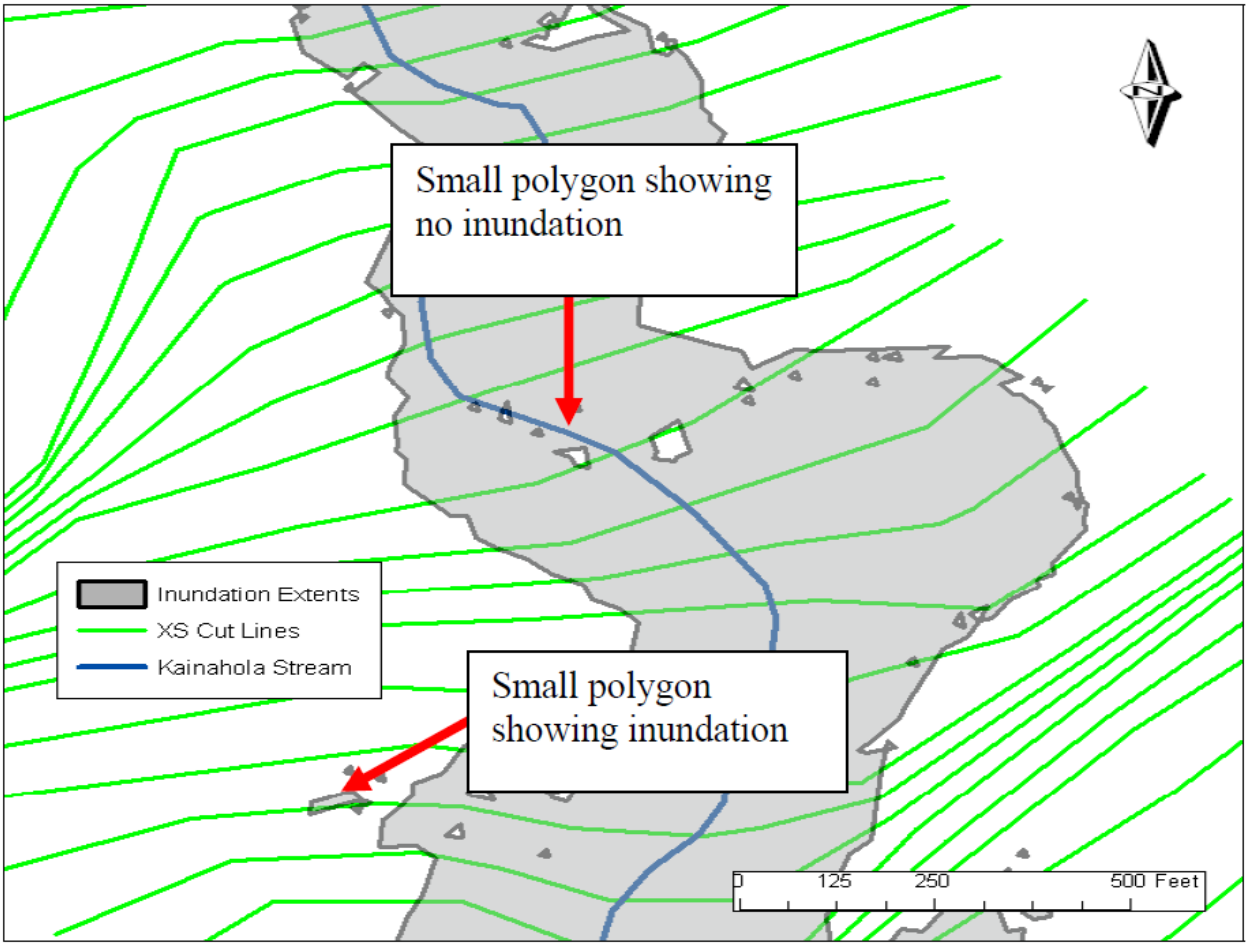

Figure 8: Example of inundation extents coverage created by HEC-GeoRAS.

Some non-connected areas of inundation, as described above, are an initial limitation of the mapping process because the computed water-surface is limited to the extents of the cross-sections; however, final mapping results should involve engineering judgment to modify the floodplain boundaries based on modeling assumptions and topographic data. If floodplain mapping is needed from the model results, then manual edits were done to either fill-in or remove areas where flooding is or is not likely to occur. An example of **Figure 8** with manual edits is shown on **Figure 9**.

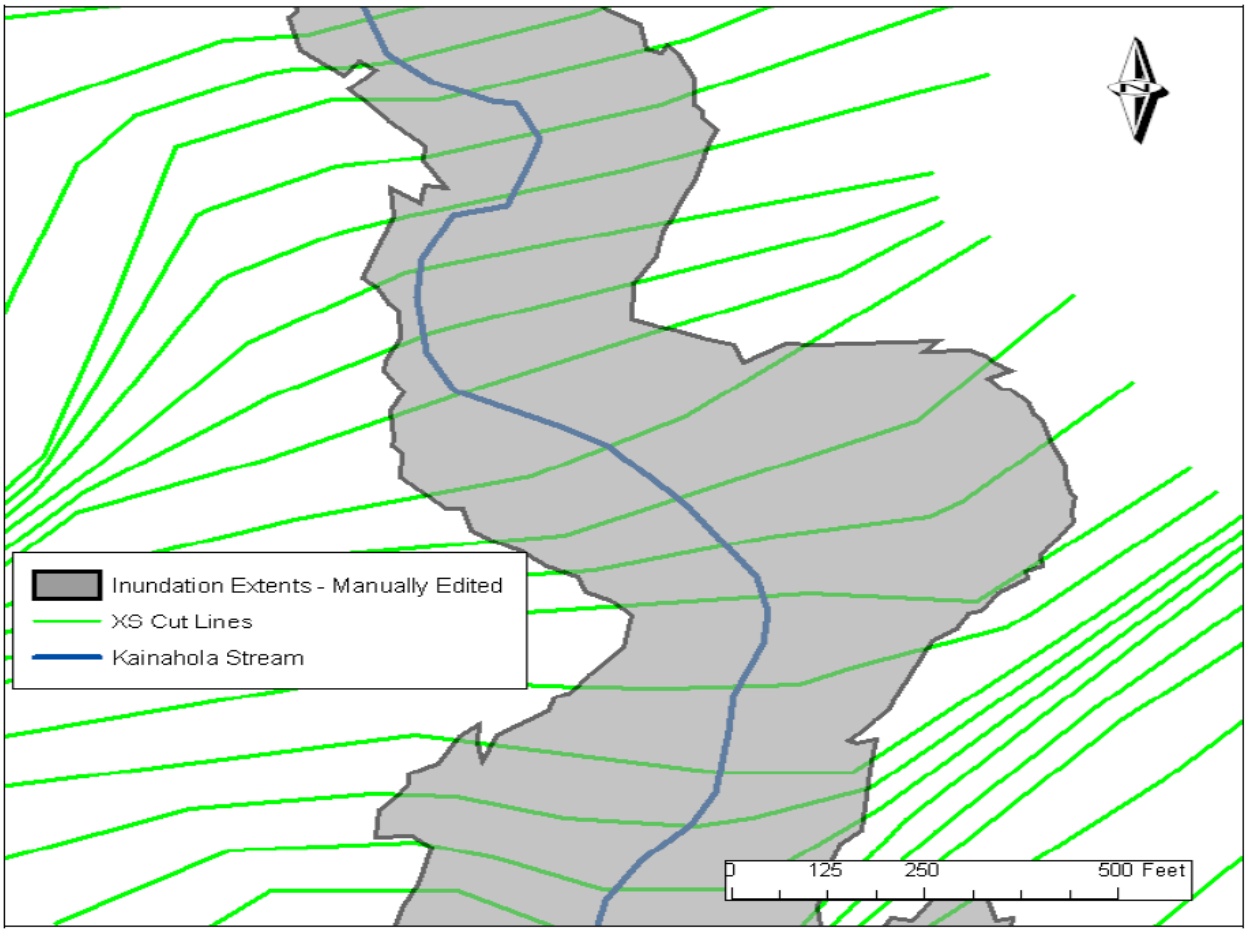

Figure 9: Example of inundation extents coverage manually edited.

4.3 Model Results

The inclusion of the lateral weirs along the Waikiki area of the Ala Wai Canal reaches resulted in a reduction in peak flow downstream of McCully Street at the 1-percent ACE (100-year) flood event; a total of approximately 5,150 cfs leaves the system and flows into the ocean. With consideration of the effects of floodplain storage and backwater along Makiki Stream, the peak flow at the mouth of the canal is reduced to about 12,675 cfs from its upstream peak of 19,500 cfs. This results in a greatly reduced flood inundation area between Kalakaua Ave. and Ala Moana Blvd. Based on the peak flow values computed for this study the Ala Wai Canal has about a 20- to 10-percent ACE (5- to 10-year) flood event capacity before overtopping. This is less than the 10-percent ACE (10-year) flood event capacity documented in Edward K. Noda and Associates, Inc. (*1994*) even with the dredging done in 2008. One reason for a reduced capacity may be due to the use of MHHW as a downstream boundary condition for all flood events and the use of a steady flow HEC-RAS model which tends to be more conservative than the in-house model used by Edward K. Noda and Associates, Inc. (*1994*). The Kalakaua Ave. Bridge was the main reason for high water-surface elevations in the upstream sections of the canal.

The flooding along lower Makiki Stream is mainly due to the high water-surface elevations of the Ala Wai Canal being such that the Makiki Stream cannot drain. Water backs up into Makiki and overtops the channel and floods the surrounding area. The flooding occurs between King St. and Kapiolani Blvd. The elevations along Kapiolani Blvd. are slightly higher than the surrounding ground, and as a result, act as a berm or weir preventing most of the flow from flooding the downstream area. A small area in the vicinity of Kaheka St. allows flow to flow over Kapiolani Blvd. and eventually into the lower area of the parking facility of the Ala Moana Center. Channel capacities for the model reaches are listed in **Table 7**. The split reaches don't have any capacities because they are not actual streams they are just the natural ground. The flooding inundation extents for lower Makiki Stream on **Figures 4** to **7** are somewhat overestimated due to the small existing channel sizes and large floodplain areas modeled. The flood mapping routines will fill in the entire cross-section width even though water may not actually flow into those areas for other factors such as walls and buildings which are not always representative in the model.

Table 7. Approximate Average Bankfull Channel Capacities and Beginning Level of Damages by Annual Probability for Stream Reaches in the HEC-RAS Model for the Ala Wai Canal Watershed, Oahu, Hawaii

River	Reach	Average Bankfull Peak Discharge Capacity (cfs)	Percent Chance Flood	Recurrence Interval (years)
Ala Wai	Lower	12,200	20	5
Ala Wai	Middle	6,900	20	5
Ala Wai	Upper	1,300	20	5
Kanaha	Ditch	350	20	5
Kanaha	Split	N/A	N/A	N/A
Makiki	Upper	1,200	5	20
Manoa	Main	3,500 to 7,600	20 to 2	5 to 50
Palolo	Main	3,400 to 6,000	10 to 2	10 to 50
Palolo	Lower	15,400	2	50
Pukele	Tributary	2,700	2	50
UH_Split	UH_Split	N/A	N/A	N/A
Waiomao	Tributary	2,600	2	50

The flooding along Kanaha Ditch is similar to the flooding along Makiki Stream. The water-surface elevation at the confluence of the ditch causes a backwater effect in the ditch and does not allow it to drain. Water overtops the channel and flows down slope. Water flows across Wilder St. and floods the area approximately bounded by Kewalo St. and Keeamoku St. Water is stopped by the H1 Freeway where it will pond and presumably make its way into the stormwater drainage systems.

Another issue with the flood modeling in the Makiki area is the discharge contained in the stream channel where floodwalls exist. These floodwalls are built upon the stream channel walls (**Photo 1**) and may or may not prove suitable to contain large flood

events. It was assumed in the HEC-RAS model that none of these types of levee-like structures would fail during any of the model runs. **Photo 2** shows that some locations may not prove adequate and the resulting flood inundation areas may be larger than shown on **Figures 4** to **7**.

As can be seen for the flood inundation maps (**Figures 4** to **7**), the floodplain boundaries for the lower Makiki Stream, the Manoa-Palolo Drainage Canal, and the Ala Wai Canal are shown in some areas as reaching the watershed boundaries. This result could be overly conservative if the hydrograph volume is insufficient to produce such flooding. Also, the flood inundation limits reach the model boundary such as at the upper end of the Ala Wai Canal. Flooding at these locations will more than likely flow into Kapiolani Park and then into the ocean. A manually edited map should account for this possibility.

Results of the detailed modeling of Palolo Stream indicate a channel capacity capable of holding a 2-percent ACE (50-year) flood event between Palolo Ave. Bridge and Kahlua Rd. Bridge. The capacity downstream is between the 5- to 2-percent ACE (20- to 50-year) flood events.

As previously documented (*U.S. Army Corps of Engineers, 2005; Oceanit, 2008b*) the Manoa Stream has channel capacity limitations between Kahaloa Drive Bridge and Woodlawn Drive Bridge which creates a flooding hazard for the nearby residences and the University of Hawaii campus.

Flood depths for the 1-percent ACE flood event around the Ala Wai Canal, Manoa-Palolo Drainage Canal, and lower Makiki Streams (**Figure 6**) are about 1.5 to 3 feet deep on average for the out of channel floodplain. Flood depths are about 2 to 3 feet deep on average for the split flow reaches of Kanaha Split and the UH_Split overland flooding. In the upper Makiki, Manoa and Palolo Streams, flood depths can get up to 5 feet depending on the location.

As a check to existing conditions HEC-RAS model computations, a comparison was made at results near USGS gaging stations located in the study area. One difficulty is that the gages are operated using gage datum which does not correspond to a known datum such as mean sea level, and thus, to make this comparison, an approximation of gage datum converted to HEC-RAS model datum, mean sea level, was made based on information supplied by the USGS at their gage locations and the elevation data of the nearest RAS model cross-section. It is expected that this conversion has a 1 foot error and that an additional difference of +/- 0.7 foot would result from model error and USGS gage rating curve error. **Table 8** shows this comparison. The discharge value comparison is based on a common discharge values from the station rating curves and the HEC-RAS model results at that location.

Photo 1. Makiki Stream looking upstream of Fern Street, November 2009

Photo 2. Makiki Stream looking upstream of Fern Street, April 2006 Flood damage to CMU wall built on channel wall from March 31, 2006 storm. Photo by Oceanit.

Table 8. Comparison of Existing Conditions HEC-RAS Model Results with Data from USGS Stream Gaging Stations, Ala Wai Canal Watershed, Oahu, Hawaii.

USGS Gage Station Number	HEC-RAS Model Reach	HEC-RAS cross-section Location	Comparison Discharge Value in ft^3/s	Gage Water Surface Elevation converted to Model Elevation (ft)	HEC-RAS Model Water-Surface Elevation (ft)
16242500	Manoa Main	1230	4,450	36.4 or 38.8	38.07
16247000	Palolo Main	9520	1,200	96.2	95.72
16247100	Palolo Lower	3201	10,910	11.9	12.93

As can be seen from comparison, water surface elevation results fall within the expected error of +/- 1.7 feet. At station 16242500, two water station elevations were computed for the conversion as the data points for the conversion was more vague that at the other two locations.

4.4 Sensitivity and Uncertainty

To test the sensitivity of the model to variation in Manning's "n" values, model runs were made varying the "n" values by +/- 20%. Results of the model runs show that for the upper reaches of Makiki, Manoa, Palolo, Pukele, Waiamao, Kanaha, there was virtually no difference in water surface elevation. This is due to the fact that these reaches are flowing at critical depth or in the supercritical flow regime. The lower reaches of of Makiki and the Manoa-Palolo canal, the difference in water surface was about 0.25 ft. In the UH_split reach, the difference in water surface elevation varied from +/- 0.2 ft. to a maximum of +/- 0.4 ft. On the alaWai canal, the difference ranged from +/- 0.2 feet in the upper reach to +/- 0.4 ft. in the lower reach.

These values were much lower than the minimum values specified in Engineer Manual 1110-2-1619, Risk-Based Analysis for Flood Damage Reduction Studies, (EM 1110-2-1619) provides guidance in determining risk and uncertainty. Table 5-2 of EM 1110-2-1619 provides minimum values for the standard deviation of error in stage. This table is reproduced below as **Table 9**.

Table 9. Minimum Standard Deviation of Error in Stage

Manning's n Value Reliability[1]	Cross Section Based on Field Survey Or Aerial Spot Elevation	Cross Section Based on Topographic Map with 2-5' Contours
Good	0.3	0.6
Fair	0.7	0.9
Poor	1.3	1.5

1- Where good reliability of Manning's n value equates to excellent to very good model adjustment/validation to a stream gage, a set of high water marks in the project effective size range, and other data. Fair reliability relates to fair to good model adjustment/validation for which some, but limited, high water mark data is available. Poor reliability equates to poor model adjustment/validation or essentially no data exists for model adjustment/validation.

As stated in Section 3.1.2, elevation data used in the hydraulic model was obtained from LIDAR data collected in late 2006 and early 2007. The data has an accuracy of 1.5 feet in the horizontal plane and 1.2 feet in the vertical plane. The elevations were processed with a 5 foot point spacing. Spot elevations were developed to a 0.1 foot accuracy.

Manning's "n" values were estimated from field observations and engineering judgement. These values were refined based on model calibration as described in Section 4.3. Due to the limited data available for calibration, the reliability of the Manning's "n" values used can be considered fair.

Using **Table 9** as a guide, the standard deviation was set to 0.7 feet. This factor was applied to all water surface elevations calculated during the model runs.

5 WITH PROJECT HYDROLOGIC MODELING

5.1 Detention Analysis

In order to determine the effectiveness of detention basins throughout the watershed, the HEC-HMS model, the Technical Summary Report, Manoa Watershed Project (*Oceanit, 2008c*), and other hydrologic analysis were used to study different detention basin scenarios.

5.2 Preliminary Analysis

Initially, 12 different sites were selected throughout the watershed. **Figure 10** shows the locations of the proposed detention basins. Each detention basin was designed to maximize effectiveness while remaining within reasonable vertical and horizontal limitations. Each basin was examined to determine the potential flow reduction. Basins were analyzed for all eight storm events.

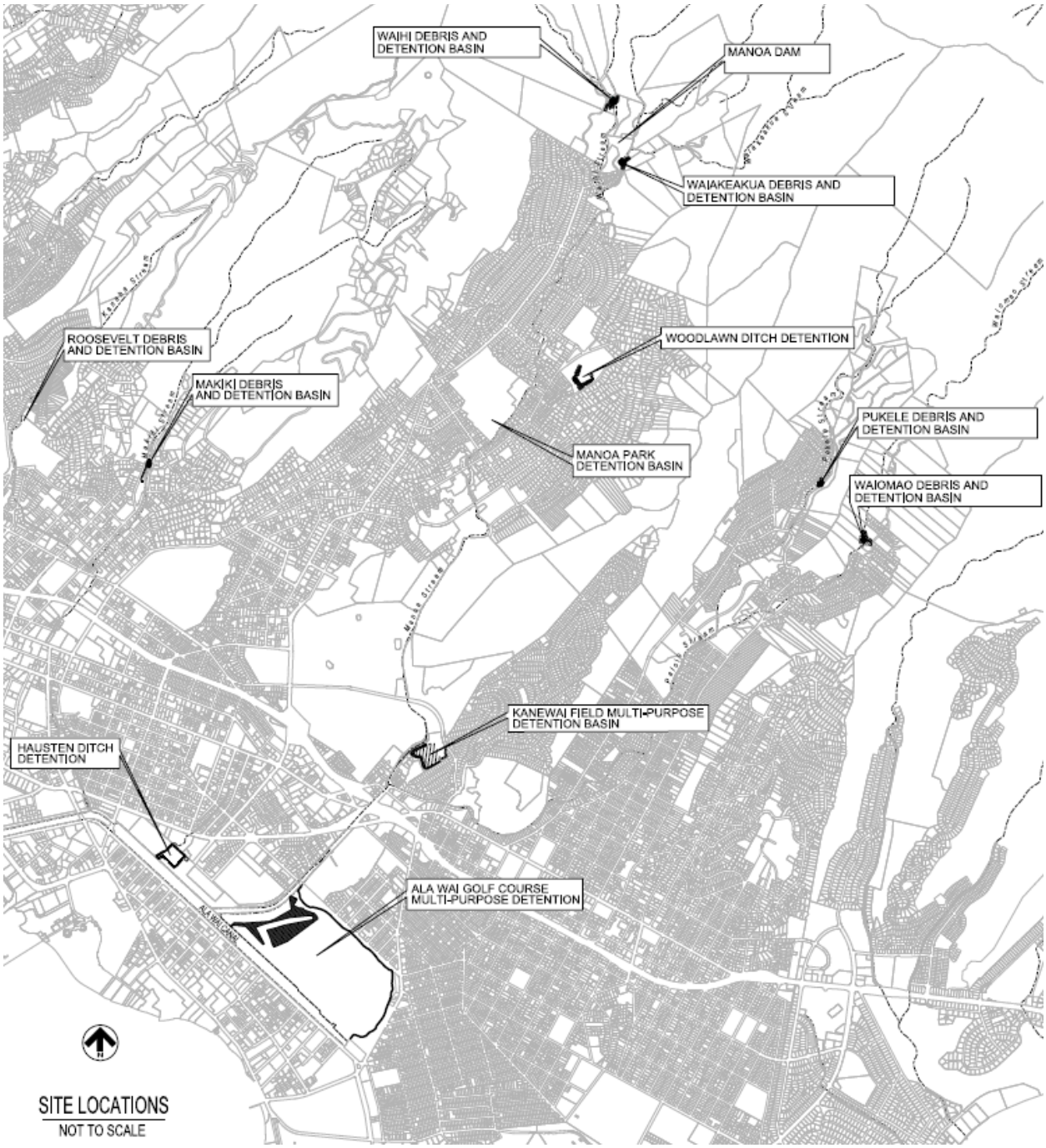

Figure 10: Preliminary Detention Basin Locations

Roosevelt Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into Kanaha Stream. The design assumes a downstream capacity of 1,254 cfs and 20 foot high berms with an emergency spillway. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into

Kanaha Stream. In addition, the basin is designed to use existing open space (i.e. no residential houses). There is an arch culvert under the berm; it is 12' long and 4'-1" high. The outlet allows about 946 cfs to pass through into Kanaha Stream.

Makiki Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into Makiki Stream. The design assumes a downstream capacity of 450 cfs and 24 foot high berms with an emergency spillway. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Makiki Stream. In addition, the basin is designed to use existing open space (i.e. no residential houses). There is an arch culvert under the berm; it is 12' long and 4'-1" high. The outlet allows about 390 cfs, the 20-percent ACE (5-year) storm, to pass through into Makiki Stream.

Hausten Ditch Detention

This basin is designed to temporarily contain water while the slide gates at Hausten Ditch Bridge are up. The slide gates will be down during a flood event to prevent water from Ala Wai Canal flowing back into Hausten Ditch. In addition, the basin is designed to use existing open space (i.e. no residential houses).

Ala Wai Golf Course Multi-Purpose Detention

This multi-purpose detention basin is designed to contain water on the golf course and prevent flood waters from leaving. There will be earthen berms constructed on the north and east sides of the golf course, the berms will basically follow the existing golf cart road. The berms have an average height of 3 feet.

A sediment basin would be located in the vicinity surrounding holes 12 to 18 of the Ala Wai Golf Course. Flows from the Manoa-Palolo Drainage Canal would be diverted into the sediment basin, which would help reduce the amount of sediment deposited into the Ala Wai Canal. Flows would reenter into the Canal at two locations, a new outlet connected to the sediment basin and an existing outlet.

Manoa Dam

This dam is designed to contain all of the predicted upstream storm water. Through modeling and rain data, it was determined that the dam needed to retain about 17,000,000 cf of water behind the residential neighborhoods of Manoa. This large quantity of water severely restricted the dam location and forced a maximum height of 50 feet. Two spillways capable of handling 3,450 cfs each located above the river bed. The spillways were sized to allow overflow for a 0.2-percent ACE (500-year) storm, with a peak flow of 6,900 cfs. There are two outlets, one into Waihi Stream and one at the junction of Luaalea and Waiakeakua Stream. The Waihi Stream 5x7 foot culvert has a capacity of 1,770 cfs and the Waiakeakua Stream 5x6 foot culvert has a capacity of 1,890 cfs, representing flows from a 20-percent ACE (5-year) storm. Flows greater than this will cause water to back up and be retained behind the dam (*Oceanit, 2008c*). In

addition, the structure is to not interfere with existing farms and houses near the basin site.

Waihi Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into the Manoa residential area. The design assumes a maximum downstream capacity of 3,000 cfs and a maximum 24 foot height and minimum containment of 125,000 cubic feet. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Manoa Stream. In addition, the structure is to not interfere with existing farms and houses near the basin site.

There is an arch culvert under the berm; it is 12' long and 4'-1" high. The outlet allows about 2,000 cfs, the 20-percent ACE (5-year) storm, to pass through into Manoa Stream. The emergency spillway would begin to overflow when the retention capacity of 125,000 cf is exceeded.

Waiakeakua Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into the Manoa residential area. The design assumes a maximum downstream capacity of 3,000 cfs and a maximum 20 foot height and minimum containment of 346,000 cubic feet. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Manoa Stream. In addition, the structure is to not interfere with existing farms and houses near the basin site.

There is an arch culvert under the berm; it is 12' long and 4'-1" high. The outlet allows about 1,475 cfs, the 20-percent ACE (5-year) storm, to pass through into Manoa Stream. The emergency spillway can handle an extra 3,150 cfs should such high flows occur.

Woodlawn Ditch Detention Basin

The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Woodlawn Ditch will eventually flow into Manoa Stream. The design assumes a maximum downstream capacity of 2,750 cfs and a maximum 20 foot height, there is also a 3x80 foot concrete-lined emergency spillway. The design assumes that slightly less than 750 cfs will flow into Woodlawn Ditch while the remaining flow will be contained in the detention basin during a flood event.

There is an arch culvert under the berm; it is 12' long and 4'-1" high. The outlet allows about 977 cfs out into Woodlawn Ditch.

Manoa Park Detention Basin

The basin is designed to use existing open space (i.e. no residential houses, use of park land) to create a detention basin that is both useful and aesthetically pleasing to the community. The detention basin is designed to handle an inflow of 4,250 cfs;

additional flows up to 2,490 cfs will require the use of the emergency spillway. The berm has a maximum eight of 13 feet and it would border three sides of Manoa District Park. The intake pipes from Poelua Place lies underground and has a bubble-up structure located in the south east corner of the park, covered by a concrete pad to ease in clean-up procedures. The bubble-up structure intakes both 10x10 foot box culverts and has a 2 foot diameter concrete outlet pipe for slow drainage back into Manoa Stream. Any water that does not immediately drain is bubbled into the basin. The basin has graded contours to allow water to accumulate to the southeast corner of the park at the drainage. For aesthetics and for clean-up the three surrounding berms have bleachers on the inside. The new landscaped park has room to contain two baseball fields and a soccer field.

Kanewai Field Multi-Purpose Detention Basin

The basin is designed to use existing open space (park land) to temporarily contain floodwaters. The intake into Kanewai Field is intended to handle 3,960 cfs of the stream inflow and outflow. The existing drainage pipe is able to drain 62 cfs. Kanewai Field will be surrounded by a 7 feet high earthen berm, but protecting the existing structures. On the northwest end of the basin, adjacent to Manoa Stream, the berm is graded down to a 3x60 foot spillway that will allow water to flow into the basin when the river level is high and out of the basin once the high flows have passed.

Pukele Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into Pukele Stream. The design assumes a downstream capacity of 1,700 cfs and a 24 foot high berm with an emergency spillway. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Makiki Stream. There is an arch culvert under the berm; it is 12’ long and 4’-1” high. The outlet allows about 300 cfs, to pass through into Pukele Stream.

Waiomao Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into Waiomao Stream. The design assumes a downstream capacity of 1,540 cfs and a 24 foot high berm with an emergency spillway. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Makiki Stream. There is an arch culvert under the berm; it is 12’ long and 4’-1” high. The outlet allows about 400 cfs, to pass through into Pukele Stream.

6 WITH PROJECT HYDRAULIC MODELING

6.1 Detention Analysis

For each of the detention scenarios modeled (See With Project Hydrologic Modeling Section) the HEC-RAS model was modified with the revised flows.

6.2 Debris Catchment Analysis

In order to determine the effectiveness of debris catchments throughout the watershed, the HEC-RAS model, the Technical Summary Report Manoa, Watershed Project (*Oceanit, 2008c*), and other analysis were used to study different debris catchment scenarios.

6.2.1 Preliminary Analysis

Initially, 7 different sites were selected throughout the watershed. **Figure 11** shows the locations of the proposed debris catchment sites. Each debris catchment was designed to maximize effectiveness while remaining in a viable location within reasonable vertical and horizontal limitations.

Waiakeakua Debris Catchment

This structure is designed to catch large debris. It allows all flood flows to pass through the debris poles. It is assumed that the largest river flow will be below the maximum height of the poles and will span the length of the debris catchment structure. The structure consists of a 2-foot thick concrete pad that spans 140 feet across the stream and the floodplain with a width of 8 feet. Steel posts 8 inches in diameter and between 4 to 7 feet high are evenly spaced at 4 feet along the center of the concrete pad.

Waihi Debris Catchment

This structure is designed to catch large debris. It allows all flood flows to pass through the debris poles. It is assumed that the largest river flow will be below the maximum height of the poles and will span the length of the debris catchment structure. The structure consists of a 2-foot thick concrete pad that spans 140 feet across the stream and the floodplain with a width of 8 feet. Steel posts 8 inches in diameter and between 4 to 7 feet high are evenly spaced at 4 feet along the center of the concrete pad (*Oceanit, 2008c*).

Poelua Place Debris Basin

This basin is designed to provide a capture point for large debris before they reach bridges downstream. In addition, the debris basin will slow the velocity of floodwaters. The debris basin is intended to capture debris in flows larger than a 50-percent ACE (2-year) stream flow and allow passage of all flows.

The debris basin consists of two separate structures. On the east side is the actual basin. The old oxbow lot will be dug down to reclaim the bend in the stream. A small berm surrounding the basin protects the existing neighborhoods from any water that may spill out of the basin. Water carrying large debris enters the northern end of the basin, curves around, and reenters the stream at the south end. Any large debris floating atop the flood waters are caught by a debris catcher consisting of five 8 inch diameter steel posts secured by a concrete pad.

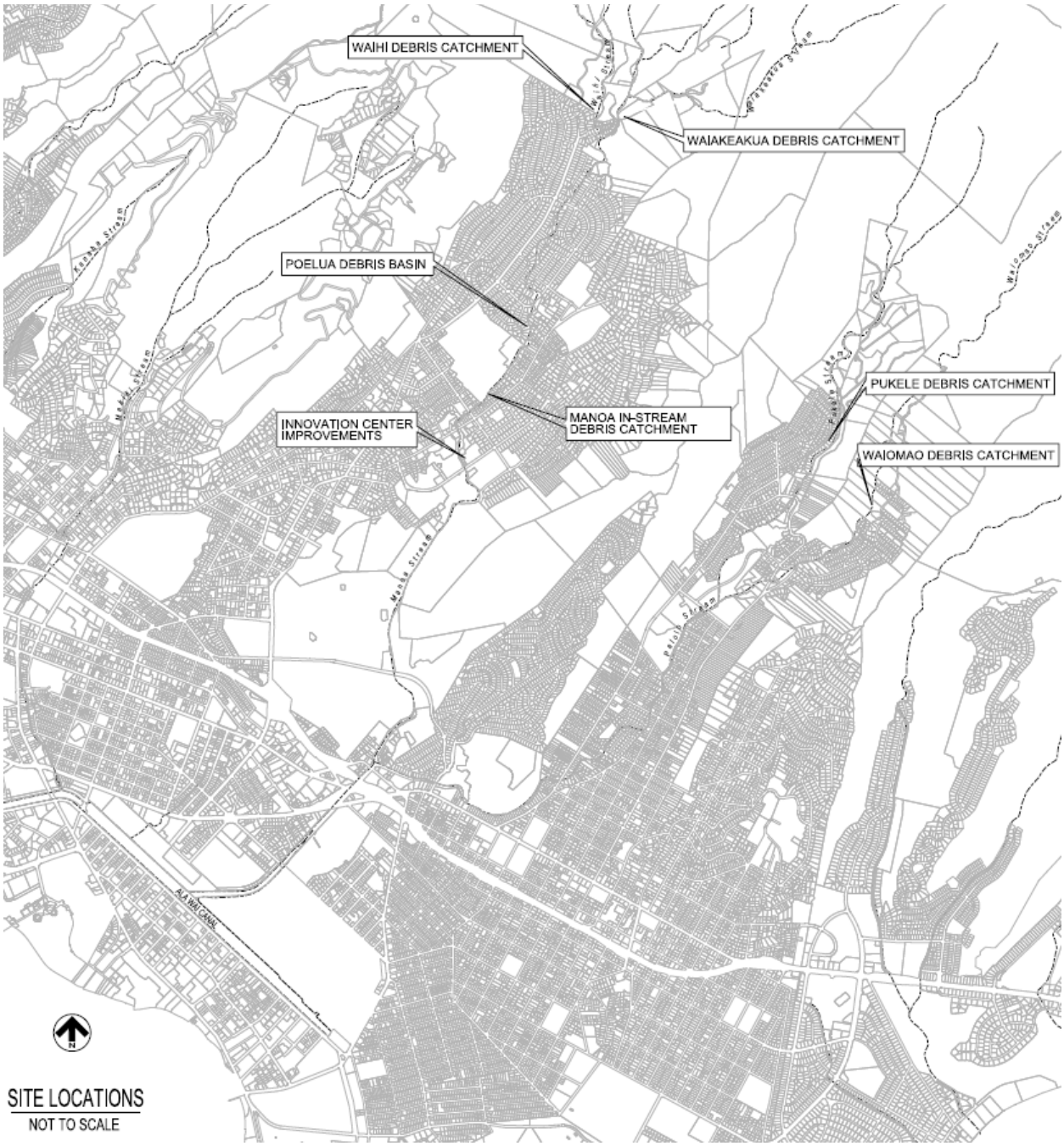

Figure 11: Preliminary Debris Catchment Locations

Manoa In-Stream Debris Catchment

This structure is designed to catch large debris. It allows all flood flows to pass through the debris poles. It is assumed that the largest river flow will be below the maximum height of the poles and will span the length of the debris catchment structure. The structure consists of a 2-foot thick concrete pad that spans 60 feet across the stream

and the floodplain with a width of 8 feet. Steel posts 8 inches in diameter and between 4 to 7 feet high are evenly spaced at 4 feet along the center of the concrete pad.

Innovation Center Improvements

The basis of this design is to restore the original floodplain between East Manoa Road Bridge and Woodlawn Bridge to lower the volume of floodwaters entering downstream of Woodlawn Bridge. A new floodplain will be created. The floodplain is intended to be inundated and capture debris when flows exceed the 50-percent ACE (2-year) storm flow. Water on the floodplain will re-enter the stream after is passes through the debris catchers (*Oceanit, 2008c*). The debris catchers consists of a 1-foot thick concrete pad that spans 250 feet parallel to the stream and the floodplain with a width of 6 feet. Steel posts 8 inches in diameter and 4 feet high are evenly spaced at 6 feet along the center of the concrete pad.

Waiomao Debris Catchment

This structure is designed to catch large debris. It allows all flood flows to pass through the debris poles. It is assumed that the largest river flow will be below the maximum height of the poles and will span the length of the debris catchment structure. The structure consists of a 2-foot thick concrete pad that spans 50 feet across the stream and the floodplain with a width of 8 feet. Steel posts 8 inches in diameter and between 4 to 7 feet high are evenly spaced at 4 feet along the center of the concrete pad.

Pukele Debris Catchment

This structure is designed to catch large debris. It allows all flood flows to pass through the debris poles. It is assumed that the largest river flow will be below the maximum height of the poles and will span the length of the debris catchment structure. The structure consists of a 2-foot thick concrete pad that spans 25 feet across the stream and the floodplain with a width of 8 feet. Steel posts 8 inches in diameter and between 4 to 7 feet high are evenly spaced at 4 feet along the center of the concrete pad.

6.3 Floodwall AnalysisIn order to determine the effectiveness of floodwalls throughout the watershed, the HEC-RAS model, the Technical Summary Report, Manoa Watershed Project (*Oceanit, 2008c*), and other analysis were used to study different floodwall scenarios.

6.3.1 Preliminary Analysis

Initially, 3 different sites were selected throughout the watershed. **Figure 12** shows the locations of the proposed floodwall sites. Each floodwall system was designed to maximize effectiveness while remaining in a viable location within reasonable vertical and horizontal limitations.

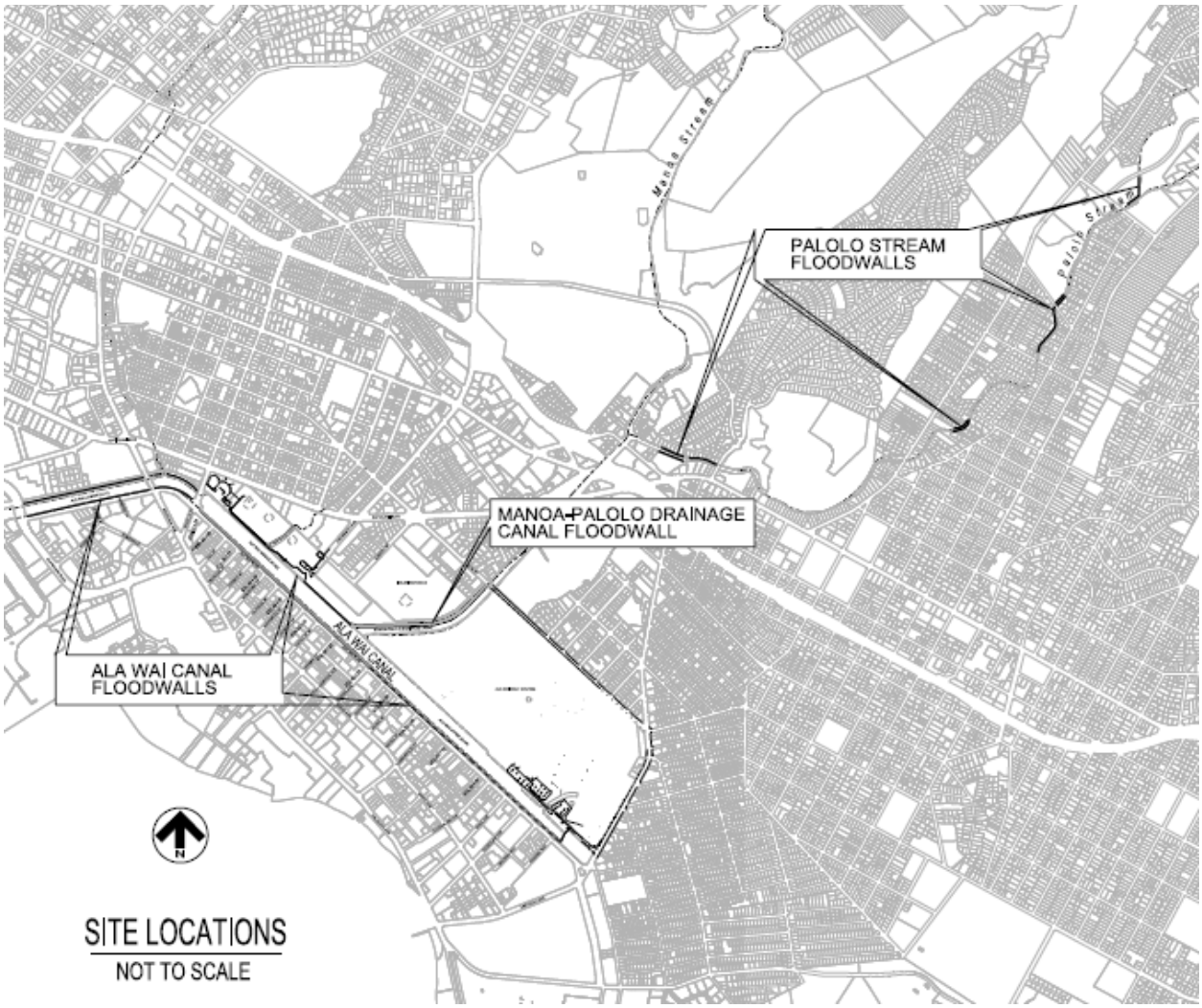

Figure 12: Preliminary Floodwall Locations

Palolo Stream Floodwalls

The Palolo Stream Floodwall system is designed to keep the 1-percent ACE (100-year) flow within the existing concrete stream channel with 90% Assurance. The floodwalls will be constructed out of reinforced concrete.

Manoa-Palolo Drainage Canal Floodwall

The Manoa-Palolo Drainage Canal Floodwall system is designed to keep the 1-percent ACE (100-year) flow from flooding the right bank with 90% Assurance. The floodwall will be constructed out of reinforced concrete and will run along the right bank from Date Street to the Ala Wai Canal.

Ala Wai Canal Floodwalls

The Ala Wai Canal Floodwall system is designed to keep the 1-percent ACE (100-year) flow within the existing channel with 90% Assurance. The entire floodwall system will be constructed out of reinforced concrete. At the upstream end the floodwall system will connect to the Ala Wai Golf Course Levee and run along the left bank of the Ala Wai Canal. There will be no floodwall on the right bank of the Canal next to the golf course. The floodwall system will continue to run along both banks all the way to the Ala Moana Blvd Bridge.

7 ALTERNATIVES

After doing analysis on the different detention basins combined with other measures such as debris catchments and floodwalls alternatives were developed. See the Feasibility Report for the full formulation of the Alternatives. This section explains which measures were used for three different alternatives.

7.1 Alternative 1A

Alternative 1A was developed using the Manoa Dam to detain as much flow as it could without using other detention measures along Manoa Stream. The emphasis of this alternative was the Manoa Dam because majority of the flows that reach the Ala Wai Canal are from Manoa Stream. The Manoa Dam would be constructed to allow debris to be caught during storm events to prevent debris from the upper watershed from entering Manoa Stream. An in-stream debris catchment was also used in this alternative to catch debris that entered the stream downstream of the dam. This measure is located right below Manoa District Park.

Waiomao Debris and Detention Basin and Pukele Debris and Detention Basins were also used in this alternative above Palolo Stream. These two measures were used to lower the peak flow in Palolo Stream, these measures also prevented debris from entering the concrete lined Palolo Stream. The two debris and detention basins did not lower the 1-percent ACE (100-year) storm enough to provide 90% Assurance so floodwalls were also added to this alternative in certain areas to attain 90% Assurance for the 1-percent ACE (100-year) event. A floodwall was also added on the right bank of the Manoa-Palolo Drainage Canal to prevent flooding in and around Iolani School.

The Roosevelt Debris and Detention Basin was used in the Makiki Watershed to lower the peak flow. This measure also catches debris to prevent it from entering Makiki Stream. Floodwalls were analyzed in Makiki but they were not feasible because of the required heights.

Even with the Manoa Dam, floodwalls along the Ala Wai Canal are still needed to prevent the 1-percent ACE (100-year) storm event from flooding Waikiki and Moiliili. The Hausten Ditch Detention was used in conjunction with the Ala Wai Canal Floodwall system to prevent interior drainage from flooding Moiliili when slide gates are closed at the Hausten Ditch Pedestrian Bridge.

7.2 Alternative 2A

The emphasis for Alternative 2A was not to detain water in the un-urbanized areas. Therefore, there were no detention basins or dams in the upstream areas of Manoa Stream but the Woodlawn Ditch Detention Basin, the Manoa Park Detention Basin, and the Kanewai Field Multi-Purpose Detention Basin were used in this alternative. Because there were no debris and detention basins in the upstream area a debris catchment will be constructed at Waiakeakua Stream and Waihi Stream. An in-stream debris catchment will also be constructed at Poelua Place; this is just upstream of the Manoa Park Detention Basin's intake so the debris catchment prevents debris from going down stream of that location including preventing debris from clogging up the intake. An in-stream debris catchment will also be constructed next to the Innovation Center just upstream of Woodlawn Bridge.

No detention measures were used in the Palolo Watershed; there just isn't any land available along Palolo Stream. The floodwall from Alternative 1 was also added on the right bank of the Manoa-Palolo Drainage Canal to prevent flooding in and around Iolani School.

The Makiki Debris and Detention Basin and the Roosevelt Debris and Detention Basins were used in the Makiki Watershed because that was the only measure that could be used to lower flows in that watershed. Same as Alternative 1, the floodwalls were analyzed in Makiki but they were not feasible because of the required heights.

Floodwalls along the Ala Wai Canal are also needed to prevent the 1-percent ACE (100-year) storm event from flooding Waikiki and Moiliili. The Hausten Ditch Detention was used in conjunction with the Ala Wai Canal Floodwall system to prevent interior drainage from flooding Moiliili when slide gates are closed at the Hausten Ditch Pedestrian Bridge. The Ala Wai Golf Course Multi-Purpose Detention was also used in conjunction with the Ala Wai Canal Floodwall system.

7.3 Alternative 3A

This alternative was created to lower as much flow as possible without using the Manoa Dam, a more effective and logical approach to flood protection. The Waiakeakua Debris and Detention Basin along with the Waihi Debris and Detention Basin and the Woodlawn Ditch Detention Basin were used along Manoa Stream. The in-stream debris catchment below Manoa District Park would also be a part of this alternative to catch debris that enters the stream downstream of Waiakeakua and Waihi Streams. The debris catchment at the Innovation Center was initially part of this alternative but after doing incremental justification the Kanewai Field Multi-Purpose Detention Basin was a better overall measure to use in this alternative instead.

The Waiomao Debris and Detention Basin and the Pukele Debris and Detention Basin were both used for the Palolo Watershed. After doing further analysis the floodwalls along Palolo Stream were too costly and infeasible. Further analysis was also done on

the floodwall along the Manoa-Palolo Drainage Canal and that measure was not incrementally justified.

The Makiki Watershed initially used the Makiki Debris and Detention Basin and the Roosevelt Debris and Detention Basins but after incremental justification the Roosevelt Debris and Detention Basin was not justified. As in Alternatives 1 and 2, the floodwalls were analyzed in Makiki but they were not feasible because of the required heights.

Floodwalls along the Ala Wai Canal are also needed in this alternative to prevent the 1-percent ACE (100-year) storm event from flooding Waikiki and Moiliili. The Hausten Ditch Detention was used in conjunction with the Ala Wai Canal Floodwall system to prevent interior drainage from flooding Moiliili when slide gates are closed at the Hausten Ditch Pedestrian Bridge. The Ala Wai Golf Course Multi-Purpose Detention was also used in conjunction with the Ala Wai Canal Floodwall system. This alternative became our TSP.

Detailed hydrologic modeling of the detention basins included as part of the TSP was performed to refine the design and determine their effectiveness as part of the system-wide alternative. The detention basins were inserted into the HEC-HMS hydrologic model and simulation runs were made for the 50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% AEP events. In addition, a 0.999% AEP event simulation was run for purposes of inclusion into the HEC-FDA economic model. Figure 13 below shows the HEC-HMS basin schematic for Alternative 3A.

For each detention basin, elevation-storage relationships were developed in GIS from the elevation data. Initial outlet configurations were selected and the hydrologic model was run to determine the basin effectiveness. The initial objective of the basin design was to allow flows up to the 20% AEP event to pass with minimal storage and to reduce outflows at the 1% AEP event to be sufficiently reduced to provide flood damage reduction benefits. Through an iterative process, embankment elevations and outlet configurations were adjusted until satisfactory results were obtained. The final basin specifications and modeling results are presented in the following section.

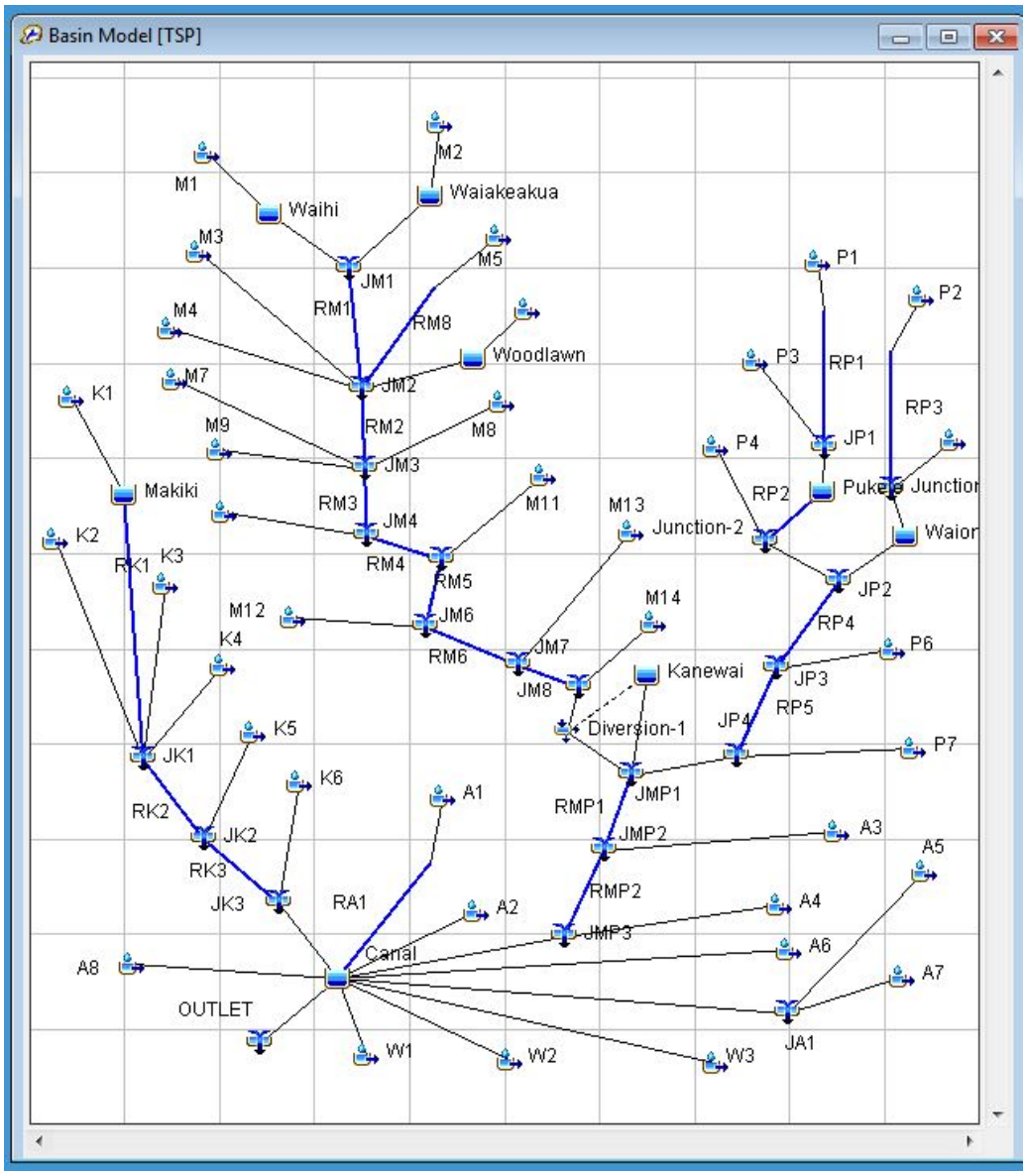

Figure 13. HEC-HMS Basin Schematic – Alternative 3A

7.3.1 Detention Analysis

As a result of the hydrologic modeling, refinements to the basin specifications were made which differ from the preliminary analysis. The refined basin specifications are described in the following paragraphs.

Waiakaekua Detention and Debris Basin

The detention basin will be formed by constructing an earthen berm approximately 34 feet in height and having a 20 foot top width. The top of the berm will be set at elevation 338.0 ft msl. A 1 foot thick concrete spillway 40 feet in length and 80 feet in width will

be constructed at elevation 334.0 ft msl. The downstream face of the embankment will have a slope of 2H:1V and the upstream face will have a slope of 3H:1V. A 2 foot thick layer of grouted riprap will protect the embankment face from erosion.

The outlet of the basin will consist of a 12' x 6' corrugated metal arch. The ends of the arch will be mitered to match the embankment slopes. The estimated length of this culvert is about 200 feet. The upstream invert of the culvert is at elevation 304.0 ft msl and the downstream invert is at elevation 299.0 ft msl. At the upstream end of the outlet culvert, a series of seven (7) eight inch diameter concrete filled steel pipe will be installed to serve as a debris trap. The downstream end of the outlet culvert will require riprap protection from erosion.

This basin configuration was modeled in the hydrologic model and the following table, **Table 10**, shows the results of the modeling.

Table 10. Waiakaekua Detention Basin Modeling Results

Exceedance Prob. (%)	Recurrence Interval	HEC-HMS Output			
		Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Elev. (ft)
0.999	1	331	331	0.3	309.2
50	2	514	512	0.9	311.2
20	5	813	758	4.2	317
10	10	1075	930	9	321.2
5	20	1365	1083	16.7	325.6
2	50	1786	1272	33.1	332.1
1	100	2128	1643	43.9	335.1
0.5	200	2503	2167	47.9	336.2
0.2	500	3034	2834	51.6	337.2

Woodlawn Ditch Detention Basin

The detention basin will be formed by constructing an earthen berm approximately 20 feet in height and having a 10 foot top width. The top of the berm will be set at elevation 220.0 ft msl. A 1 foot thick concrete spillway 25 feet in length and 80 feet in width will be constructed at elevation 217.0 ft msl. The downstream face of the embankment will have a slope of 2H:1V and the upstream face will have a slope of 3H:1V. A 2 foot thick layer of grouted riprap will protect the embankment face from erosion.

The outlet of the basin will consist of a 12' x 4.1' corrugated metal arch culvert. The ends of the arch will be mitered to match the embankment slopes. The estimated length of this culvert is about 110 feet. The upstream invert of the culvert is at elevation 200.0 ft msl and the downstream invert is at elevation 199.0 ft msl.

This basin configuration was modeled in the hydrologic model and the following T**able 11** shows the results of the modeling.

Table 11. Woodlawn Ditch Detention Basin Modeling Results

Exceedance Prob. (%)	Recurrence Interval	HEC-HMS Output			
		Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Elev. (ft)
0.999	1	122	119	0.7	205.3
50	2	190	184	1.2	207.1
20	5	300	282	2.1	209.5
10	10	394	364	3.1	211.5
5	20	497	446	4.5	213.4
2	50	646	554	7.1	216.4
1	100	765	710	8.6	217.6
0.5	200	896	866	9.1	218.1
0.2	500	1079	1068	9.8	218.5

Kanewai Field Detention Basin

The detention basin will be formed by constructing an earthen berm approximately 9 feet in height and having a 10 foot top width. The top of the berm will be set at elevation 43.0 ft msl. Flow will enter the basin by way of a lateral weir located at the northwest corner of the basin along the left bank of Manoa Stream. The weir will consist of a 2 foot thick concrete spillway set at elevation 40.0 ft msl and having a weir length of 54 feet. The weir will have side slopes of 3H:1V until meeting the berm elevation for a total length of 60 feet. The interior face of the embankment will have a slope of 2H:1V and the exterior face will have a slope of 3H:1V. A 2 foot thick layer of grouted riprap will protect the spillway approach slopes from erosion.

The outlet of the basin consists of an existing 2' diameter drainage pipe leading back into Manoa Stream. The inlet of the drainage pipe is set at the floor of the basin at its existing elevation of 34.0 ft msl. The outlet of the pipe extends into the left bank of the stream.

This basin configuration was modeled in the hydrologic model and the following **Table 12** shows the results of the modeling.

Table 12. Kanewai Detention Basin Modeling Results

Exceedance Prob. (%)	Recurrence Interval	HEC-HMS Output			
		Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Elev. (ft)
0.999	1	0	0	0	30
50	2	0	0	0	30
20	5	1	1	0	30.5
10	10	130	29	3.4	35.8
5	20	260	35.6	11.3	36.2
2	50	418	41.8	26.2	40.9
1	100	504	42.2	27.2	41
0.5	200	553	42.2	27.4	41.1
0.2	500	746	42.3	27.7	41.1

Waihi Detention and Debris Basin

The detention basin will be formed by constructing an earthen berm approximately 37 feet in height and having a 10 foot top width. The top of the berm will be set at elevation 404.0 ft msl. A 1 foot thick concrete spillway 20 feet in length and 100 feet in width will be constructed at elevation 400.0 ft msl. The downstream face of the embankment will have a slope of 2H:1V and the upstream face will have a slope of 3H:1V. A 2 foot thick layer of grouted riprap will protect the embankment face from erosion.

The outlet of the basin will consist of a 12' x 6' box culvert with wingwalls flared at an angle of 45 degrees and extending until they reach the natural channel side slope. The estimated length of this culvert is about 205 feet. The upstream invert of the culvert is at elevation 367.0 ft msl and the downstream invert is at elevation 357.0 ft msl. At the upstream end of the outlet culvert, a series of seven (7) eight inch diameter concrete filled steel pipe will be installed to serve as a debris trap. The downstream end of the outlet culvert will require riprap protection from erosion.

This basin configuration was modeled in the hydrologic model and the following **Table 13** shows the results of the modeling.

Table 13. Waihi Detention Basin Modeling Results

Exceedance Prob. (%)	Recurrence Interval	HEC-HMS Output			
		Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Elev. (ft)
0.999	1	488	486	0.2	373.5
50	2	756	755	0.4	375.9
20	5	1199	1174	1.5	381.2
10	10	1581	1499	3.5	386.8
5	20	2006	1781	8	393.2
2	50	2611	2244	17.7	400.7
1	100	3102	2919	19.8	401.9
0.5	200	3640	3581	21.3	402.8
0.2	500	4400	4332	23	403.7

Waiamao Detention and Debris Basin

The detention basin will be formed by constructing an earthen berm approximately 33.5 feet in height and having a 10 foot top width. The top of the berm will be set at elevation 402.0 ft msl. A 1 foot thick concrete spillway 20 feet in length and 100 feet in width will be constructed at elevation 398.6 ft msl. The downstream face of the embankment will have a slope of 2H:1V and the upstream face will have a slope of 3H:1V. A 2 foot thick layer of grouted riprap will protect the embankment face from erosion.

In order to obtain the required storage, excavation of the channel bottom is required. This excavation will enlarge the channel to a 30 foot bottom width having near vertical side slopes (0.5:1HV). From the upstream invert of the outlet culvert the channel bottom will rise at a slope of 2% for a distance of about 200 feet to aid in draining the basin. At this point the channel will transition to the existing channel geometry over a distance of about 200 feet. This excavation will remove an estimated 3.060 CY of material.

The outlet of the basin will consist of a 20’ x 5’ box culvert with a headwall extending across the channel bottom. The estimated length of this culvert is about 178 feet. The upstream invert of the culvert is at elevation 368.6 ft msl and the downstream invert is at elevation 367.6 ft msl. At the upstream end of the outlet culvert, a series of seven (7) eight inch diameter concrete filled steel pipe will be installed to serve as a debris trap. The downstream end of the outlet culvert will require riprap protection from erosion.

This basin configuration was modeled in the hydrologic model and the following **Table 14** shows the results of the modeling.

Table 14. Waiamao Detention Basin Modeling Results

Exceedance Prob. (%)	Recurrence Interval	HEC-HMS Output			
		Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Elev. (ft)
0.999	1	352	351	1.3	372.1
50	2	656	649	1.8	373.9
20	5	1141	1123	2.9	377.3
10	10	1579	1522	5	380.9
5	20	2049	1906	8.6	385.5
2	50	2709	2414	16.5	393.1
1	100	3257	2531	28.7	395.1
0.5	200	3873	2636	48.9	397
0.2	500	4707	3162	77.7	399.8

Pukele Detention and Debris Basin

The detention basin will be formed by constructing an earthen berm approximately 30 feet in height and having a 10 foot top width. The top of the berm will be set at elevation 441.0 ft msl. A 1 foot thick concrete spillway 20 feet in length and 80 feet in width will be constructed at elevation 437.0 ft msl. The downstream face of the embankment will have a slope of 2H:1V and the upstream face will have a slope of 3H:1V. A 2 foot thick layer of grouted riprap will protect the embankment face from erosion.

In order to obtain the required storage, excavation of the channel bottom is required. This excavation will enlarge the channel to a 30 foot bottom width having near vertical side slopes (0.5:1HV). From the upstream invert of the outlet culvert the channel bottom will rise at a slope of 1% for a distance of about 200 feet to aid in draining the basin. At this point the channel will transition to the existing channel geometry over a distance of about 300 feet. This excavation will remove an estimated 14,330 CY of material.

The outlet of the basin will consist of a 120’ x 6’ box culvert with a headwall extending across the channel bottom. The estimated length of this culvert is about 160 feet. The upstream invert of the culvert is at elevation 407.0 ft msl and the downstream invert is at elevation 405.0 ft msl. At the upstream end of the outlet culvert, a series of seven (7) eight inch diameter concrete filled steel pipe will be installed to serve as a debris trap. The downstream end of the outlet culvert will require riprap protection from erosion.

This basin configuration was modeled in the hydrologic model and the following **Table 15** shows the results of the modeling.

Table 15. Pukele Detention Basin Modeling Results

Exceedance Prob. (%)	Recurrence Interval	HEC-HMS Output			
		Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Elev. (ft)
0.999	1	158	154	0.7	409.8
50	2	379	369	2	412.1
20	5	774	726	4.5	415.6
10	10	1126	1031	7.5	419.2
5	20	1521	1340	12	424.1
2	50	2079	1693	22.1	431.1
1	100	2529	1946	32.6	437.1
0.5	200	3055	2758	36.7	439.1
0.2	500	3778	3612	39.4	440.5

Makiki Detention and Debris Basin

The detention basin will be formed by constructing an earthen berm approximately 33.2 feet in height and having a 10 foot top width. The top of the berm will be set at elevation 184.0 ft msl. A 1 foot thick concrete spillway 20 feet in length and 60 feet in width will be constructed at elevation 180.8 ft msl. The downstream face of the embankment will have a slope of 2H:1V and the upstream face will have a slope of 3H:1V. A 2 foot thick layer of grouted riprap will protect the embankment face from erosion.

In order to obtain the required storage, excavation of the channel bottom is required. This excavation will enlarge the channel to a 30 foot bottom width having near vertical side slopes (0.5:1HV). From the upstream invert of the outlet culvert the channel bottom will rise at a slope of 2% for a distance of about 280 feet to aid in draining the basin. At this point the channel will transition to the existing channel geometry over a distance of about 200 feet. This excavation will remove an estimated 3.035 CY of material.

The outlet of the basin will consist of a 120’ x 6’ box culvert with a headwall extending across the channel bottom. The estimated length of this culvert is about 160 feet. The upstream invert of the culvert is at elevation 407.0 ft msl and the downstream invert is at elevation 405.0 ft msl. At the upstream end of the outlet culvert, a series of seven (7) eight inch diameter concrete filled steel pipe will be installed to serve as a debris trap. The downstream end of the outlet culvert will require riprap protection from erosion.

This basin configuration was modeled in the hydrologic model and the following **Table 16** shows the results of the modeling.

Table 16. Makiki Detention Basin Modeling Results

Exceedance Prob. (%)	Recurrence Interval	HEC-HMS Output			
		Inflow (cfs)	Outflow (cfs)	Storage (ac-ft)	Elev. (ft)
0.999	1	105	105	0.7	153.4
50	2	204	203	0.9	154.9
20	5	385	382	1.3	157.1
10	10	558	542	2.2	159.5
5	20	766	716	3.9	163.6
2	50	1084	954	8.9	171
1	100	1363	1083	15.8	175.9
0.5	200	1680	1192	26.7	180.5
0.2	500	2149	1218	52.8	181

7.3.2 Peak Flow Data

The results of the hydrologic modeling were tabulated and served as the input for the hydraulic model for improved conditions. Table 15 below shows the peak flows for Alternative 3A, the Tentatively Selected Plan (TSP). Flows for the Golf Course Detention basin, the Kanewai Detention basin, Kanaha Split reach, and the UH_split reach were indexed by 0.01 cfs due to the requirement in HEC-FDA that flows are constantly increasing within a cross section. **Tables 17** and **18** compares the peak flows from the existing without-project condition with the with-project Alternative 3A condition

Table 17. Input Peak Flow Discharges in cubic feet per second for Ala Wai Canal Watershed HEC-RAS for Alternative 3A Model, Honolulu, Hawaii

Model Stream Names		Model Input Cross-section Location	Percent ACE Flood							
River	Reach		50%	20%	10%	5%	2%	1%	0.5%	0.2%
Ala Wai	Upper	9724	1,000	1,400	1,800	2,300	3,040	3,600	4,320	5,300
Ala Wai	Middle	5825	3,520	5,850	7,420	9,310	12,100	14,000	17,700	20,700
Ala Wai	Lower	2324	7,920	10,950	12,320	14,110	15,600	16,500	17,300	19,500
Golf Cs	1	1444	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08
Kanaha	Ditch	4372	270	500	700	930	1,240	1,500	1800	2,200
Kanaha	Split	3508	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08
Kanewai	1	550	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08
Makiki	Upper	10768	150	330	540	770	1,080	1,200	1,400	1,800
Makiki	Upper	7674	240	490	770	1,040	1,290	1,510	1,720	1,960
Makiki	Lower	6286	630	1,260	1,830	2,420	3,120	3,740	4,120	5,230
Makiki	Lower	3189	680	1,360	1,930	2,570	3,220	4,040	4,920	5,530
Makiki	Lower	1465	880	1,660	2,530	3,170	4,220	5,240	6,120	6,830
Manoa	Main	16506	1,170	1,870	2,450	2,890	3,540	4,210	4,890	6,660
Manoa	Main	10968	1,660	3,020	4,150	4,880	5,920	6,910	7,660	9,550
Manoa	Main	9274	1,860	3,320	4,350	5,180	6,170	7,060	7,960	10,050
Manoa	Main	7839	1,960	3,520	4,550	5,480	6,470	7,510	8,560	10,750
Manoa	Main	6175	2,060	3,620	4,750	5,880	6,970	8,110	9,260	11,450
Manoa	Main	2477	2,260	3,920	5,250	6,380	7,770	8,910	10,460	12,650
Manoa	Main	1807	2,460	4,120	5,550	6,780	8,270	9,410	10,760	13,550
Manoa	Main	1230	2,560	4,270	5,700	6,980	8,470	9,910	11,160	14,350
Palolo	Main	15526	950	1,170	2,390	2,930	2,990	3,150	4,640	7,240
Palolo	Main	9520	1,150	1,970	2,590	3,130	3,390	3,650	5,040	8,040
Palolo	Main	7552	1,250	2,370	2,990	3,830	4,190	4,650	6,440	10,040
Palolo	Lower	5198	3320	5,650	7,220	9,110	11,800	13,700	17,300	20,400
Pukele	Tributary	5958	440	820	1,200	1,600	2,100	2,700	3,000	3,900
Pukele	Tributary	3629	520	1,140	1,400	1,720	2,110	2,530	3,530	5,080
UH_Split	UH_Split	6929	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08
Waiomao	Tributary	4900	550	1,050	1,540	1,960	2,550	3,000	3,500	4,700

Table 18. Input Peak Flow Discharge Comparison in cubic feet per second for Ala Wai Canal Watershed HEC-RAS for Existing Conditions and TSP Model, Honolulu, Hawaii

Model Stream Names		Model Input Cross-section Location	Percent ACE Flood							
			Existing Conditions				TSP			
River	Reach		10%	2%	1%	0.2%	10%	2%	1%	0.2%
Ala Wai	Upper	9724	1,800	3,040	3,600	5,300	1,800	3,040	3,600	5,300
Ala Wai	Middle	5825	8,600	14,500	17,000	23,200	7,420	12,100	14,000	20,700
Ala Wai	Lower	2324	13,500	18,000	19,500	22,000	12,320	15,600	16,500	19,500
Kanaha	Ditch	4372	700	1,240	1,500	2,200	700	1,240	1,500	2,200
Kanaha	Split	3508	1.03	1.05	1.06	1.08	1.03	1.05	1.06	1.08
Makiki	Upper	10768	800	1,400	1,700	2,400	540	1,080	1,200	1,800
Makiki	Upper	7674	770	1,290	1,510	1,960	770	1,290	1,510	1,960
Makiki	Lower	6286	1,900	3,400	4,200	6,400	1,830	3,120	3,740	5,230
Makiki	Lower	3189	2,000	3,500	4,500	6,700	1,930	3,220	4,040	5,530
Makiki	Lower	1465	2,600	4,500	5,700	8,000	2,530	4,220	5,240	6,830
Manoa	Main	16506	2,800	4,600	5,500	7,400	2,450	3,540	4,210	6,660
Manoa	Main	10968	4,600	7,150	8,200	10,500	4,150	5,920	6,910	9,550
Manoa	Main	9274	4,800	7,400	8,350	11,000	4,350	6,170	7,060	10,050
Manoa	Main	7839	5,000	7,700	8,800	11,700	4,550	6,470	7,510	10,750
Manoa	Main	6175	5,200	8,200	9,400	12,400	4,750	6,970	8,110	11,450
Manoa	Main	2477	5,700	9,000	10,200	13,600	5,250	7,770	8,910	12,650
Manoa	Main	1807	6,000	9,500	10,700	14,500	5,550	8,270	9,410	13,550
Manoa	Main	1230	6,150	9,700	11,200	15,300	5,700	8,470	9,910	14,350
Palolo	Main	15526	2,900	5,100	6,100	9,200	2,390	2,990	3,150	7,240
Palolo	Main	9520	3,100	5,500	6,600	10,000	2,590	3,390	3,650	8,040
Palolo	Main	7552	3,500	6,300	7,600	12,000	2,990	4,190	4,650	10,040
Palolo	Lower	5198	8,400	14,200	16,700	22,900	7,220	11,800	13,700	20,400
Pukele	Tributary	5958	1,200	2,100	2,700	3,900	1,200	2,100	2,700	3,900
Pukele	Tributary	3629	1,710	2,940	3,500	5,400	1,400	2,110	2,530	5,080
UH_Split	UH_Split	6929	1.03	1.05	1.06	1.08	1.03	1.05	1.06	1.08
Waiomao	Tributary	4900	1,540	2,550	3,000	4,700	1,540	2,550	3,000	4,700

7.3.3 Uncertainty and EYOR

The uncertainty of the peak flow discharge values is based on the equivalent years of record. The final equivalent years of record (EYOR), used in the risk and uncertainty of the HEC-FDA model is based on stream reach and is presented in Table 17. The Makiki Watershed with the least amount of available data was given the lowest EYOR of 18 years, while the remaining sub-watersheds were assigned values from 25 to 30 years. The highest values were from sub-basins where the peak flow discharges were almost entirely based on gaged data; Pukele and Waiomao Streams. The assigned EYOR is based on the overall confidence in the reliability or accuracy of the peak flow discharge estimates and as applied in HEC-FDA constrains the confidence limits of the sampling

of peak flow discharge estimates. The initial values in **Table 19** were determined from the final output discharge values from HEC-RAS and methodology in Bulletin 17B, Appendix 5 (Interagency Advisory Committee on Water Data, 1982). The actual usage of these values versus the graphical curve method is discussed in the Economic Appendix.

Table 19. With-Project Peak Flow Discharge Frequency Data based on HEC-RAS Output Discharges Intermediate Future Condition and Uncertainty in Equivalent Years of Record used in HEC-FDA, Ala Wai Watershed, Oahu, Hawaii

Stream or Sub-Watershed	HEC-HMS Model Sub-Basin or Junction	HEC-RAS Reach Name	HEC-FDA Reach Name	HEC-FDA Analytical Frequency Curve Data (Log Units)			EYOR
				Mean	Std. Dev.	Skew	
Ala Wai, Waikiki	Ala Wai	Ala Wai Lower	ALA 1	3.8420	0.1601	-1.6634	30
		Ala Wai Middle	ALA 2	3.5099	0.1838	-0.1656	
		Ala Wai Upper	ALA 3	3.0325	0.1663	1.1793	
Makiki	K2	Kanaha Ditch	KAH 1 KAH 2	2.4314	0.3201	-0.0040	18
	----	Kanaha Split	KAO 1	----	----	----	
	JK3	Makiki Lower	MAK 1	2.8222	0.2392	0.1502	
	JK2		MAK 2	2.7783	0.2539	-0.0656	
	JK1	Makiki Upper	MAK 3	2.3255	0.4752	-0.6975	
	K1, K3		MAK 4	2.1257	0.5071	-0.5551	
Manoa	JM7, JM 8	Manoa Stream Main Reach	MAN 1	3.3773	0.3112	-0.6017	25
	JM 6		MAN 2	3.2876	0.3160	-0.5346	
	JM 4, JM 5		MAN 3 MAN 4	3.2565	0.3373	-0.6436	
	JM 3		MAN 5	3.1730	0.3751	-0.7639	
	JM 2		MAN 6	3.0596	0.2592	-0.2146	
	JM 1		MAN 7	2.9680	0.3013	-0.2146	
	----	UH_Split	UNI 1 UNI 2	----	----	----	18
Manoa-Palolo Canal	JMP 1 to JMP 3	Palolo Lower	MPC 1	3.5089	0.2757	-0.2717	30
			MPC 2	3.5169	0.2651	-0.0968	30
Palolo	JP 4	Palolo Main	PAL 1	3.0410	0.3774	-0.9202	27
			PAL 2	2.9826	0.3999	-1.1816	27
	JP 3	Palolo Main	PAL 3 PAL 4	2.8373	0.5523	-1.5663	27
	Junction 2	Pukele Tributary	PUK 1	2.6776	0.3858	-0.6359	44
	Junction 1	Waiomao Ditch	WAI 1	2.6303	0.4885	-1.3841	35

EYOR = Equivalent Years of Record; ----, not a separate sub-basin in HEC-HMS model

7.3.4 Scour and Erosion Protection

At each of the 5 primary in-stream detention basins, Makiki, Waihi, Waiakeakua, Pukele, and Waiamao, exit velocities ranged from 27 to 35 ft/s for the 1% ACE flood event. Natural stream velocities at these locations without any project features ranged from 18 to 24 ft/s for the 1% ACE flood event. Due to the increased velocities and concentrated flow at the culvert outlets, a dissipation and scour protection basin was designed and added to each of the primary in-stream detention basins. Given the similar hydraulic characteristics at each location, the 1% ACE flood event highest velocity of 35.4 ft/s at the Waihi Stream detention basin was used as the input design parameters to provide a constant set of output design parameters to be used at all five detention basins. Other design input parameters included 12 ft by 6 ft box culvert with 4.88% slope, manning's n of 0.015, tailwater depth of 4.4 ft and outlet depth in culvert of 4.9 ft.

Guidance in the Federal Highway Administration (FHWA) report FHWA-NHI-06-086, Hydraulic Design of Energy Dissipators for Culverts and Channels, Hydraulic Engineering Circular Number 14, Third edition was used to design the rip rap dissipation and scour protection basins. This report provides design procedures based on research and field survey of practices and experience. For this particular design, the rip rap basin typical in **Figure 14** was used.

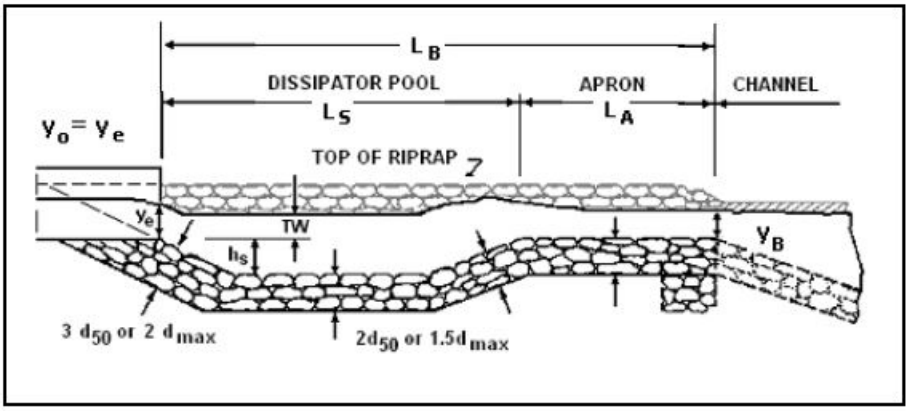

Figure 14. Typical Profile of Rip Rap Basin (Figure 10.1 in FHWA HEC-14)

Using VDOT Class Ill riprap (D_{50} = 2.2 ft) the riprap basin would have the following dimensions:

- Length of dissipation pool (Ls) = 86 ft
- Dissipator pool depth {h_s} = 8.6 ft
- Length of apron (L_A) = 43 ft
- Total basin length (L_s)= 129 ft

- Basin width at the basin exit {W_s} = 98 ft ideal, but varies by stream width at each location
- Basin side slope (z) = 2H:1V
- Riprap Basin exit velocity {V_e)= 9.5 ft/sec

The basin width at the end of the apron was 50 ft at the Makiki basin, 90 ft at the Waihi basin, 70 ft at the Waiakeakua basin, 60 ft at the Pukele basin, and 60 ft at the Waiamao basin. The design typical is illustrated in Plate 11 on sheet C-308.

7.4 WITH PROJECT HYDRAULIC MODELING

Peak flows developed from the With Project hydrologic model were used to determine water surface elevations for the TSP.

The hydraulic model geometry was modified to include the upstream detention and debris basins, floodwalls, and the Ala Wai Golf course Detention basin. In Section 3.1.4, there is a discussion on blockages of several bridge structures due to debris. Since the upstream detention basins contain mechanisms to trap debris, these blockages were removed from the model geometry.

The Ala Wai Golf Course Detention basin is an off-channel basin which accepts water which overfows the main channel. Water enters the basin from the upper reach of the Ala Wai canal and the left bank of the Manoa-Palolo canal below the Date St. Bridge. These overflows are modeled as lateral weirs. On the Ala Wai canal, the right bank serves as the weir. Overflow occurs from its confluence with the Manoa-Palolo canal up stream to its end. The weir coefficient was set to be 0.3. On the Manoa-Palolo canal, water overtops the left bank and enters the golf course detention. This weir coefficient was set to be 1.0. The golf course detention area was modeled as a separate reach in order to route flows thru the basin.

7.4.1 Model Results

On the Ala Wai canal, results of the modeling show that flow begins to enter the golf course detention from the Ala Wai side at the 50% AEP event thru a low point along the bank profile. Along the Manoa-Palolo stream, flow will begin overtopping the left bank at the 20% AEP event. At the 1% AEP event, a total of 4940 cfs is diverted to the golf course and the detention area has an elevation of about 5.3 msl.

The floodwalls along the Ala Wai canal protect Waikiki and the surrounding area from flood damage. On the left bank of the canal, the floodwalls begin at the Ala Moana Blvd. bridge and extend upstream to the end of the canal, where it joins the earthen levee that forms the golf course detention basin. On the right bank of the canal, the floodwall also begins at the Ala Moana Blvd. Bridge, but is not continuous. The floodwall breaks at the confluence with Makiki Stream. It then begins again above Makiki Stream and upstream to the confluence with the Manoa-Palolo canal. This break, at Makiki Stream, allows water to back up into the stream and prevent the stream

from draining. The economic analysis will determine the effect this has on the area surrounding Makiki Stream.

Initial elevations of the floodwalls were set to be 2 feet above the 1% AEP water surface elevation. A risk analysis was performed to determine the final levee heights that will satisfy a conditional non-exceedance probability (CNP) of at least 90%. The results of the analysis show that for reach ALA1, the floodwall elevation at the index point (sta. 1477) is 6.3. For reach ALA2, the floodwall elevation at the index point (sta. 4847) is 8.75, and for reach ALA3A, at the index point (sta. 8015) is 9.3. **Table 20** shows the average elevation and height of the floodwalls by reach. Further discussion of the analysis is presented in the Economic Appendix. **Plate 2** shows cross sections plots at the index points of the modeled streams for the TSP.

Table 20. Average Elevations and Heights of Ala Wai Canal Floodwalls in Feet

REACH	Left Bank		Right Bank	
	Ave. Elev.	Ave. Height	Ave. Elev.	Ave. Height
ALA1	5.7	1.1	5.7	1
ALA2	8.5	3.3	8.5	3.4
ALA3	9.3	4.4	NA	NA

There is a concern that installation of the floodwalls will have an adverse impact on the three bridges crossing the Ala Wai Canal. Water surface elevations at or higher than the low chord elevations of the bridges may cause undue uplift pressure on the bridge structure and would require some measure of strengthening to mitigate. The results of the model show that the maximum water surface elevations do not impinge on the maximum low chord of the bridges. **Table 21** below show the comparison of with project water surface elevations with the bridge deck and low chord elevations.

Table 21. Comparison of Bridge Data with Water Surface Elevations for With Project Conditions

Bridge	Top of Roadway at highest low chord (ft)	Highest Low Chord (ft)	Station on Sheet C-310	Left Bank Elevation at sta. (ft)	Top of Floodwall Elevation at sta. (ft)	1% AEP WSE (ft)	0.5% AEP WSE (ft)	0.2% AEP WSE (ft)
Ala Moana Blvd	11.60	7.40	4+39	5.00	5.00	2.55	2.56	2.57
Kalakaua Ave	8.80	6.6	23+24	5.9	7.3	5.57	5.58	5.59
McCully St.	10	8.81	31+06	5.5	7.6	6.57	6.77	6.97
WSE = water surface elevation								

At the Manoa-Palolo canal, water overtops the right bank and will inundate the area around the Iolani School. An economic analysis was performed to determine whether extending the floodwall upstream to the Date St. Bridge can be incrementally justified. This analysis showed the floodwall extension to be economically infeasible.

At several locations along the streams modeled, hydraulic jumps appear. These jumps occur at the upstream side of various bridges and culverts and are mainly a result of changes in topography and channel slope as the stream bed transitions from the steep uphill areas to the flatter valley areas.

In general, implementation of the recommended plan reduces peak flows entering the Ala Wai Canal system and the floodwalls protect the surrounding area from damage due to flooding. Plate 4 shows the water surface profiles of the modeled stream for the TSP.

8 INTERIOR DRAINAGE

Along both banks of the Ala Wai canal, there are numerous drainage outlets from the storm sewer system. These outlets will require the installation of flap-gates to prevent water from backing up and inundating areas beyond the floodwalls. During storm events, these flap-gates will close and prevent water from draining into the canal. This will cause residual flood inundation to the areas protected by the floodwalls. This residual flooding is not expected to be significant due to it being shallow sheetflow and not dep ponding.

To determine impacts of storm drain or storm sewer outfalls being shut during periods of high water surface elevation in the Ala Wai Canal with the project floodwalls, stormdrains greater than 18-inch diameter pipes along the Ala Wai Canal (21 out of 43 outfalls) were analyzed for backwater impacts. Only the larger stormdrain pipe or culvert sizes were chosen for this analysis since these stormdrains had drainage areas larger than 4 acres and pipe sizes greater than 18-inches. Many of the small outfalls only drain the Ala Wai Boulevard roadway, those of single 18-inch or less diameter pipes (22 out of 43 outfalls), have very minimal drainage areas, will only have minor impacts to Ala Wai Boulevard in case of backwater, and would have only minor residual damages if any.

To evaluate the interior flooding due to backwater in gravity storm drains, the coincident frequency assumption is that the interior flooding input for these gravity outlets to the canal would use the 10% 1-hour rainfall intensity volumes and given the flashy nature of runoff in the watershed, the gates could be closed for up to 6 hours depending on the riverine flood event. Next the pipe and channel storage; i.e. volume capacity; for those stormdrain outfalls were determined based on the pipe or culvert sizes and lengths. Then using existing topographic data to determine the street elevation of stormwater inflow grates and overbank conditions, excess volumes which exceeded the storm drain capacities were mapped assuming that the shallow flooding, up to 1 foot depth, would spread following the local topology with roads serving as the primary channels of this

excess backwater flow. Figure 15 illustrates the shallow flooding areas, based on 1 foot depth, for the storm drains analyzed.

As part of this interior drainage analysis, similar analyses were done at each of the pump station locations assuming the pump station did not exist or was not functioning. For these locations, the excess volume was much greater than for the other stormdrains due to larger drainage areas. Additionally for the economic justification of each pump station, multiple storm events were analyzed to determine frequency-stage curves for each impacted area. For the pump stations, the flooded area was determined using the TIN/Lidar data in ArcGIS to help determine the depth/area/duration of interior flooding which would be converted to economic damages.

For Pump Station 1, located at the east end of the Ala Wai Canal, the large drainage area of 290 acres generates an excess volume of 31 acre-feet for the 10% ACE storm event. This excess volume would first flood Kapahulu Avenue and it was assumed that the flooding would follow the streets first before spreading out. The potential inundation area would flood the Ala Wai library and Thomas Jefferson Elementary school grounds before moving south to the Kapahulu Avenue stormdrain, where it is assumed that this 10 ft by 5 ft box could help convey this water out to ocean and the remaining floodwaters would continue to move down Kapahulu Avenue towards the ocean. There are low areas towards Kapiolani Park, if floodwaters cross Kapahulu Avenue and enter the park, the park space could hold all 31 acre-ft. The area represented as Pump Station 1 and 2 Flood Area in Figure 15 represents an area of 115 acres, which is sufficient to even hold the 0.2% ACE interior flood volume of 80 acre-feet at less than 1 foot depth. This area represents the Honolulu Zoo area of Kapiolani Park and does not spread out across the park. It is assumed the drainage ditch in the park and the stormdrains along Monserrat Avenue with catch and divert the shallow flooding before it can spread to the entire park. The worst case is shown in Figure 15 as Pump Station 1 and 2 Maximum Flooding Area, which does include the entire park. That would be improbable as the 0.2% ACE interior storm events for both Pump Stations 1 and 2 generate an excess volume of 125 acre-feet, which would not be able to cover the entire 200 acres represented by that area. For Pump Station 2, the excess water would be about 3 feet deep at the base of the golf course levee and less than a foot deep over Kapahulu Avenue at Herbert Street. The potential floodwaters would run south along Kapahulu Avenue down to Ala Wai Boulevard, where it would presumably pond in the low area by the library or continue to travel down Kapahulu Avenue and also potentially enter the park area as described above, although the excess volume for this location of 19 acre-feet is much less that that from Pump Station 1.

Pump station 3 is located by University Avenue and drains an area of 125 acres. Excess volume for the 10% ACE storm event is about 12 acre-feet. Flooding would begin on Hihiwai Street and there would be 1 foot deep flooding at the Ala Wai Elementary School, community gardens, and possibly also onto the campus of Iolani School and nearby apartment and residential buildings (Figure 15). As discussed for Pump Satations1 and 2 previously, a frequency-stage curve was computed for this pump station flooded area as well for the economic justification.

Figure 15 shows the expected residual flood inundation resulting from the closing of the flap-gates and the potential power loss of the pump stations. The economic analysis will determine if the pump stations are economically justified. Other discussions on the interior flooding situation, residual risk, and floodwall superiority can be found in the main report.

9 Floodwall Resilience and Overtopping

In the main feasibility report, Section 8 presents a resiliency discussion. Specific to this appendix, resiliency refers to how well the system performs in case of capacity exceedance or overtopping on the floodwalls. Resiliency was incorporated as a structural measure into the floodwall design by constructing a scour protection apron, as a concrete sidewalk, on the protected side of the floodwall for the purpose of minimizing erosion during flood events that exceed the top of wall elevation. The design floodwall height is not expected to be exceeded until a flood event greater than 0.2% ACE (500-yr) occurs. An extrapolation of the water-surface elevation data by frequency flood event is shown in Figure 16. This figure shows that an event of about 0.13% ACE (750-year) is needed for the floodwall to be overtopped.

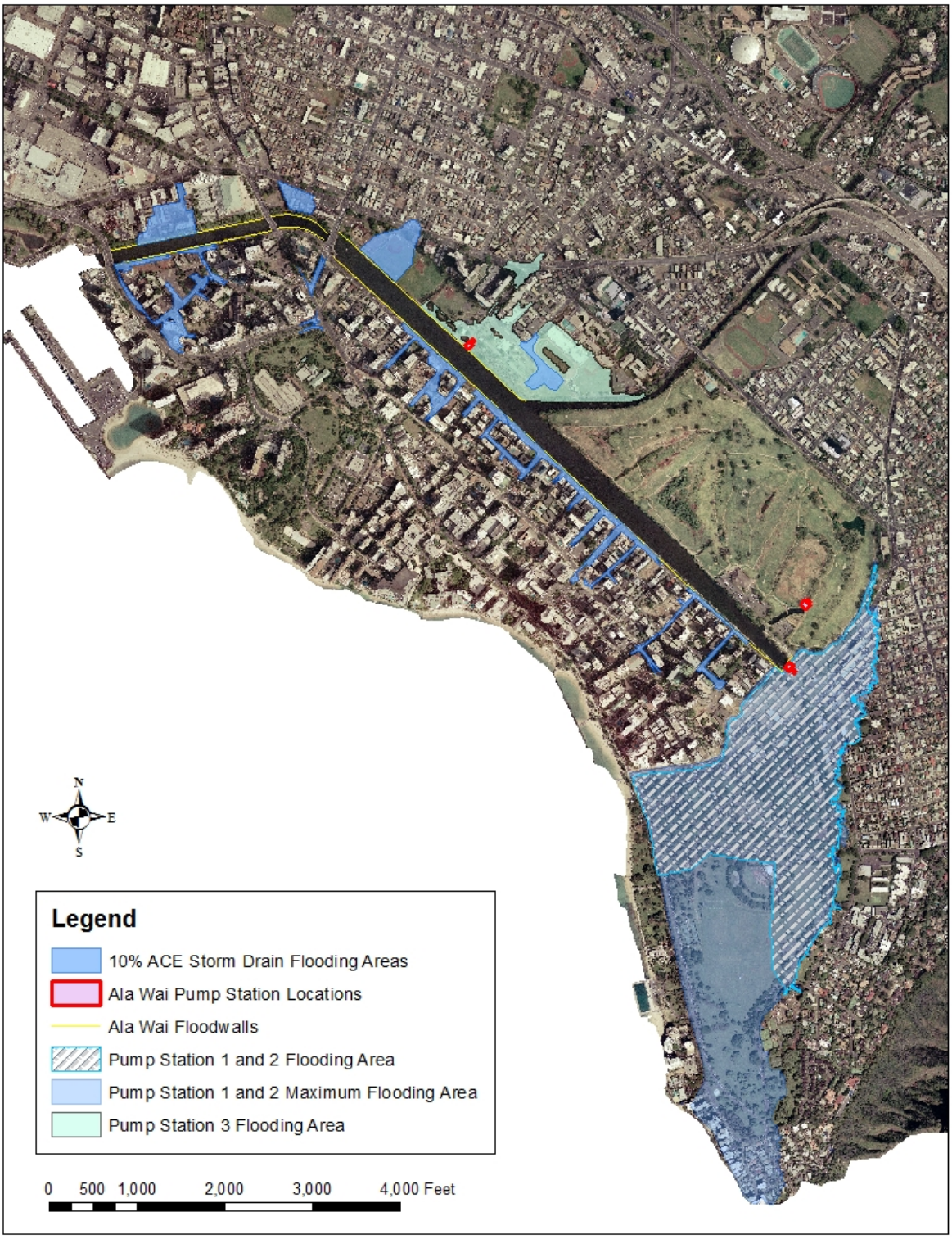

Figure 15. Residual Flood Inundation

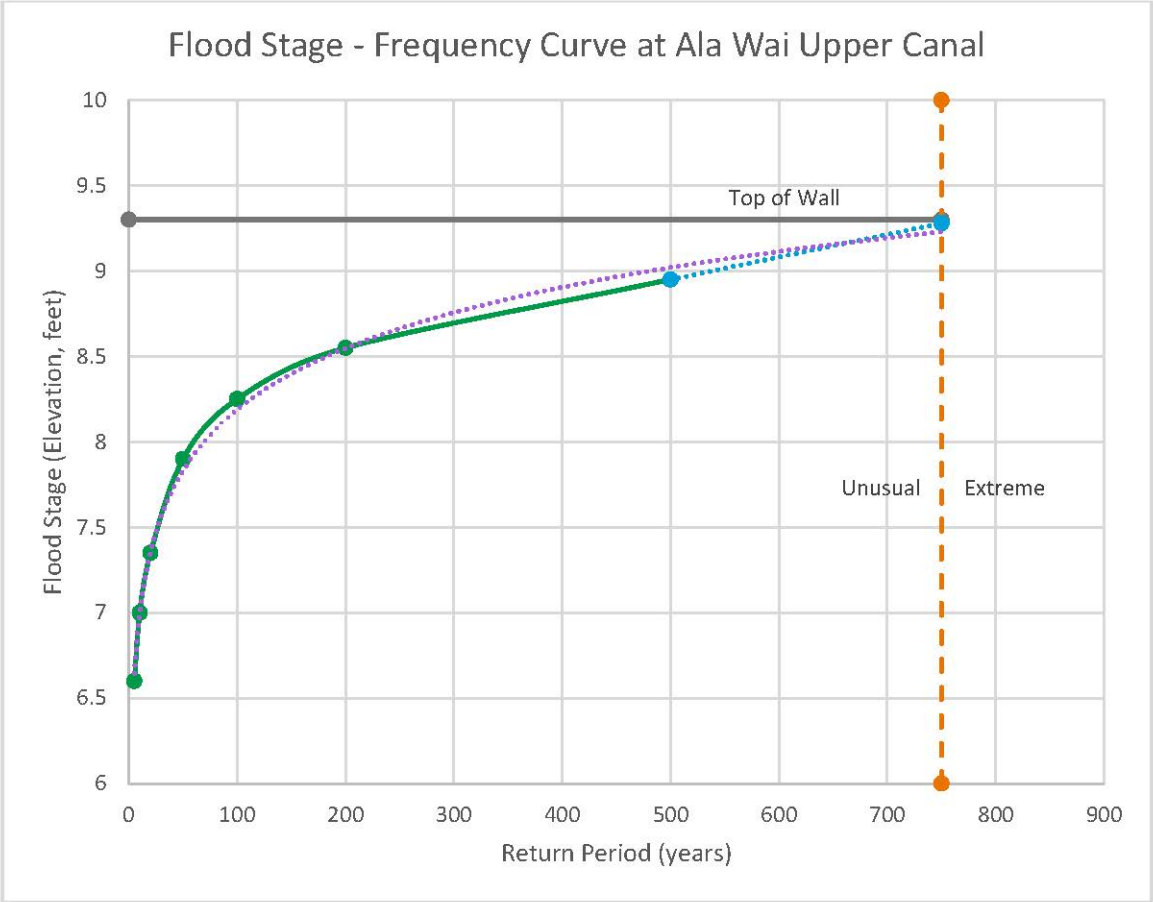

Figure 16. Extrapolated Flood Stage Frequency Curve for Upper Ala Wai Canal Floodwall Reach

10 Coastal Surge, High Sea Level Rise, and Adaptability

The floodwall height values were determined and justified by the optimization process in the National Economic Development (NED) plan development process as described in the main feasibility report and Economic Appendix. This determination was based on riverine flooding and the 2075 intermediate sea level rise backwater condition. To account for coastal surge events, flood wall heights determined for the riverine storm events were also checked versus the potential coastal surge values possible in the Ala Wai Canal regardless of a riverine storm event and also in coincident with a riverine event. This section also discusses floodwall height performance under high sea level conditions out to the year 2125.

Coastal surge or total water values were computed by Patrick O'Brien, P.E., Coastal Engineer Technical Expert with the Climate Preparedness and Resilience Community of Practice. These values, shown in **Table 22**, were computed from tidal data at the Honolulu harbor tide gage.

Table 22. Coastal Surge or Total Water Level values with Sea Level Rise in Feet, Mean Sea Datum

		Intermediate Sea Level Rise			High Sea Level Rise		
ACE (%)	Recurrence interval (year)	2025	2075	2125	2025	2075	2125
100	1.01	1.57	2.33	3.54	1.88	4.27	8.52
50	2	1.88	2.64	3.85	2.19	4.58	8.83
20	5	2.13	2.89	4.10	2.44	4.83	9.08
10	10	2.33	3.09	4.30	2.64	5.03	9.28
5	20	2.56	3.32	4.53	2.87	5.26	9.51
2	50	2.90	3.66	4.87	3.21	5.60	9.85
1	100	3.20	3.96	5.17	3.51	5.90	10.15
0.5	200	3.54	4.30	5.51	3.85	6.24	10.49
0.2	500	4.10	4.84	6.05	4.39	6.78	11.03

Note: Boundary Condition Honolulu/Waikiki Harbor TWL = MHHW + NTR (feet MSL)*
*MSL based on 1983-2001 NTE NOAA 1612340, Honolulu, HI

In comparing the 2075 intermediate and high sea level, 1% ACE total water levels to the floodwall heights determined by the NED process, it is shown in **Figure 17**, the intermediate 2075 case water level is below the floodwall heights for all the Ala Wai Canal reaches. However, the high 2075 1% ACE total water level is higher than the NED determined floodwall heights only at the lower Ala Wai Canal reach, ALA 1. Thus, a coastal event of this magnitude would still cause flooding in the lower Ala Wai Canal reach. To counter this coastal flood risk, the floodwall in the lower Ala Wai Canal reach was raised to 7.9 feet, roughly 2 feet high that the 1% ACE total water level. Note that this total water level does not account for any surge attenuation due to the nearshore coastal bathymetry or reefs. **Table 23** documents the average height change at ALA 1 compared to **Table 20**.

Table 23. Adjusted Average Elevations and Heights of Ala Wai Canal Floodwalls to account for Coastal Surge

	Left Bank		Right Bank	
REACH	Ave. Elev.	Ave. Height	Ave. Elev.	Ave. Height
ALA1	7.9	3.2	7.9	3.1
ALA2	8.5	3.3	8.5	3.4
ALA3	9.3	4.4	NA	NA

Note: Elevation in feet above MSL

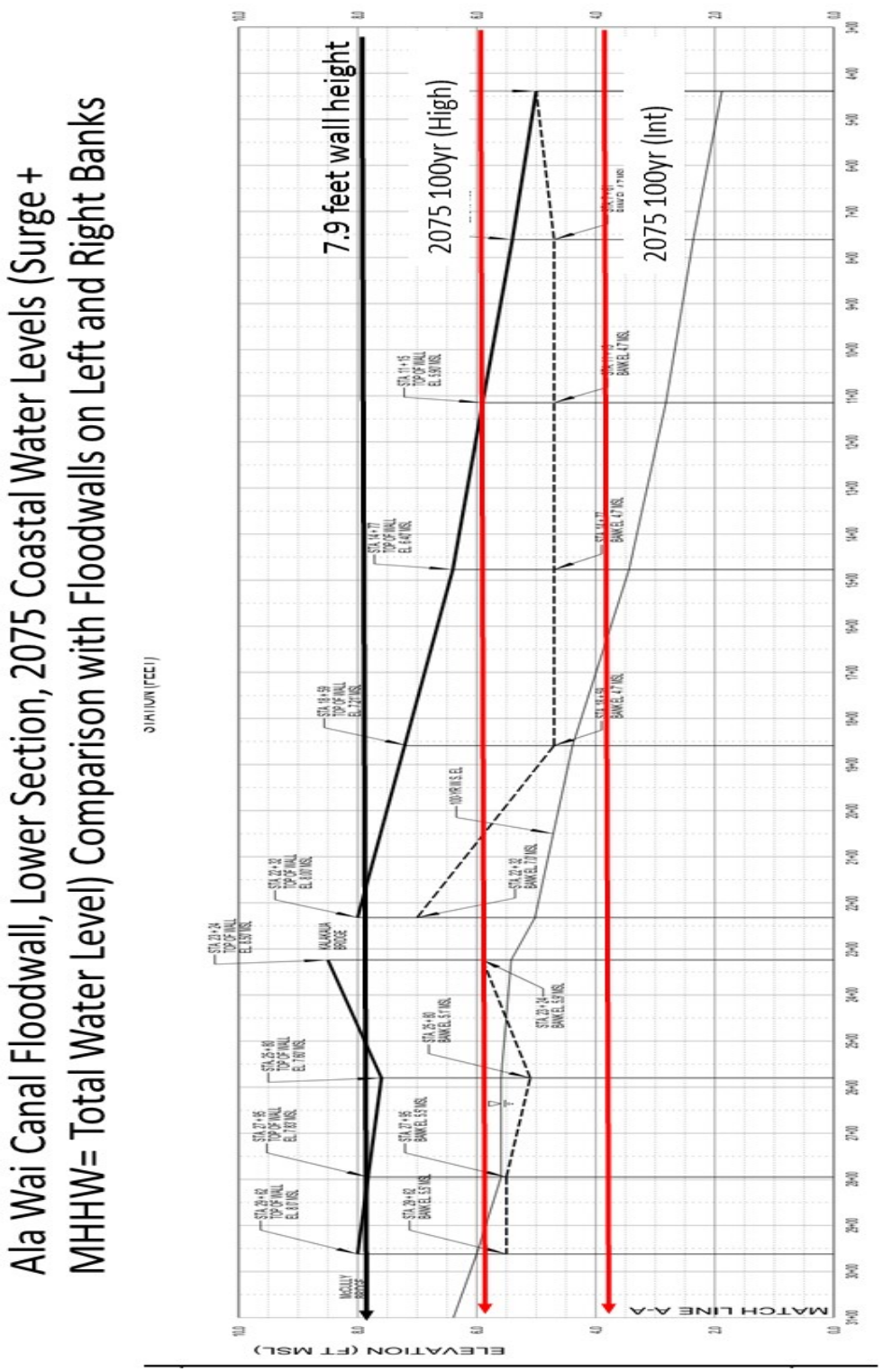

Figure 17. Comparison of 2075 Intermediate and High Coastal Surge Water Level with Floodwall Elevation at the Lower Ala Wai Canal Reach

In addition to coastal surge alone, various coincident scenarios where coastal surge events occur at the same time as riverine events were determined and resulting downstream boundary conditions were computed for these scenarios. Downstream boundary conditions are shown in **Table 24** for these coincident coastal surge and riverine flooding events. All cases have a 1% (100-year) coincident probability, which is the product of the individual probabilities. Case 2.1 is a 10-year (10% ACE) coastal surge for a 10-year (10% ACE) fluvial flow event; Case 2.2 is a 2-year (50% ACE) coastal surge for a 50-year (2% ACE) fluvial flow; Case 2.3 is a 50-year (2% ACE) coastal surge for a 2-year (50% ACE) fluvial flow.

Table 24. Downstream Boundary Conditions for Coastal Coincident Scenarios

Scenario	Recurrence intervals* (year)		Downstream Boundary Condition Elevation		
			2025	2075	2125
Case 2.1	10c / 10f	Intermediate	2.33	3.09	4.30
Case 2.2	2c / 50f		1.88	2.64	3.85
Case 2.3	50c / 2f		2.90	3.66	4.87
Case 2.1	10c / 10f	High	2.64	5.03	9.28
Case 2.2	2c / 50f		2.19	4.58	8.83
Case 2.3	50c / 2f		3.21	5.60	9.85

Note: Elevation in feet above MSL.
*Recurrence intervals: c = coastal surge, f = fluvial flows.
I.e. Case 2.2 = 2-year coastal surge and 50-year fluvial flows.

As discussed in Section 3.1.7 Boundary Conditions and Appendix 3, sea level rise was added to the HEC-RAS models as an increased downstream boundary condition in order to check the floodwall heights under future conditions. To check floodwall height performance, a number of HEC-RAS and HEC-FDA model runs were made using various backwater conditions to cover the wide range of SLR values and scenarios. The backwater scenarios run are shown in **Table 25** with only the high SLR with coastal surge values being added from the values of **Table 5**. Performance data for these various backwater conditions are shown in **Table 26**.

Table 25. Starting Backwater Conditions in Feet for Floodwall Performance Scenarios, Ala Wai Canal Floodwall

Scenario	Without Project		With Project			
Year	Low SLR	Intermediate SLR	Low SLR	Intermediate SLR	High SLR	High SLR with Coastal Surge
2025	1.64	1.74	1.64	1.74	2.05	----
2075	1.89	2.50	1.89	2.50	4.44	5.60
2125	----	-----	----	3.71	8.69	9.85
SLR = sea level rise; ---- = no scenario run						

Table 26. Project Performance of Ala Wai Canal Floodwalls

Damage Reach at Index Point	Top of Floodwall Elevation (feet)	1% ACE Water Surface Elevation (feet)	Annual Exceedance Probability		Long term Risk (years)			Conditional Non-Exceedance Probability					
			Median	Expected (mean)	10	30	50	10% (10-yr)	4% (25-yr)	2% (50-yr)	1% (100-yr)	0.4% (200-yr)	0.2% (500-yr)
Intermediate Sea Level Rise 2075 Scenario, Starting Backwater 2.50 feet													
ALA 1	7.9	4.71	0.01%	0.01%	0.10%	0.30%	0.50%	99.98%	99.96%	99.96%	99.96%	99.96%	99.95%
ALA 2	8.75	5.63	0.01%	0.01%	0.15%	0.46%	0.77%	99.99%	99.97%	99.96%	99.96%	99.83%	99.54%
ALA 3	9.3	6.07	0.01%	0.02%	0.23%	0.70%	1.16%	99.97%	99.99%	99.94%	99.84%	99.69%	99.58%
Intermediate Sea Level Rise 2125 Scenario, Starting Backwater 3.71 feet													
ALA 1	7.9	5.09	0.01%	0.01%	0.14%	0.43%	0.71%	99.98%	99.98%	99.96%	99.96%	99.96%	99.95%
ALA 2	8.75	6.34	0.01%	0.05%	0.50%	1.49%	2.47%	99.90%	99.75%	99.64%	99.63%	99.18%	96.82%
ALA 3	9.3	6.52	0.01%	0.03%	0.27%	0.81%	1.35%	99.98%	99.94%	99.72%	99.53%	99.21%	98.85%
High Sea Level Rise 2075 Scenario, Starting Backwater 4.44 feet													
ALA 1	7.9	5.80	0.01%	0.03%	0.33%	0.99%	1.64%	99.93%	99.87%	99.86%	99.86%	99.85%	99.85%
ALA 2	8.75	7.23	0.01%	0.16%	1.60%	4.74%	7.77%	99.52%	98.79%	98.55%	98.53%	97.62%	96.06%
ALA 3	9.3	7.44	0.01%	0.06%	0.64%	1.91%	3.17%	99.89%	99.73%	99.36%	98.69%	97.77%	97.15%
High Sea Level Rise with Coastal Surge 2075 Scenario, Starting Backwater 5.60 feet													
ALA 1	7.9	6.29	0.01%	0.40%	3.98%	11.46%	18.37%	99.25%	98.99%	98.94%	98.90%	98.87%	98.86%
ALA 2	8.75	7.63	0.01%	0.75%	7.26%	20.23%	31.39%	97.47%	95.31%	94.61%	94.55%	93.24%	91.27%
ALA 3	9.3	7.82	0.01%	0.14%	1.43%	4.24%	6.96%	99.84%	98.90%	98.29%	97.60%	96.82%	96.33%

Table 26. Project Performance of Ala Wai Canal Floodwalls--Continued													
Damage Reach at Index Point	Top of Floodwall Elevation (feet)	1% ACE Water Surface Elevation (feet)	Annual Exceedance Probability		Long term Risk (years)			Conditional Non-Exceedance Probability					
			Median	Expected (mean)	10	30	50	10% (10-yr)	4% (25-yr)	2% (50-yr)	1% (100-yr)	0.4% (200-yr)	0.2% (500-yr)
High Sea Level Rise 2125 Scenario, Starting Backwater 8.69 feet													
ALA 1	7.9	8.79	99.90%	87.68%	100.0%	100.0%	100.0%	11.30%	10.88%	10.72%	10.51%	10.32%	10.18%
ALA 2	8.75	8.96	58.29%	51.31%	99.93%	100.0%	100.0%	42.85%	40.90%	39.27%	38.52%	37.63%	37.25%
ALA 3	9.3	9.10	0.01%	25.35%	94.62%	99.98%	100.0%	69.07%	65.65%	62.31%	60.11%	58.62%	57.46%
High Sea Level Rise with Coastal Surge 2125 Scenario, Starting Backwater 9.85 feet													
ALA 1	7.9	9.92	99.90%	99.70%	100.0%	100.0%	100.0%	0.14%	0.14%	0.12%	0.12%	0.12%	0.12%
ALA 2	8.75	10.01	99.90%	94.18%	100.0%	100.0%	100.0%	4.56%	4.20%	3.73%	3.57%	3.44%	3.36%
ALA 3	9.3	10.12	99.90%	80.25%	100.0%	100.0%	100.0%	17.34%	15.55%	13.24%	11.91%	11.20%	10.55%

In **Table 26**, the intermediate 2075 SLR scenario is the base scenario representing the NED plan. At these floodwall elevations, the annual exceedance probability (AEP) is close to 1 exceedance in 1000 years at all three index points. Long term risk remains below 1% except for the 50-year periods at damage reach AA 3, where there is a roughly 1.2% chance of at least one overtopping event in 50 years. The conditional non-exceedance probability (CNP) is very high. At the ALA 2 index point, for the 1% ACE flood event there is a 99.96% assurance of not over-topping the floodwall elevation or alternatively, can be stated as 99.96% assurance of containing the 1% ACE event. This assurance CNP does not decrease much for containing the 0.2% ACE event with 99.54% assurance.

Keeping with the ALA 2 index point as the point of comparison, with the intermediate 2125 SLR scenario, assurance remains high, only decreases slightly to 99.63% for the 1% ACE event and to 96.82% for the 0.2% ACE event. With the high 2075 SLR scenario, assurance decreases to 98.53% for the 1% ACE event and to 96.06% for the 0.2% ACE event. Long term risk rises to a 7.77% chance of one or more overtopping events occurring in 50 years. The 1.4 feet increase in starting backwater between the intermediate and high 2075 SLR scenarios translate to an approximate increase of 1.60 feet in the 1% ACE water-surface elevation at ALA 2 index point.

Performance begins to drop in the high SLR with coastal surge 2075 SLR scenario with a starting backwater of 5.60 feet. Assurance at ALA 2 versus the 1% ACE event is 94.55% with the 0.2% ACE event assurance dropping to 91.27%. The 1% ACE event assurance is at the 95% CNP threshold used as a minimum recommended level of assurance for levee/floodwall projects. The 5.60 feet starting backwater represents the highest backwater condition that provides a high level of assurance. At this starting backwater level, the AEP at ALA 2 rises to 0.75% which means the floodwall elevation is close to matching the 1% ACE water-surface elevation. For this scenario, the 1% ACE water-surface elevation is about 1.2 feet below the top of the floodwall. Long term risk rises to 31% chance of one or more overtopping events in 50 years.

Considering the staring backwater of 5.60 feet as the upper limit of assurance, means that for the majority of coastal coincident scenarios (**Table 24**), intermediate and high 2075 SLR and intermediate 2125 SLR scenarios, there is sufficient assurance in the floodwall heights to provide a level of protection in the event these scenarios occur. In scenarios with starting backwater elevations greater than 5.6 feet, such as the high 2125 coastal coincident (**Table 24**) and the high 2125 SLR and 2125 high SLR with coastal surge scenarios (**Table 25**), the NED floodwall heights do not provide sufficient assurance against overtopping. At the ALA 2 index point for the high 2125 SLR scenario, the computed 1% ACE event water-surface elevation is greater than the floodwall height by 0.21 feet. The resulting CNP assurance is only 38.52%, AEP is 51.31% and long-term risk becomes 100% chance of one or more overtopping events starting at 10 years.

If any of the high 2125 scenarios occur, the floodwalls would provide very little protection and would need to be raised as an adaptation measure to provide protection on the north side of the Ala Wai canal. On the south or Waikiki side of the canal, as

discussed in the next paragraph, flooding in Waikiki from SLR and/or coastal surge would negate the need for adaptation of the south side floodwall.

For a discussion on adaptability, SLR conditions with project were computed and mapped. **Figures 18** to **21** show four future scenarios of years 2075 and 2125 with intermediate and high SLR values. Included on these figures are the 1% (100-year) and 0.2% (500-year) floodplains determined by the HEC-RAS model results for each scenario. Sea level rise elevations shown here follows a “low elevation” approach, where any elevations below the designated SLR elevation is shown as holding water. This is regardless of wave action (which would possibly flood more areas) or hydrologic connectivity (which would preclude areas that are not connected to the ocean). From these result maps, it can be seen that the modeled floodwall heights remain effective for retaining 1% ACE (100-year) flood events for the with-project scenario for three of the four scenarios. The highest SLR scenario, year 2125 High, has a SLR elevation of 8.69 feet, and HEC-RAS results show flooding throughout the Waikiki area. However, the majority of this flooded area will experience passive flooding due to SLR, which is not directly linked to flooding of the Ala Wai canal. Thus, in cases except the high SLR 2125 case, floodwall adaptability, in terms of floodwall raise, is not needed. In the high SLR 2125 case, a raise in floodwall would not be sufficient to protect the Waikiki area. Other adaptability measures, such as a coastal barrier, pump stations, retreat or relocation, specific building adaptations, structural fill, and other possibilities, for Waikiki would be needed for that case.

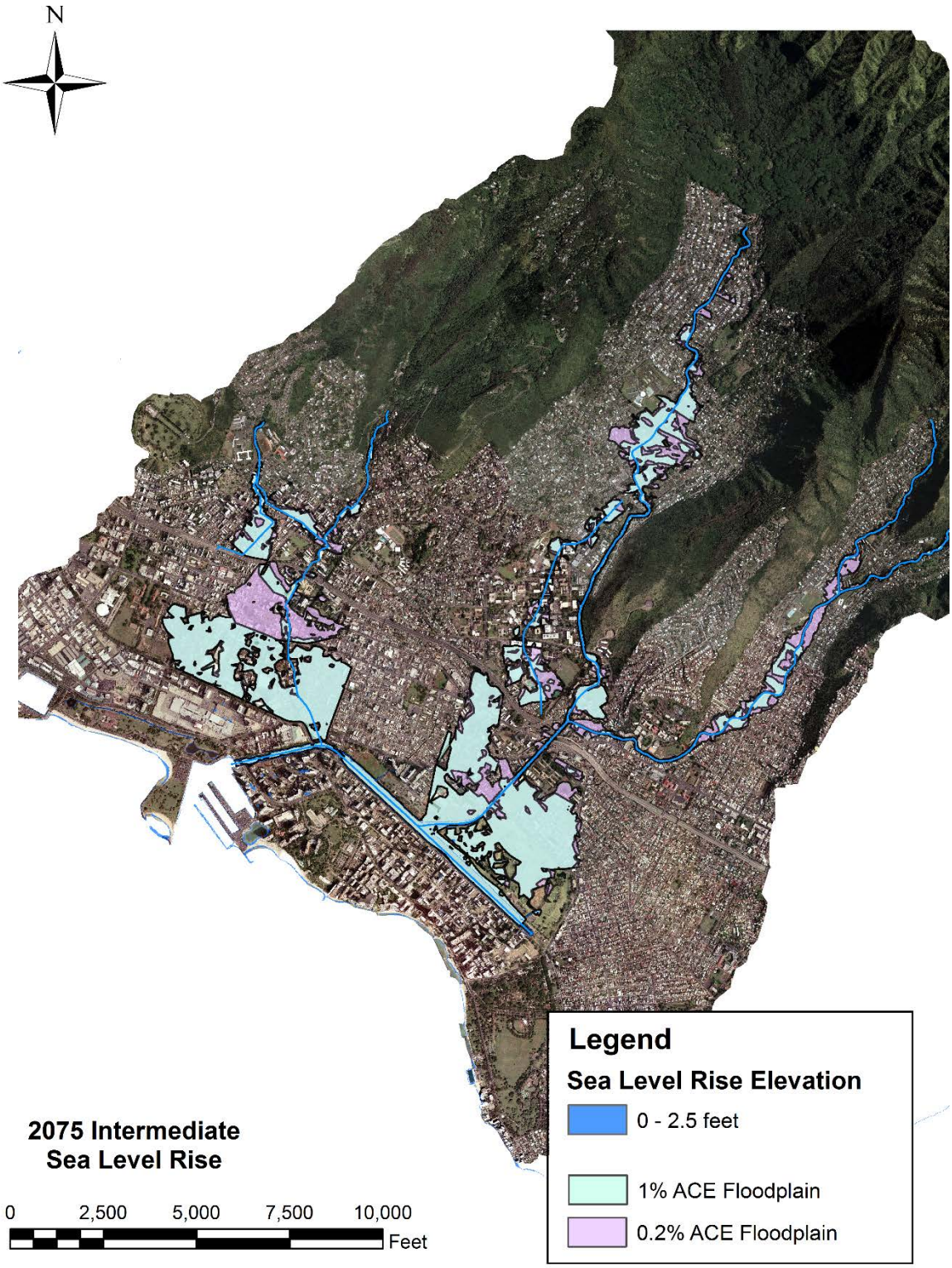

Figure 18. Floodplains for 1% ACE (100-year) and 0.2% ACE (500-year) Flood Events with 2075 Intermediate Sea Level Rise elevations.

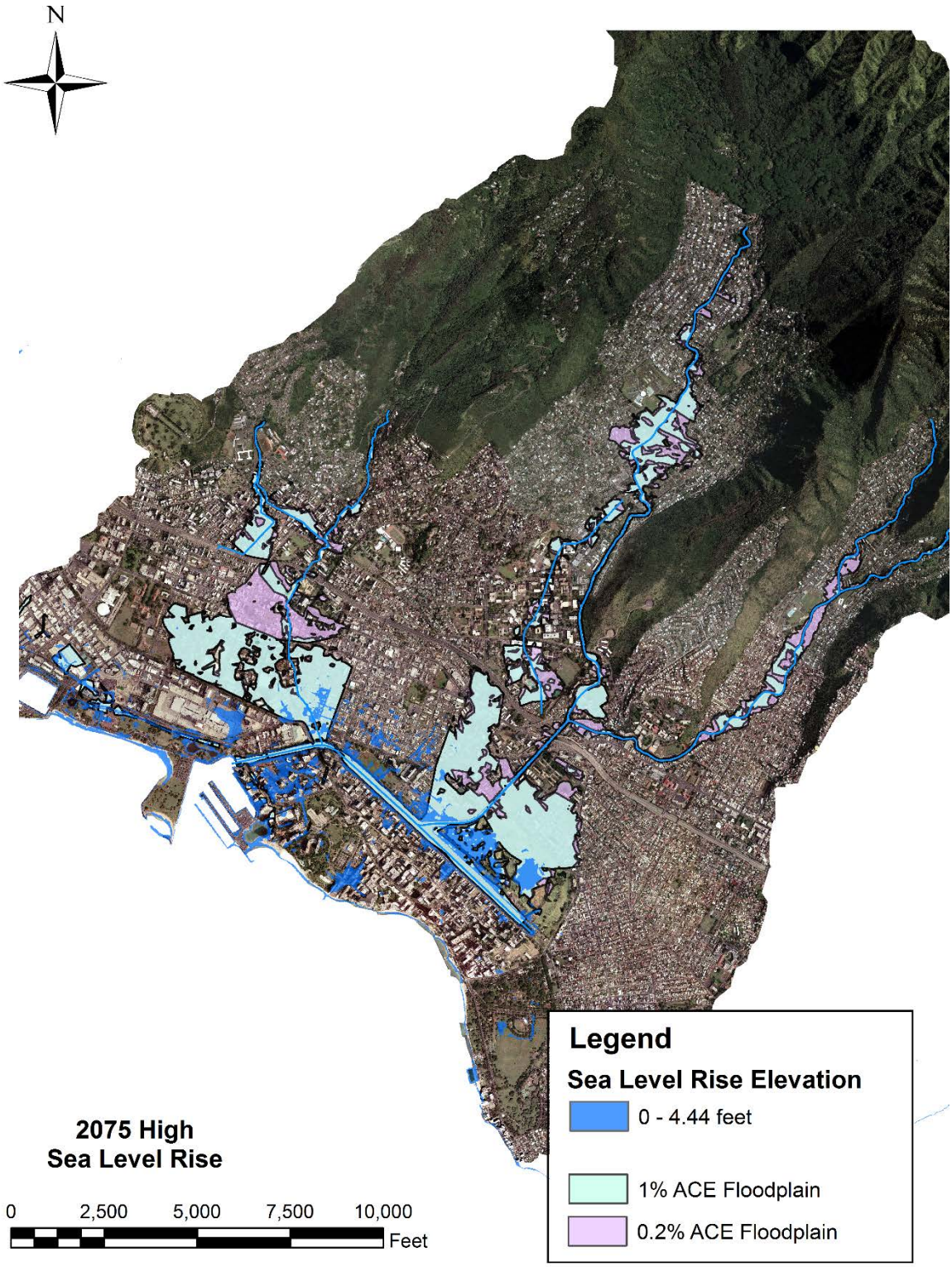

Figure 19. Floodplains for 1% ACE (100-year) and 0.2% ACE (500-year) flood events with 2075 High Sea Level Rise elevations.

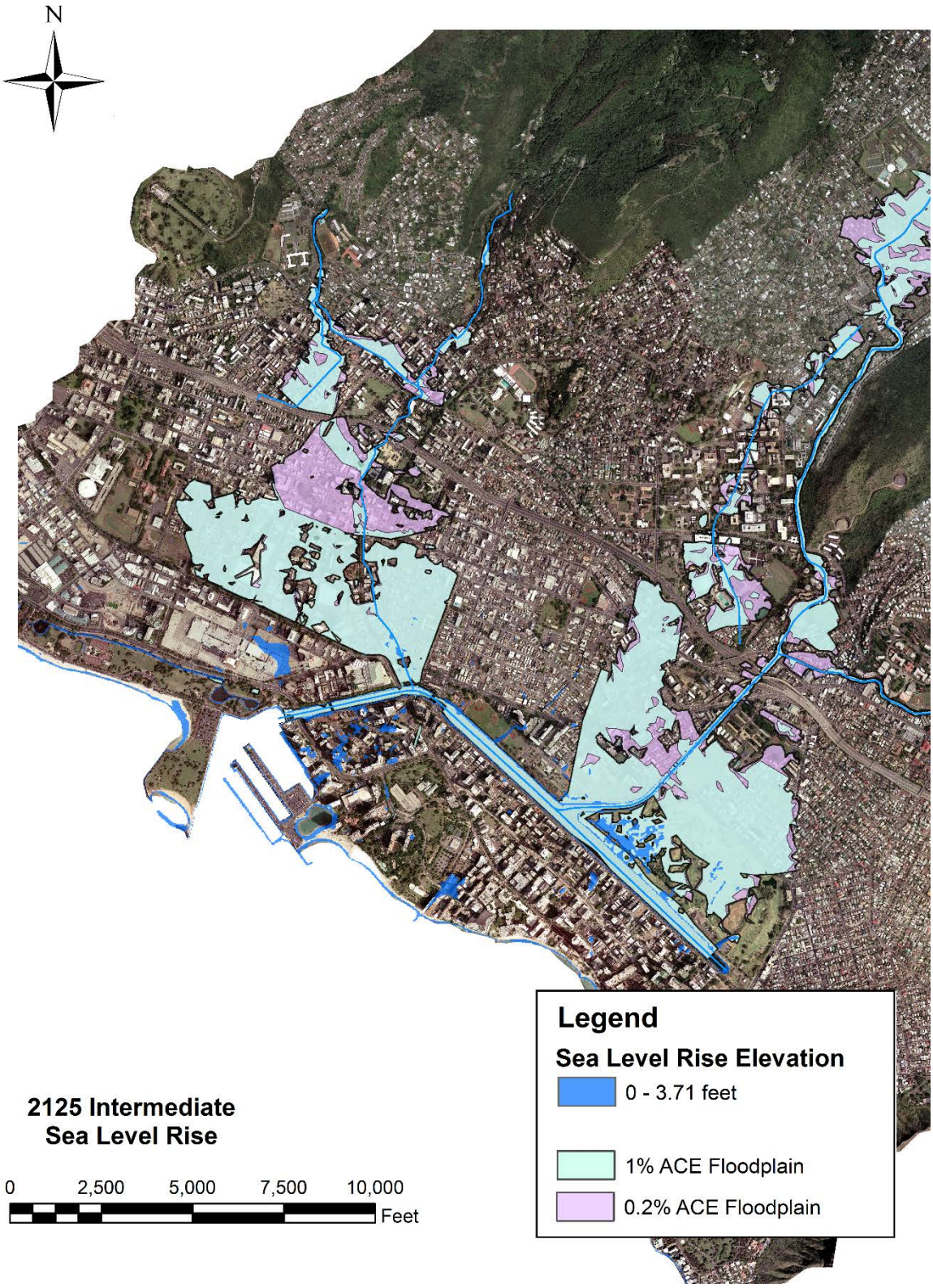

Figure 20. Floodplains for 1% ACE (100-year) and 0.2% ACE (500-year) flood events with 2125 Intermediate Sea Level Rise elevations.

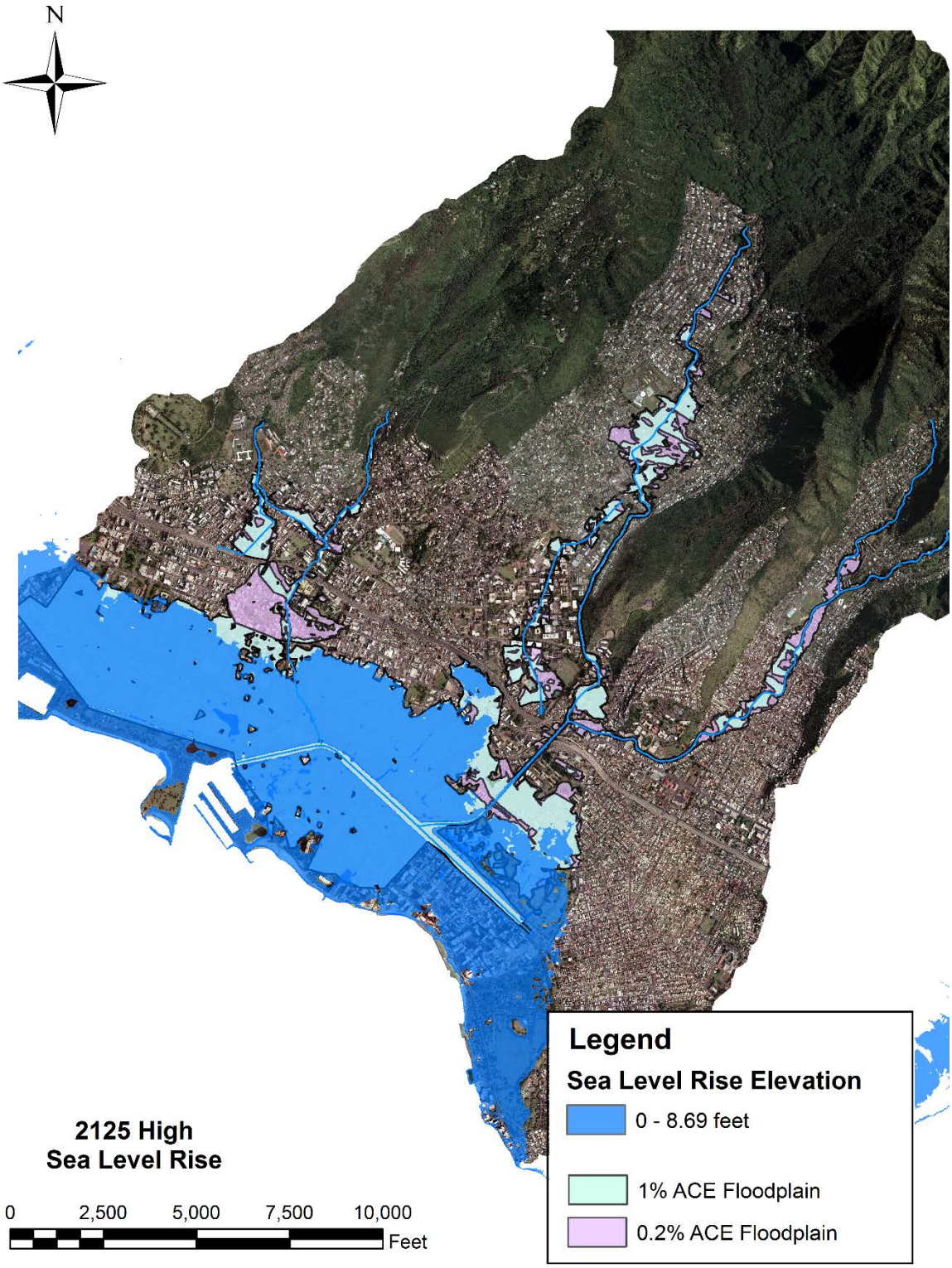

Figure 21. Floodplains for 1% ACE (100-year) and 0.2% ACE (500-year) Flood Events with 2125 High Sea Level Rise Elevations.

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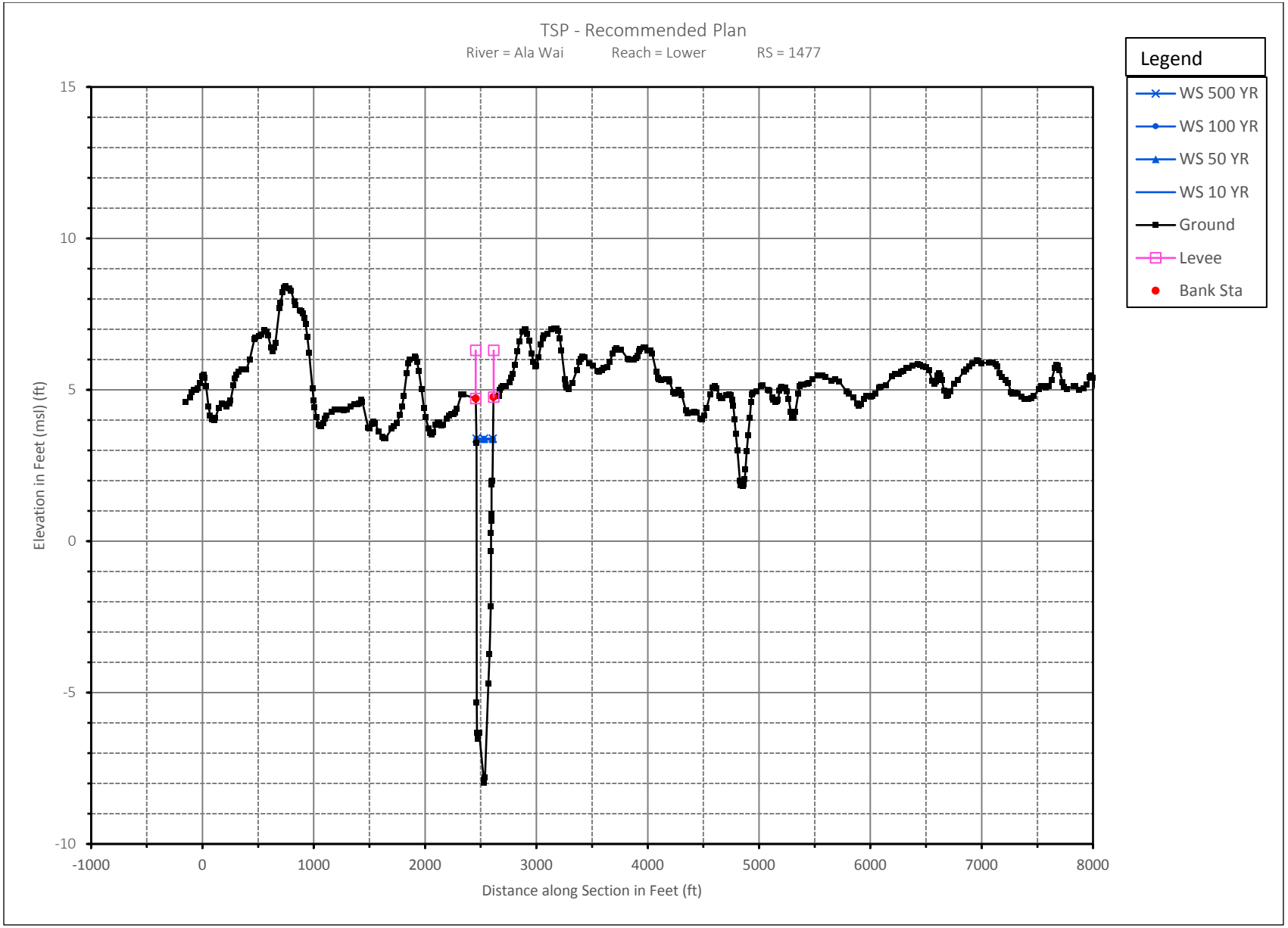
AlaWai Watershed
Flood Risk Management Study
HEC-RAS Cross Section Locations

Plate 2 HEC-RAS Cross Section Plots for TSP at Index Station Locations



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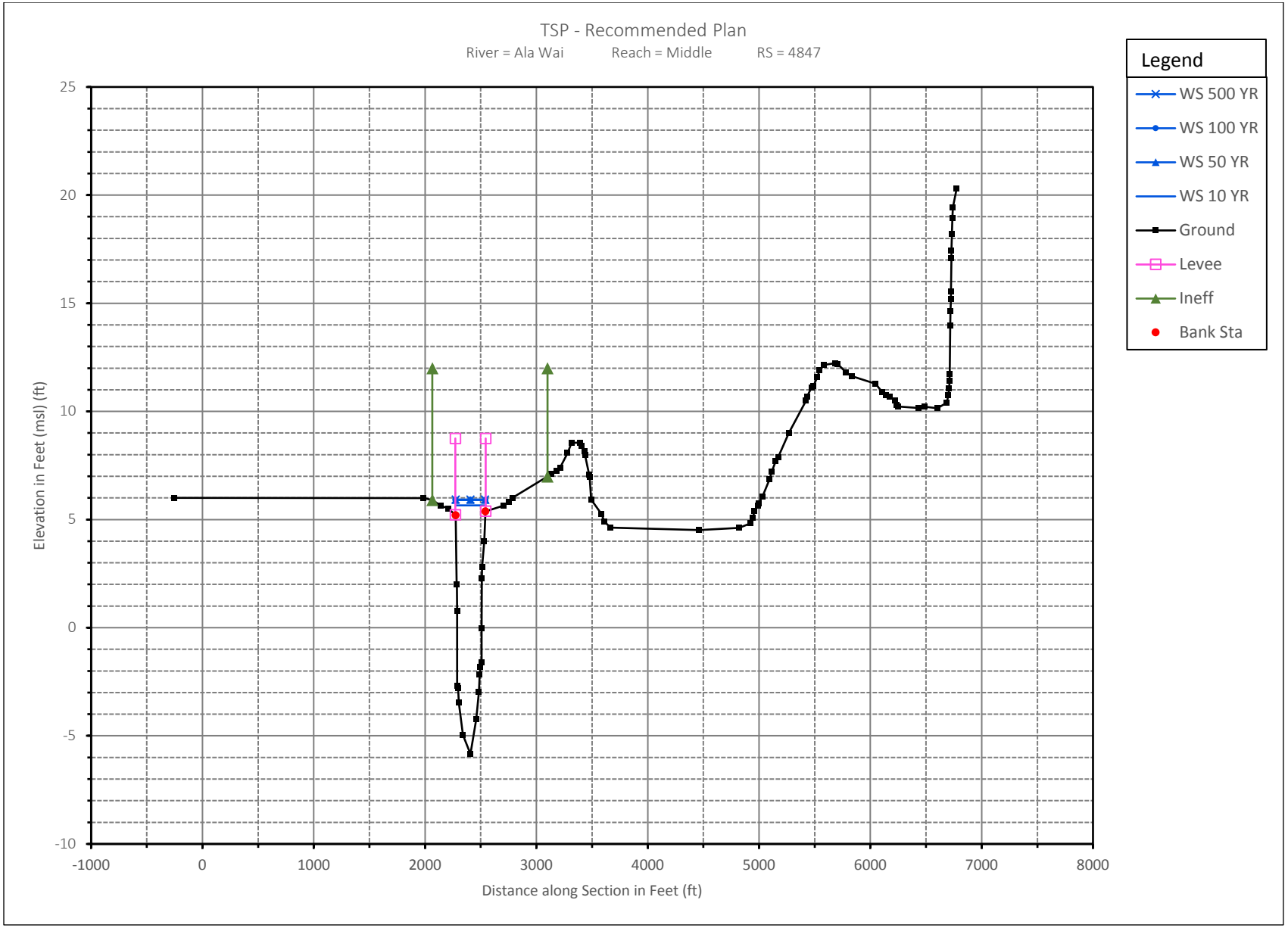

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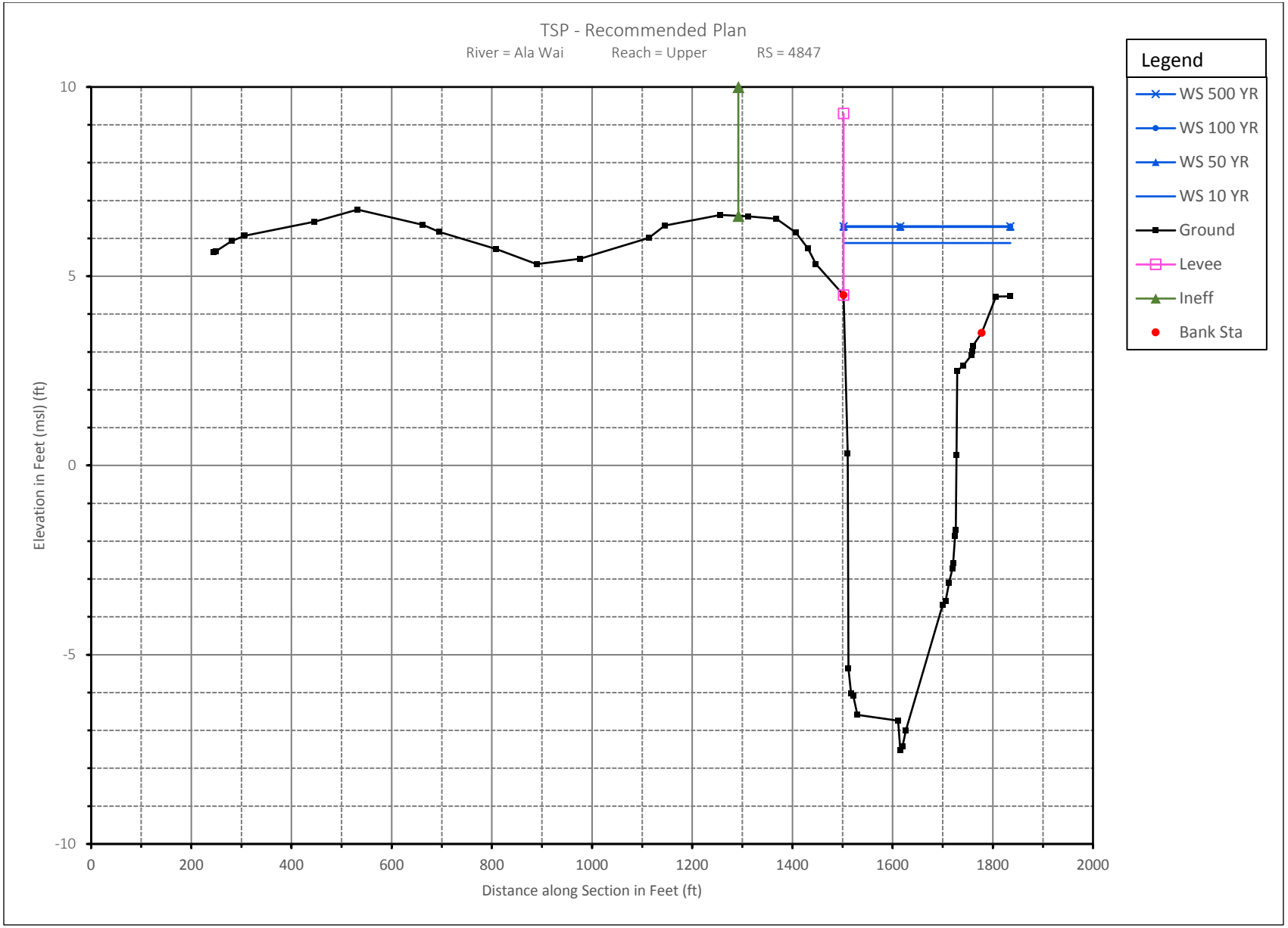

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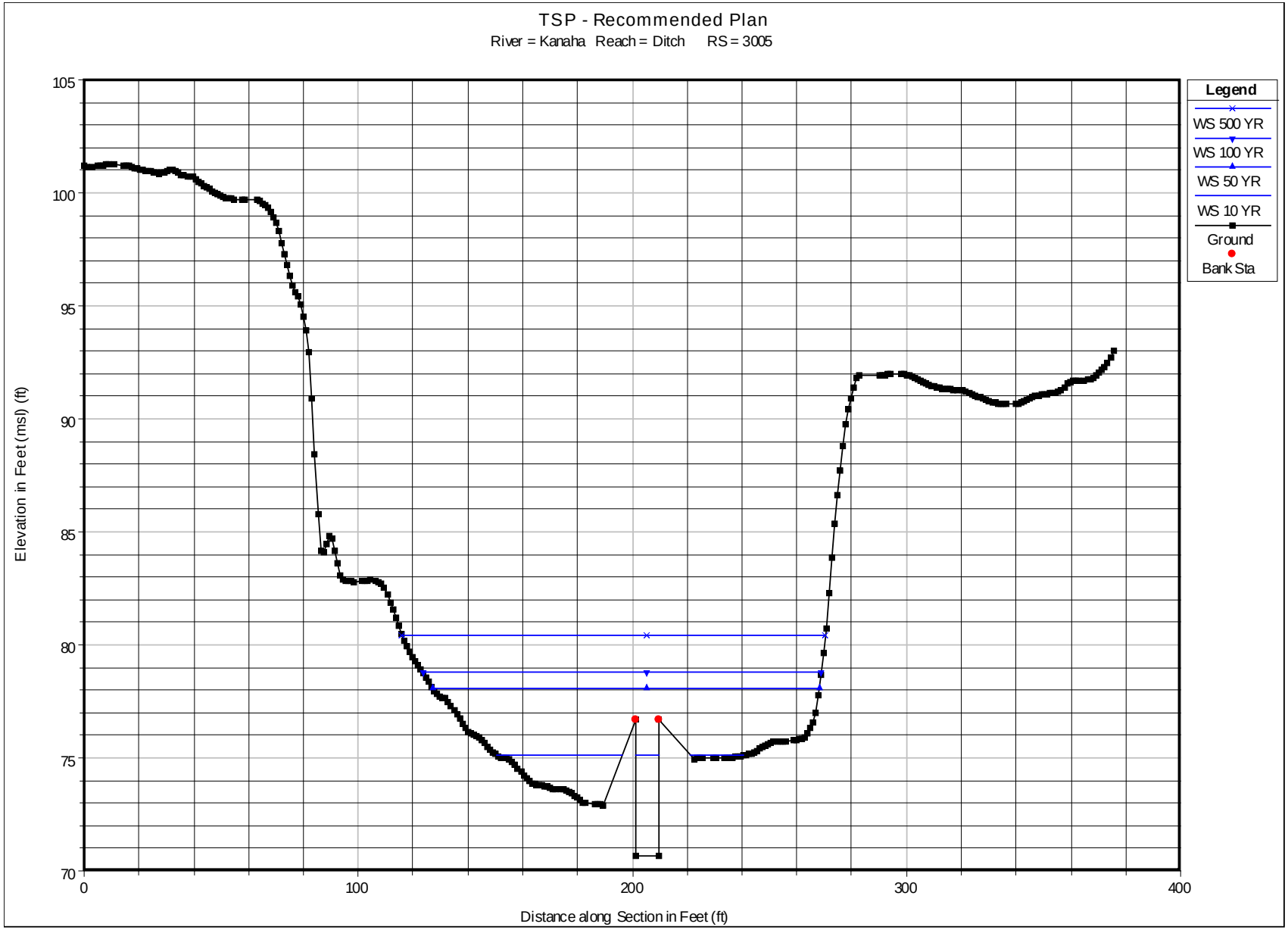

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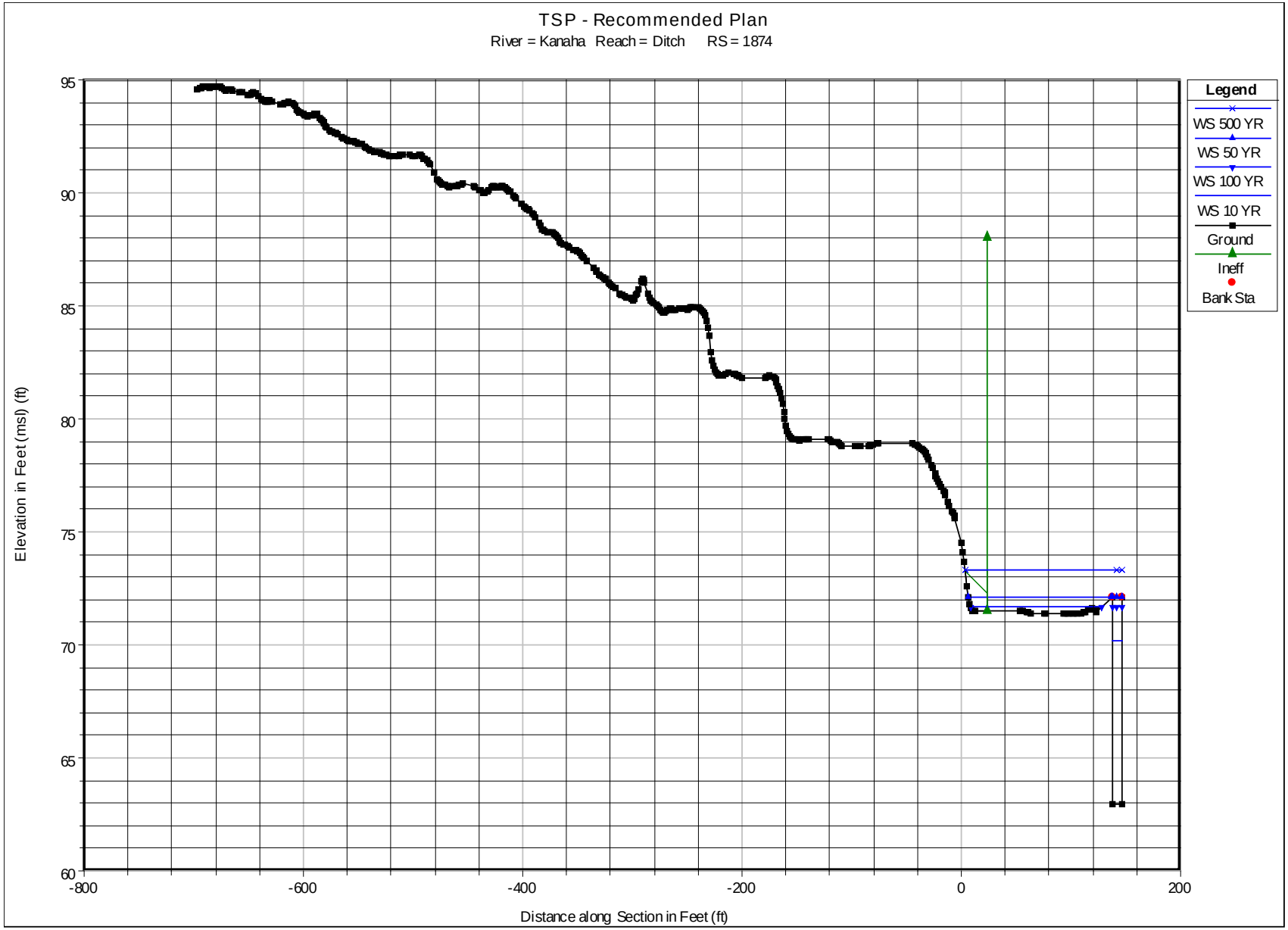

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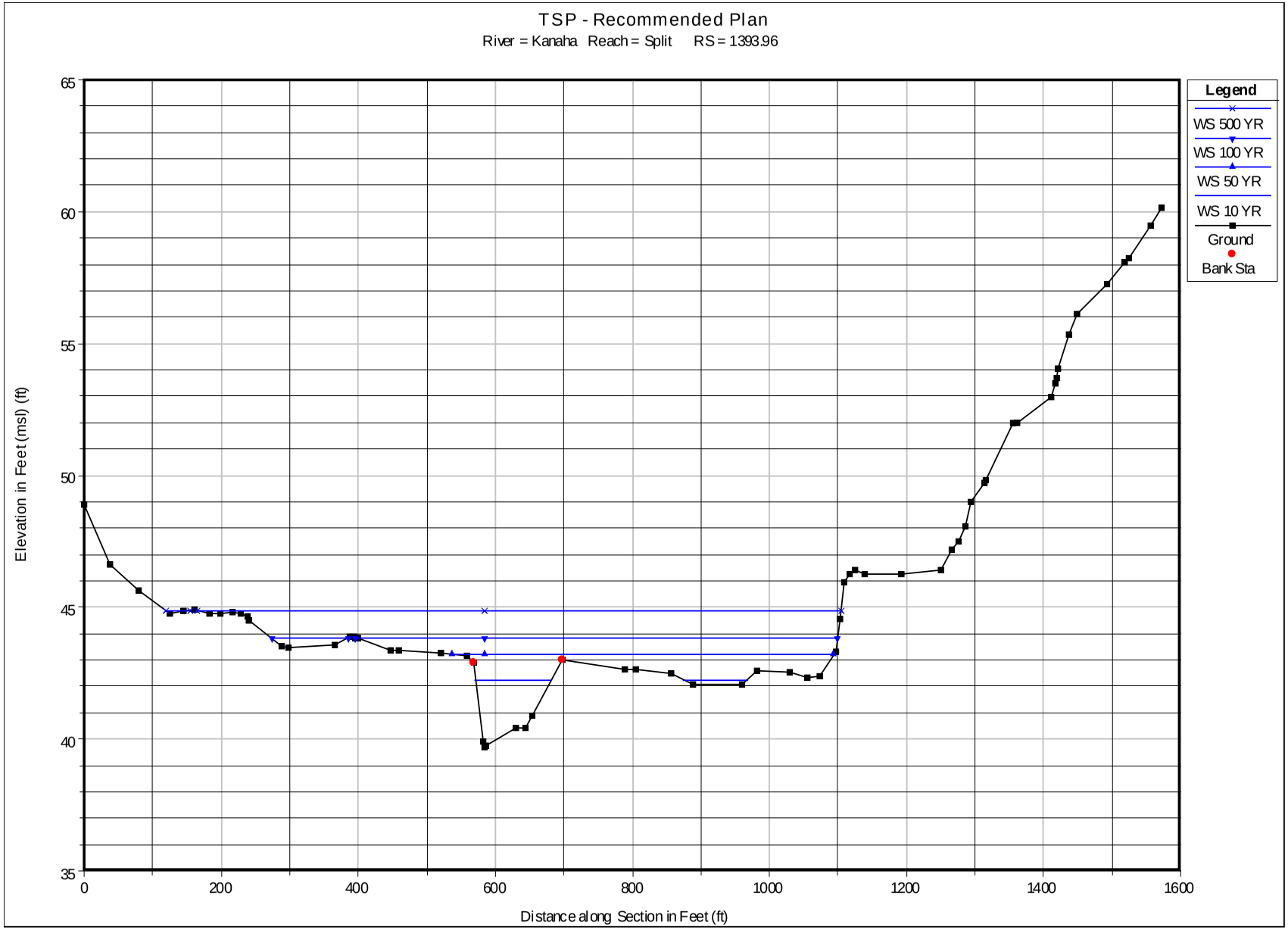

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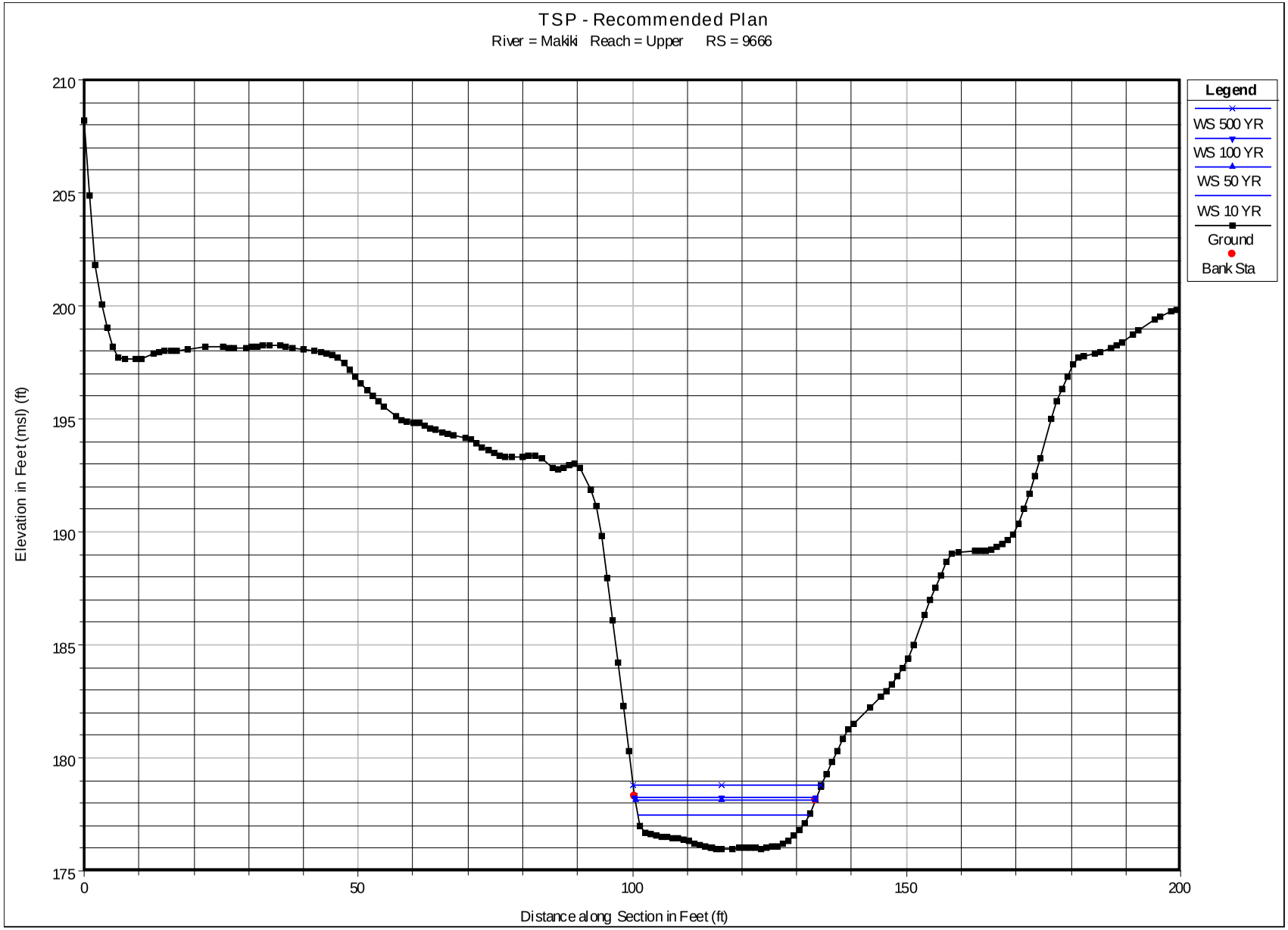

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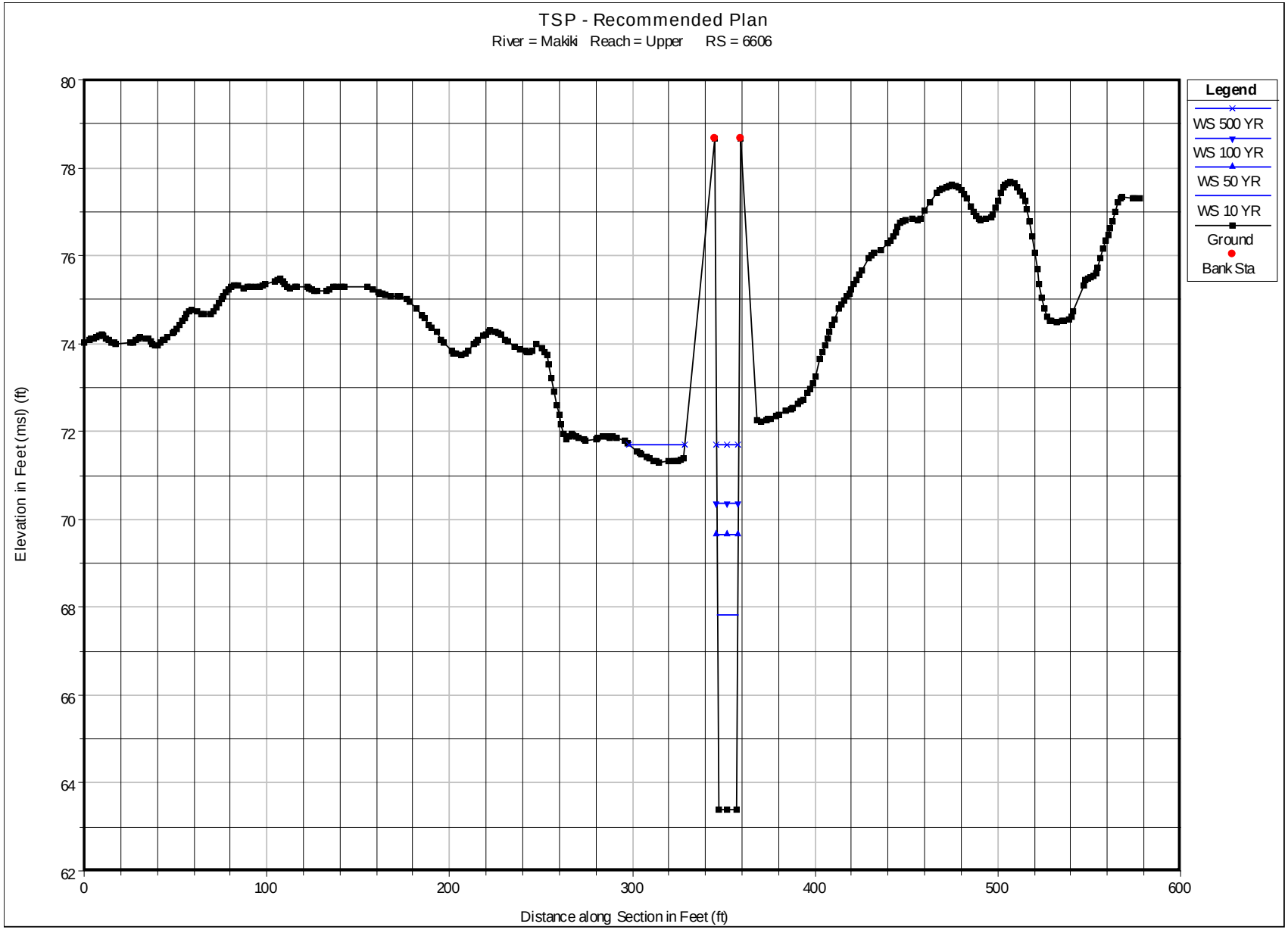

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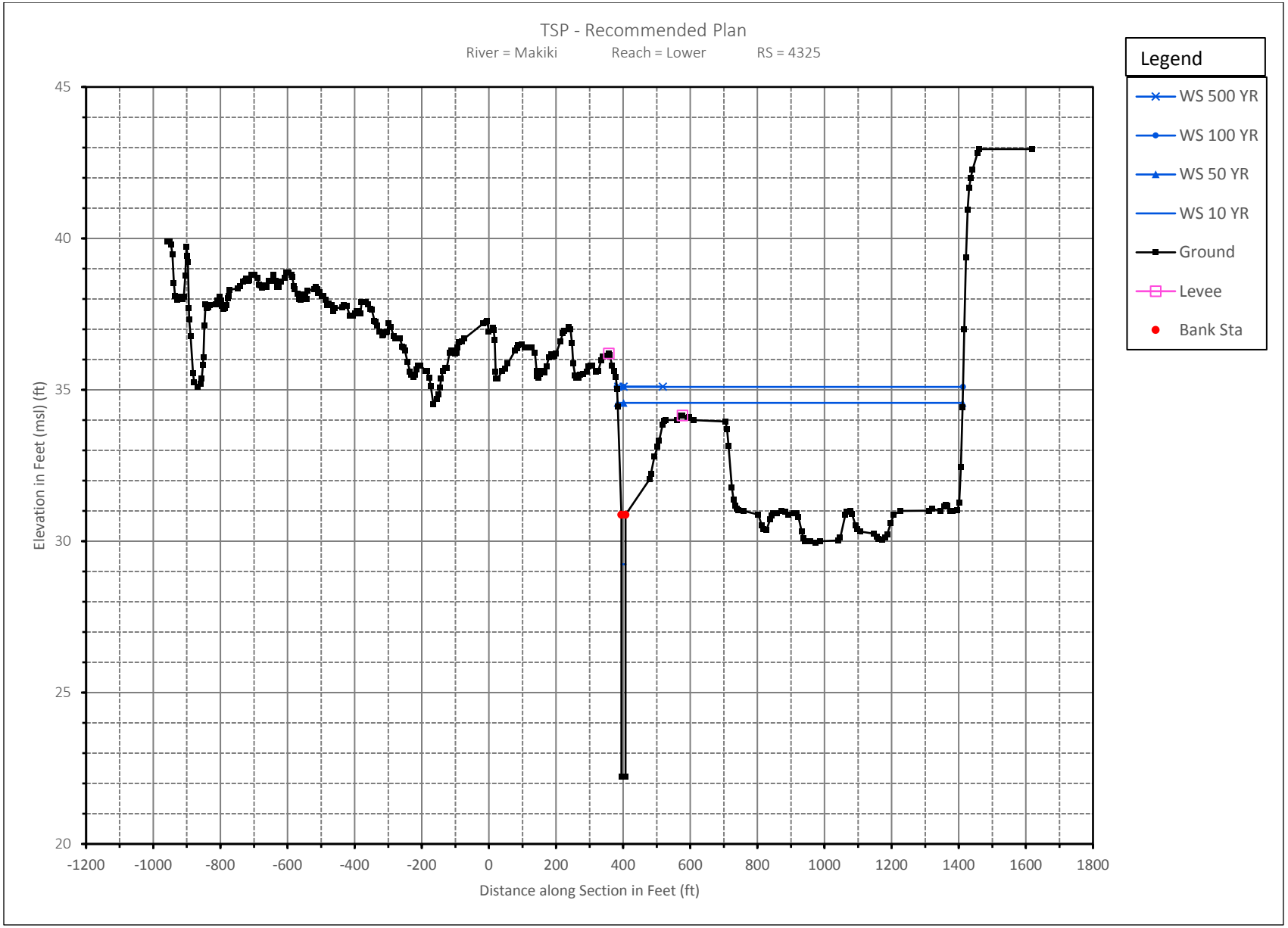

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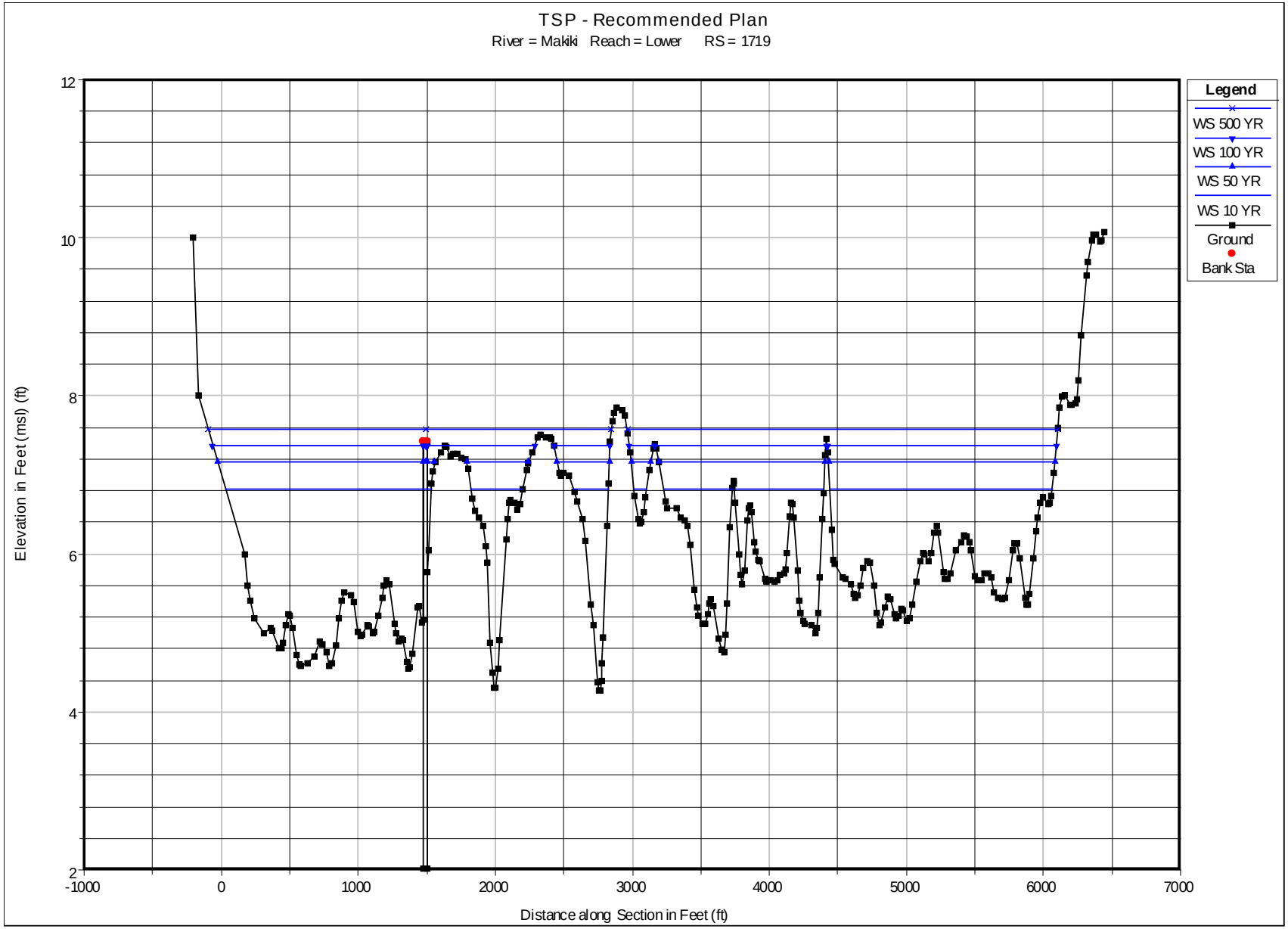

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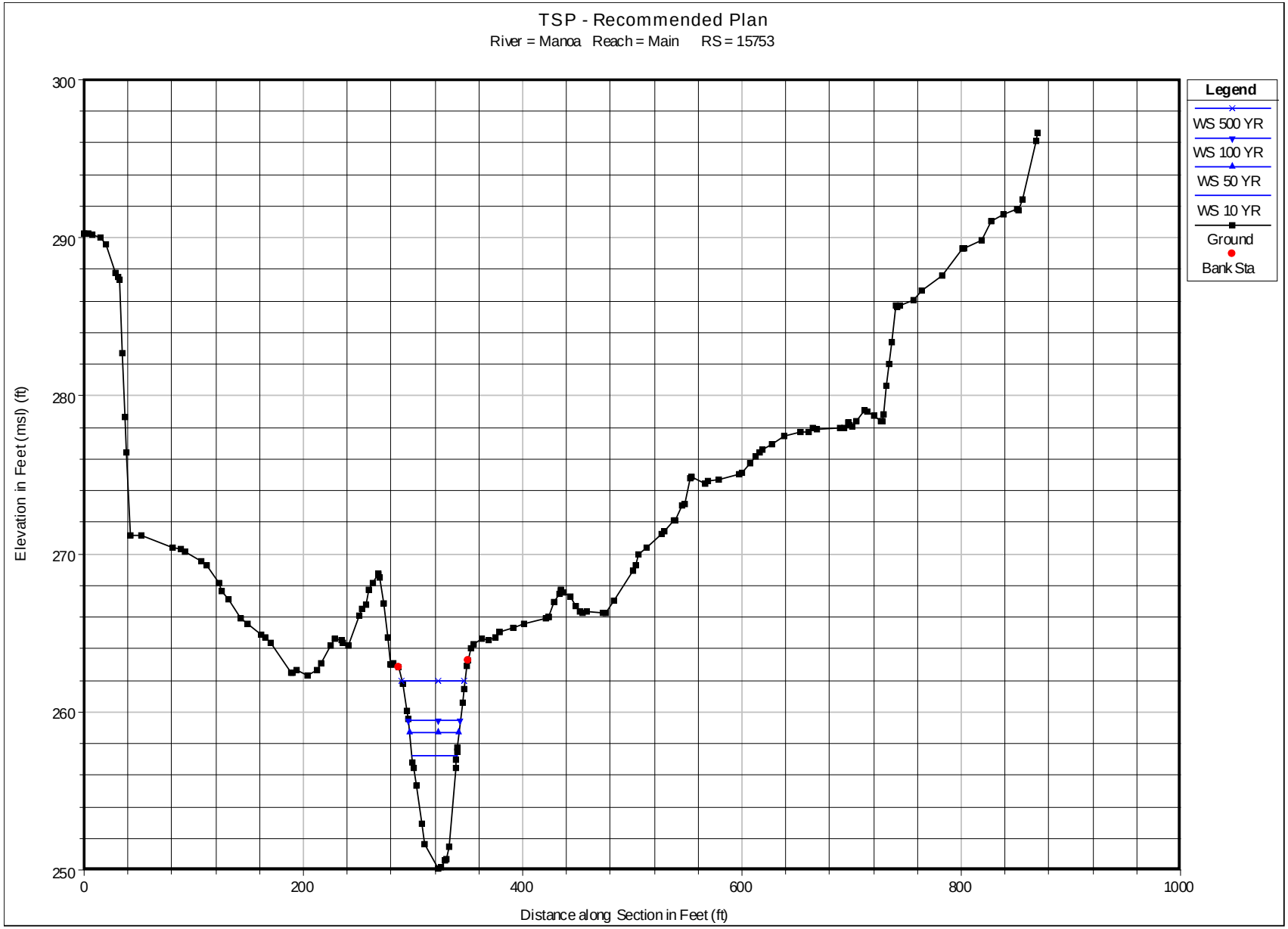

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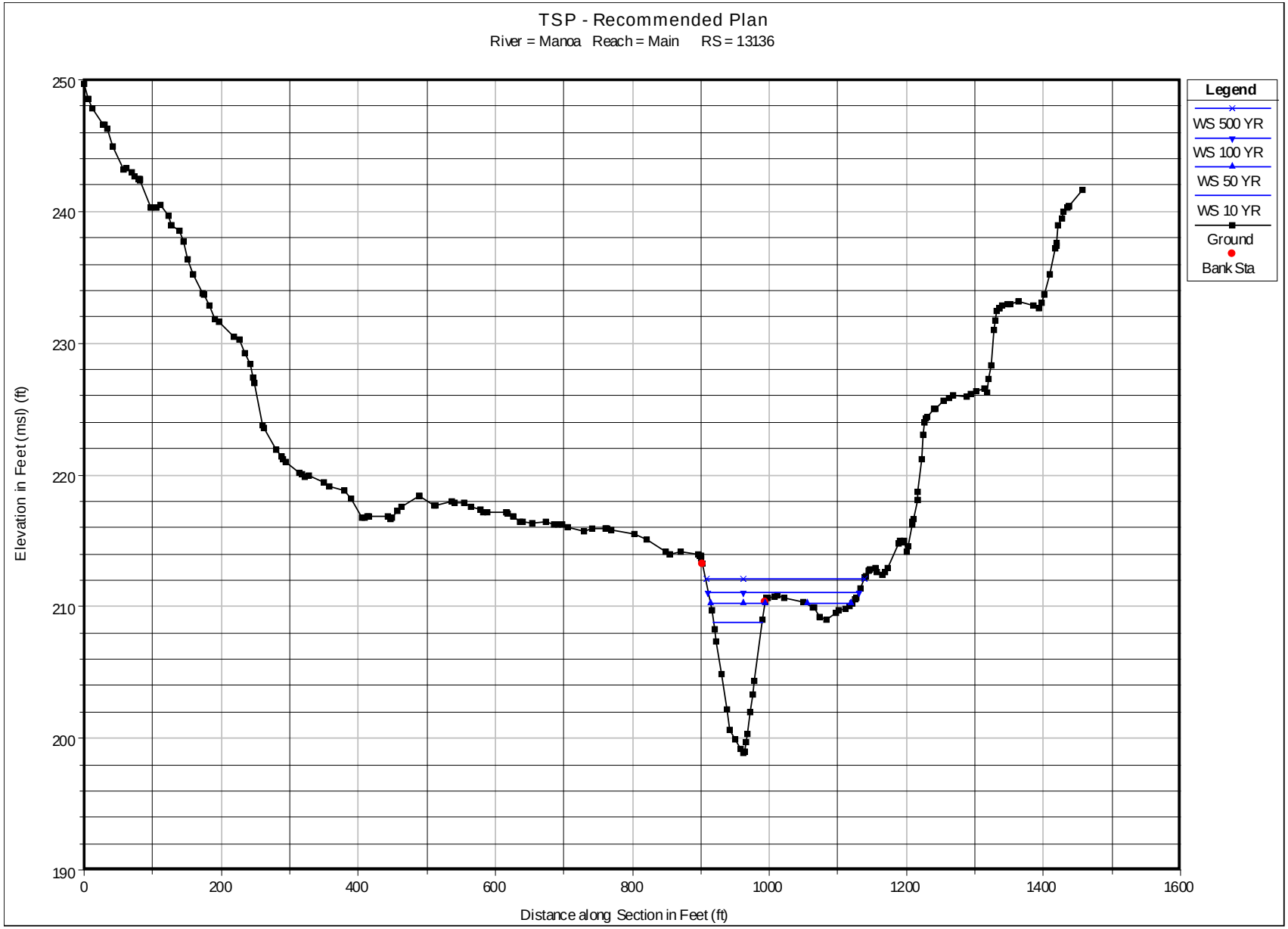


Plate 2 HEC-RAS Cross Section Plots for TSP at Index Station Locations

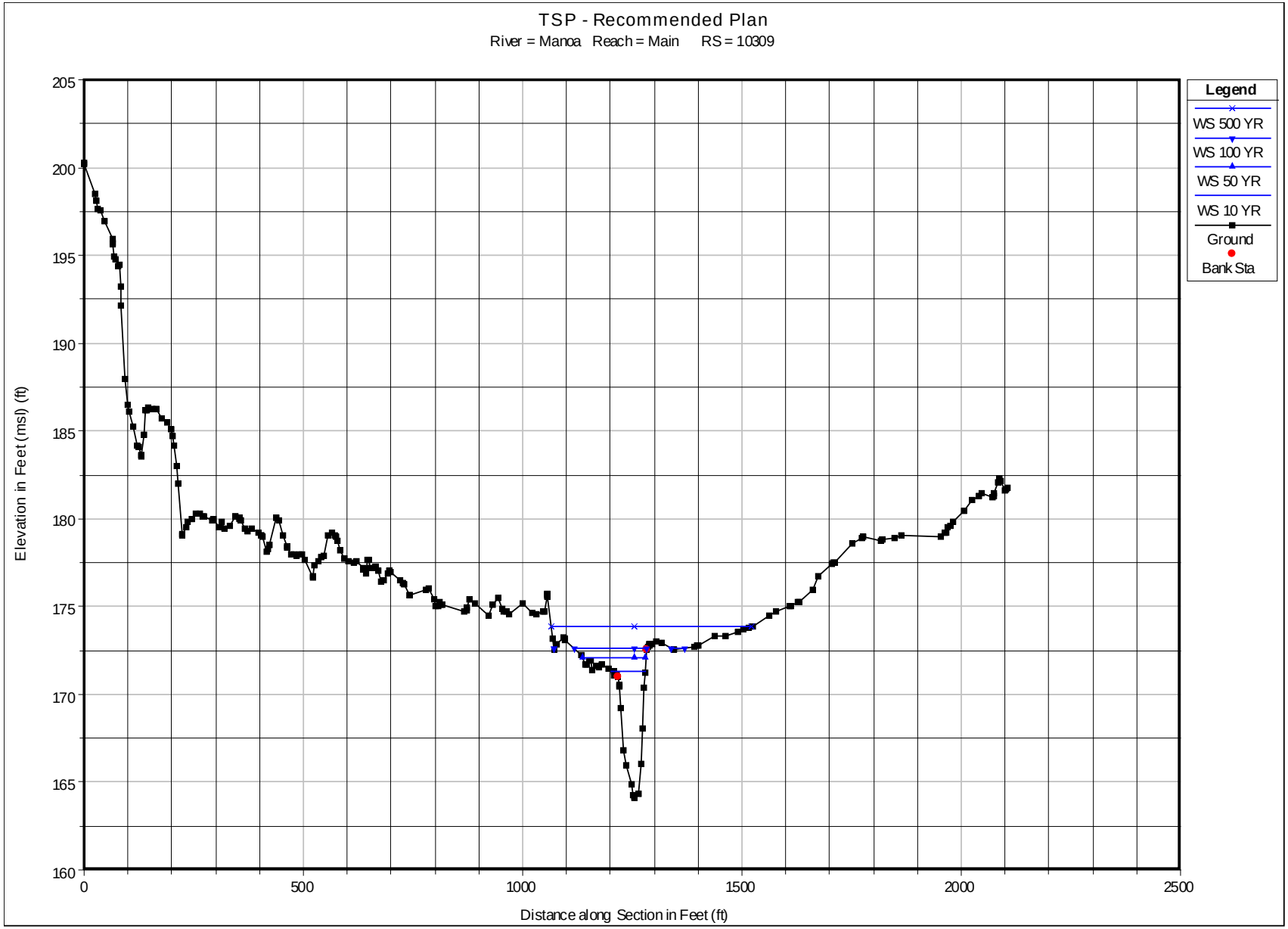


Plate 2 HEC-RAS Cross Section Plots for TSP at Index Station Locations

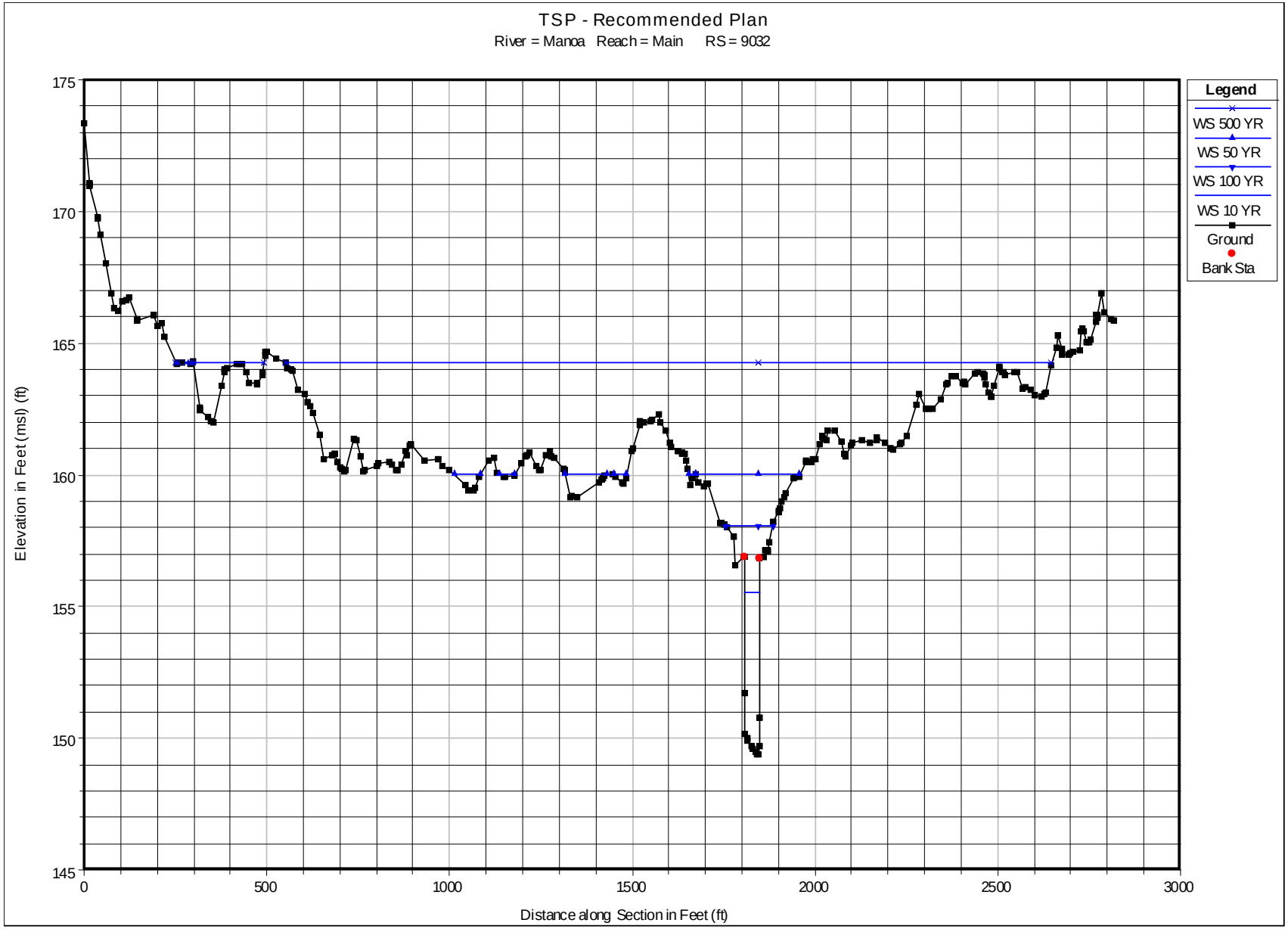
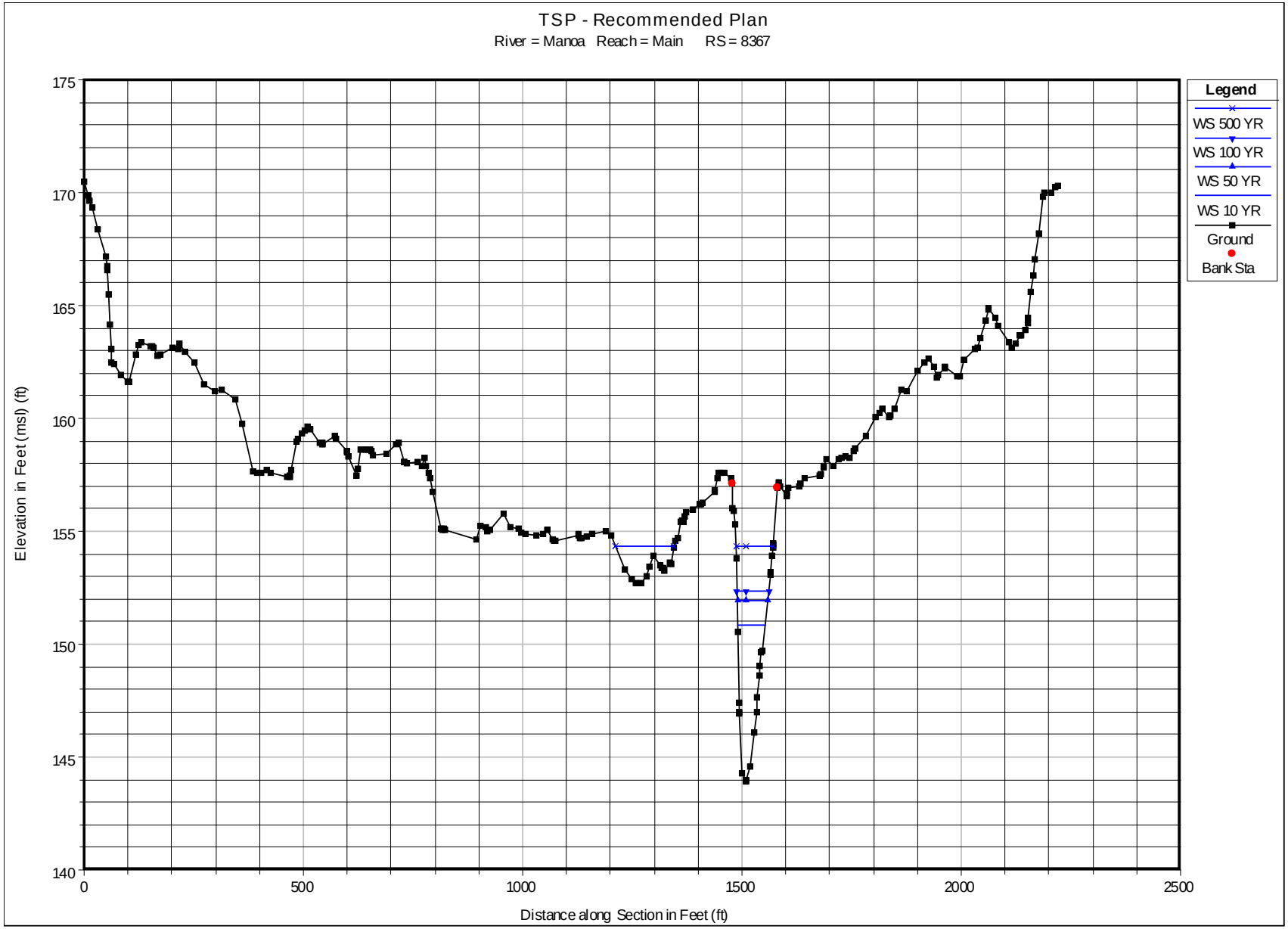


Plate 2 HEC-RAS Cross Section Plots for TSP at Index Station Locations



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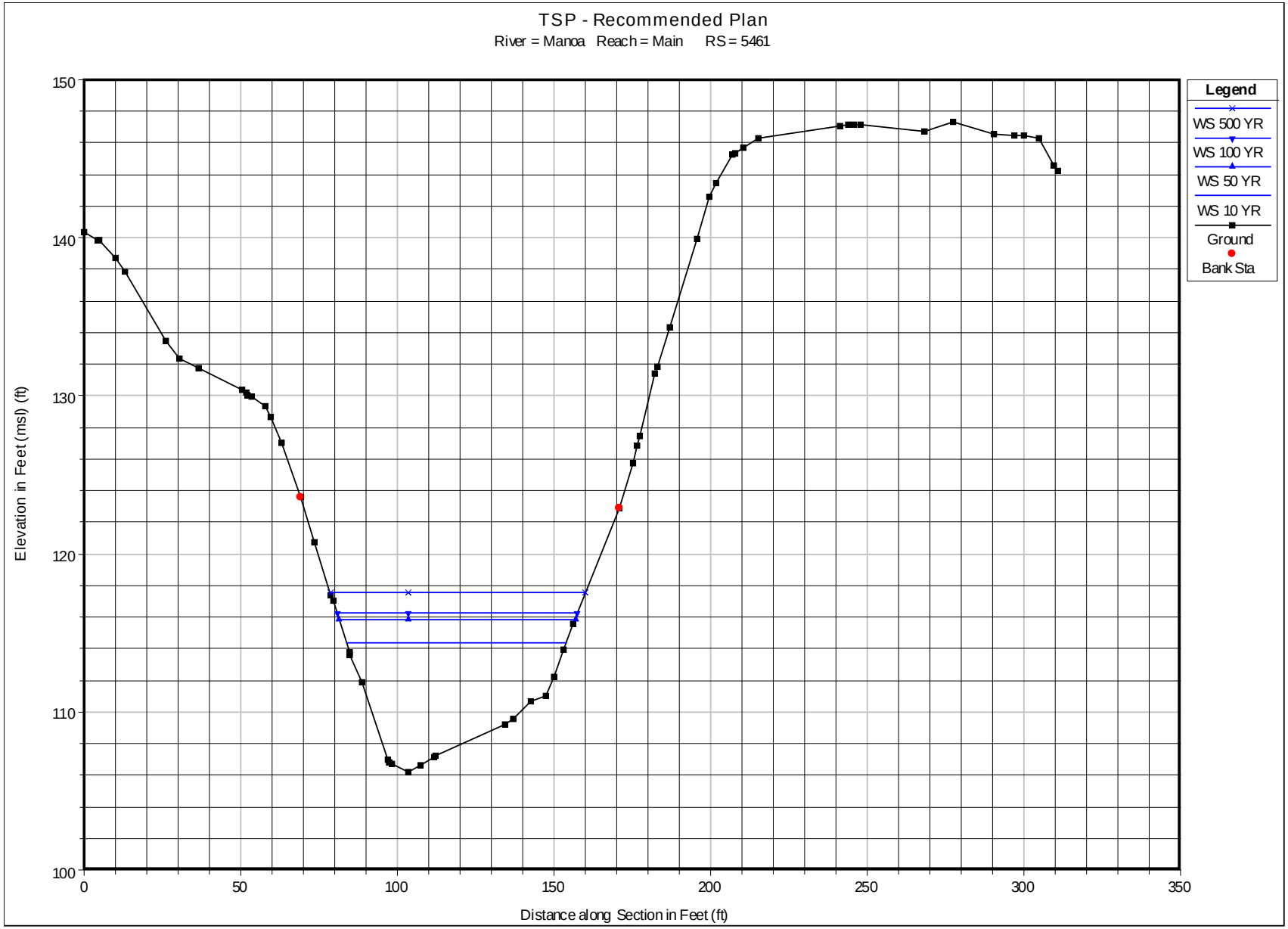

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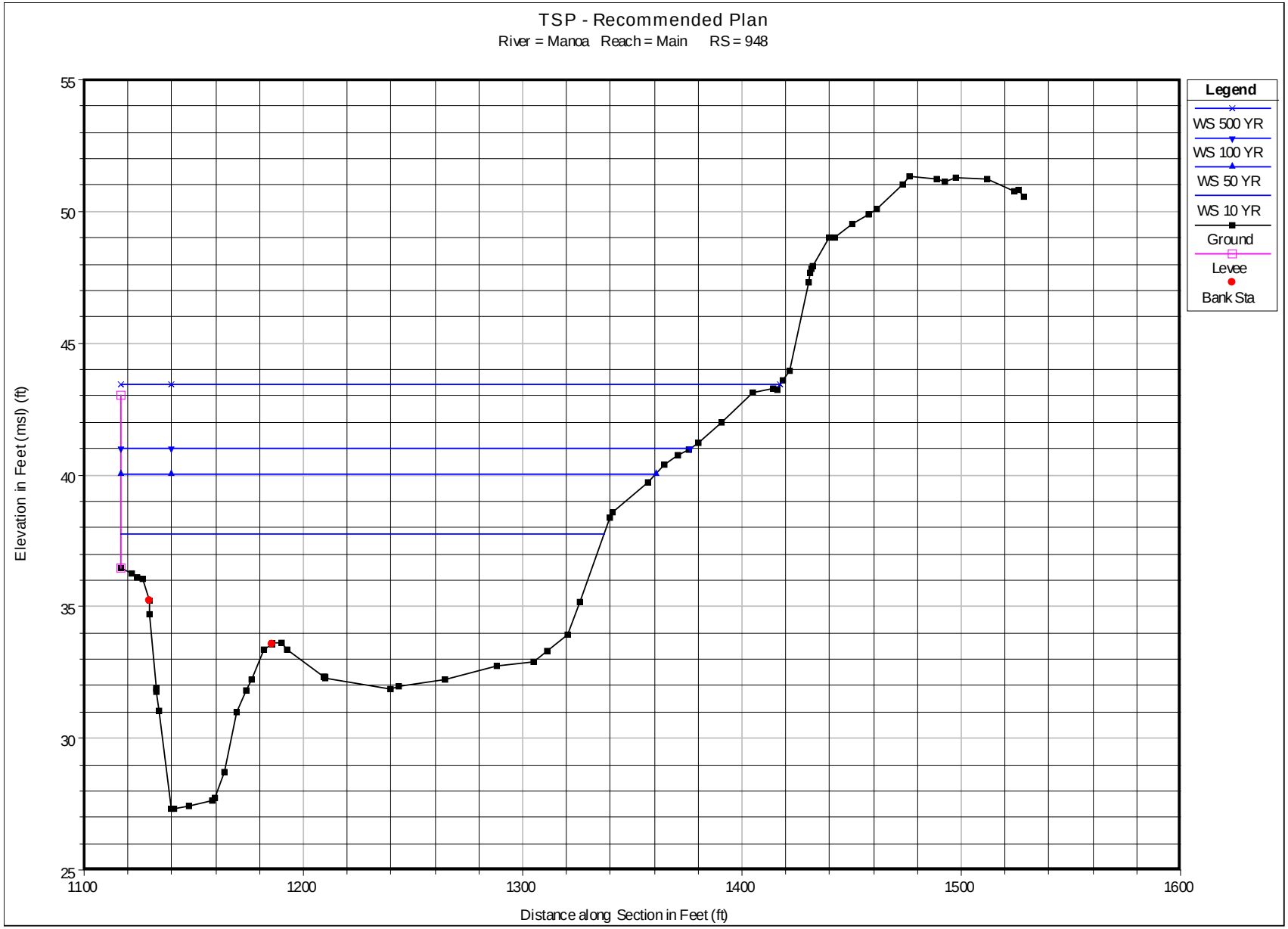

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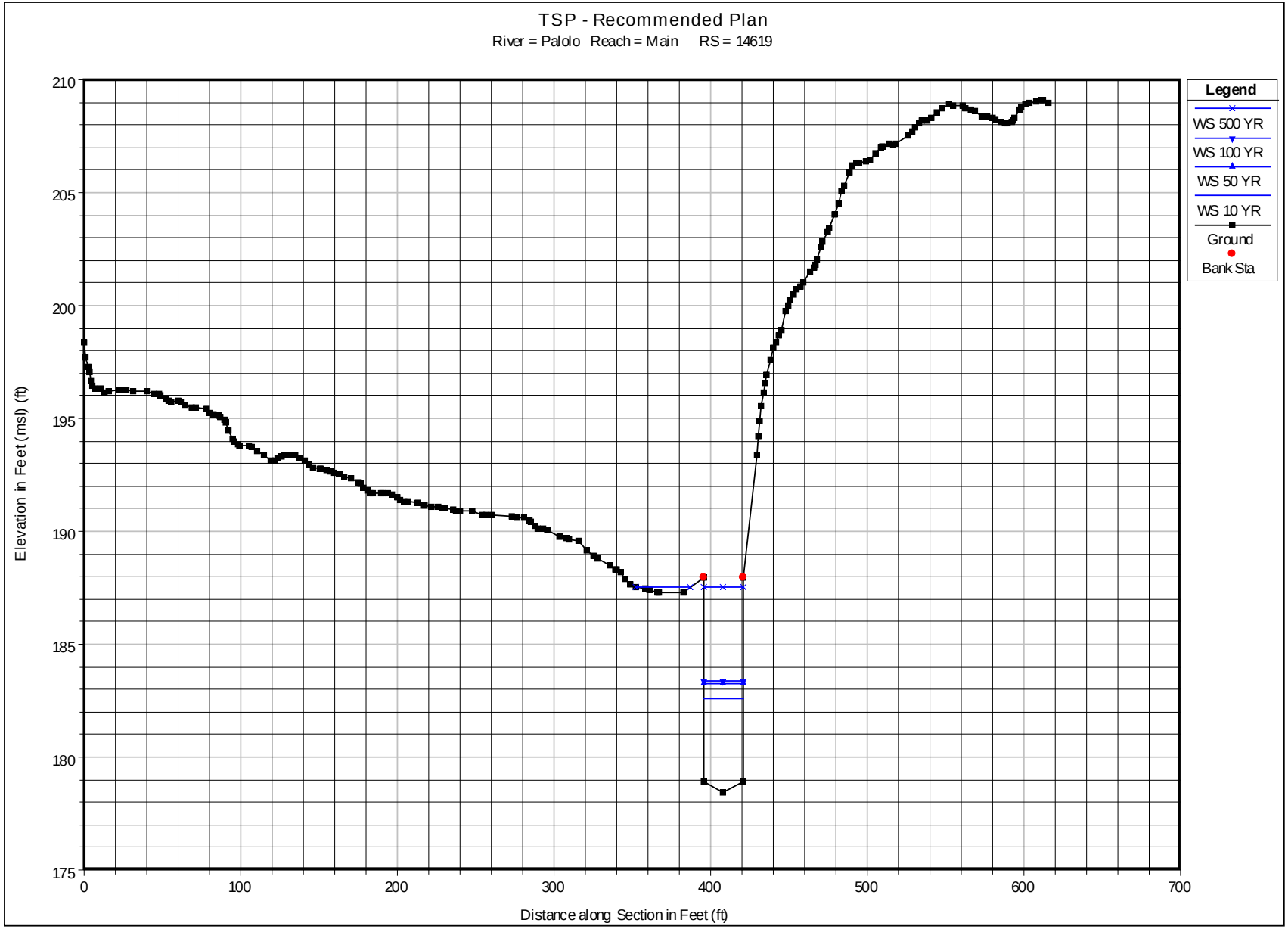

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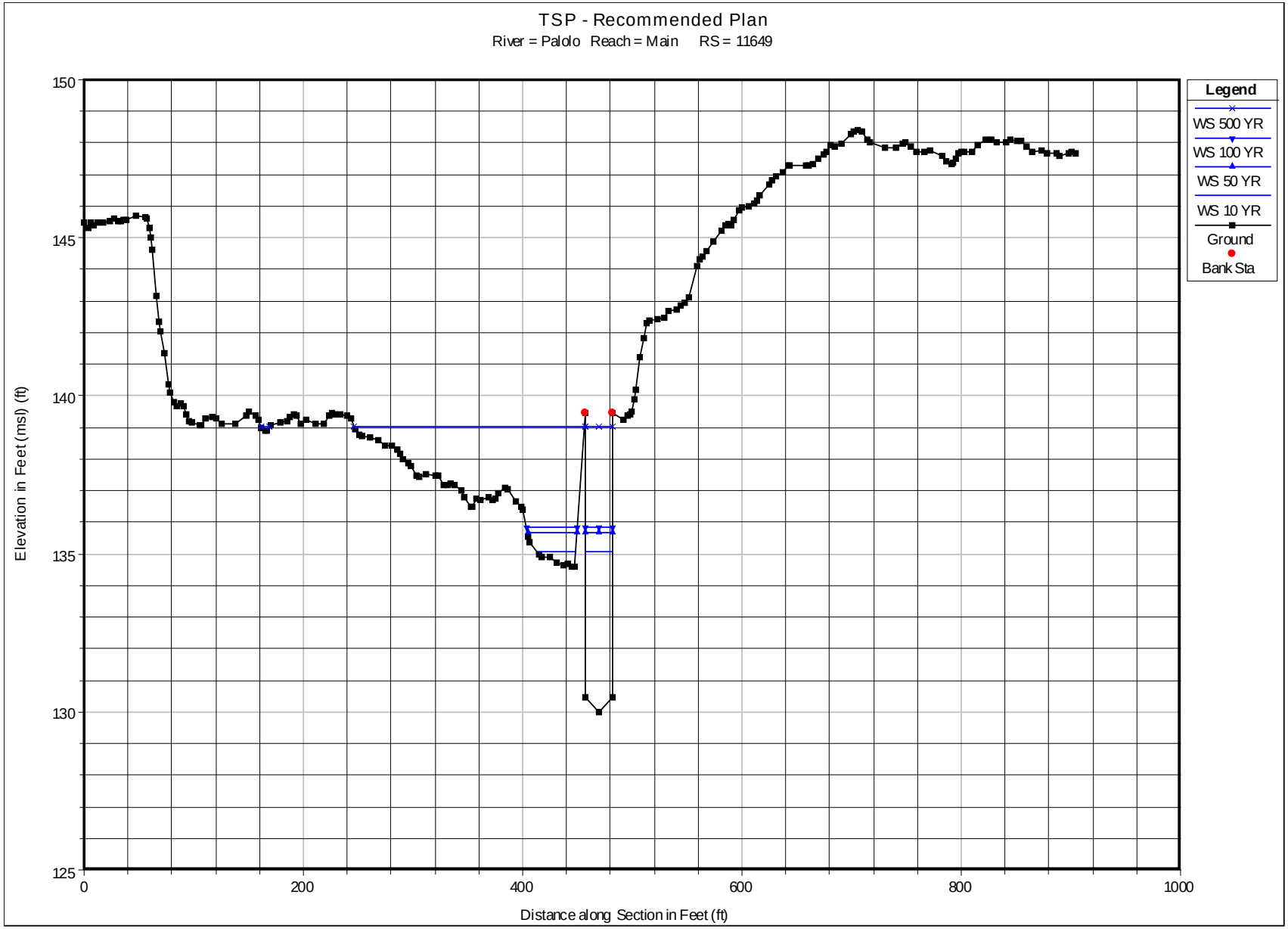

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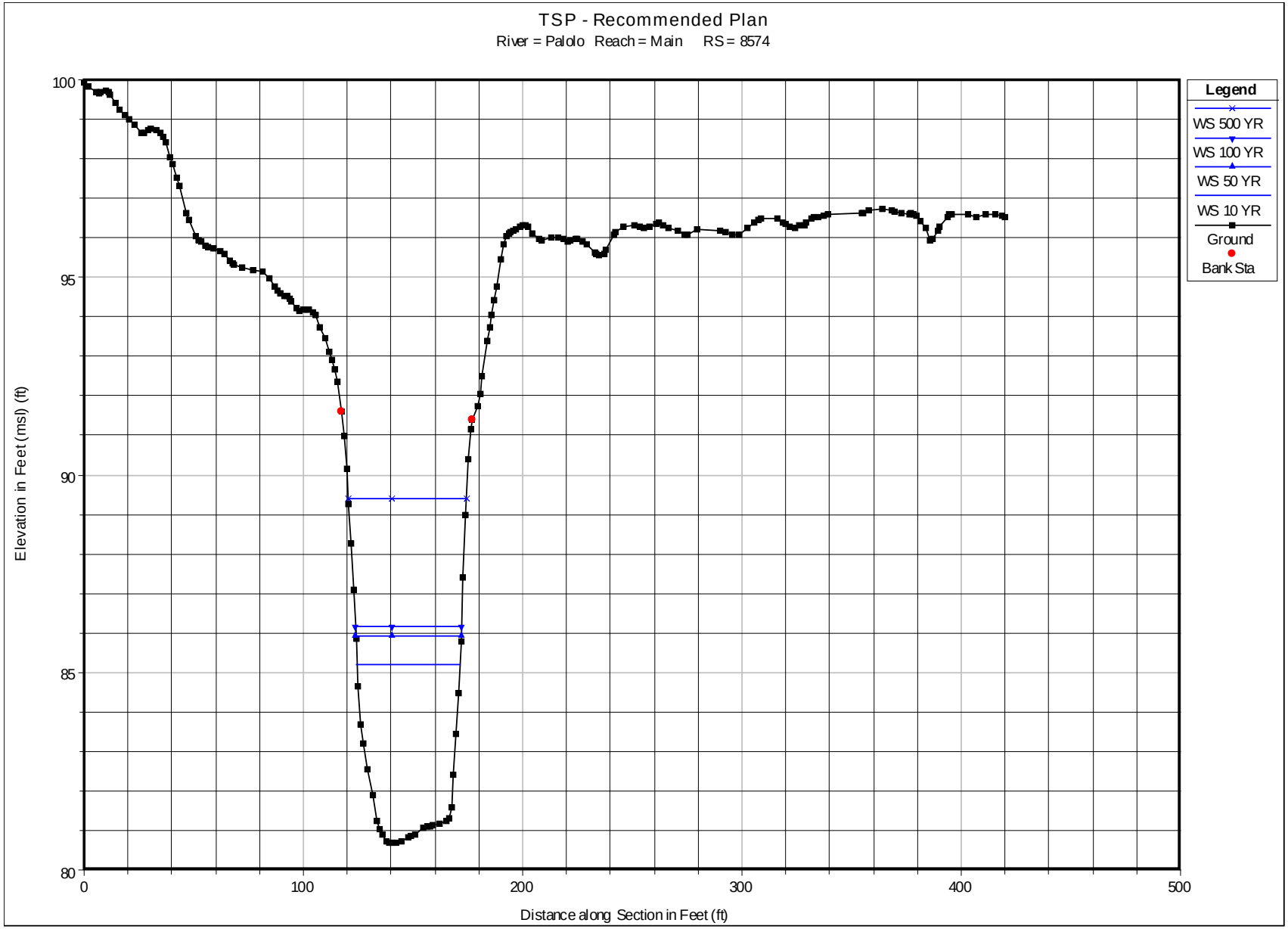

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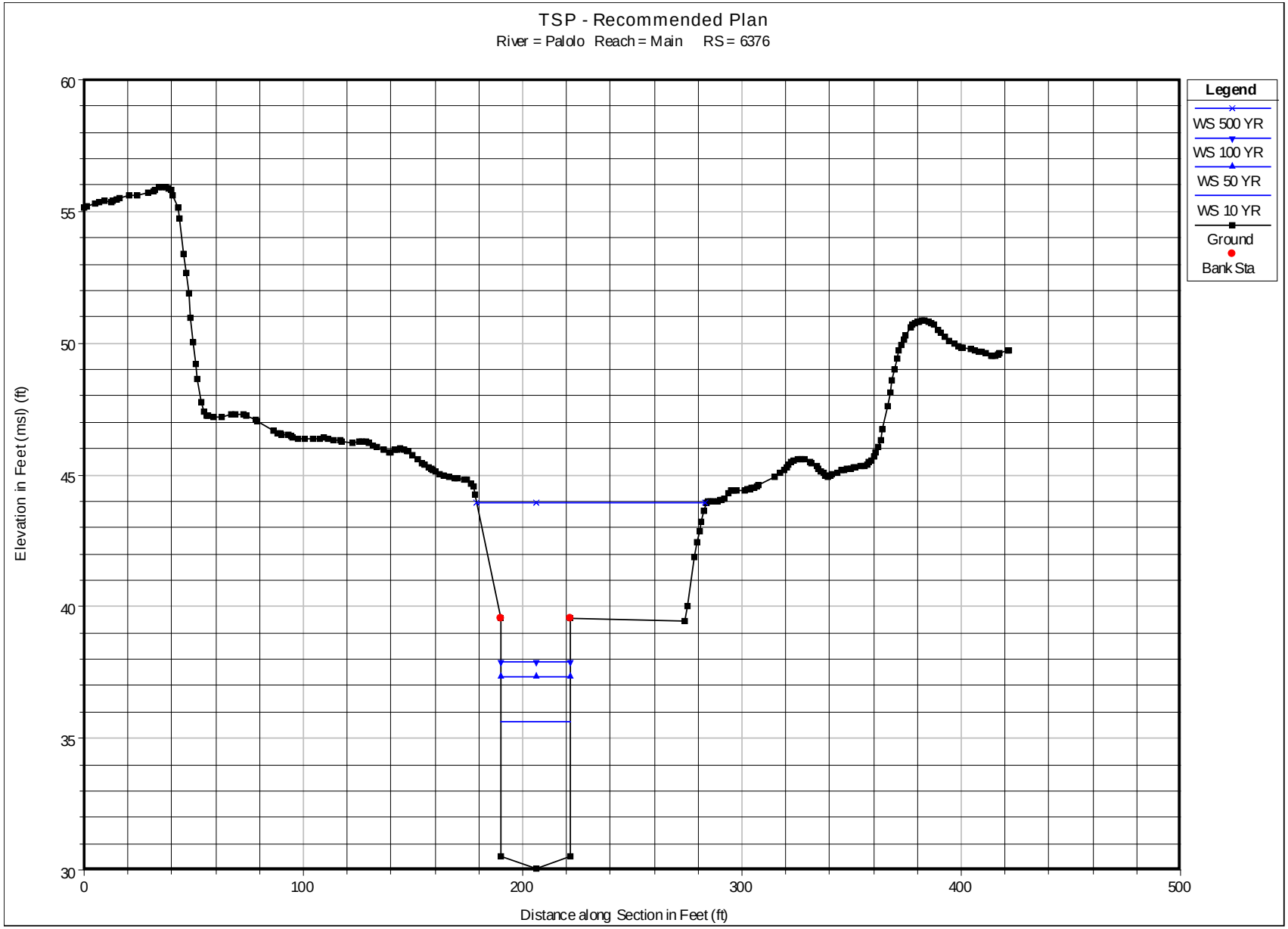

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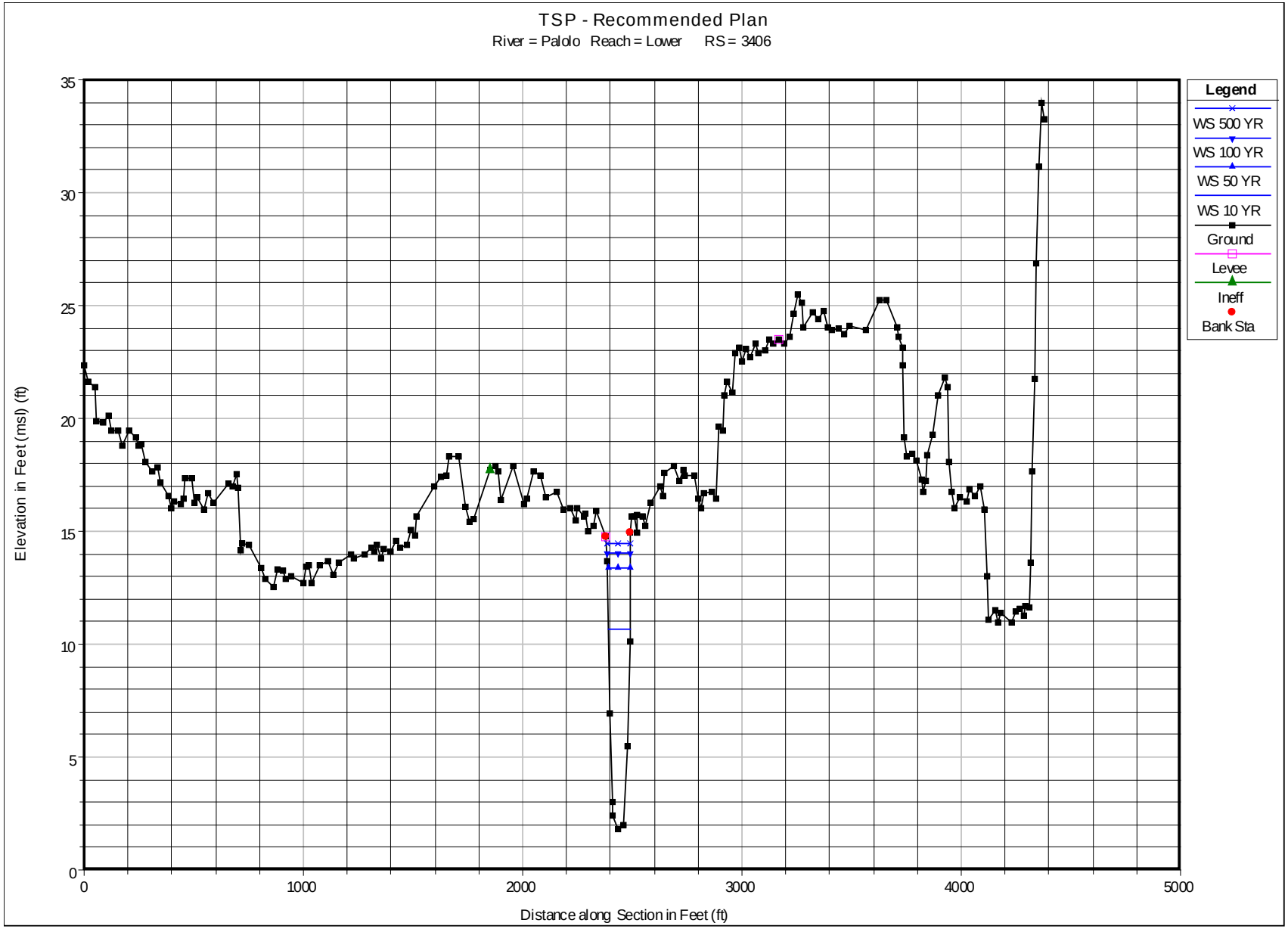

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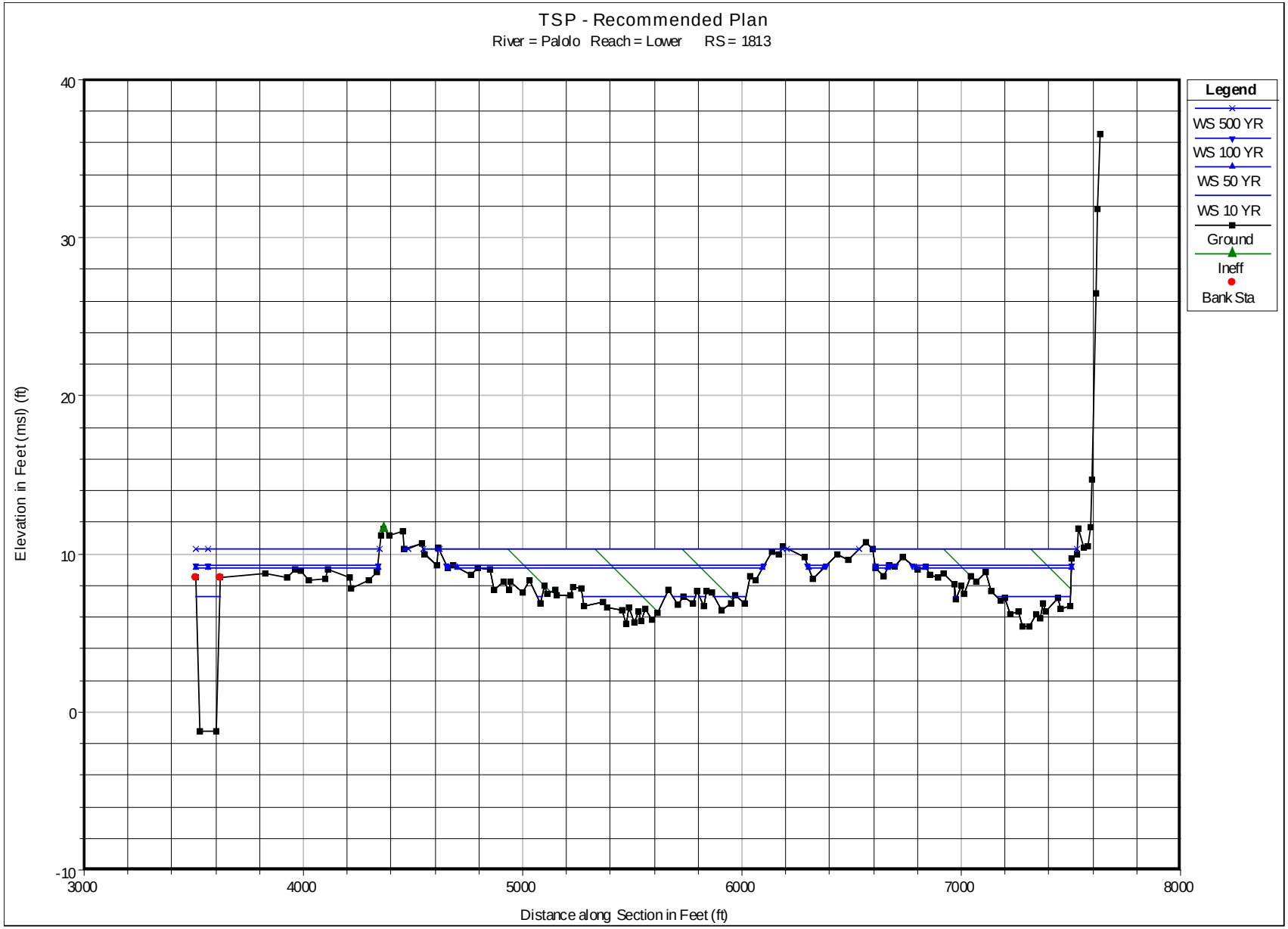

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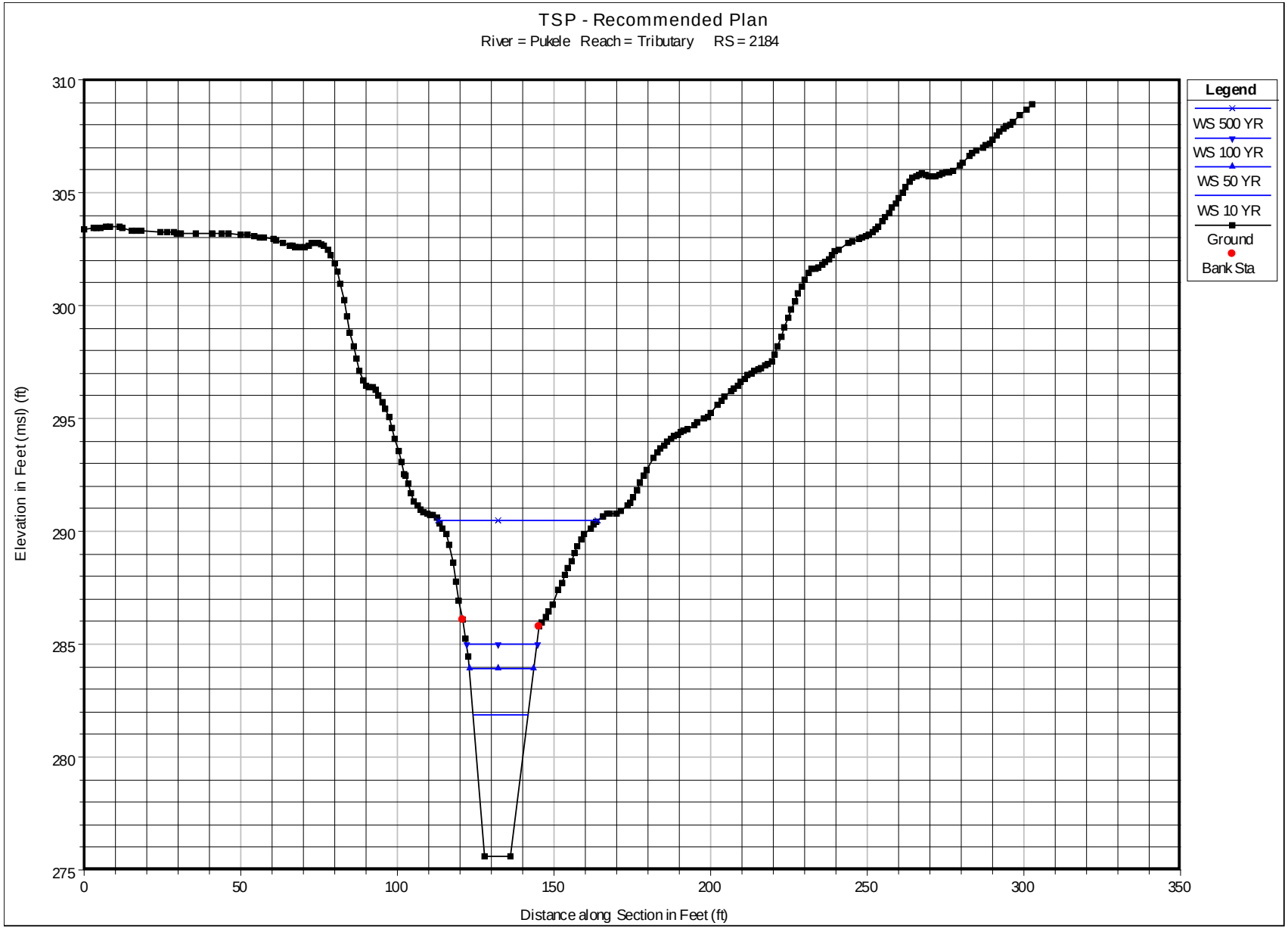

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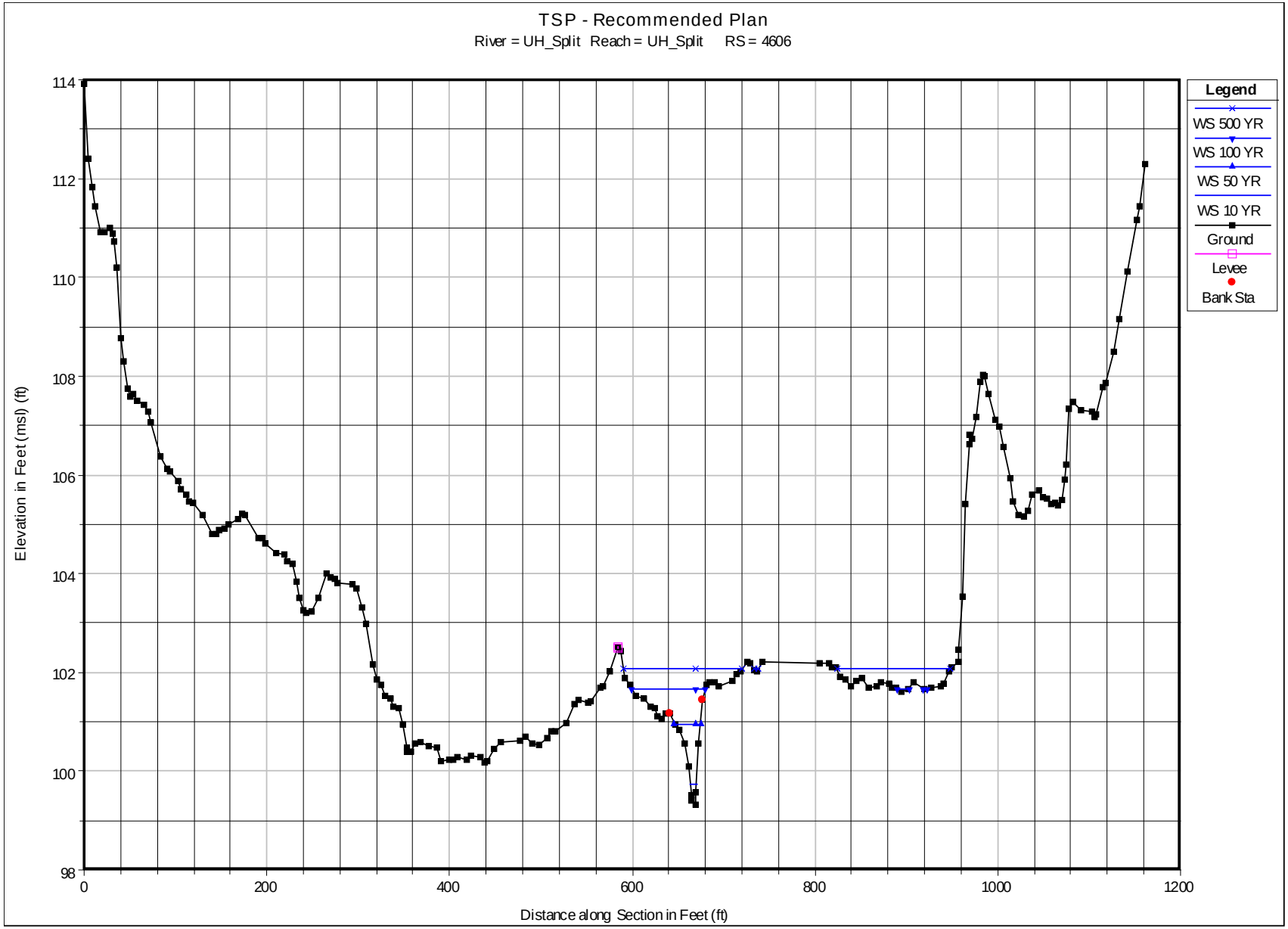

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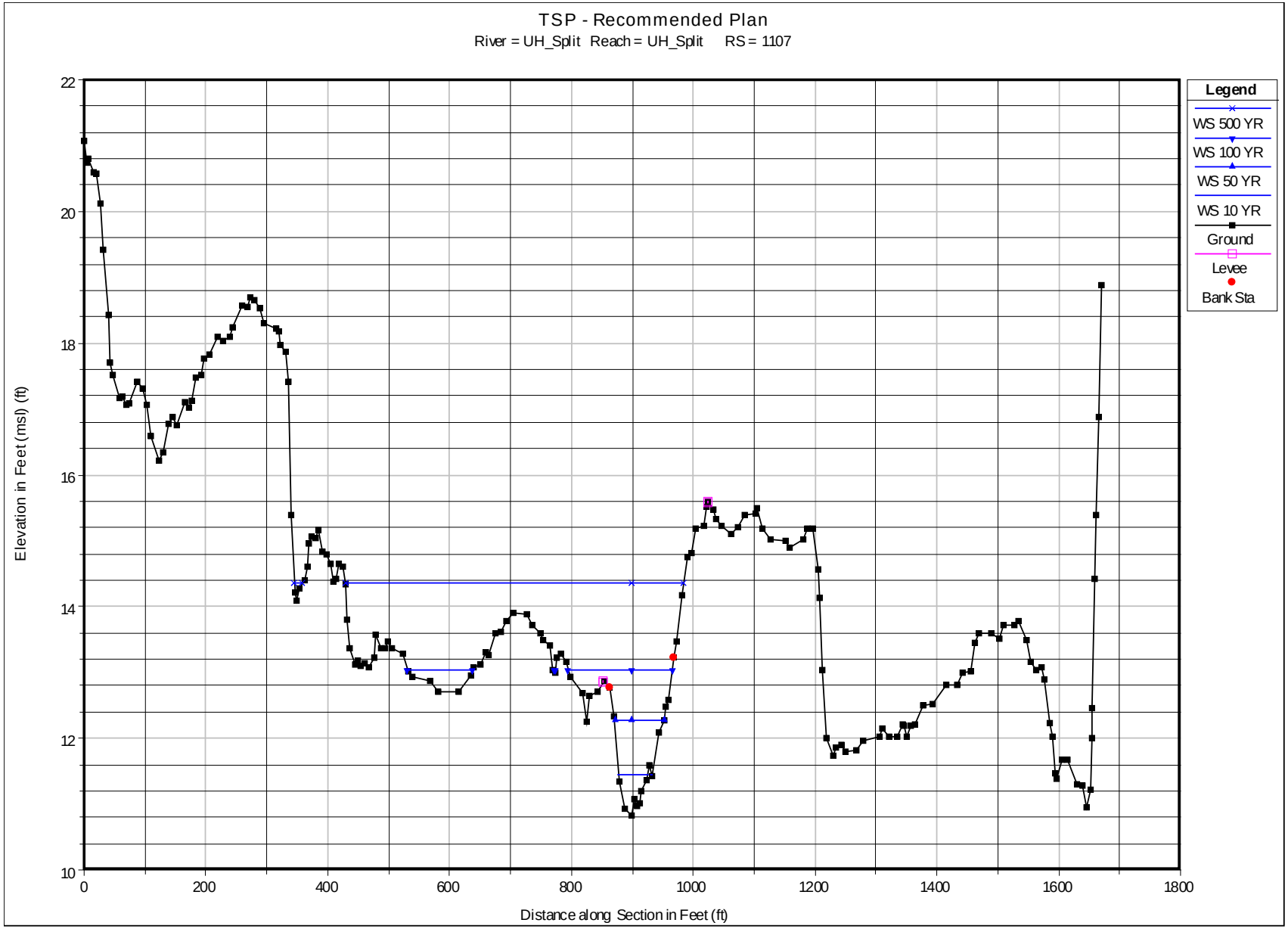

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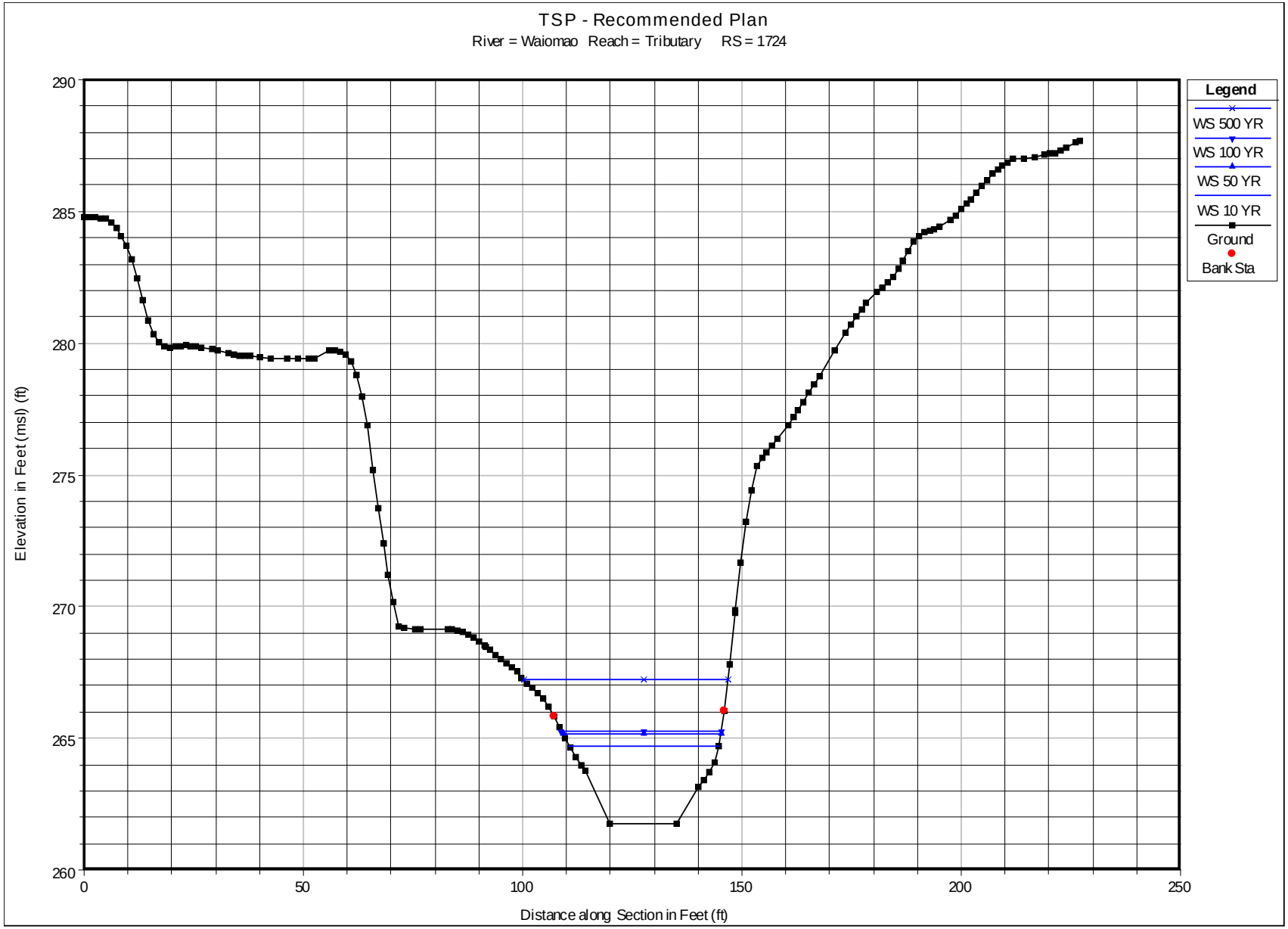


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Ala Wai Lower | Ala Wai Middle | Ala Wai Upper

Legend
- WS 10 YR
- WS 50 YR
- WS 100 YR
- WS 500 YR
- Ground
- LOB
- ROB

Elevation in Feet (msl) (ft)

10
5
0
-5
-10
-15

0
2000
4000
6000
8000
10000

Distance measured in feet (ft)

Downstream Limit of Stu...
Ala Moana Blvd Bridge
Index Point - Reach ALA1
D/S Kalakaua Ave.
Kalakaua Avenue Bridge
Start Reach - ALA2
D/S Face McCully Street
McCully Street Bridge
Index Point - Reach ALA2
End Reach - ALA2
Start Reach ALA3
End Reach - ALA3

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Ala Wai Lower

Legend

WS 10 YR
WS 50 YR
WS 100 YR
WS 500 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

10
5
0
-5
-10
-15

0
500
1000
1500
2000
2500

Distance measured in feet (ft)

Start Reach ALA1
Downstream Limit of Stu...
Ala Moana Blvd Bridge
Index Point - Reach ALA1
D/S Kalakaua Ave.
Kalakaua Avenue Bridge

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Ala Wai Middle

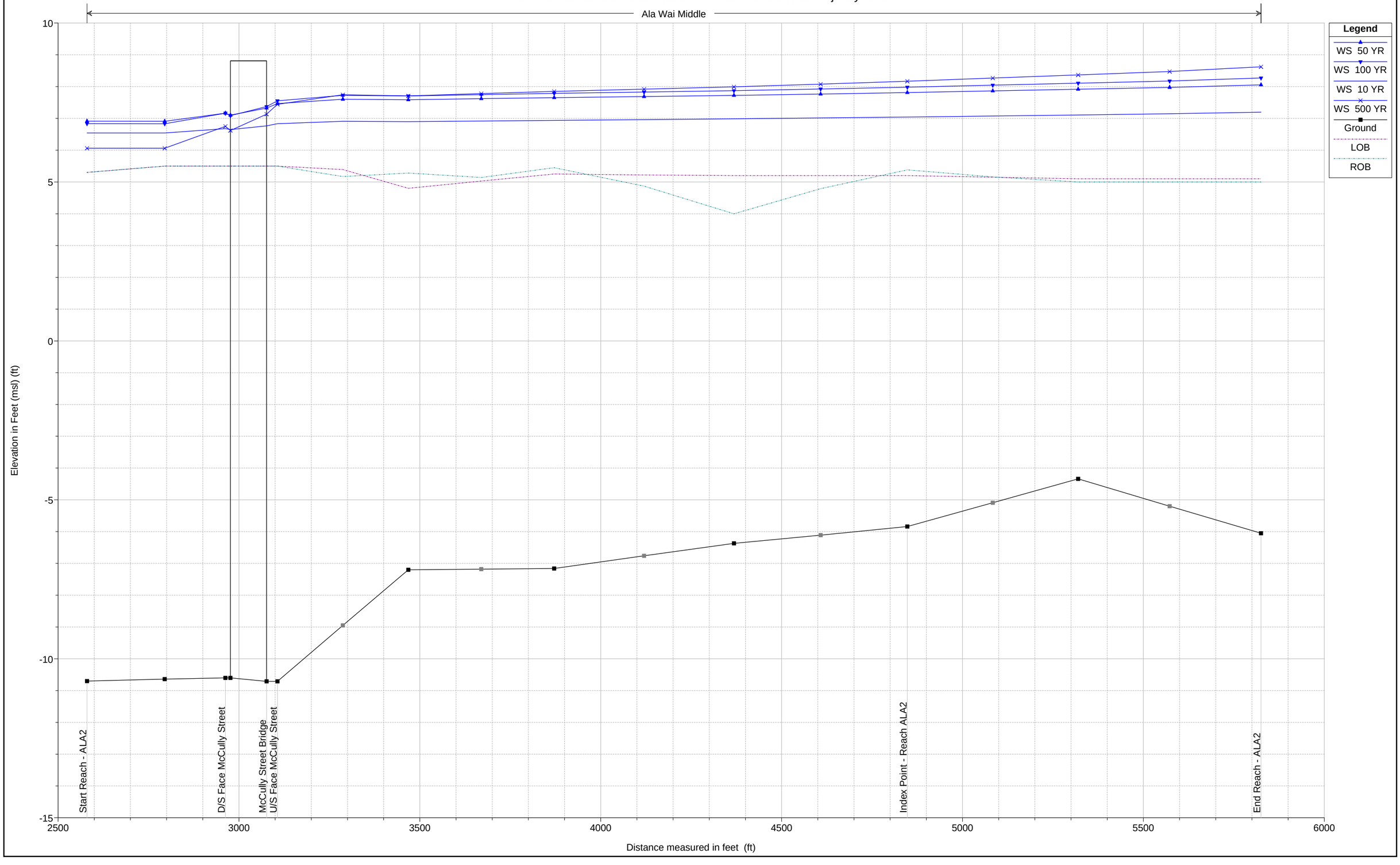


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Ala Wai Upper

Legend

WS 500 YR

WS 100 YR

WS 50 YR

WS 10 YR

Ground

LOB

ROB

Elevation in Feet (msl) (ft)

10

8

6

4

2

0

-2

-4

-6

-8

-10

Start Reach ALA3

End Reach - ALA3

6000

6500

7000

7500

8000

8500

9000

9500

10000

Distance measured in feet (ft)

Plate 3 With-Out Project Hydraulic Profiles

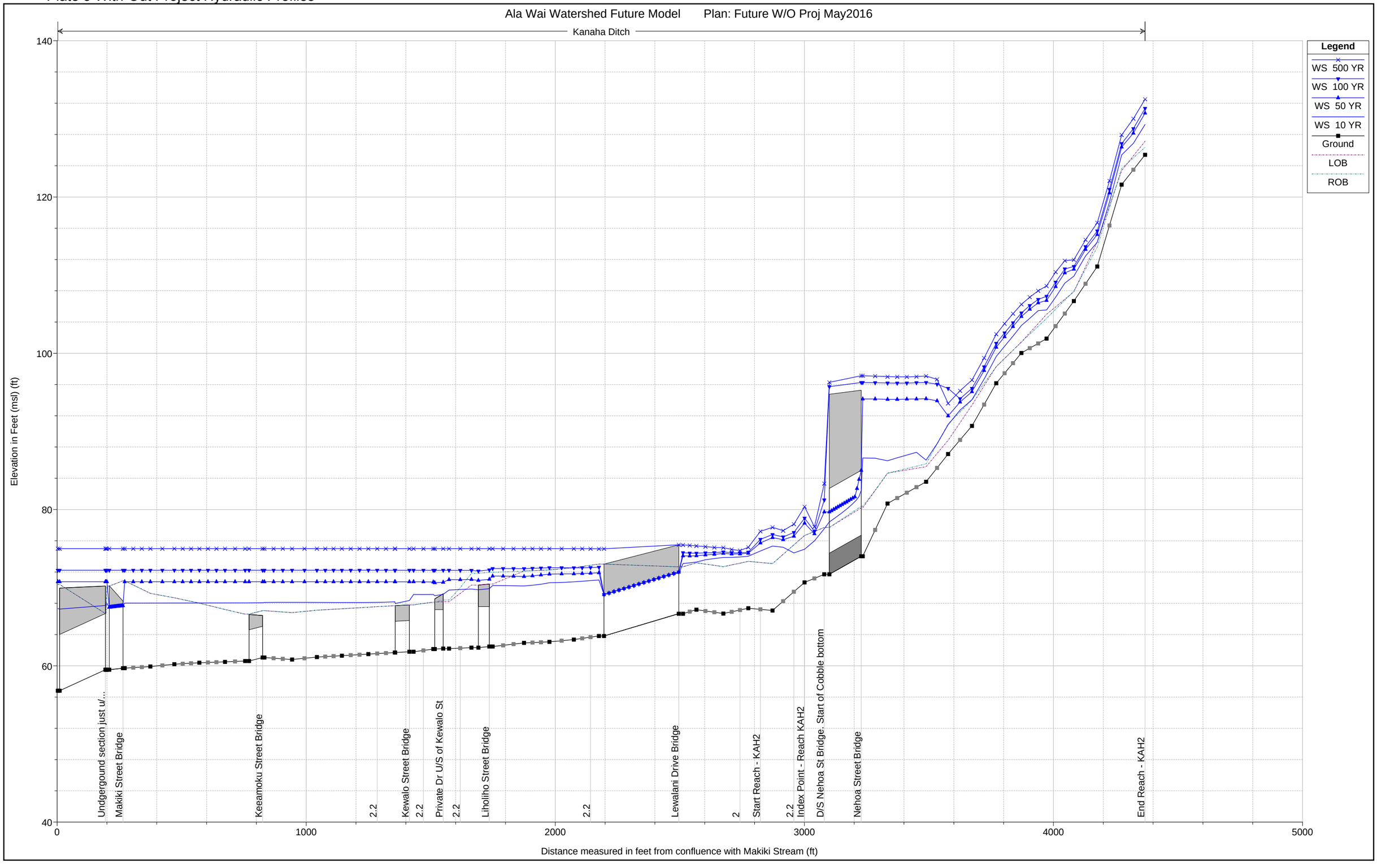


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Kanaha Ditch

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Undgergound section just u/s of Makiki Stream confluen...

Makiki Street Bridge

Keeamoku Street Bridge

Elevation in Feet (msl) (ft)

Distance measured in feet from confluence with Makiki Stream (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

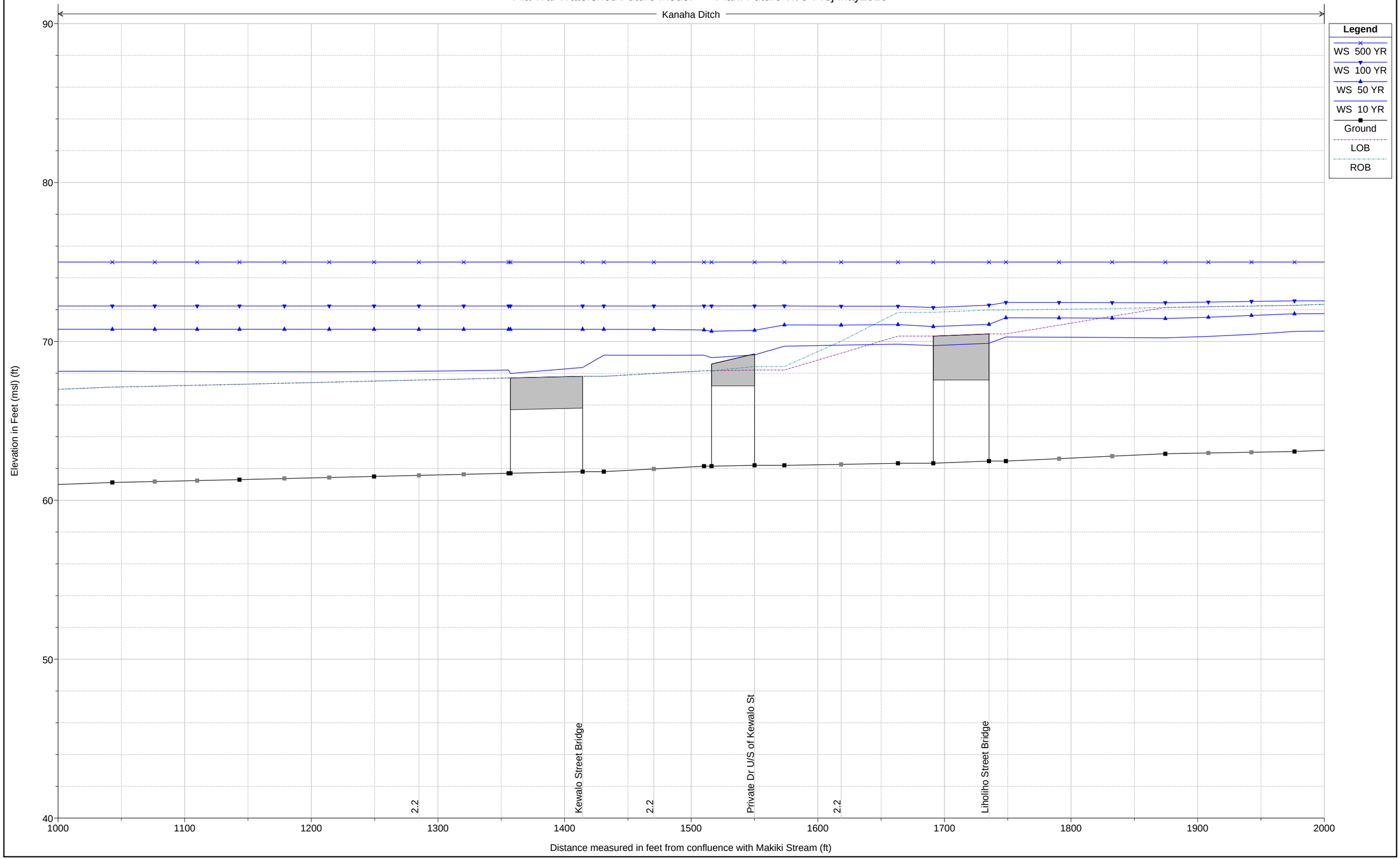


Plate 3 With-Out Project Hydraulic Profiles

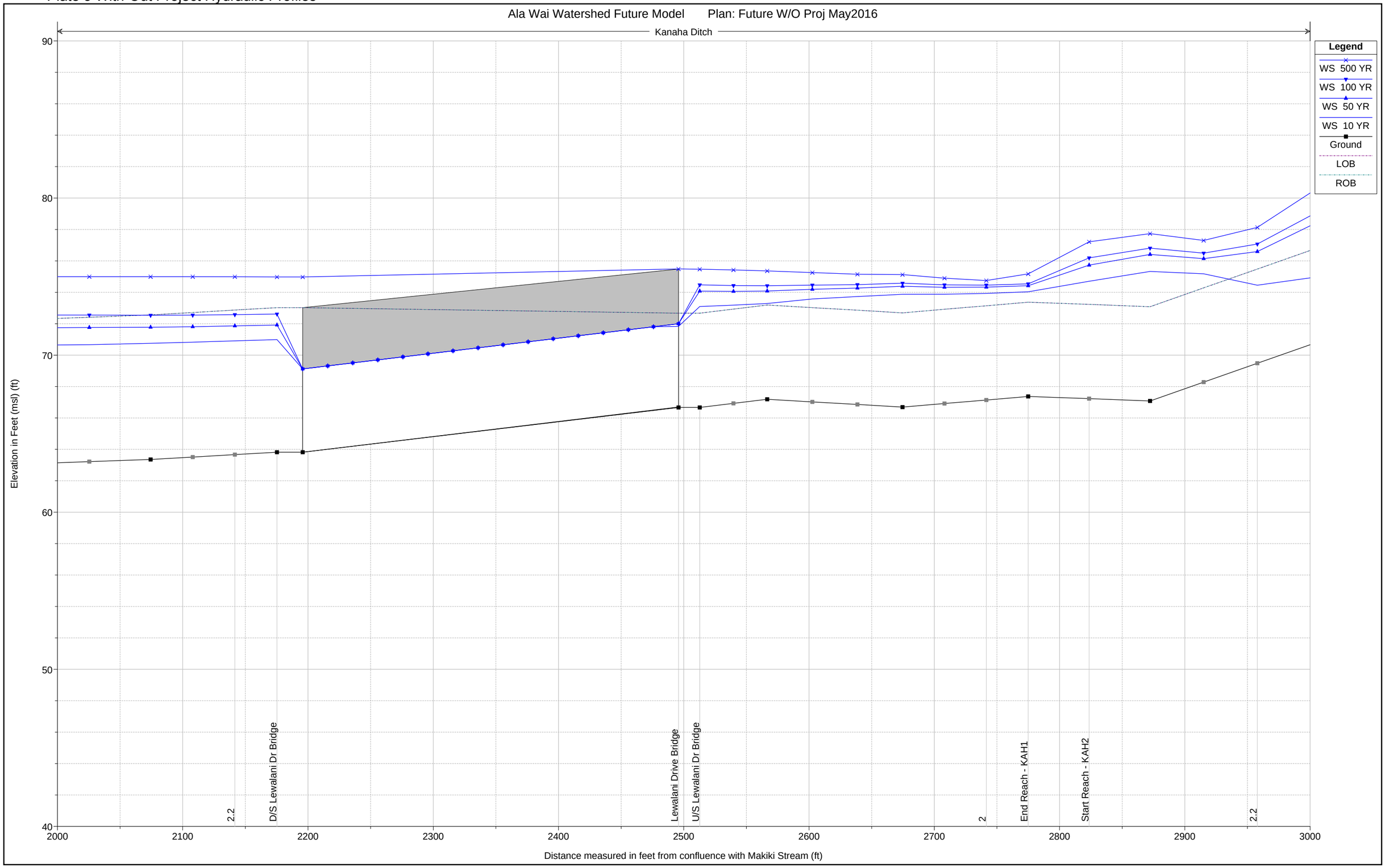


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Kanaha Ditch

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

120
110
100
90
80
70
60

D/S Nehoa St Bridge. Start ...
Nehoa Street Bridge

3000
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000

Distance measured in feet from confluence with Makiki Stream (ft)

Plate 3 With-Out Project Hydraulic Profiles

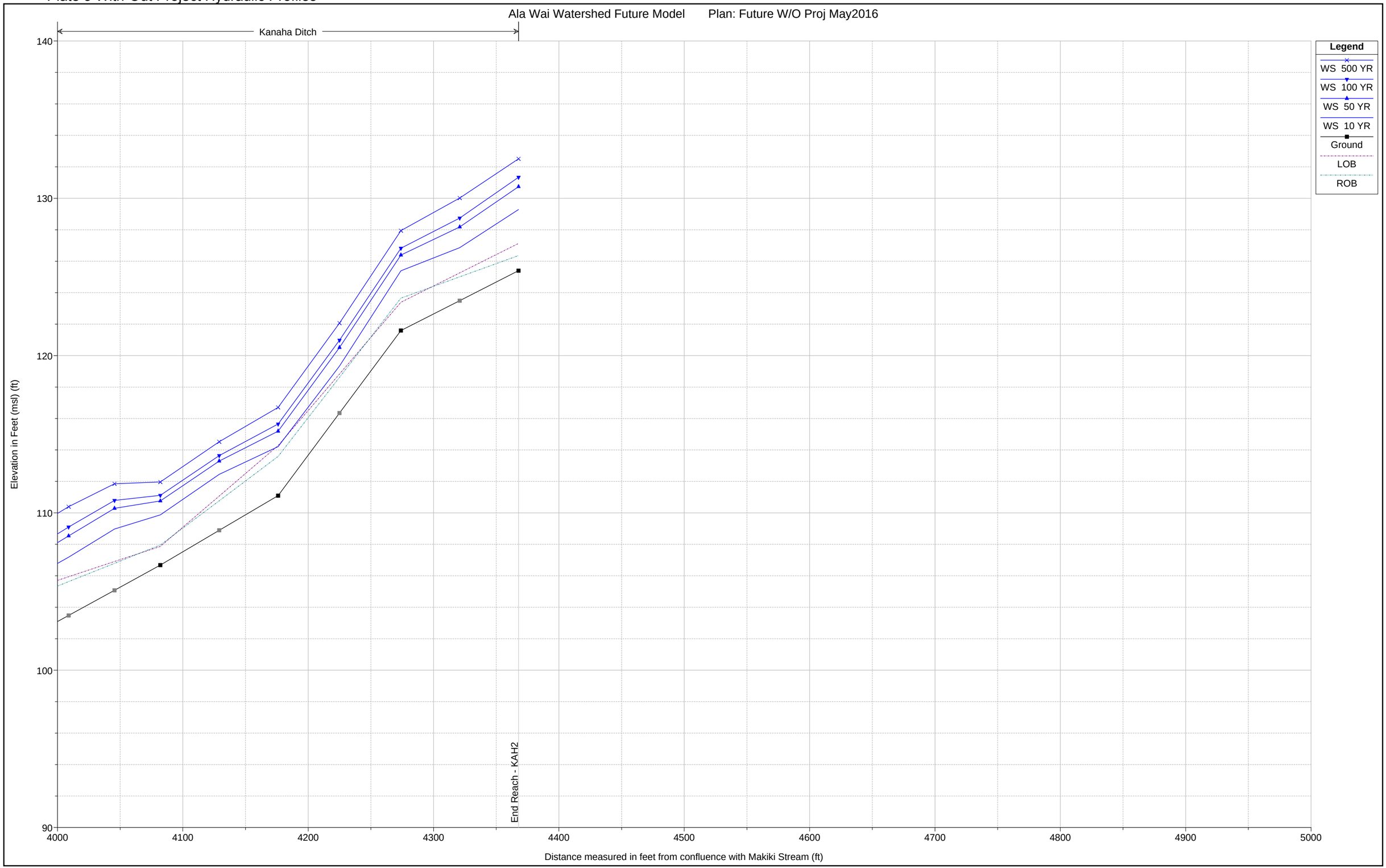


Plate 3 With-Out Project Hydraulic Profiles

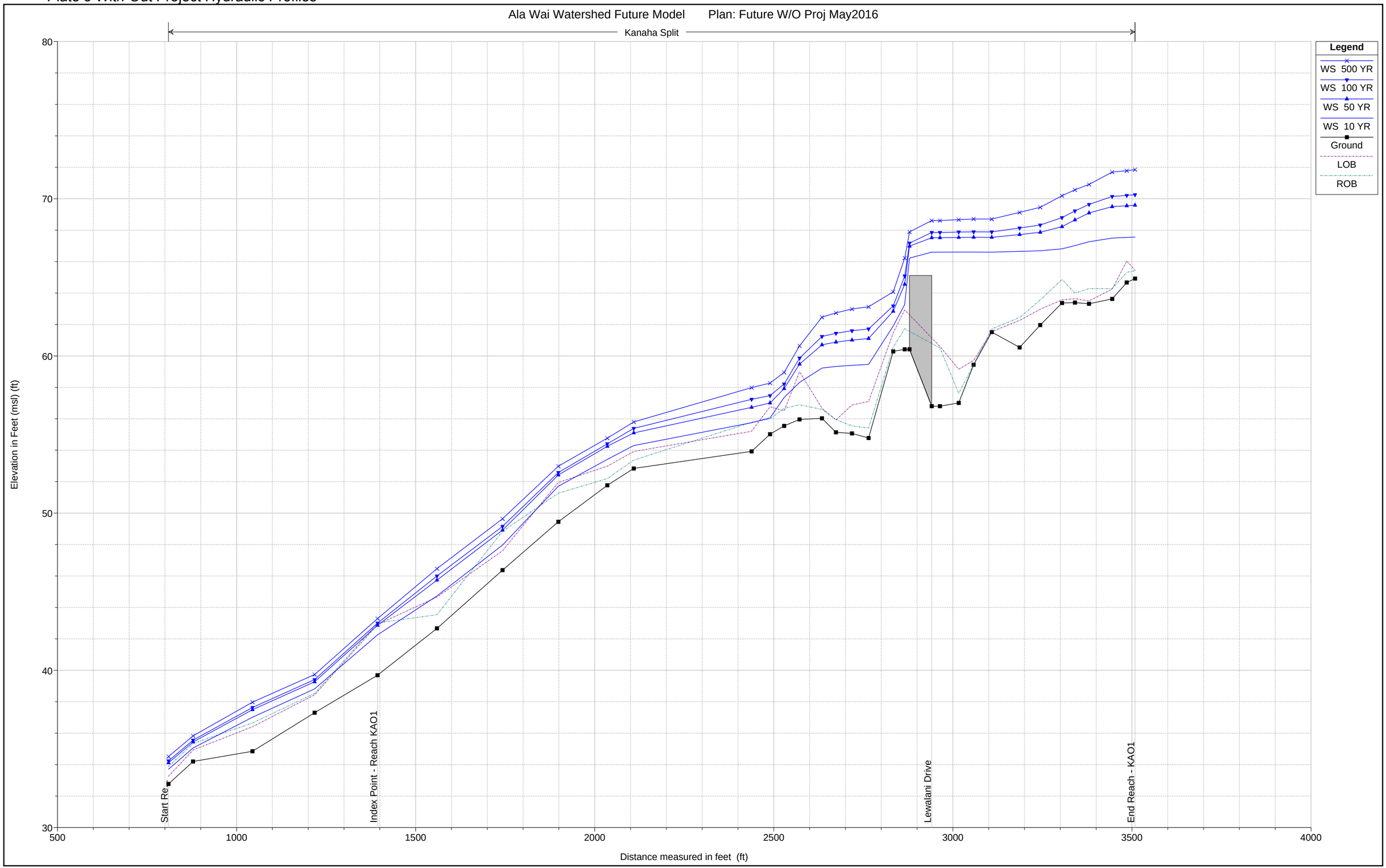


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Kanaha Split

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

50
40
30

Start Reach - KAO1

Index Point - Reach KAO1

800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800

Distance measured in feet (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Kanaha Split

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

70
60
50

1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800

Distance measured in feet (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

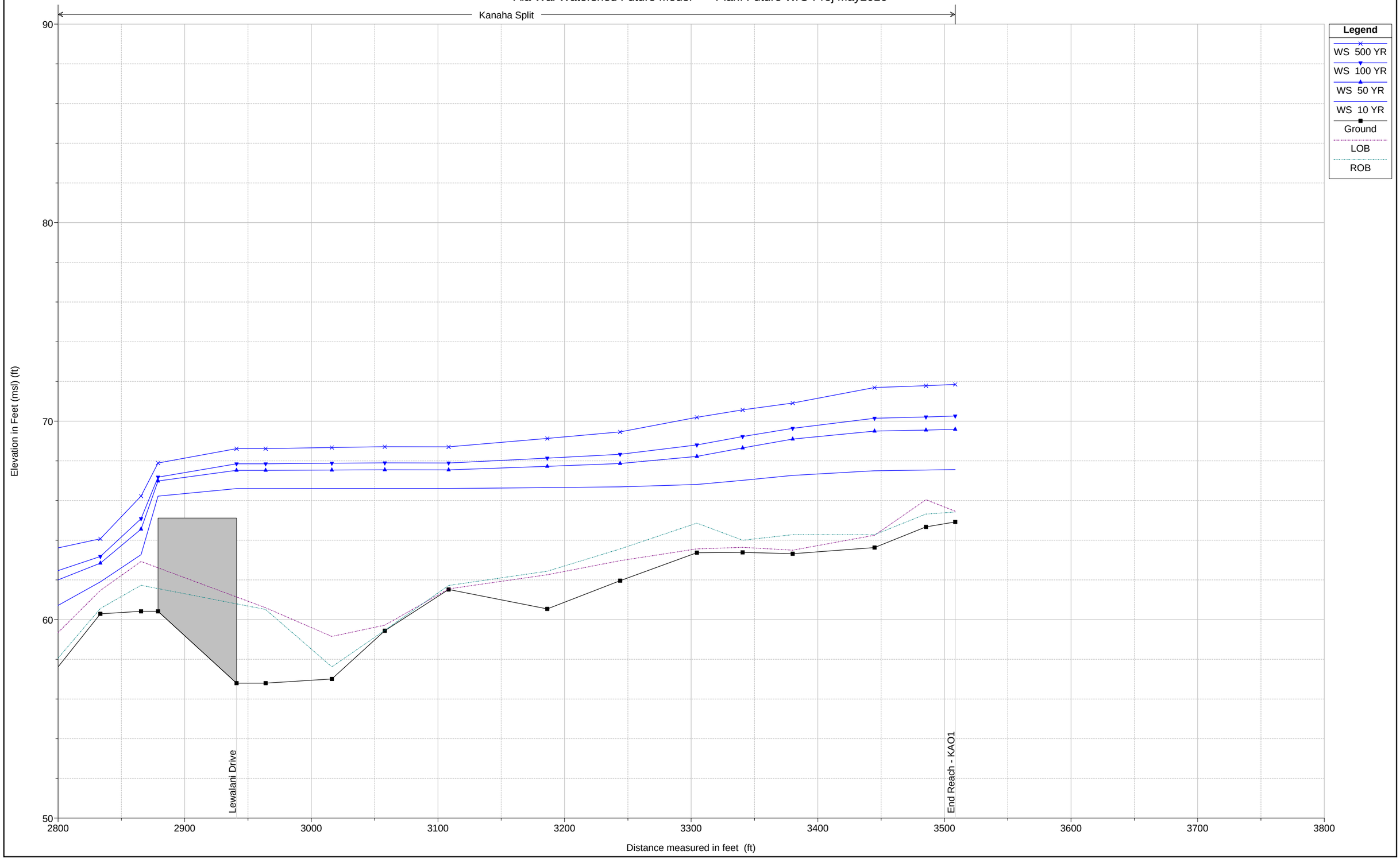


Plate 3 With-Out Project Hydraulic Profiles

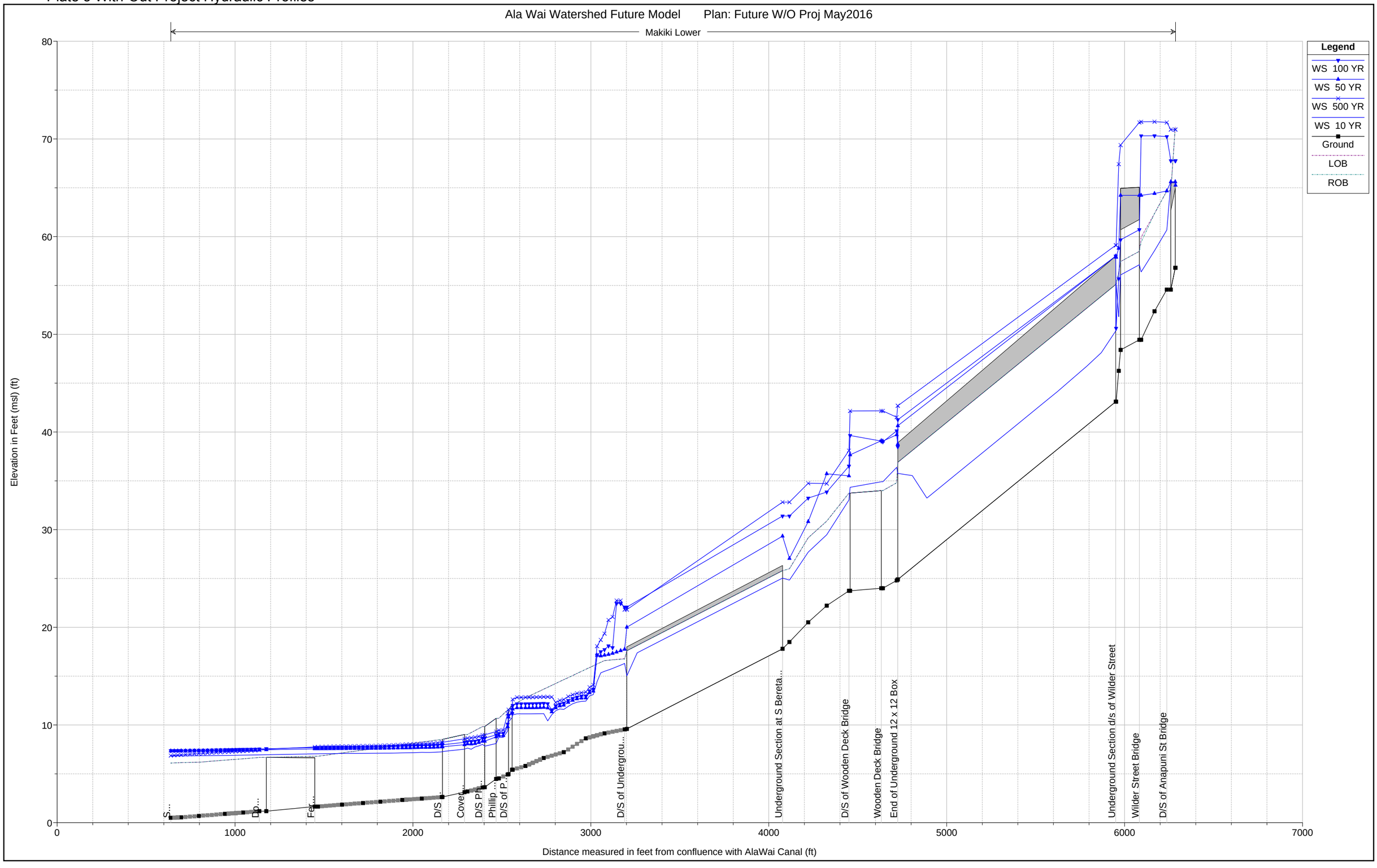


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Makiki Lower

Legend

WS 100 YR
WS 50 YR
WS 500 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

40
30
20
10
0
-10

600
700
800
900
1000
1100
1200
1300
1400
1500
1600

Start Reach - MAK1
Downstream of Fern St.
Fern St Bridge
Upstream of Fern St.

Distance measured in feet from confluence with AlaWai Canal (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

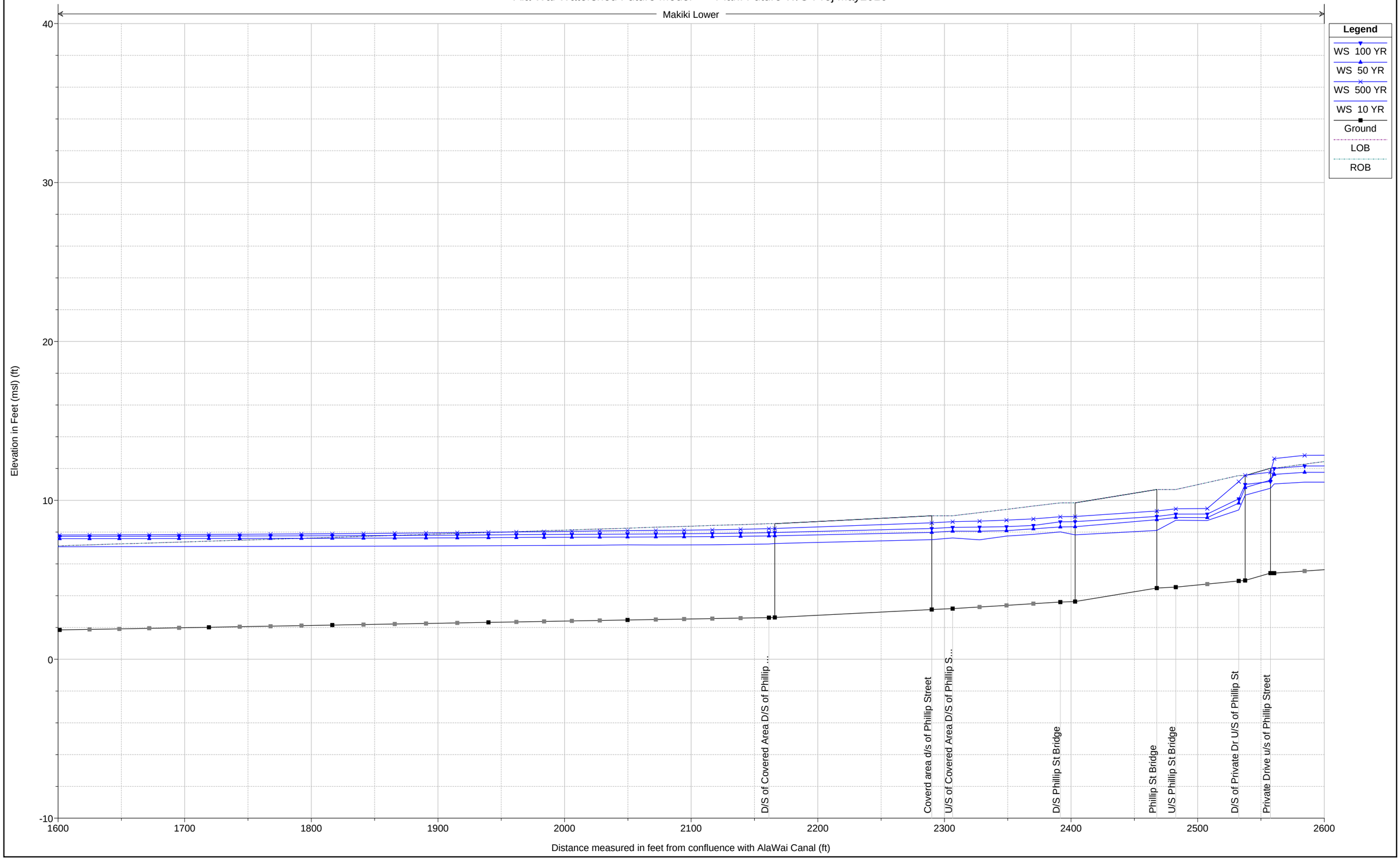


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Makiki Lower

Legend

WS 100 YR
WS 50 YR
WS 500 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

40
30
20
10
0
-10

2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
3600

D/S of Underground 12 x 8 box culvert

Distance measured in feet from confluence with AlaWai Canal (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

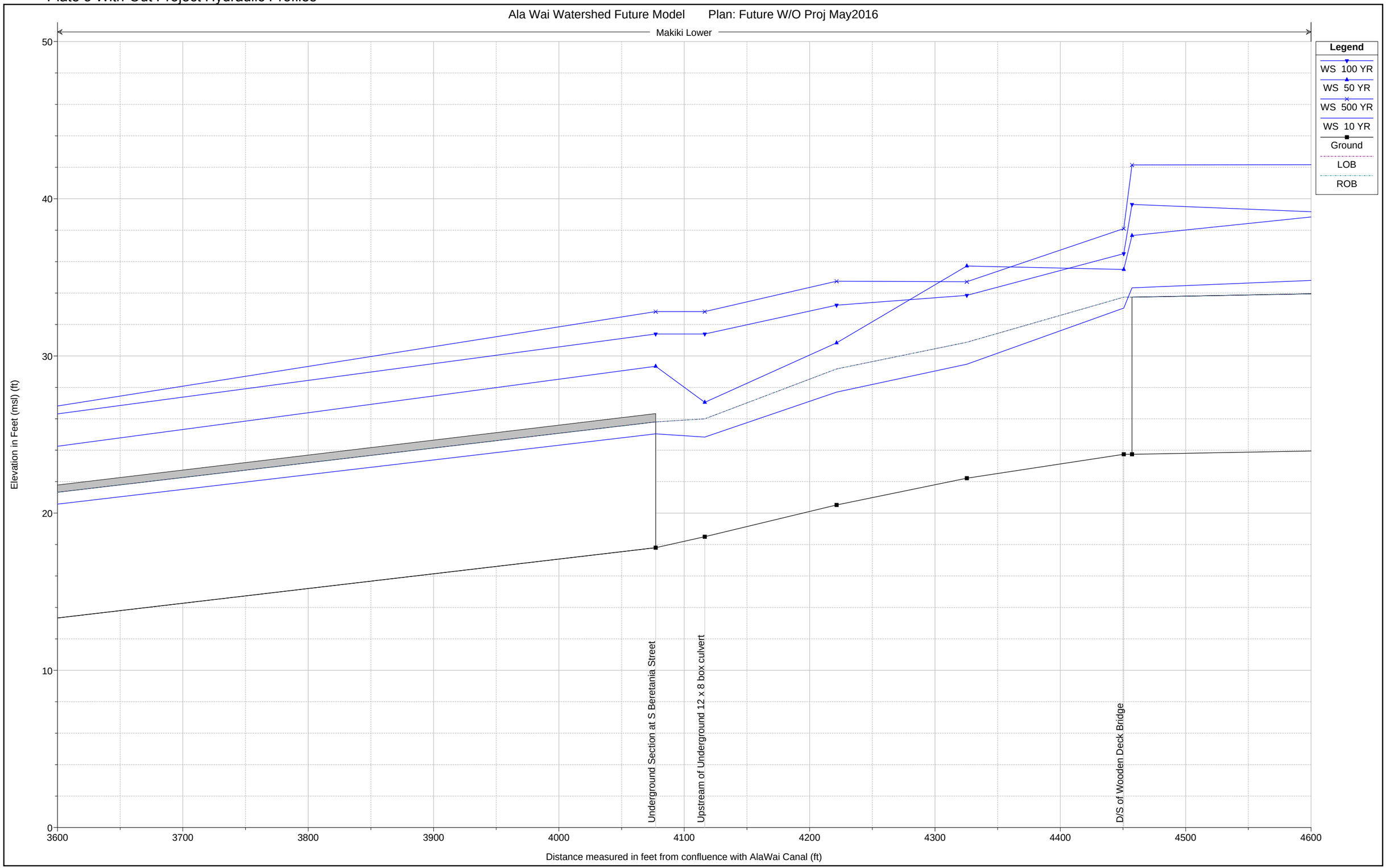


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Makiki Lower

Legend

WS 100 YR
WS 50 YR
WS 500 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

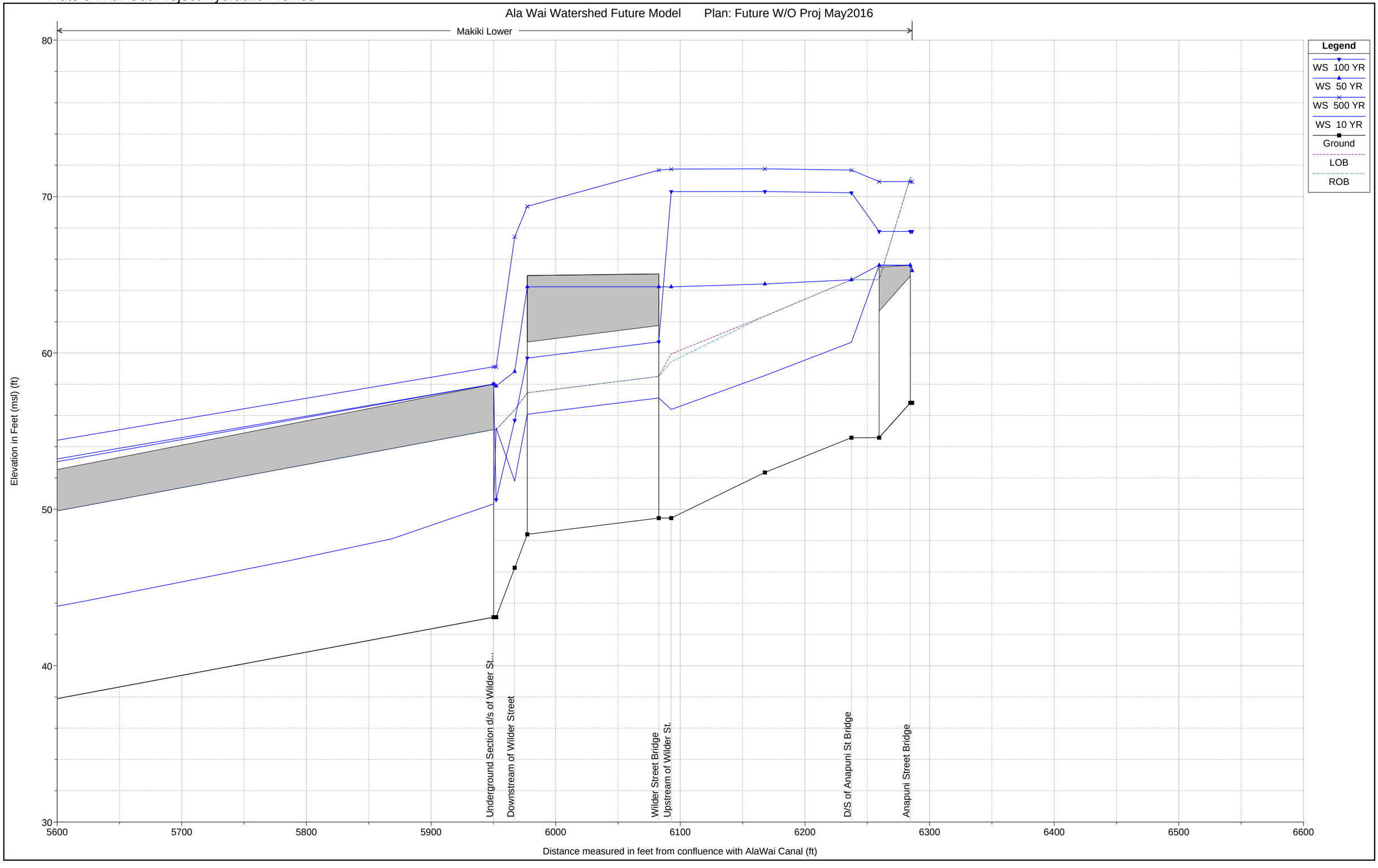
60
50
40
30
20
10

Wooden Deck Bridge
U/S of Wooden Deck Bridge
End of Underground 12 x 12 Box

4600 4700 4800 4900 5000 5100 5200 5300 5400 5500 5600

Distance measured in feet from confluence with AlaWai Canal (ft)

Plate 3 With-Out Project Hydraulic Profiles



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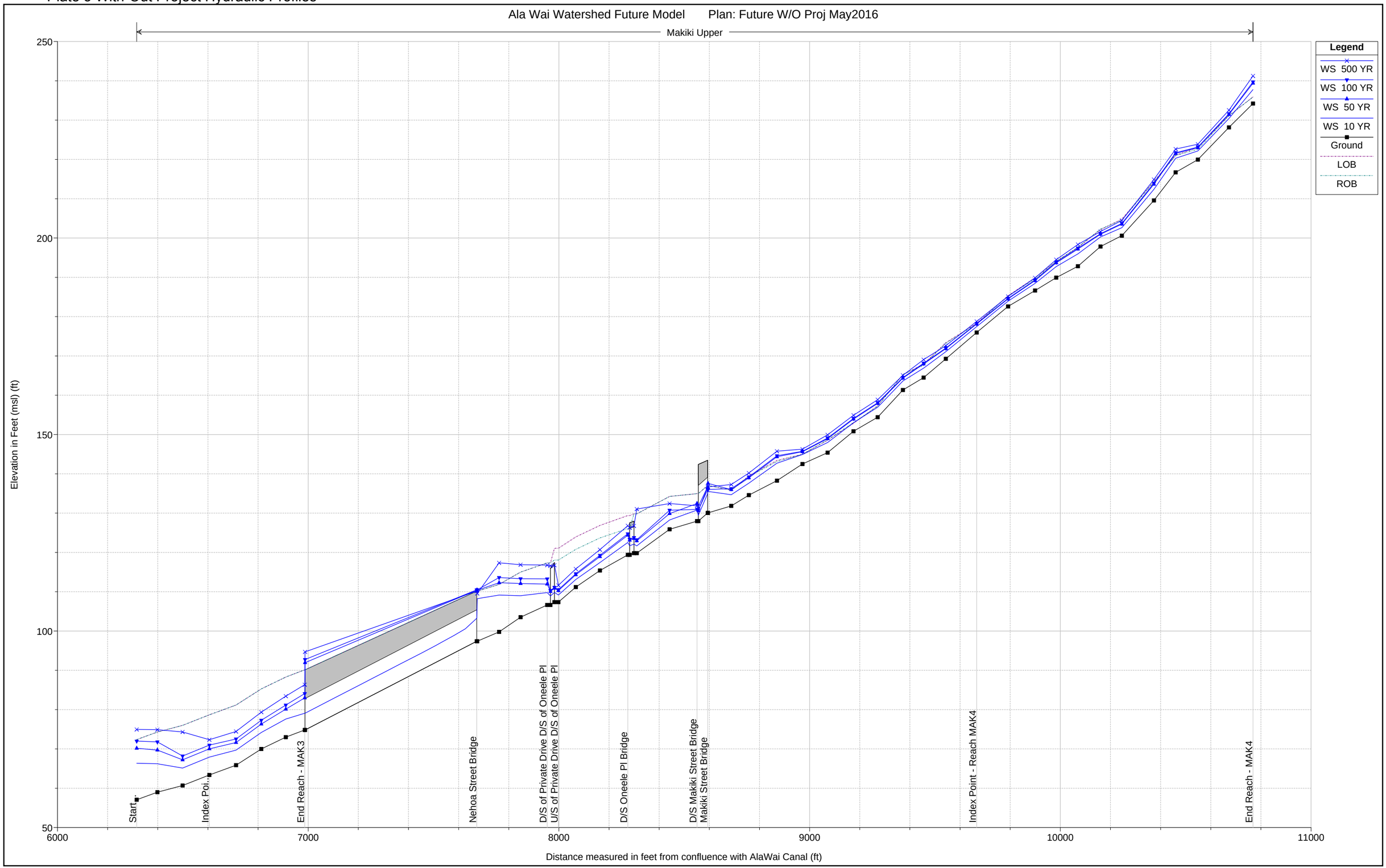

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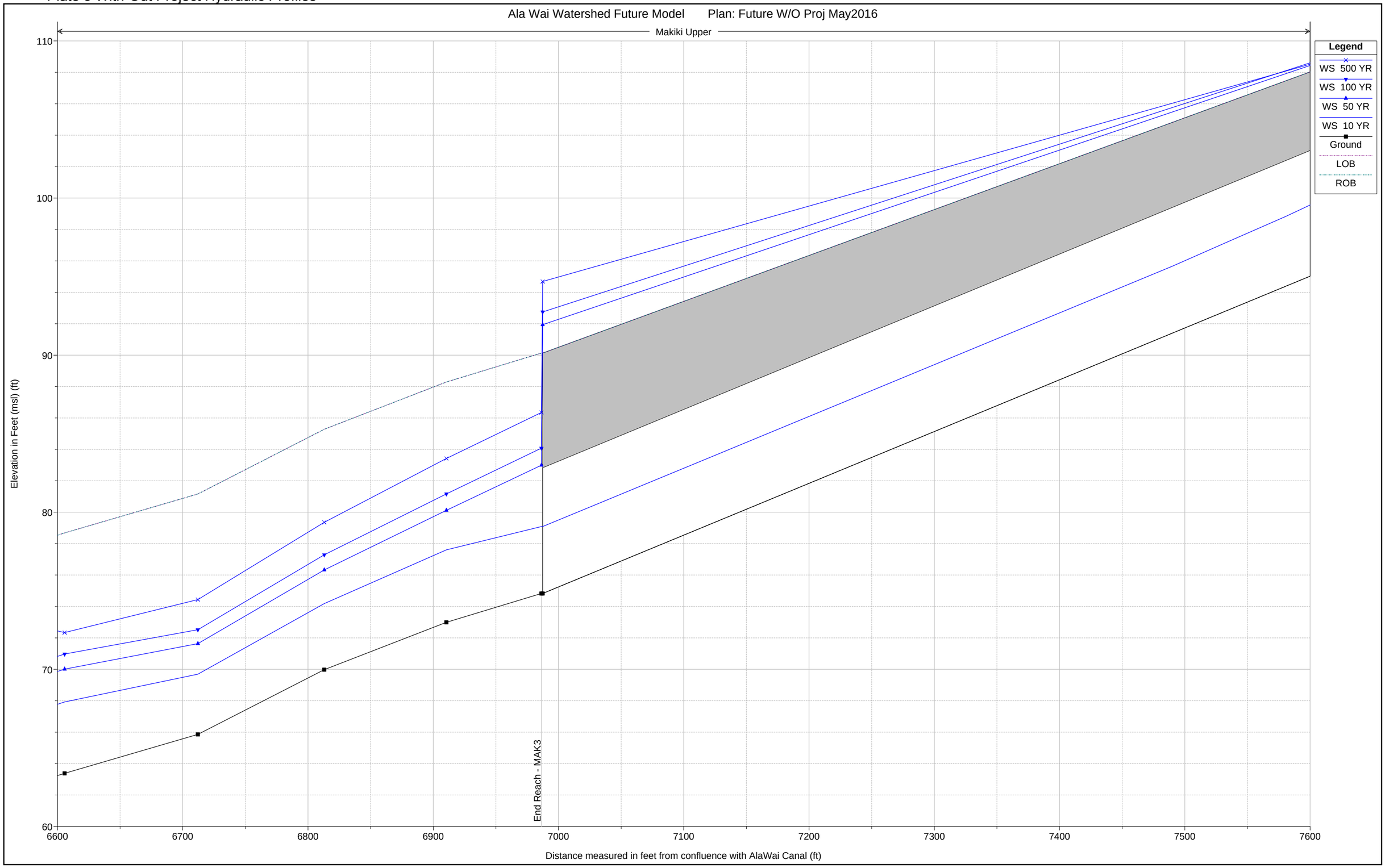

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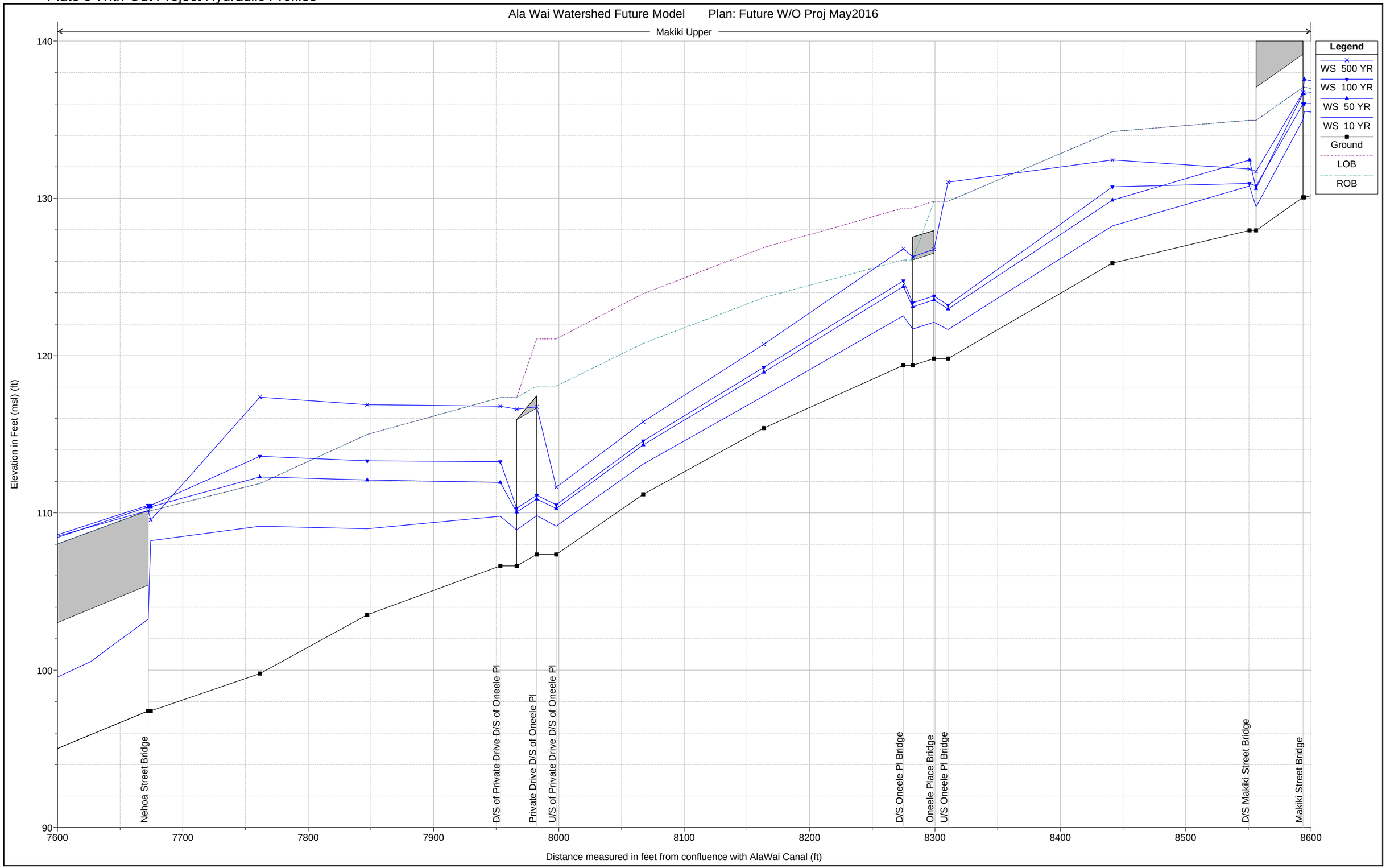

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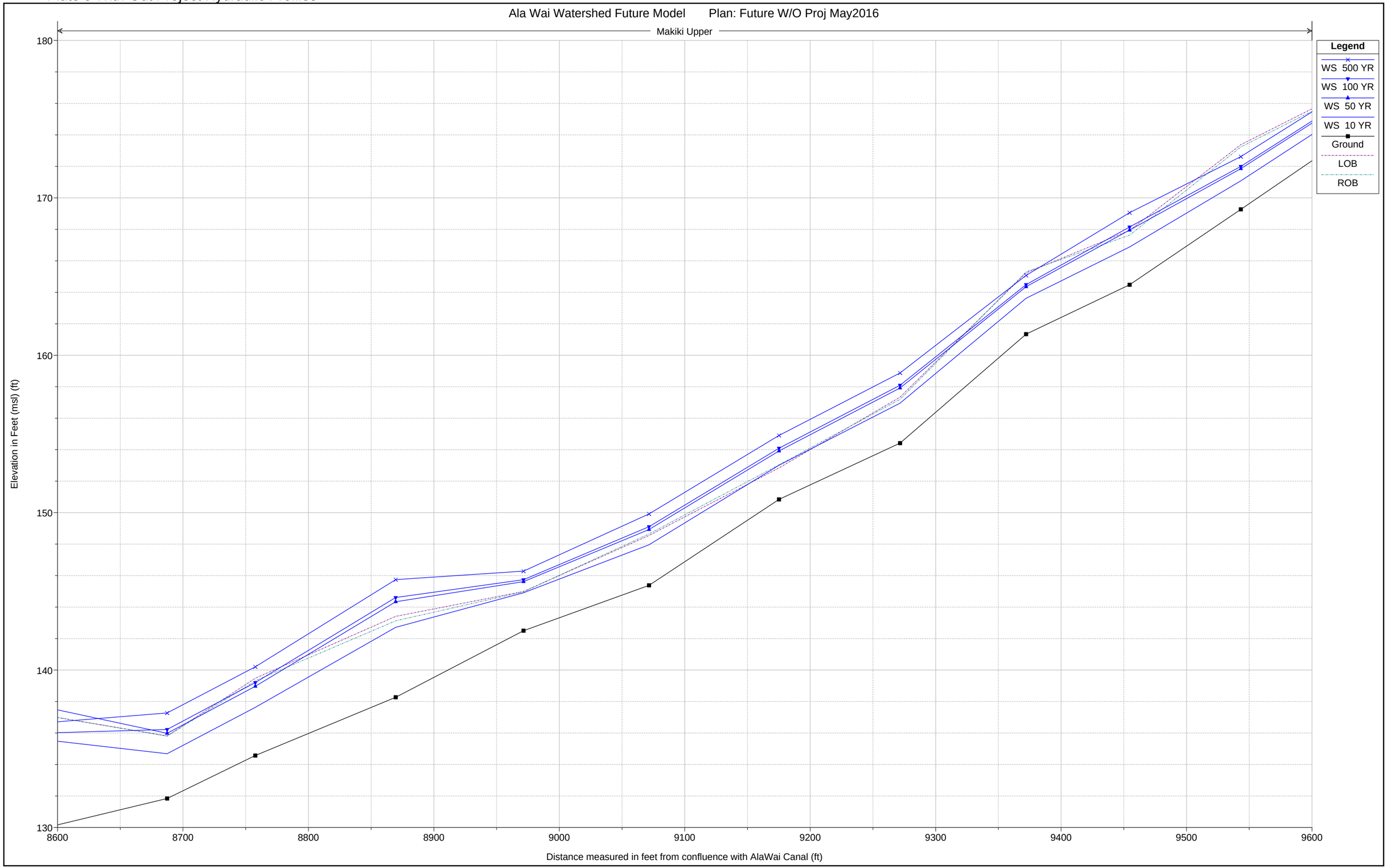

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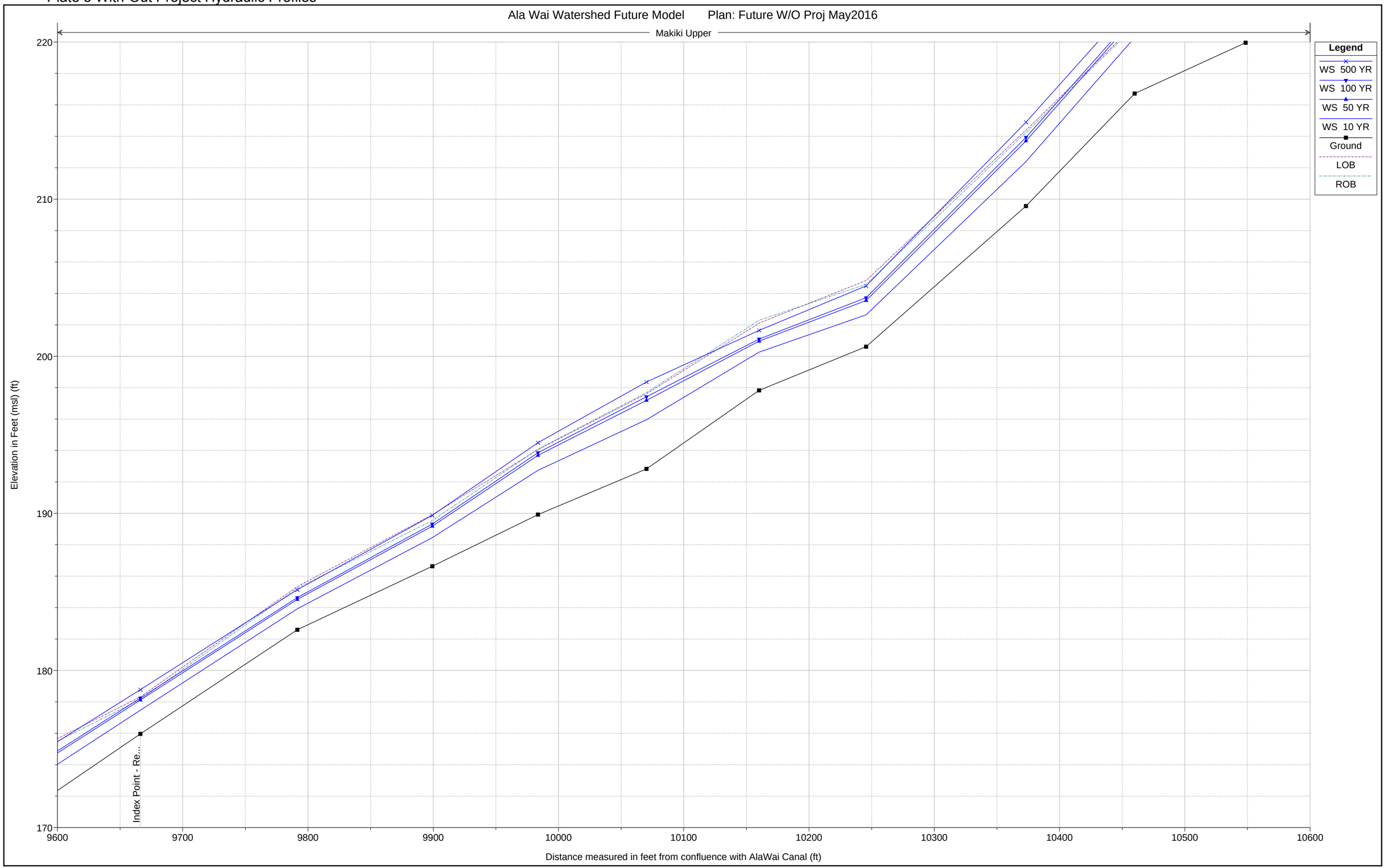
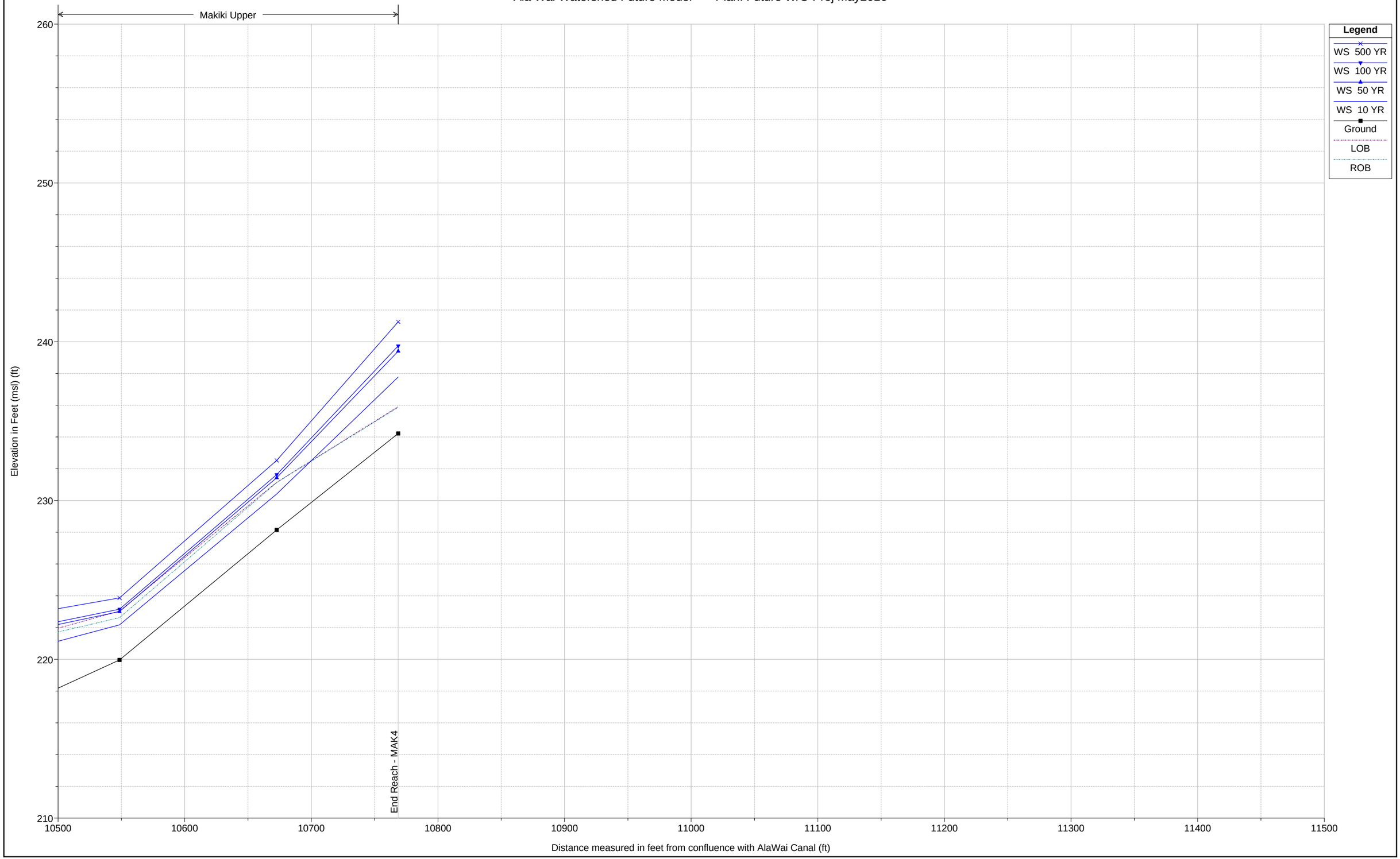


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016



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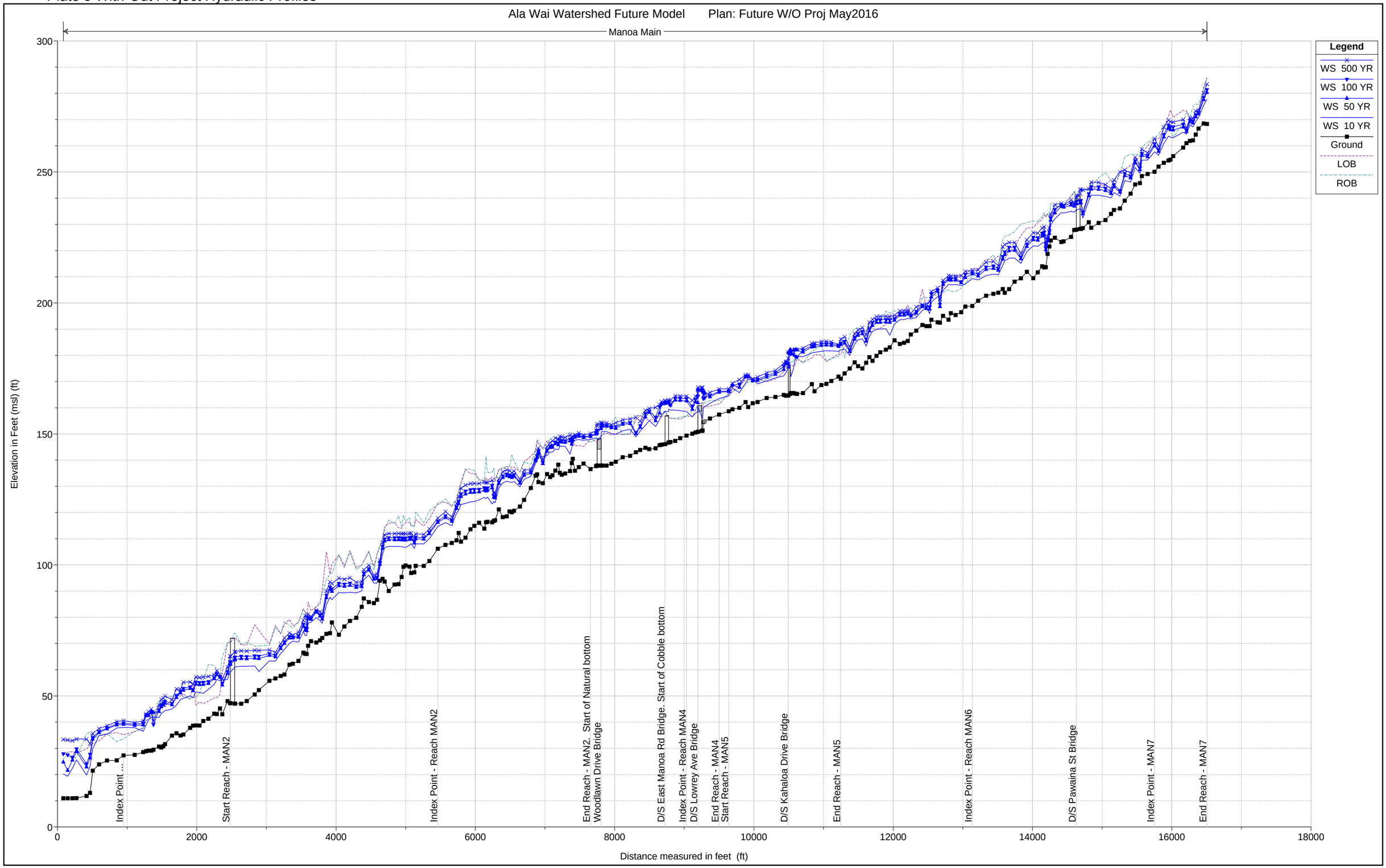

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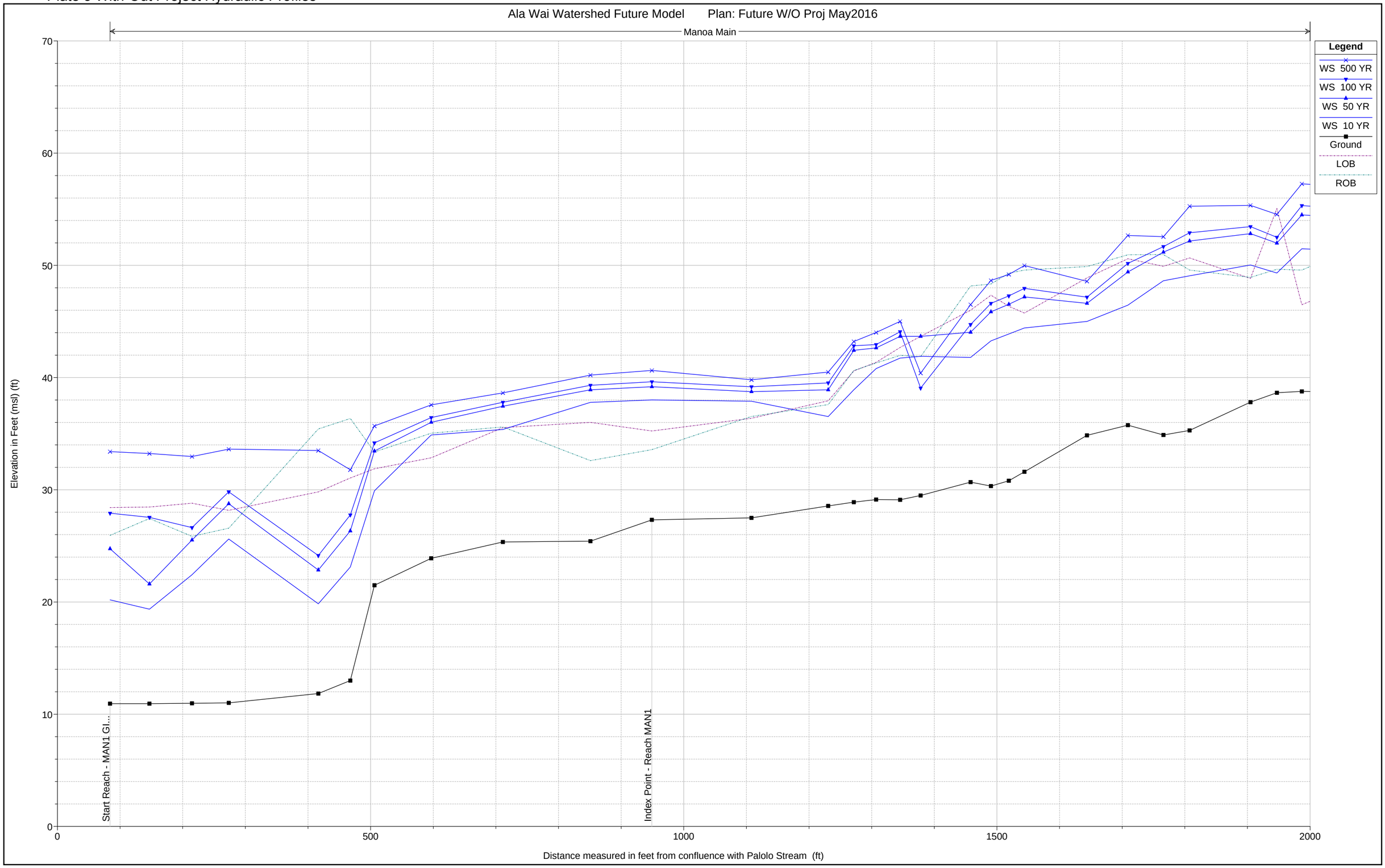


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Manoa Main

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

100
90
80
70
60
50
40

Start Reach - MAN2
Dole Street Bridge

2000
2500
3000
3500
4000

Distance measured in feet from confluence with Palolo Stream (ft)

Plate 3 With-Out Project Hydraulic Profiles

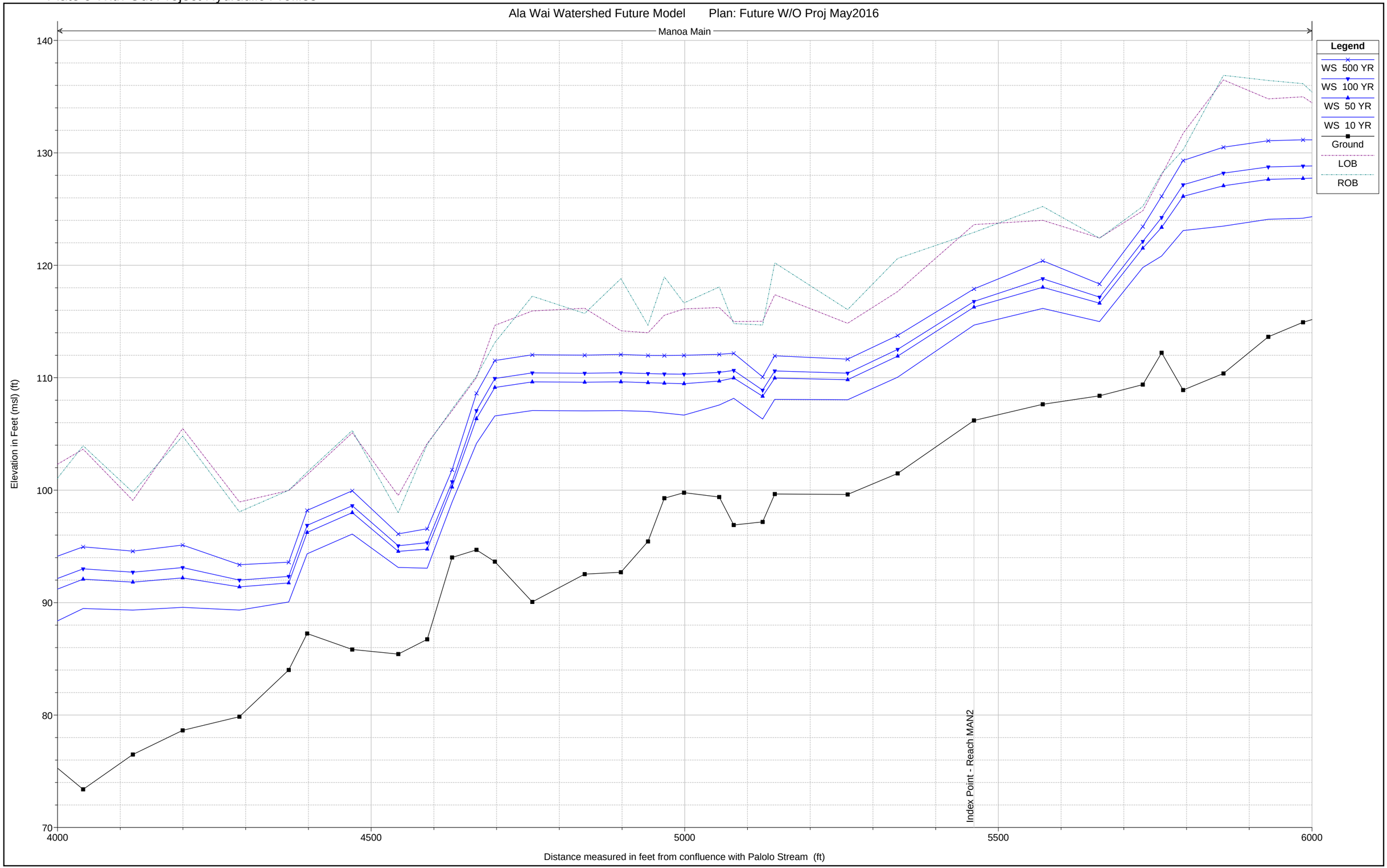


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Manoa Main

Legend
- WS 500 YR
- WS 100 YR
- WS 50 YR
- WS 10 YR
- Ground
- LOB
- ROB

Elevation in Feet (msl) (ft)

180
170
160
150
140
130
120
110

6000
6500
7000
7500
8000

Distance measured in feet from confluence with Palolo Stream (ft)

End Reach - MAN2. Start of Natural bottom

Start Reach - MAN3

Woodlawn Drive Bridge

Plate 3 With-Out Project Hydraulic Profiles

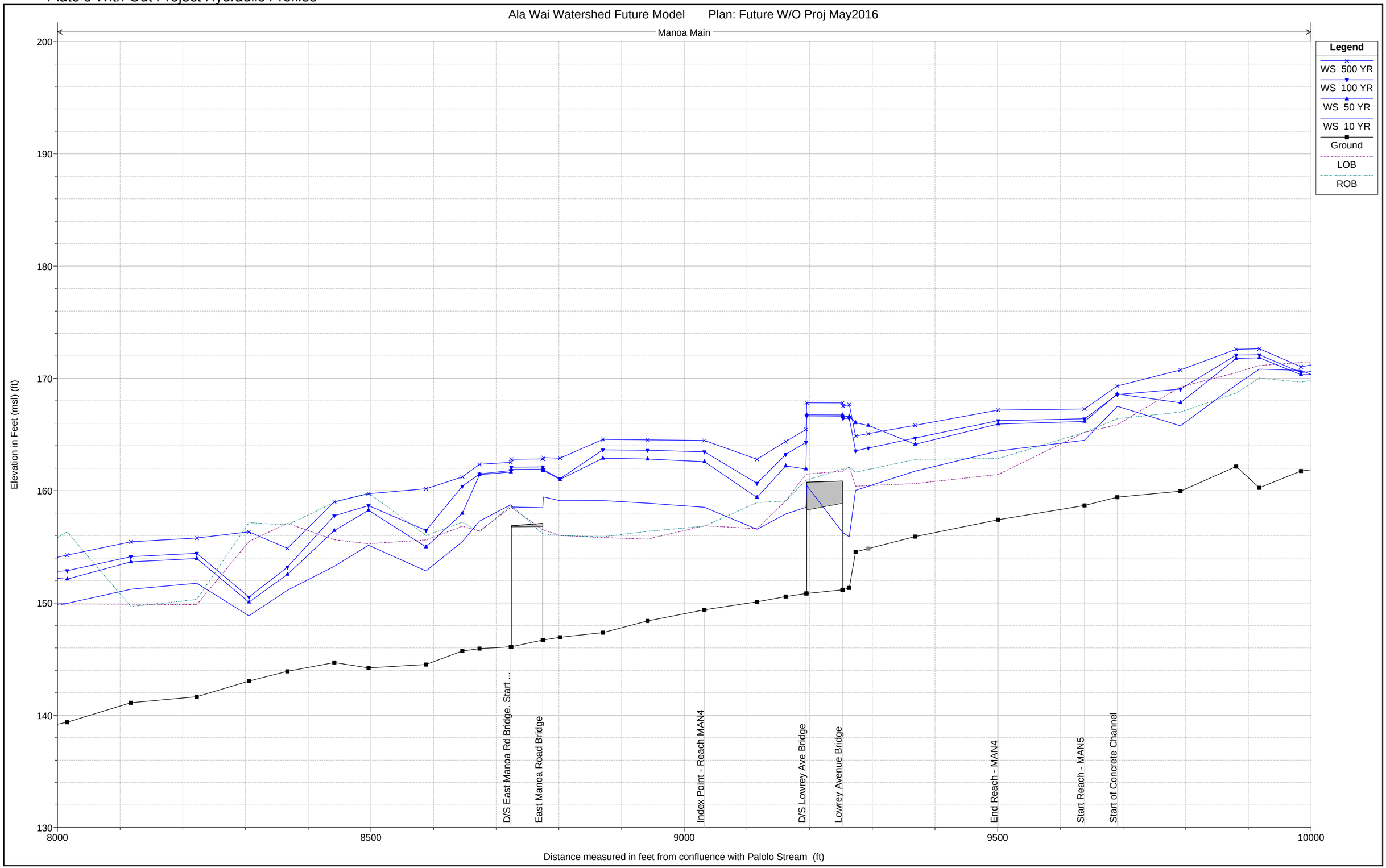


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Manoa Main

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

220
210
200
190
180
170
160
150

10000
10500
11000
11500
12000

D/S Kahaloa Drive Bridge
Kahaloa Drive Bridge
Start of Cobble bottom
End Reach - MAN5
Start Reach - MAN6

Distance measured in feet from confluence with Palolo Stream (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Manoa Main

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

240
230
220
210
200
190
180
170

12000
12500
13000
13500
14000

Index Point - Reach MAN6

Distance measured in feet from confluence with Palolo Stream (ft)

Plate 3 With-Out Project Hydraulic Profiles

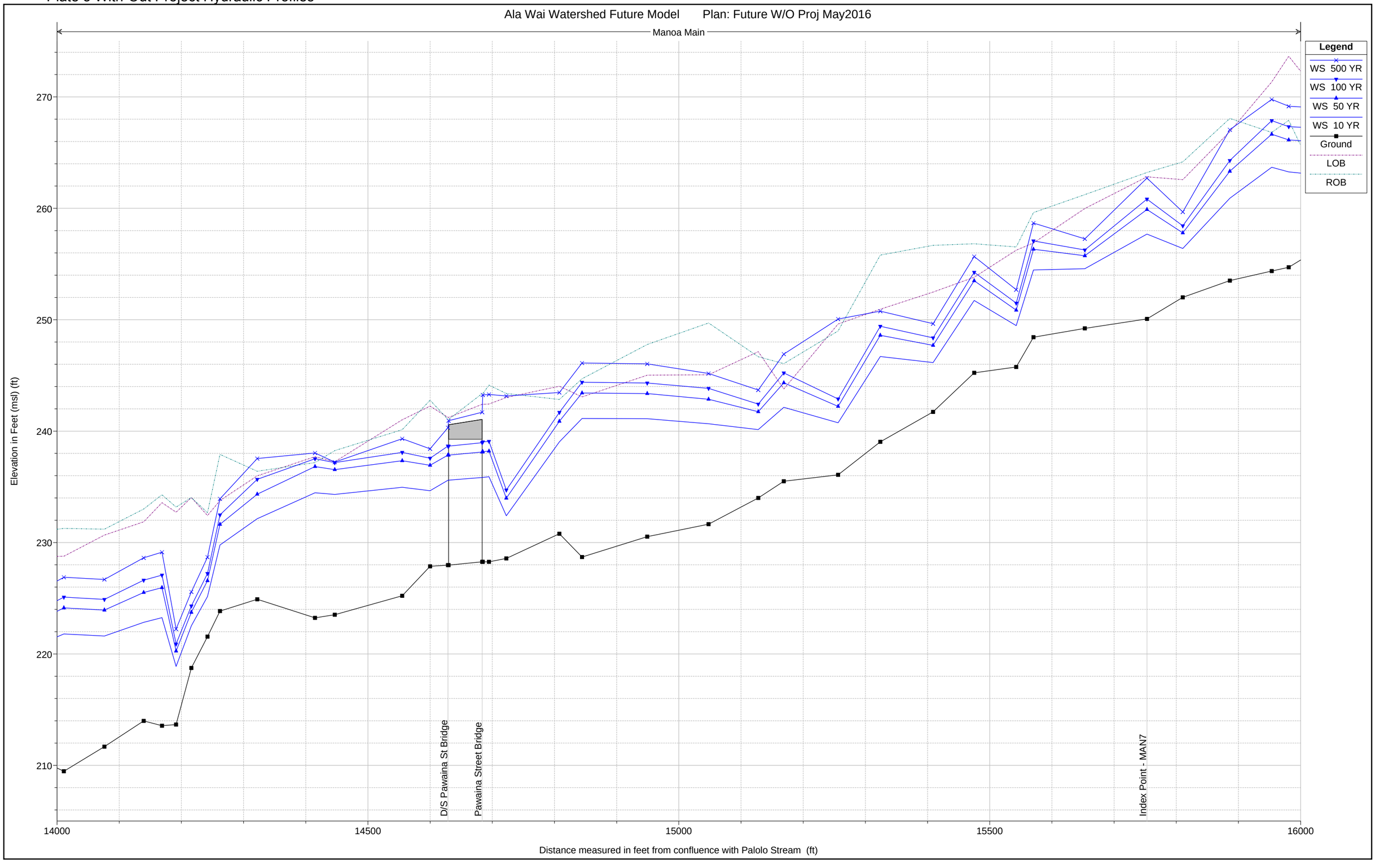


Plate 3 With-Out Project Hydraulic Profiles

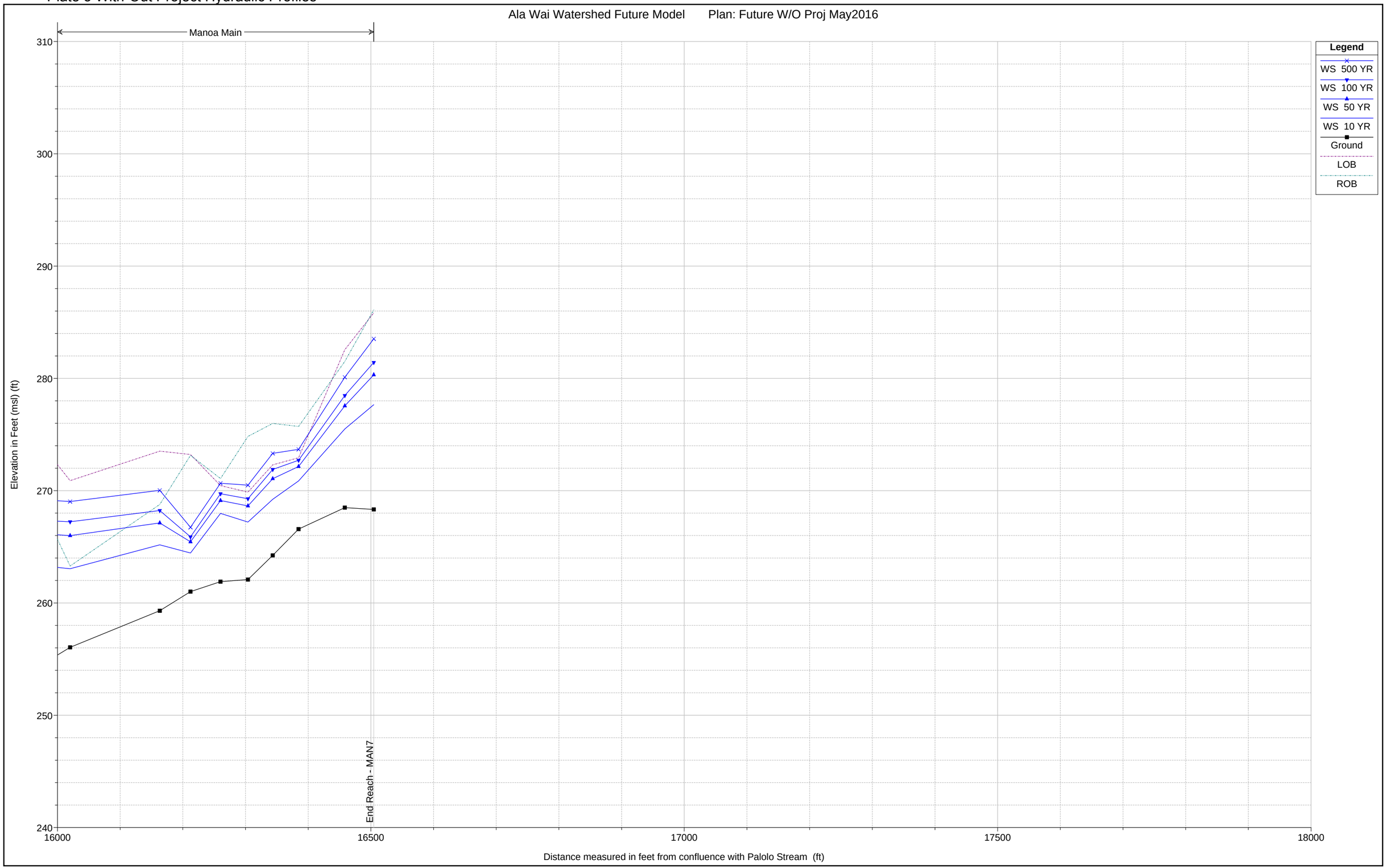


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Palolo Lower

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

35
30
25
20
15
10
5
0
-5

0
1000
2000
3000
4000
5000
6000

Distance measured in feet from confluence with AlaWai Canal (ft)

Start Re...
Invert & c...
Invert & chan...
D/S Face Date St...
Date Street Bridg...
Adjusted channel a...
Adjusted channel an...
Adjusted channel and ...
Index Point - Reach MPC...
D/S Face Kapiolani Blvd
Kapiolani Boulavard Bridge
U/S Face Kapiolani Blvd
D/S Face S King Street
South King Street Bridge
D/S Face Highway 1
Highway H1 Bridge
D/S Face Waialai Avenue
Waialale Avenue Bridge
End Reach - MPC2

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Palolo Main

Legend
- WS 500 YR
- WS 100 YR
- WS 50 YR
- WS 10 YR
- Ground
- LOB
- ROB

Elevation in Feet (msl) (ft)

250
200
150
100
50
0

4000
6000
8000
10000
12000
14000
16000

Distance measured in feet from confluence with AlaWai Canal (ft)

Concret...
D/S Footbridg...
Index Point - Re...
D/S St Louis Driv...
start of Concrete Chan...
Beginning of Natural Cha...
D/S Third Avenue Bridge. E...
Index Point - Reach PAL2
transition to Natural bottom
Beginning Concrete Channel (35 ft width)
D/S Palolo Avenue Bridge
U/S Face Palolo Avenue
Private Bridge #2
D/S Face Private Bridge
Index Point - Reach PAL3
D/S Face Paalea Street
D/S Face Kalua Road
Index Point - PAL4
D/S Face Kiwila Street
Concrete Channel

Plate 3 With-Out Project Hydraulic Profiles

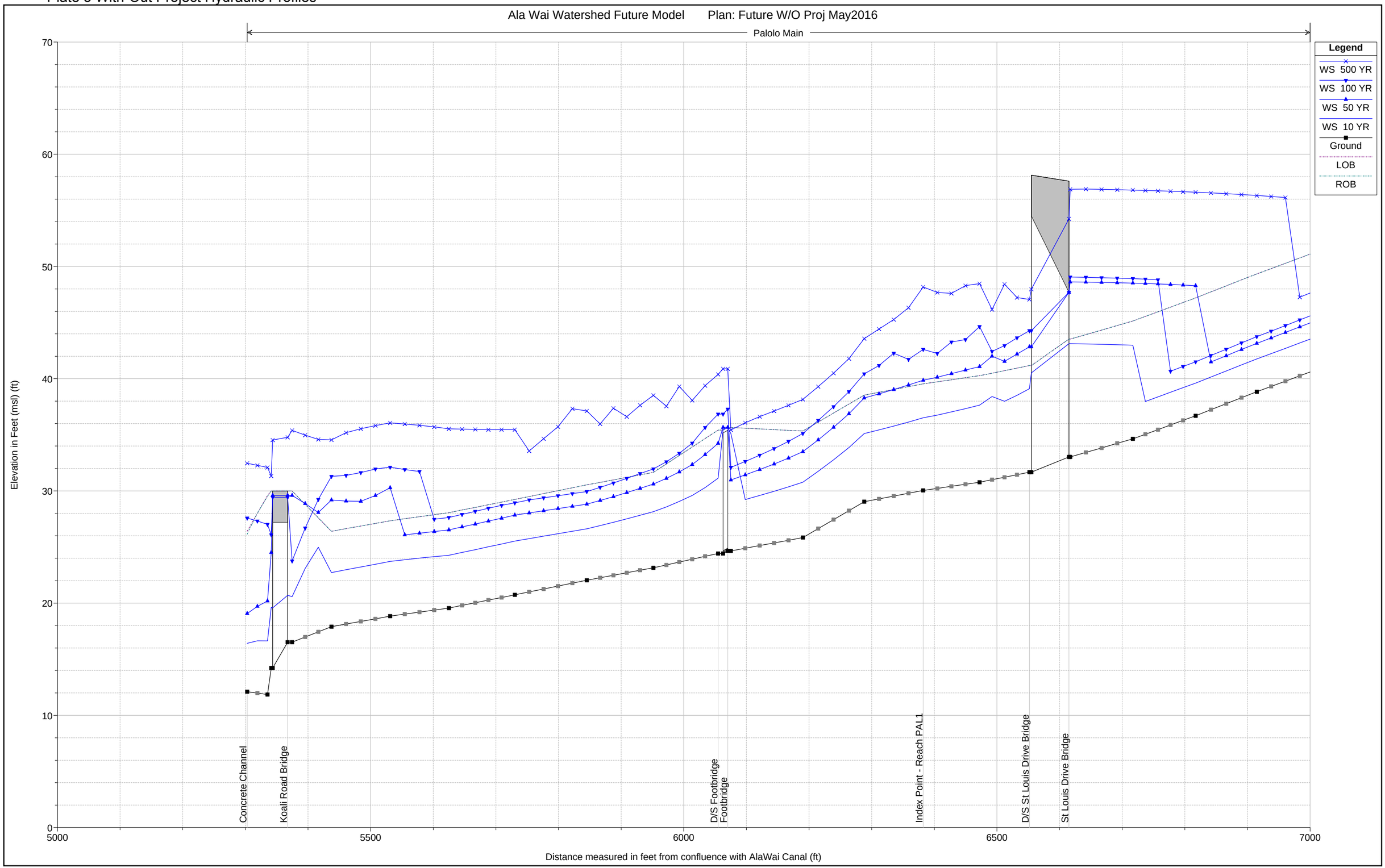


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Palolo Main

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

110
100
90
80
70
60
50
40
30

7000
7500
8000
8500
9000

transition back to Co...
Beginning of Natural C...
D/S Third Avenue Bridge. End Rach...
3rd Avenue Bridge
Index Point - Reach PAL2
transition to Natural bottom
Beginning Concrete Channel (32 ft width)

Distance measured in feet from confluence with AlaWai Canal (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Palolo Main

Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

130
120
110
100
90
80

9000
9500
10000
10500
11000

Beginning Concrete Channel (35 ft wid...
D/S Palolo Avenue Bridge
Palolo Avenue Bridge
Private Bridge #2
U/S Face Private Bridge

Distance measured in feet from confluence with AlaWai Canal (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Palolo Main

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

170
160
150
140
130
120
110

11000
11500
12000
12500
13000

Distance measured in feet from confluence with AlaWai Canal (ft)

D/S Face Private B...
Private Bridge #1
Index Point - Reach PAL3
D/S Face Paalea Street
Paalea Street Bridge

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Palolo Main

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

210
200
190
180
170
160
150
140

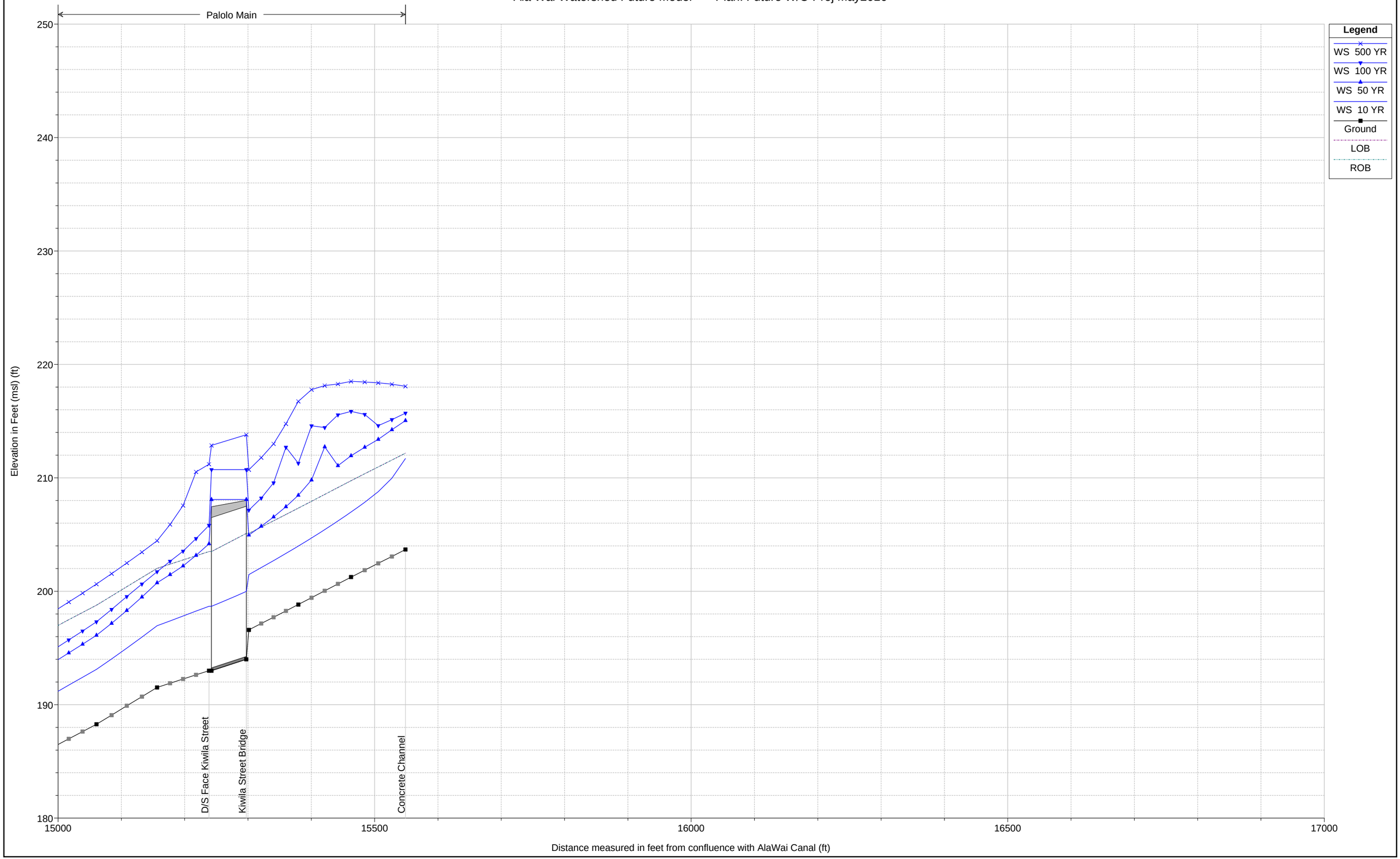
13000
13500
14000
14500
15000

D/S Face Kalua Road
Kalua Road Bridge
Index Point - PAL4

Distance measured in feet from confluence with AlaWai Canal (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016



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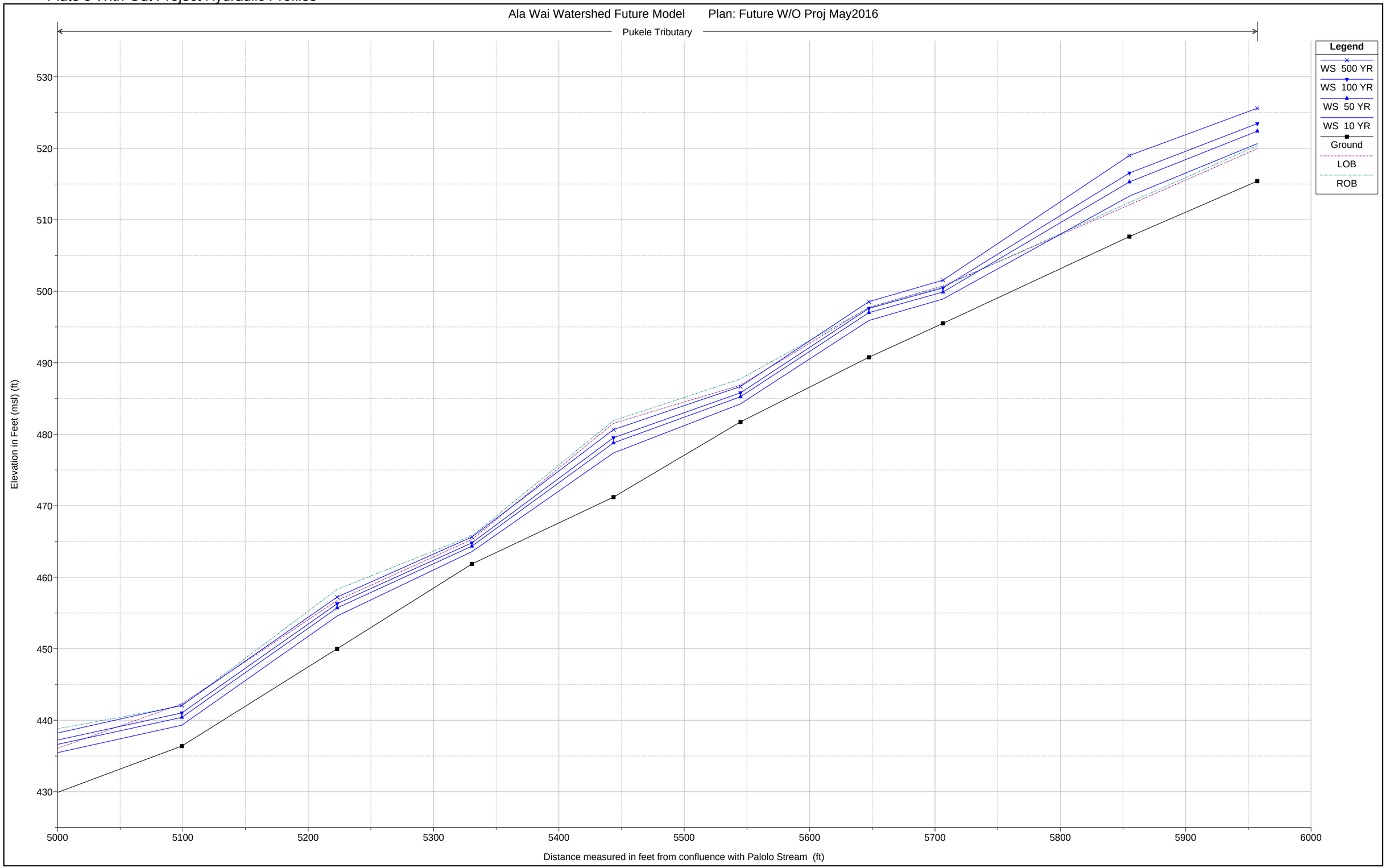

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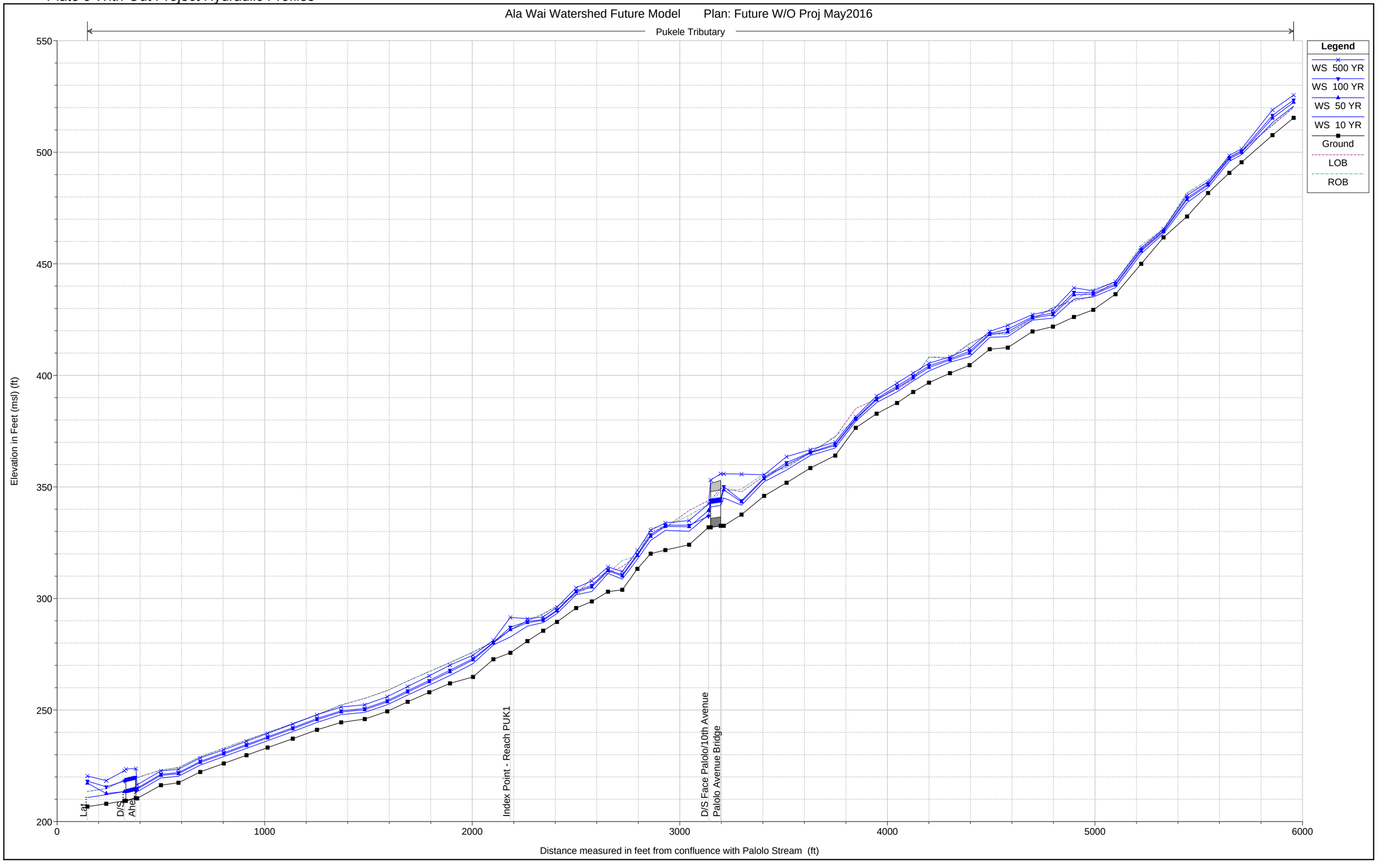


Plate 3 With-Out Project Hydraulic Profiles

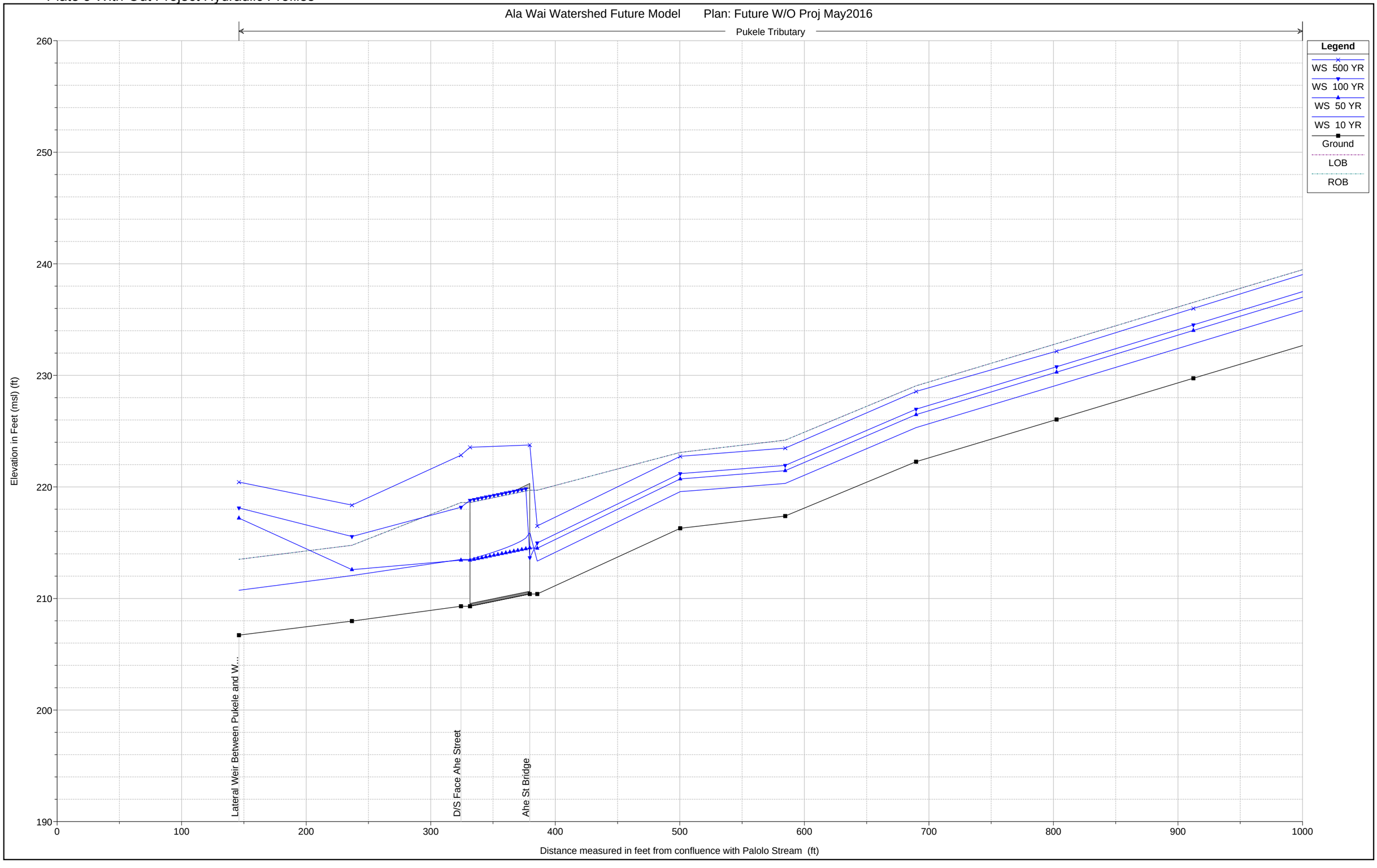


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Pukele Tributary

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

290
280
270
260
250
240
230
220

1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000

Distance measured in feet from confluence with Palolo Stream (ft)

Plate 3 With-Out Project Hydraulic Profiles

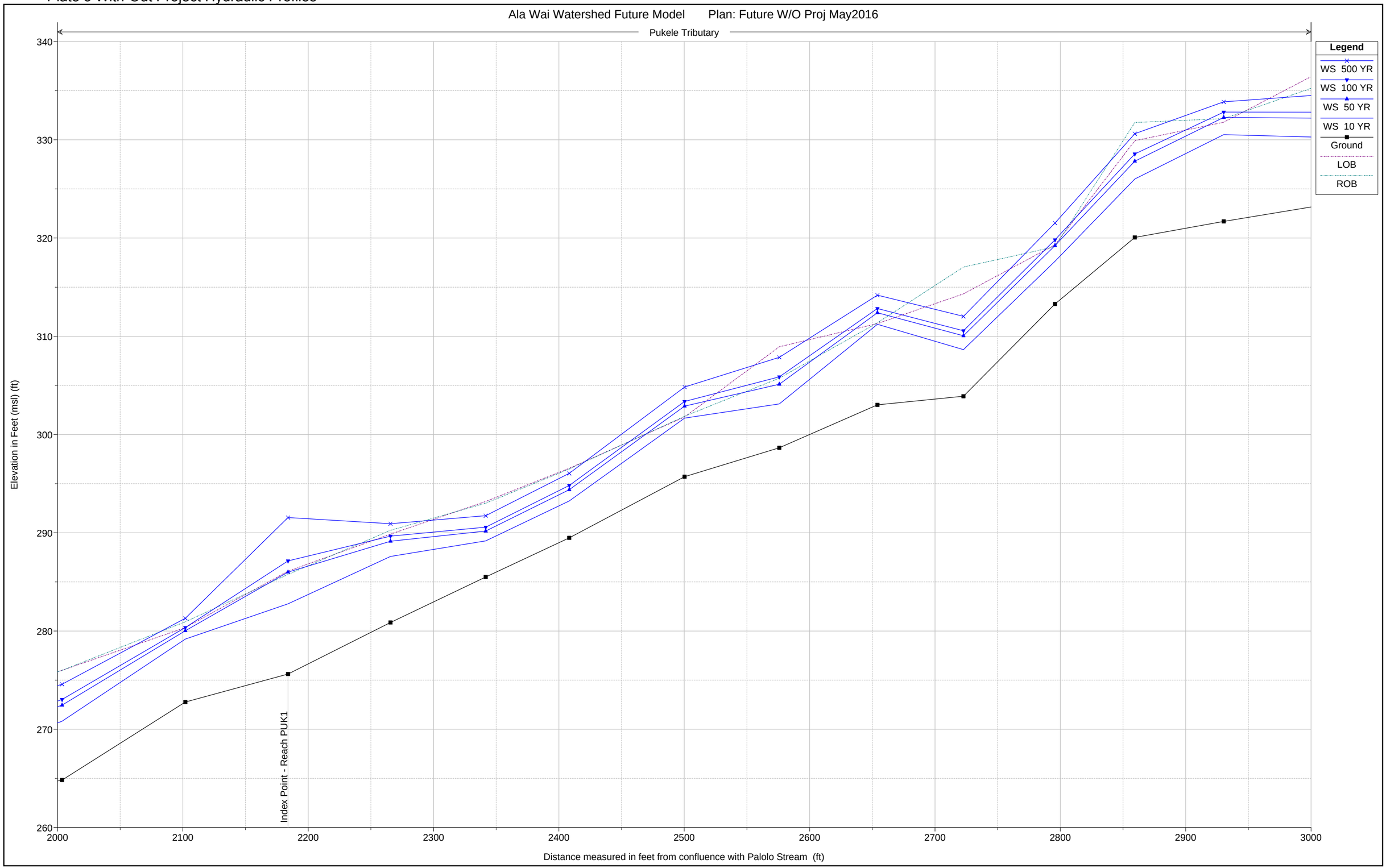


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

Pukele Tributary

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

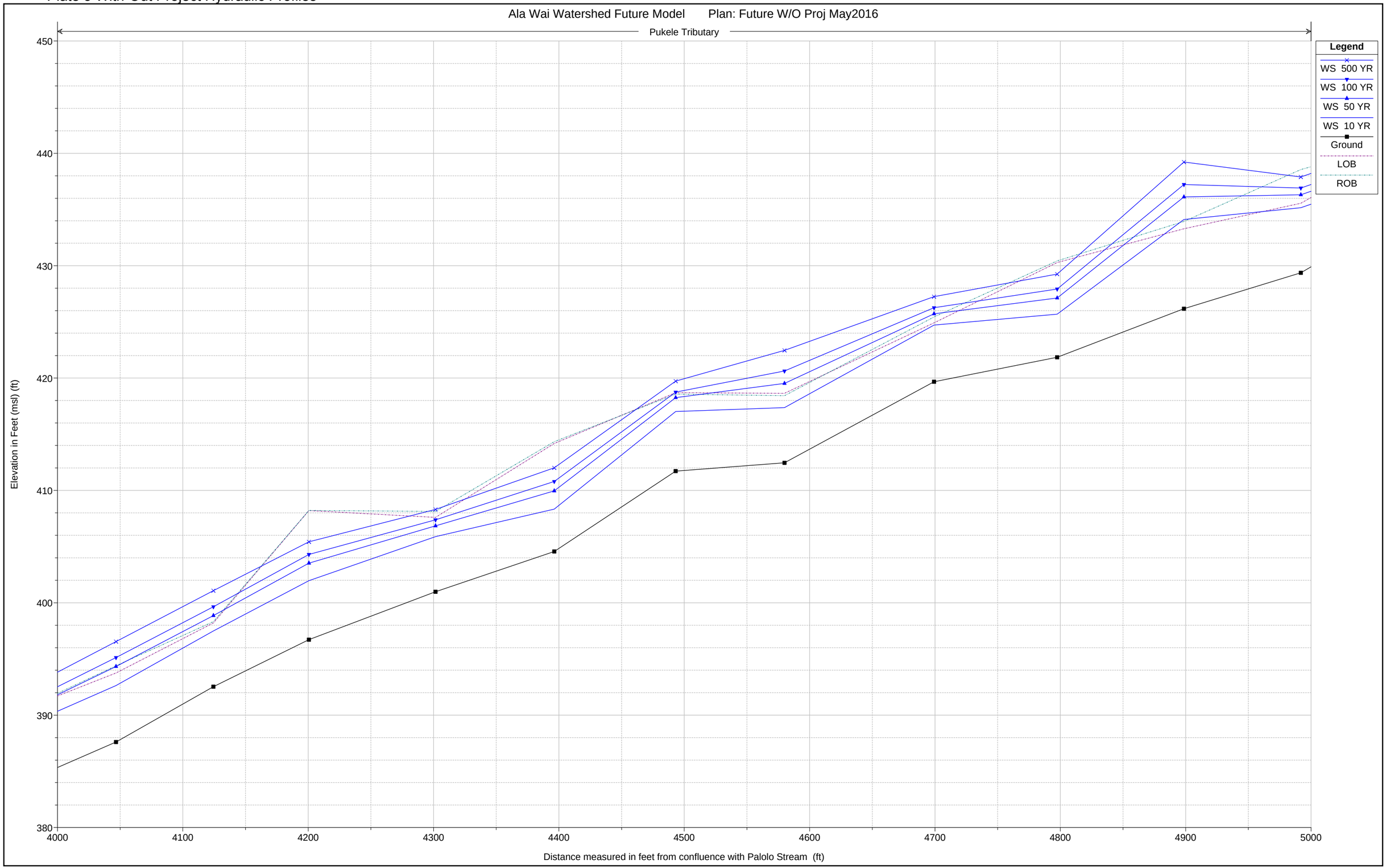
400
390
380
370
360
350
340
330
320
310

3000
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000

D/S Face Palolo/10th Avenue
Palolo Avenue Bridge
U/S Face Palolo/10th Avenue

Distance measured in feet from confluence with Palolo Stream (ft)

Plate 3 With-Out Project Hydraulic Profiles



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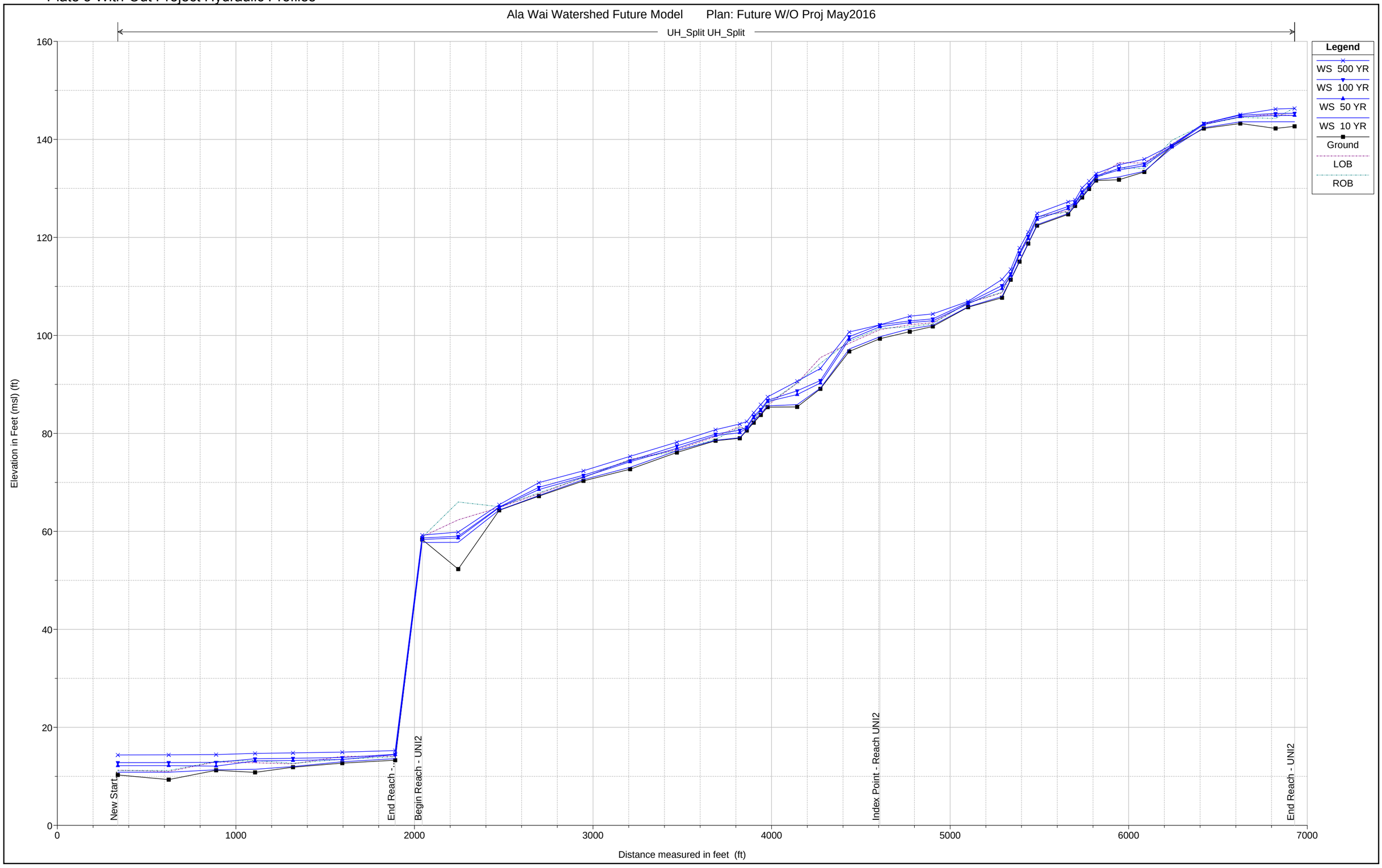

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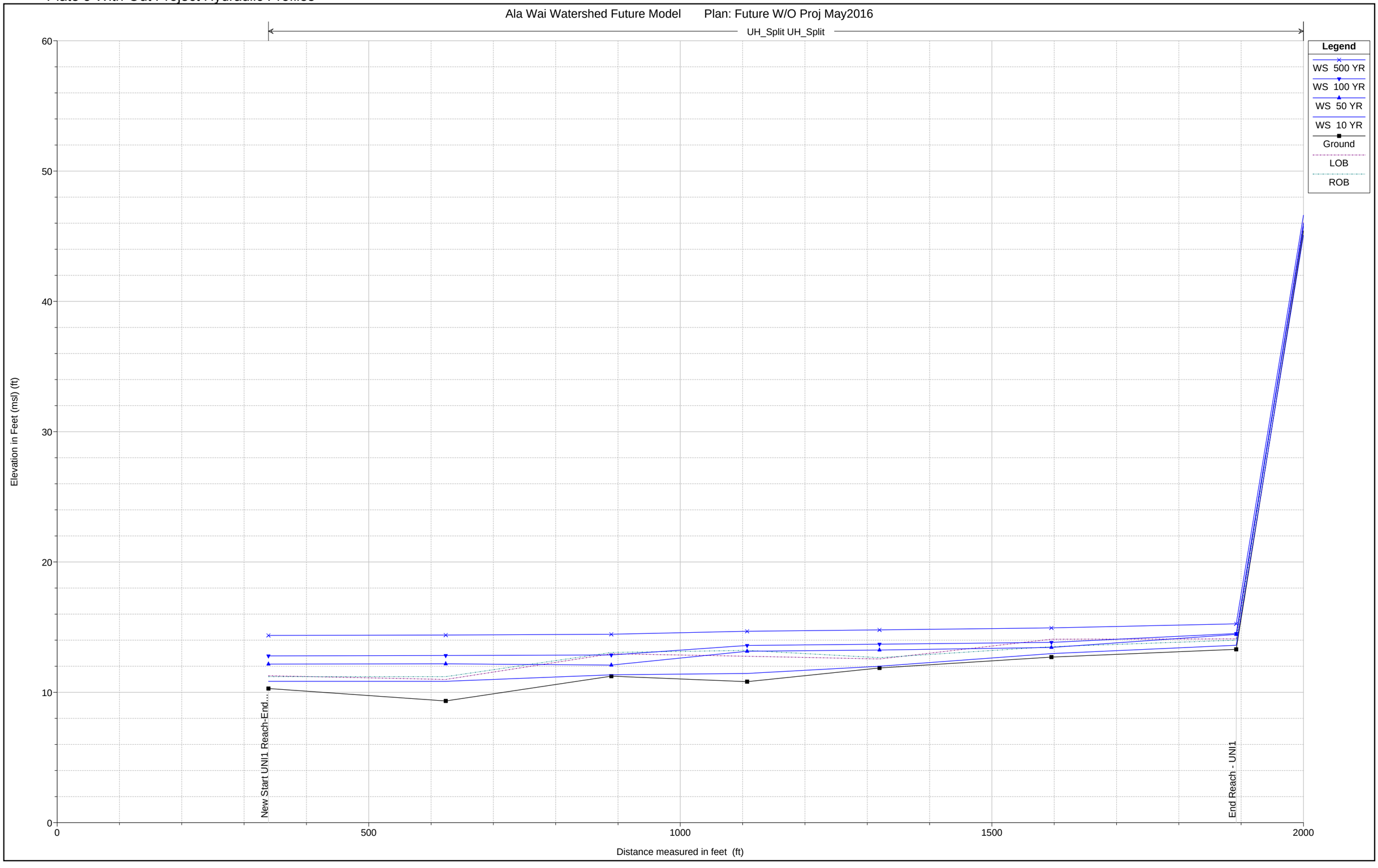


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

UH_Split UH_Split

Legend

WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
LOB
ROB

Elevation in Feet (msl) (ft)

100
90
80
70
60
50
40

Begin Reach - UNI2

2000
2500
3000
3500
4000

Distance measured in feet (ft)

Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016

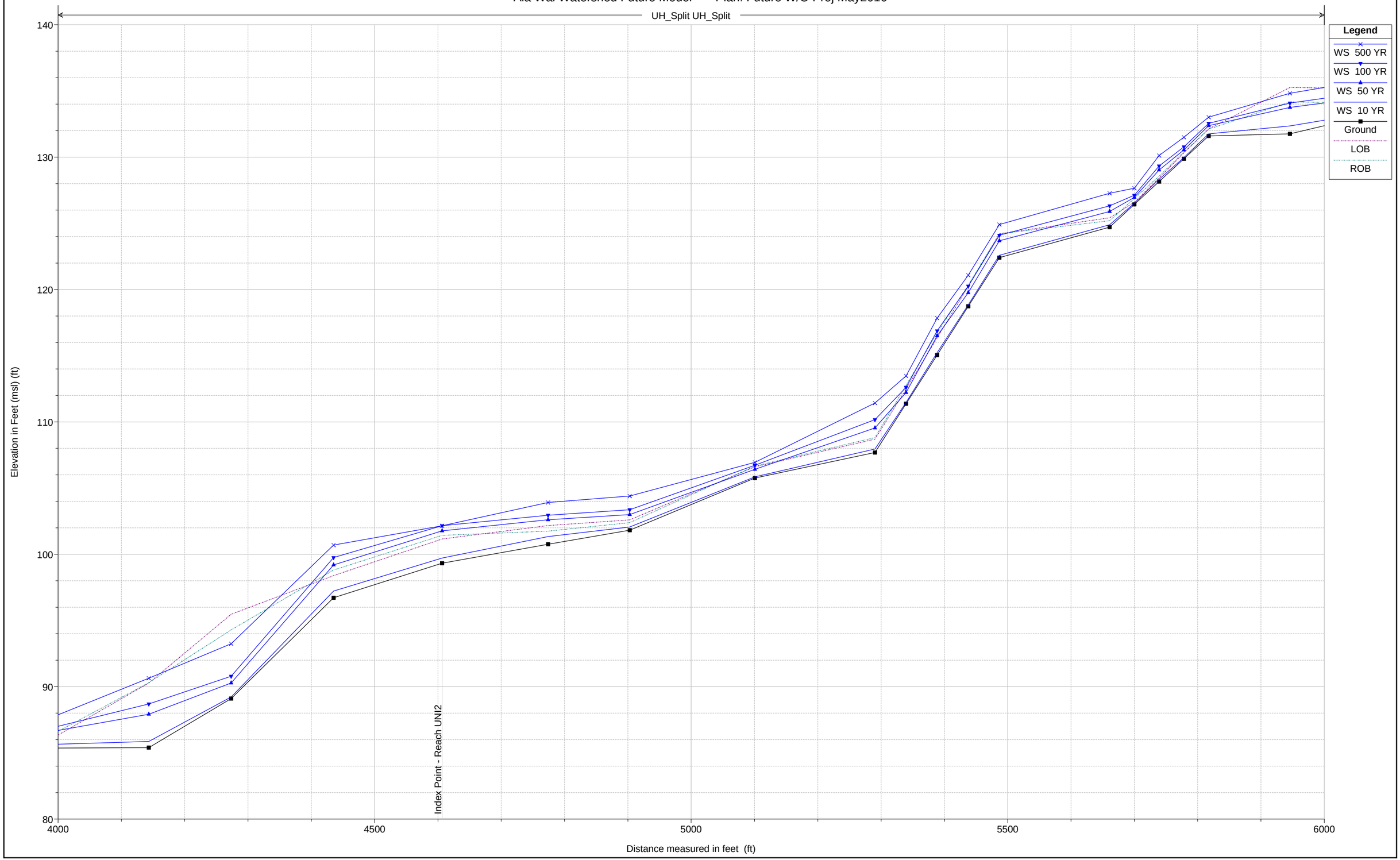
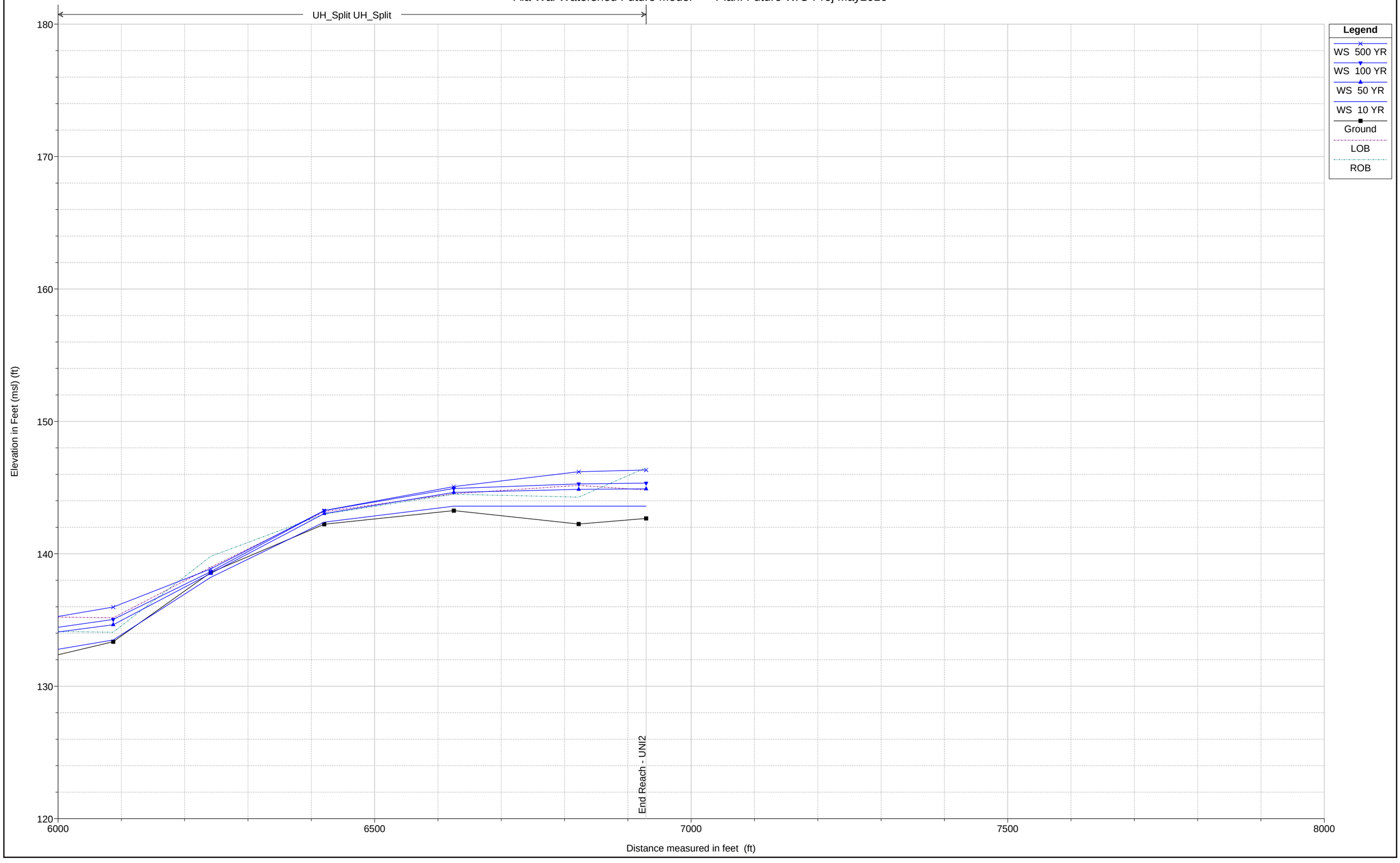


Plate 3 With-Out Project Hydraulic Profiles

Ala Wai Watershed Future Model Plan: Future W/O Proj May2016



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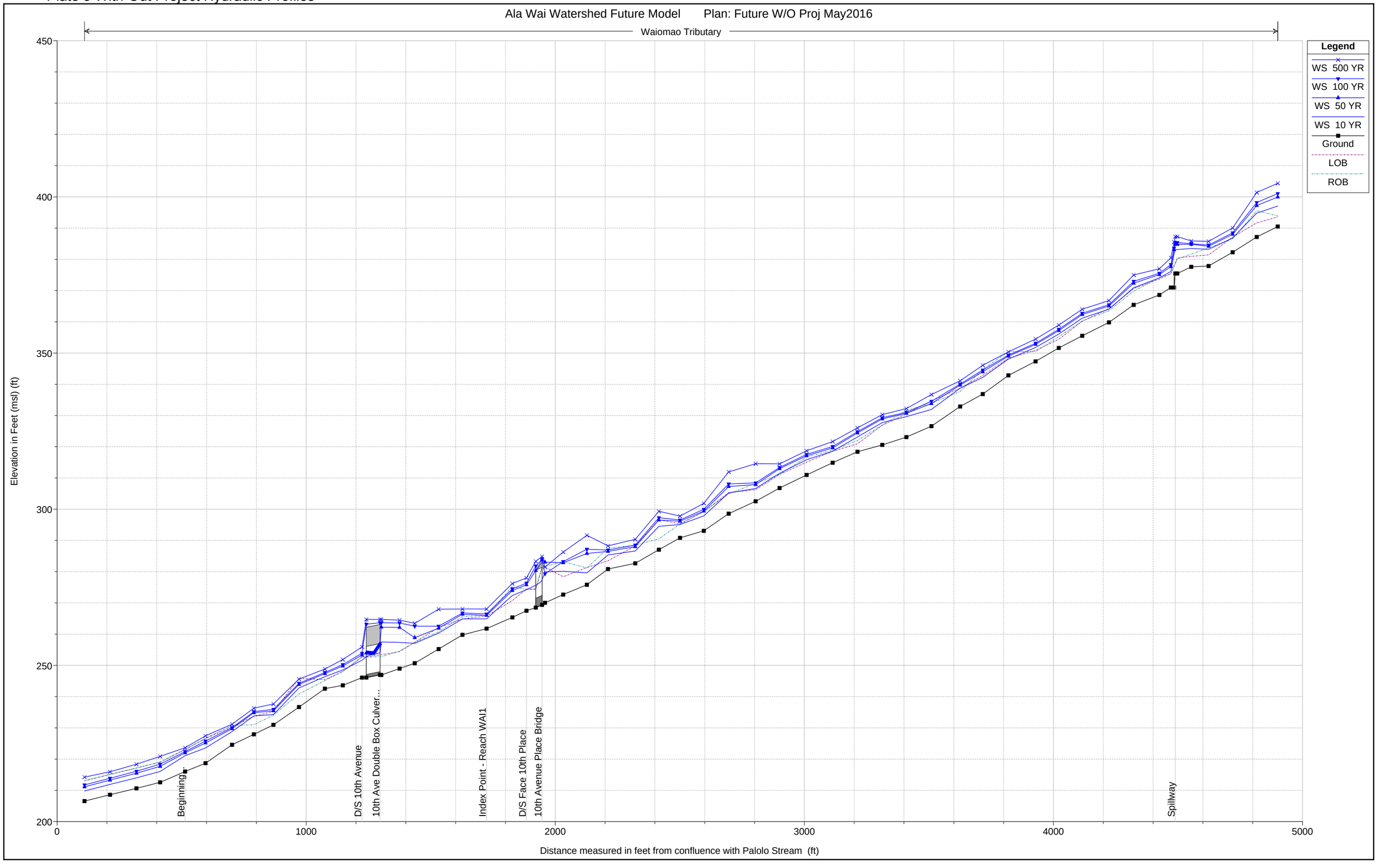

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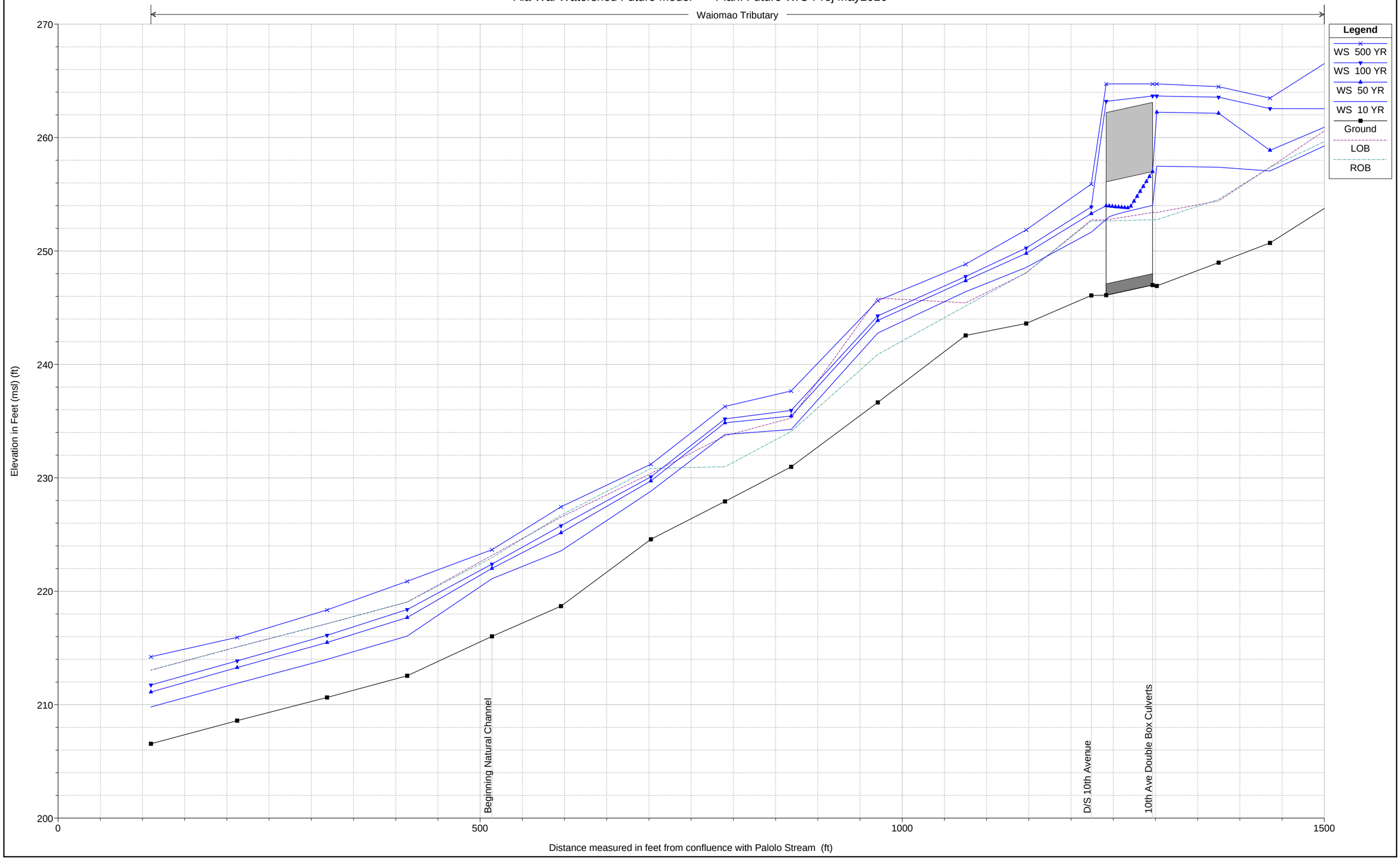
Ala Wai Watershed Future Model Plan: Future W/O Proj May2016



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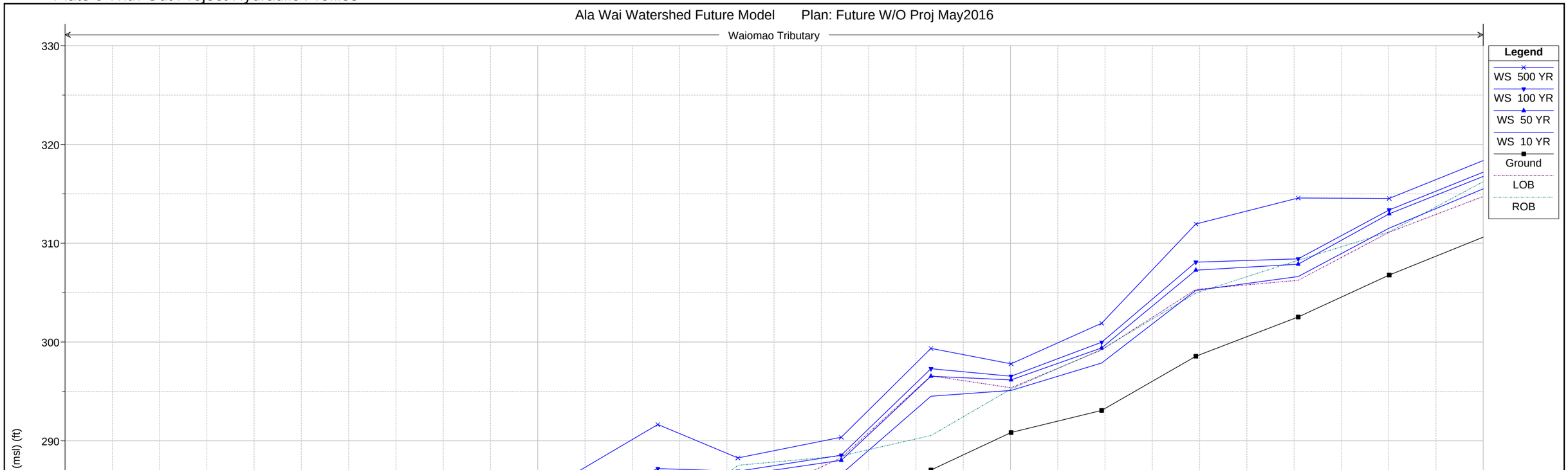

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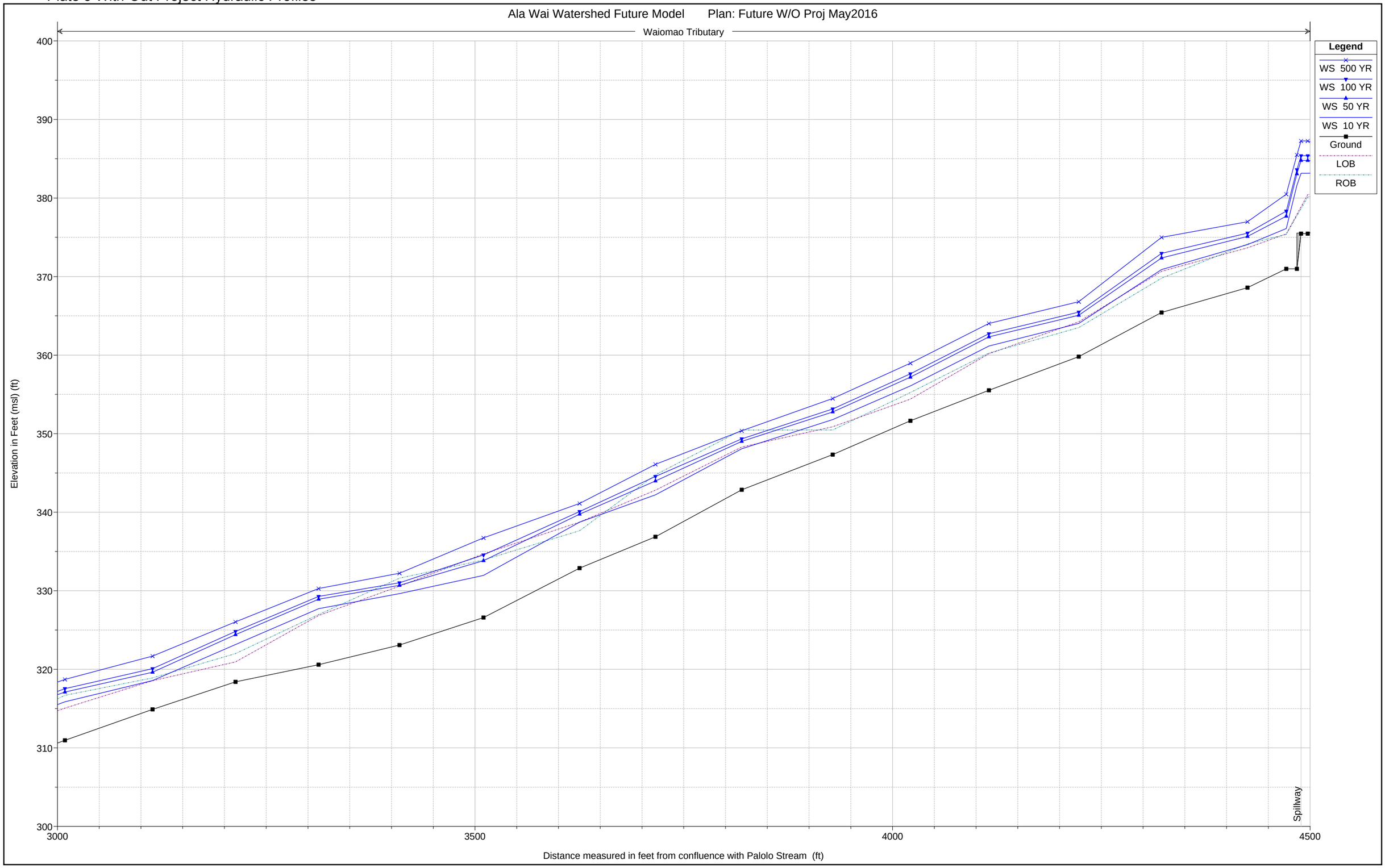

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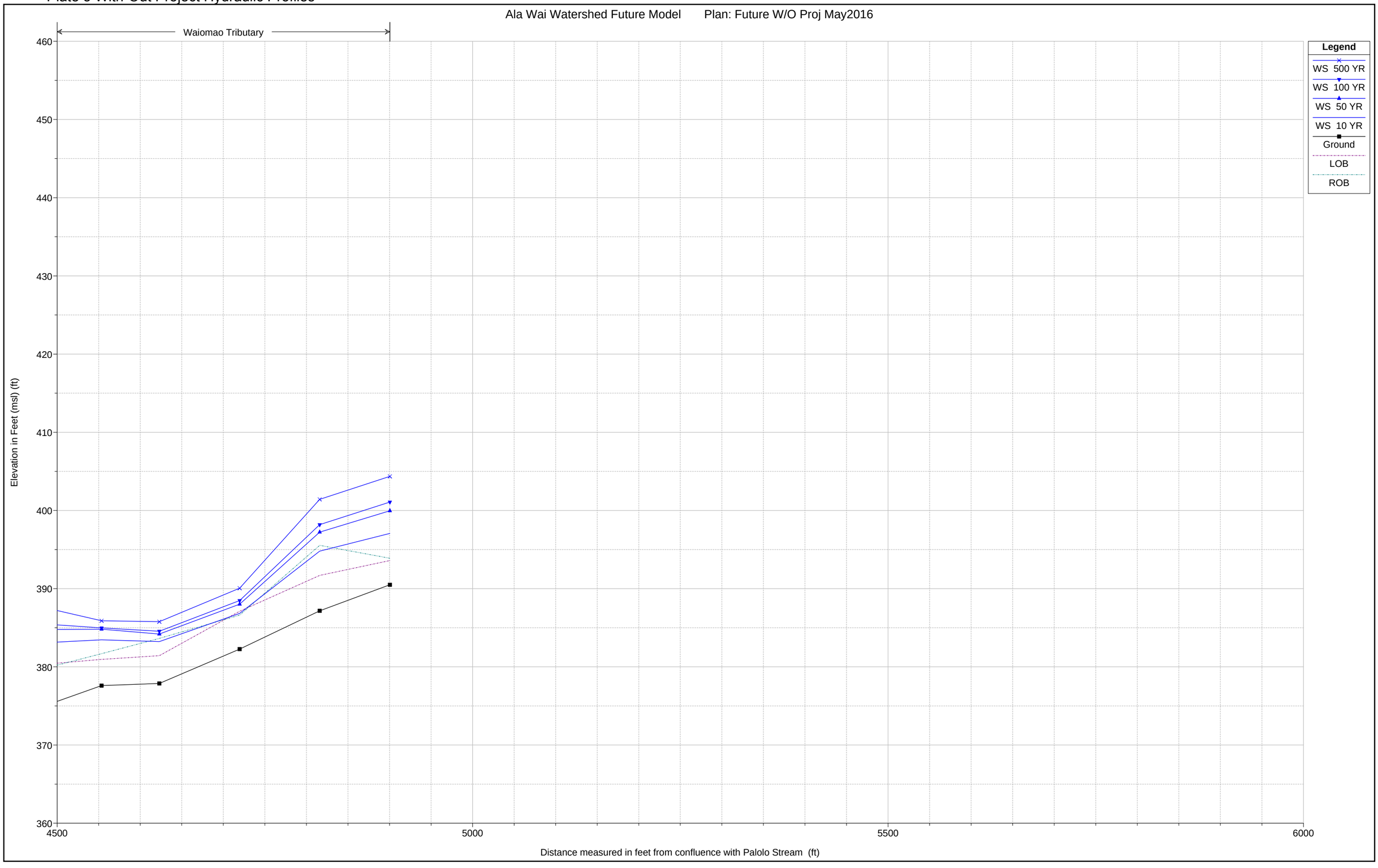


Plate 4 With-Project TSP Hydraulic Profiles

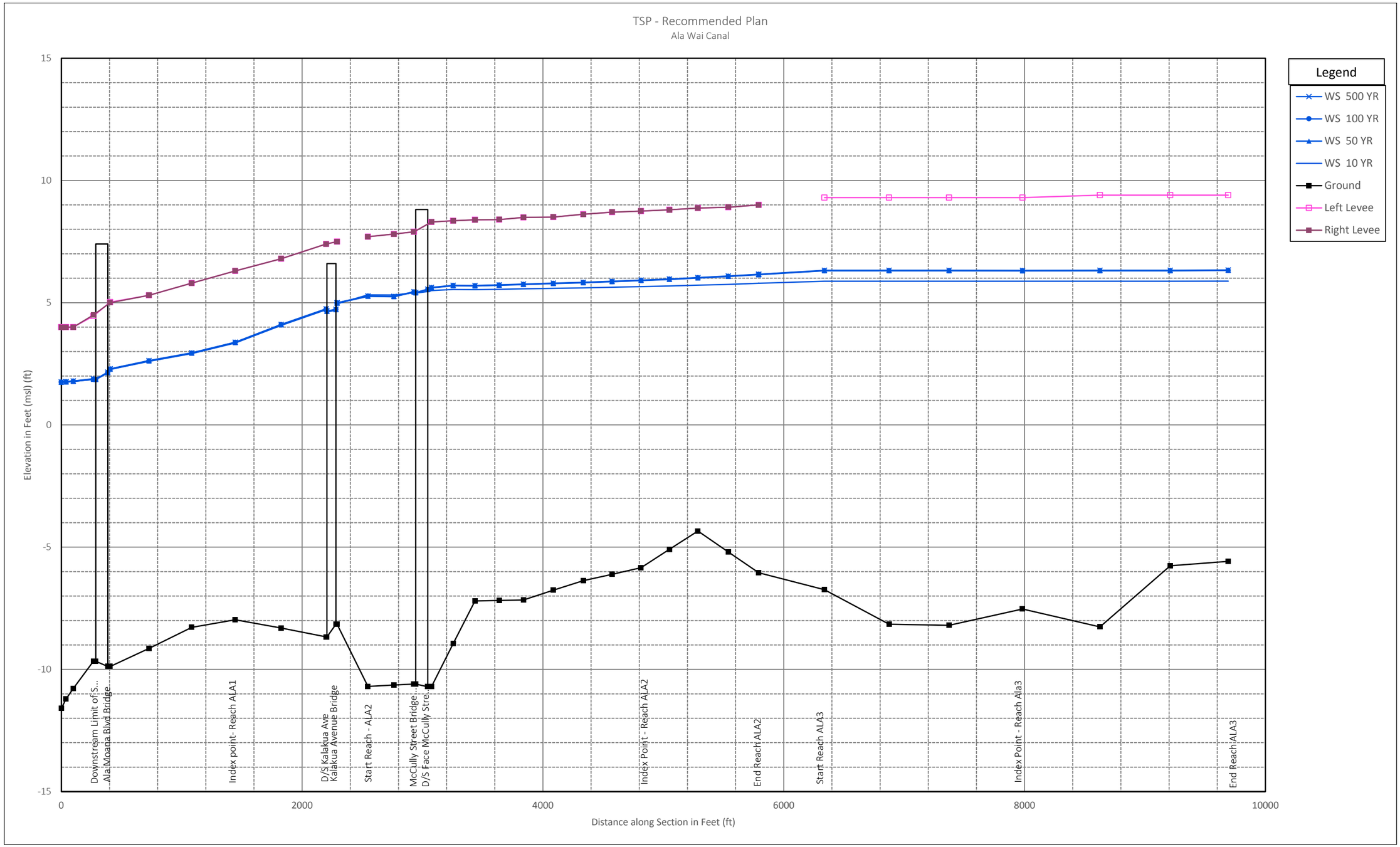
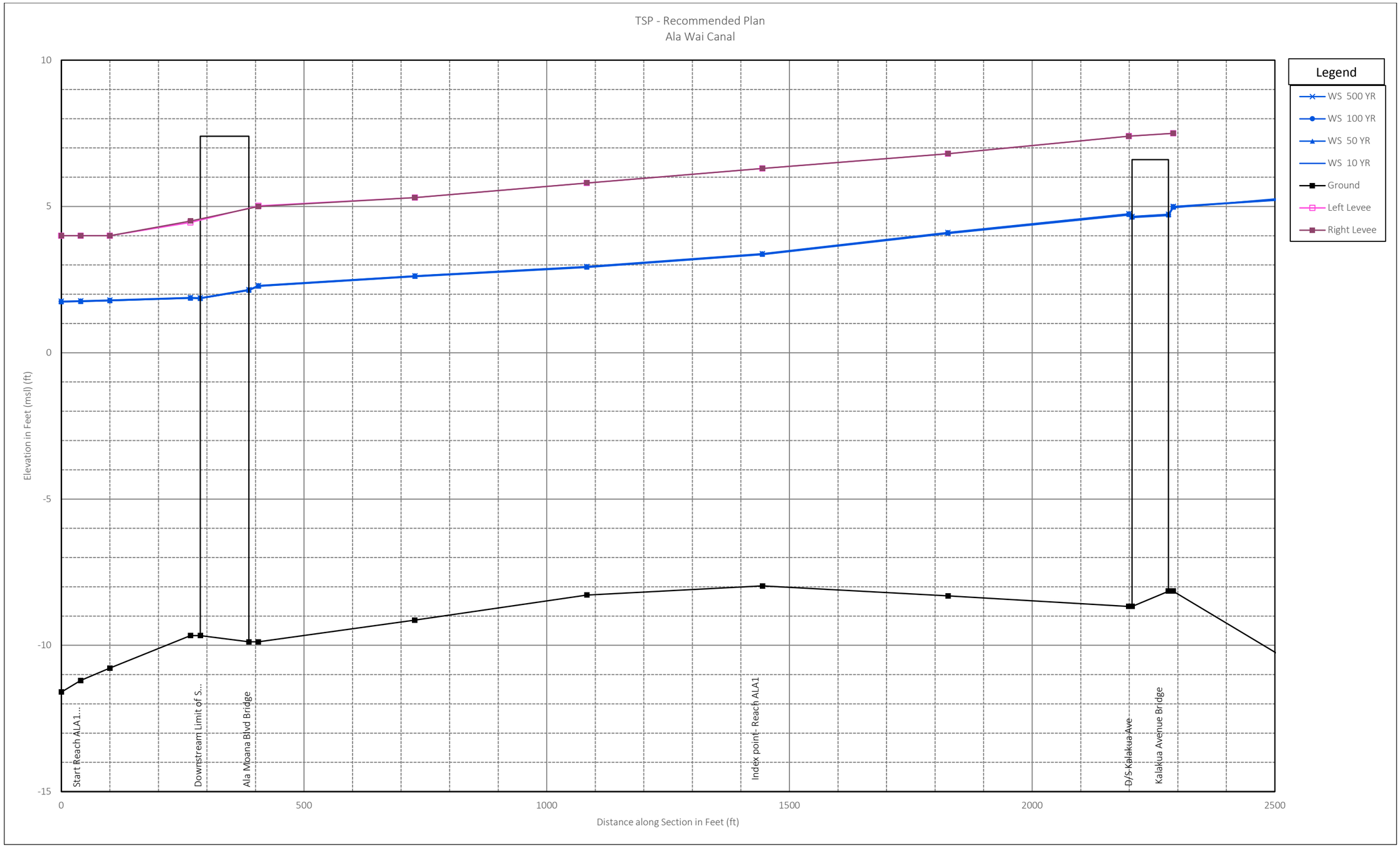


Plate 4 With-Project TSP Hydraulic Profiles



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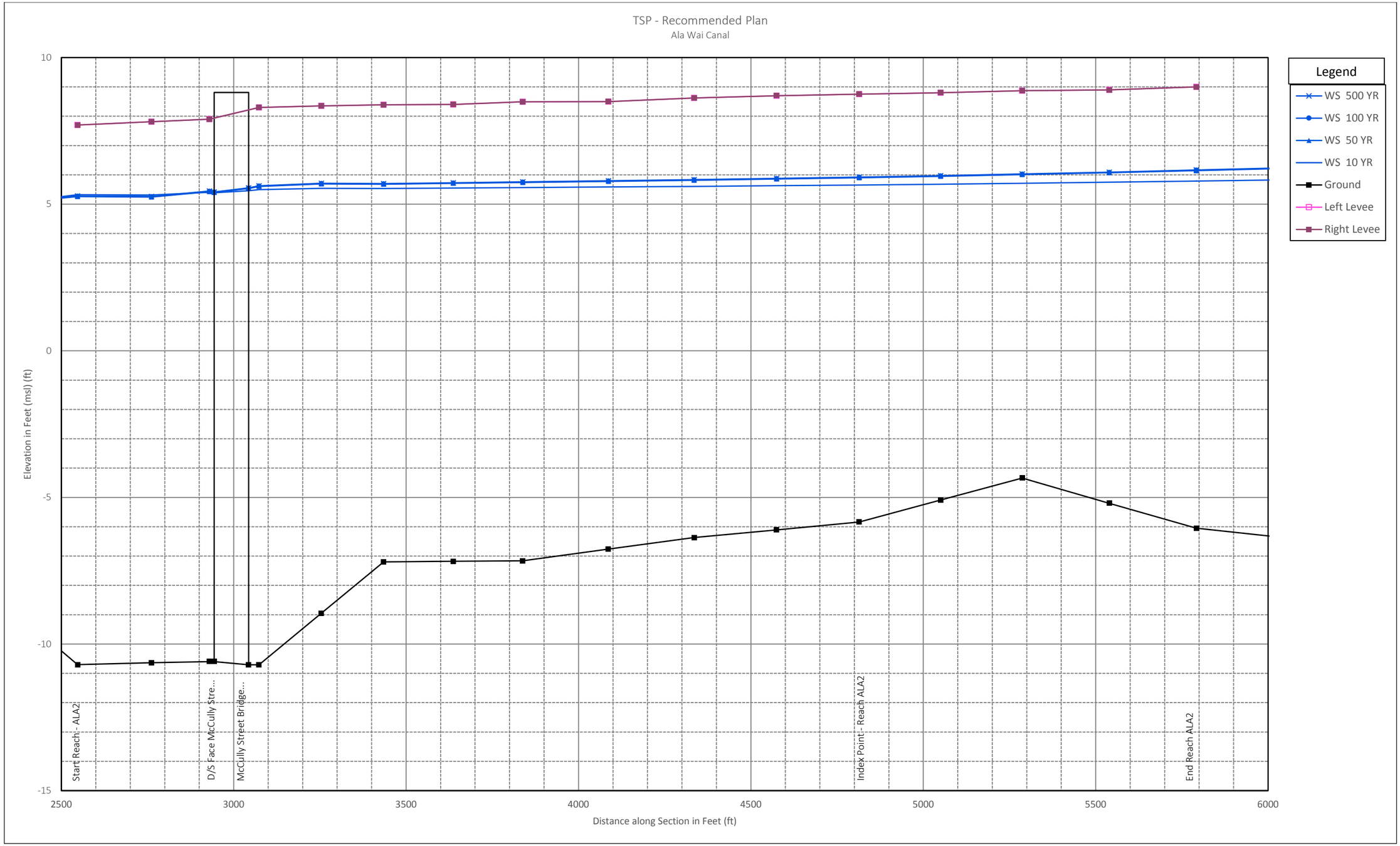

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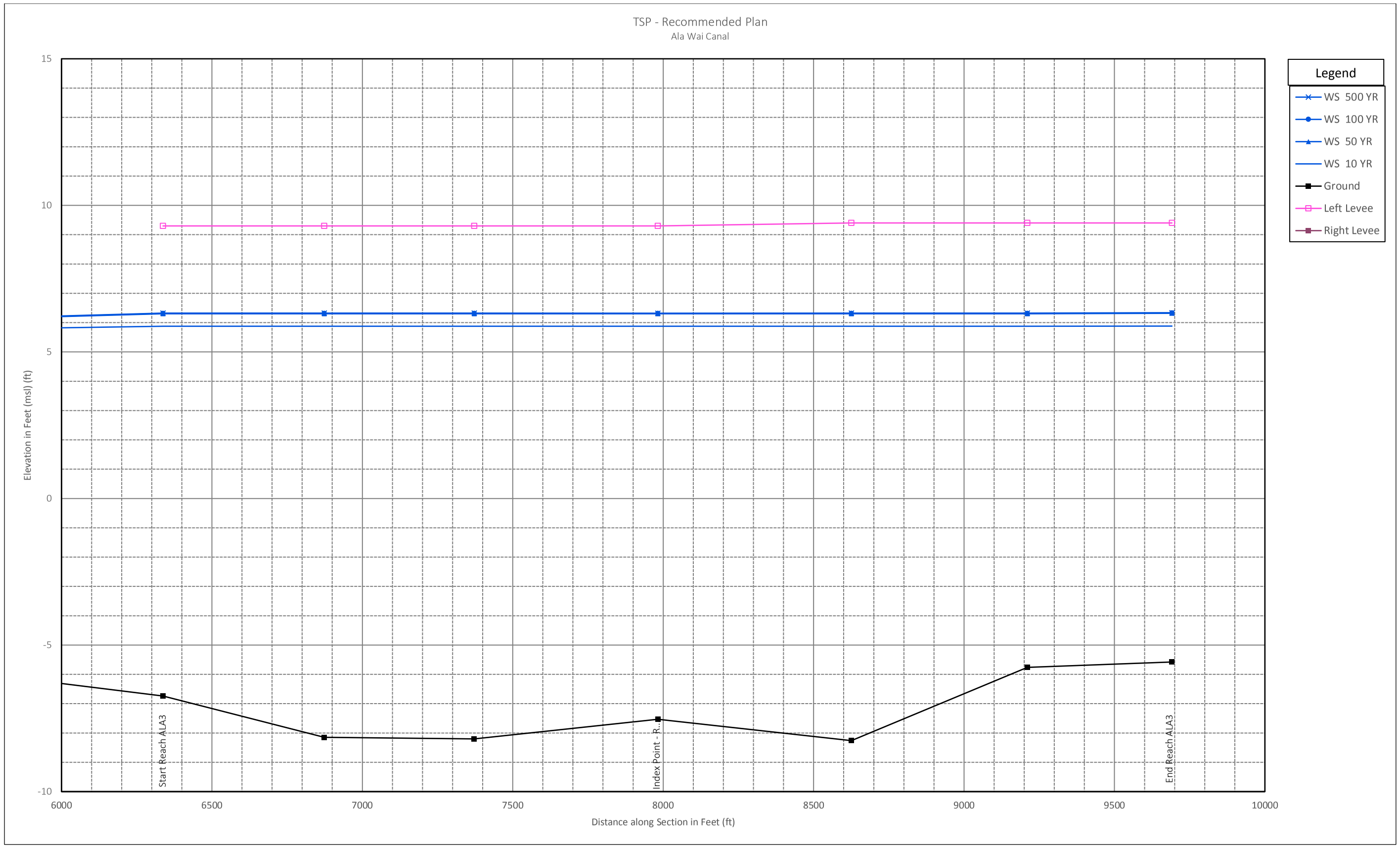

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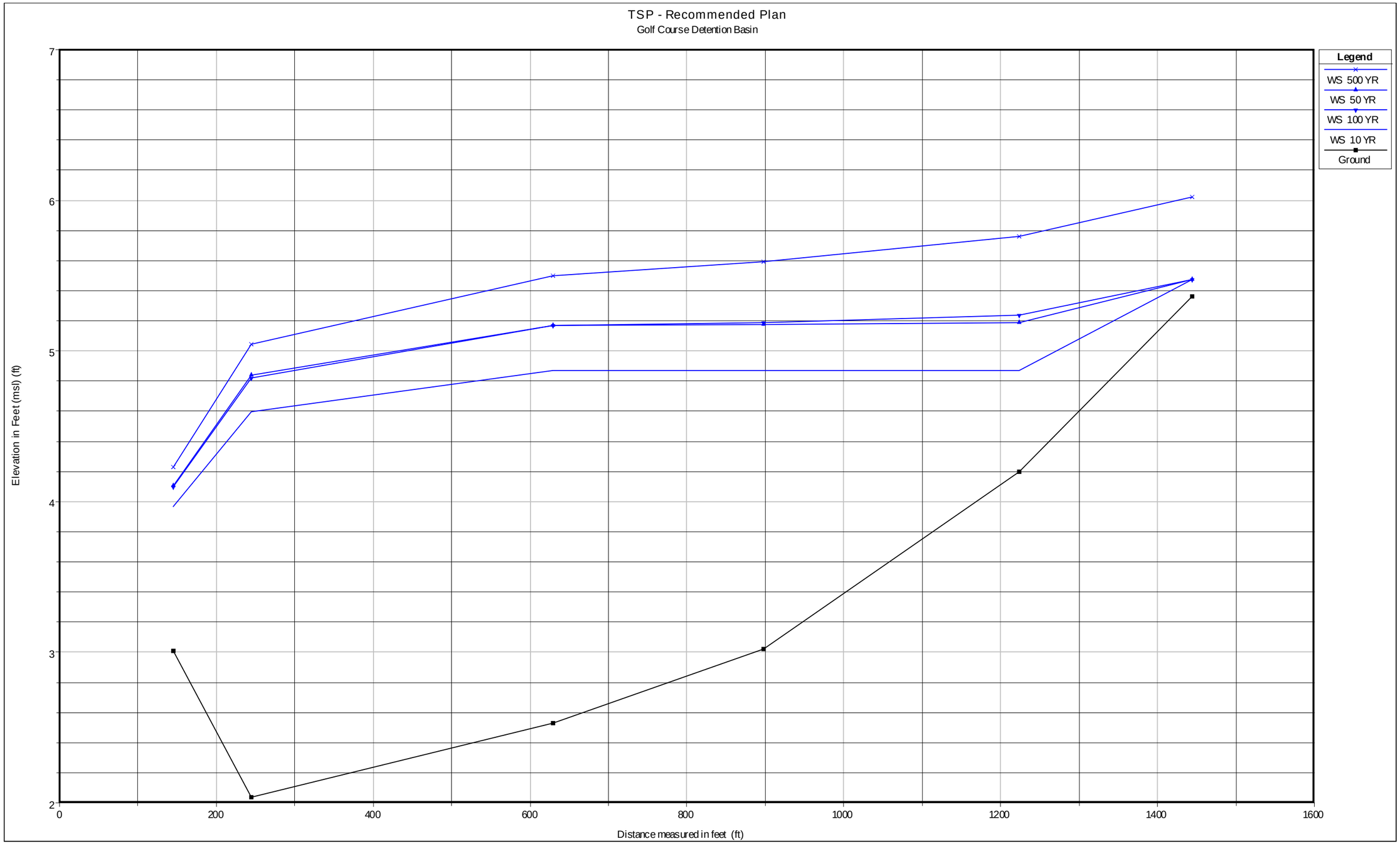

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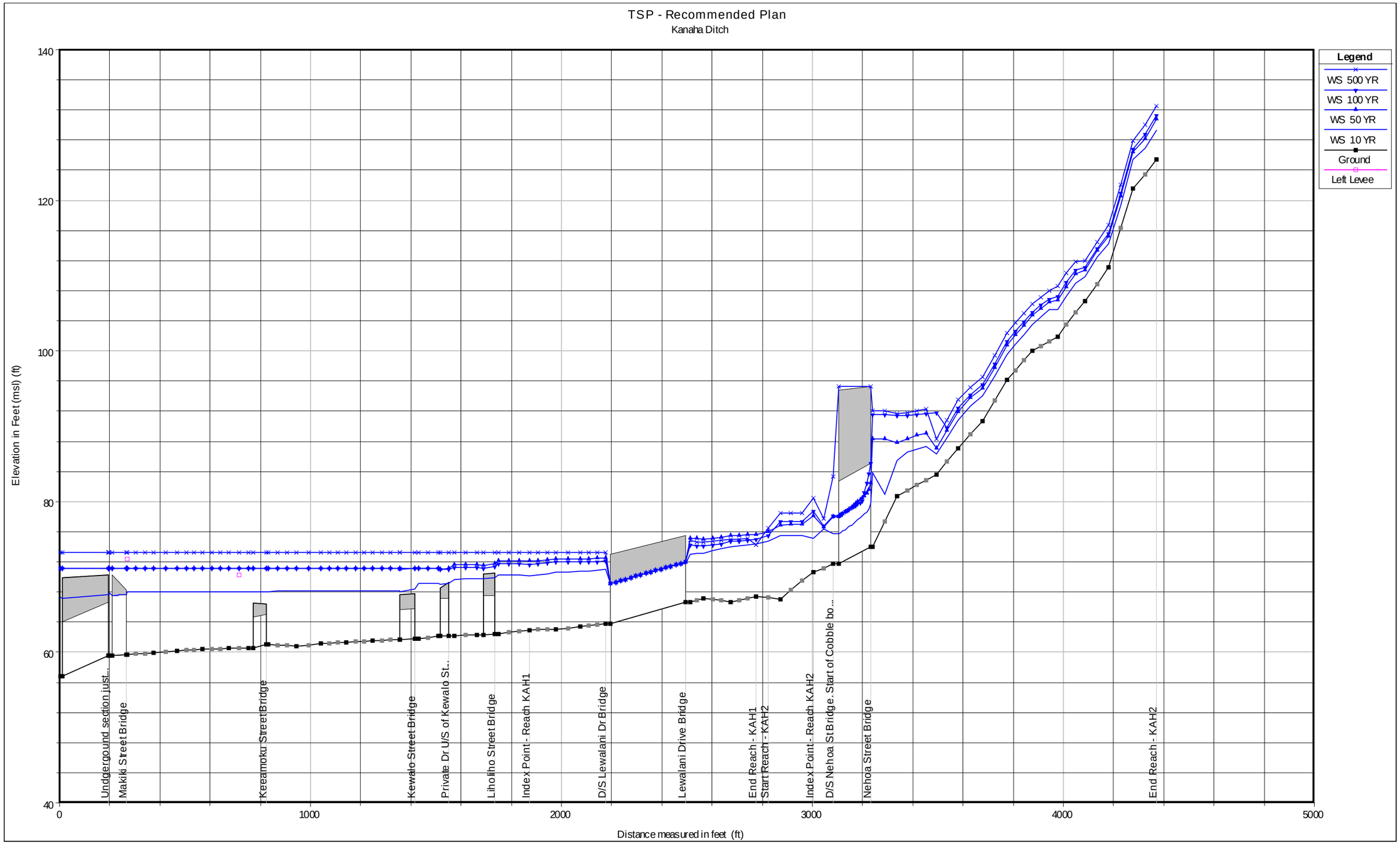

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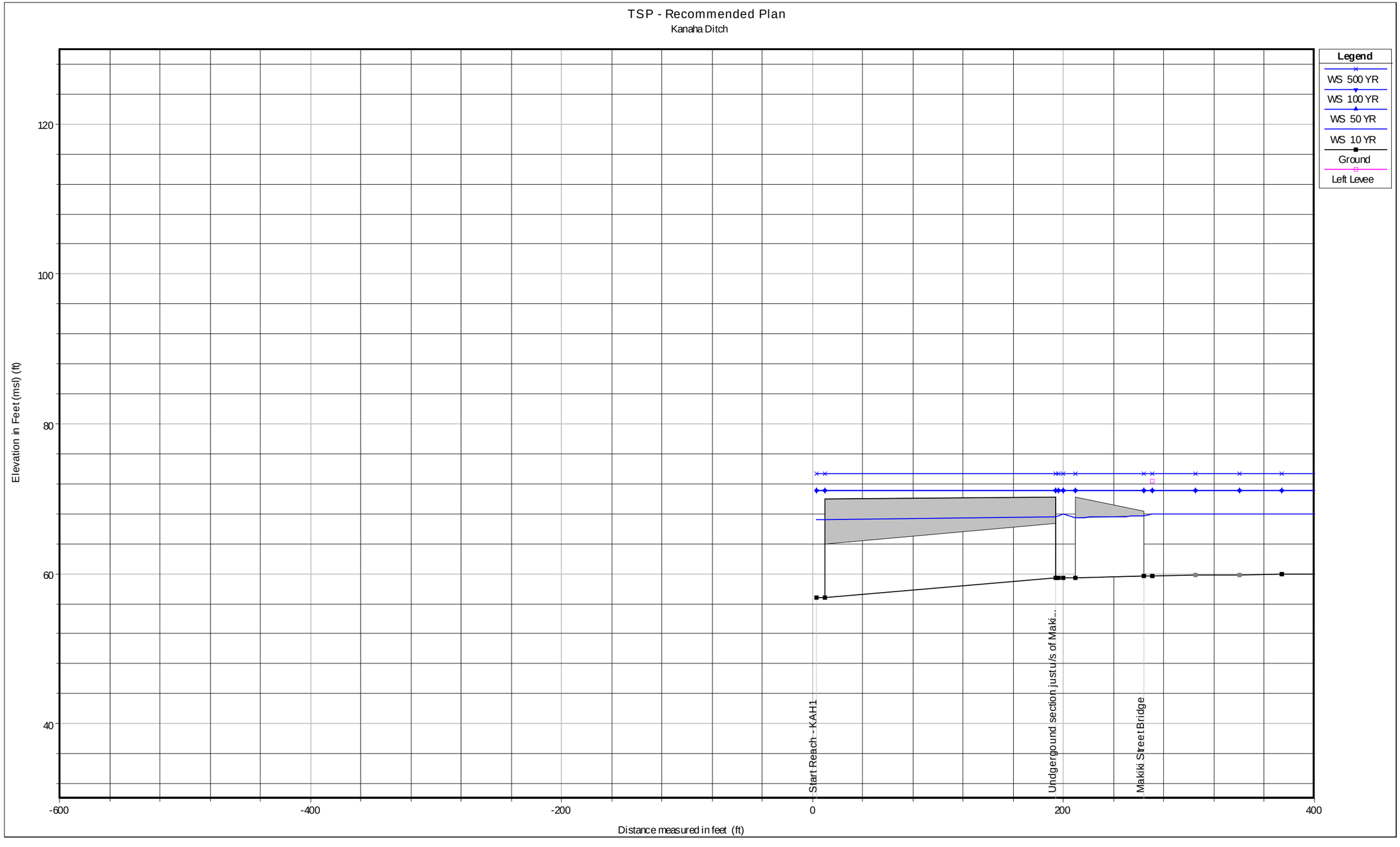

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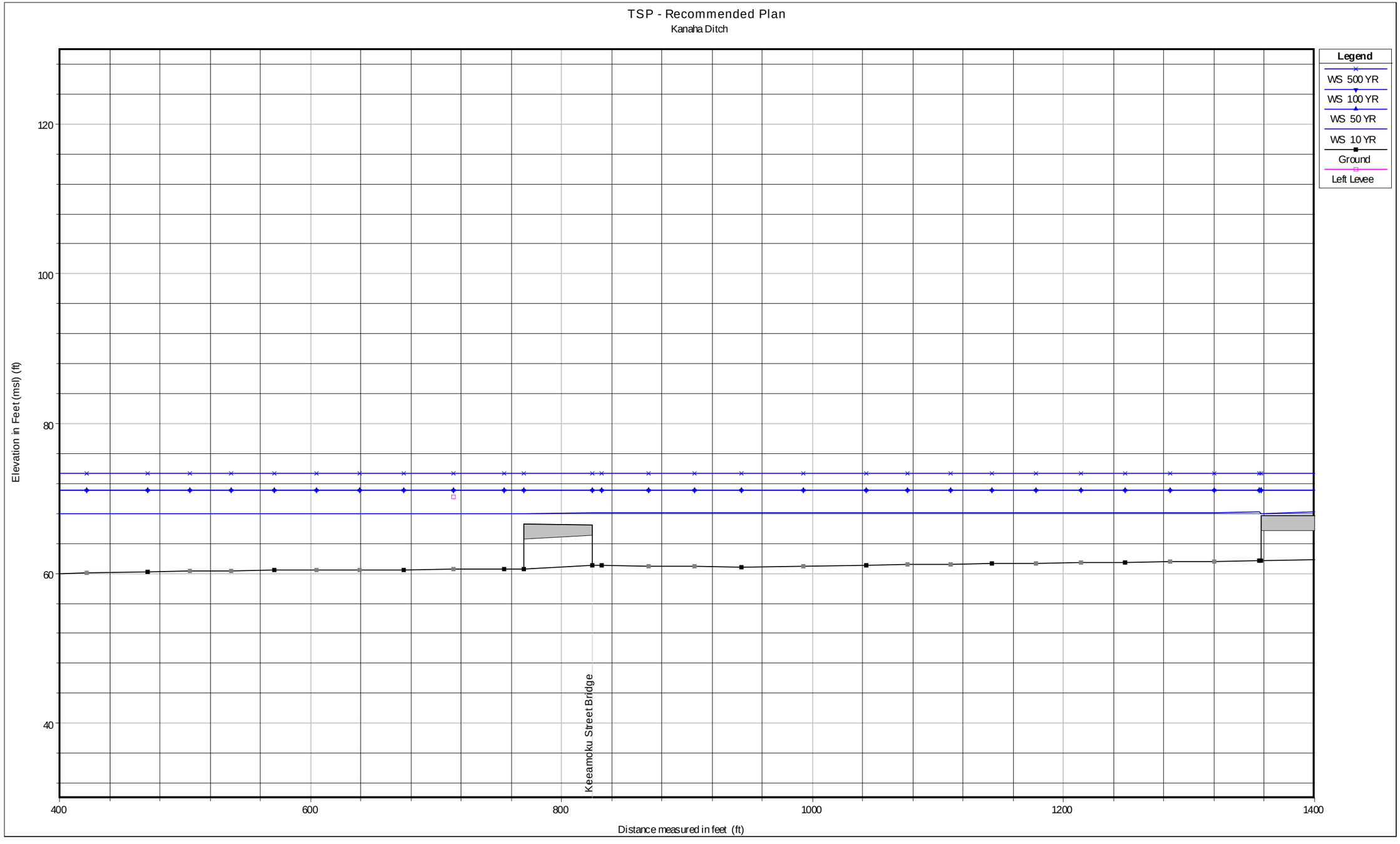

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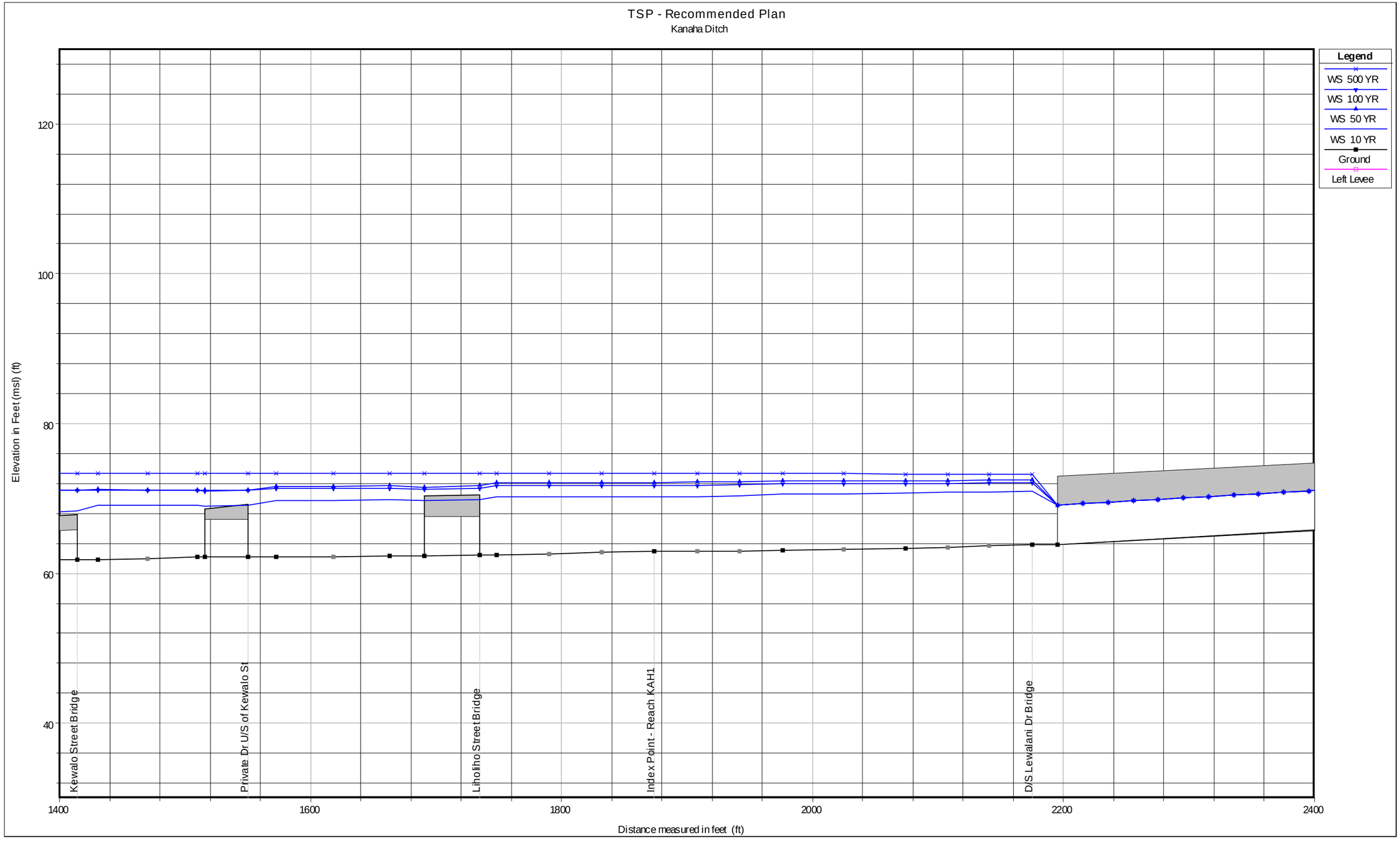

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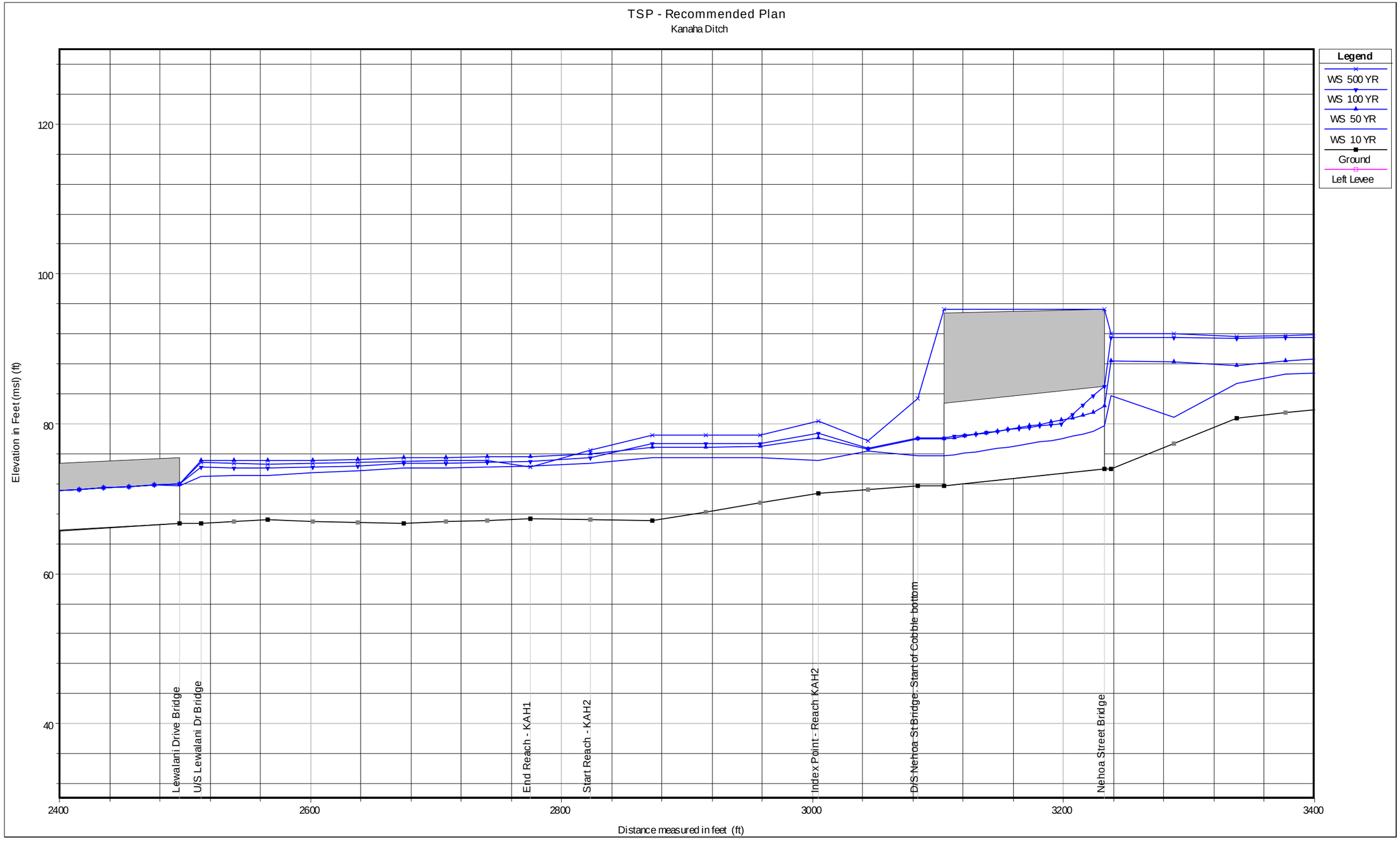

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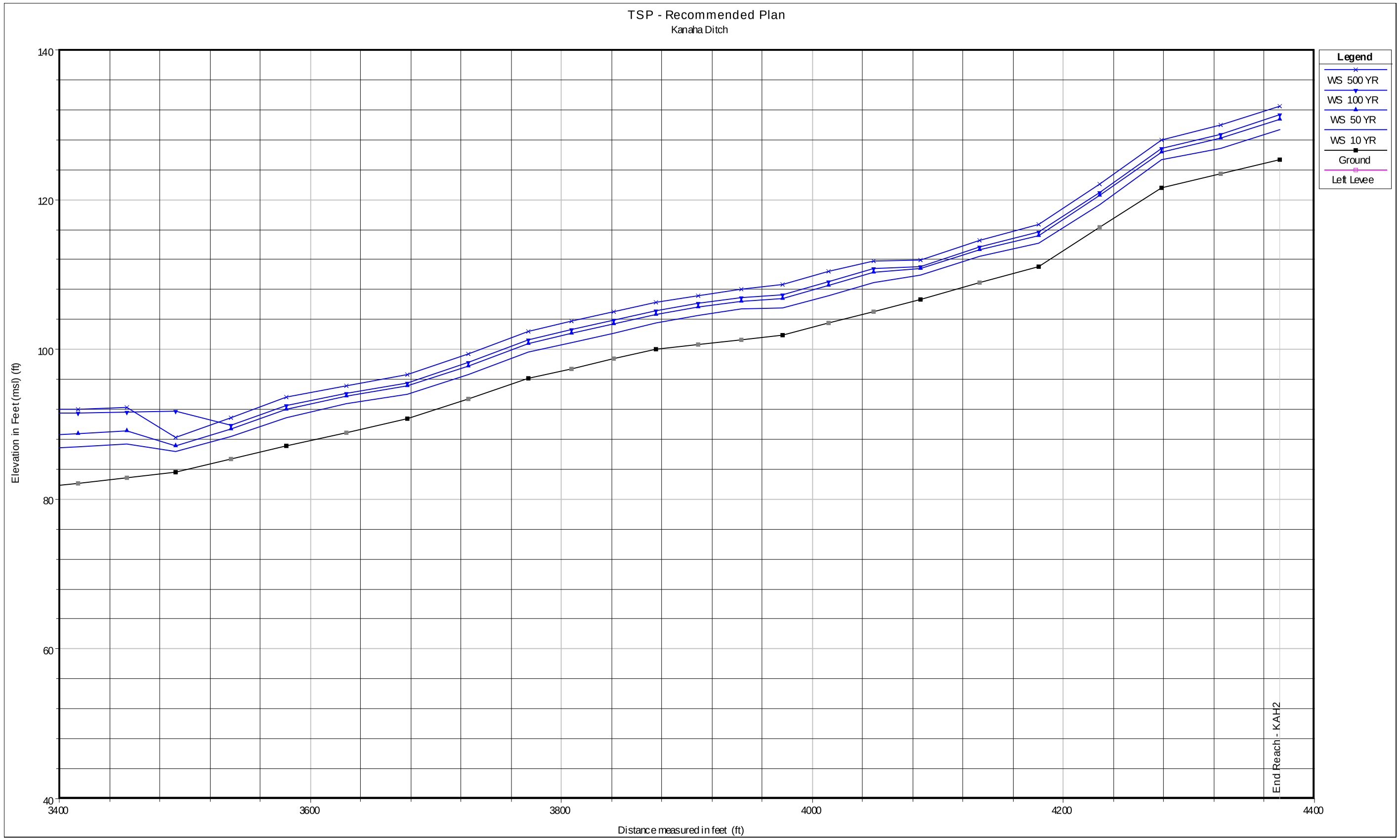

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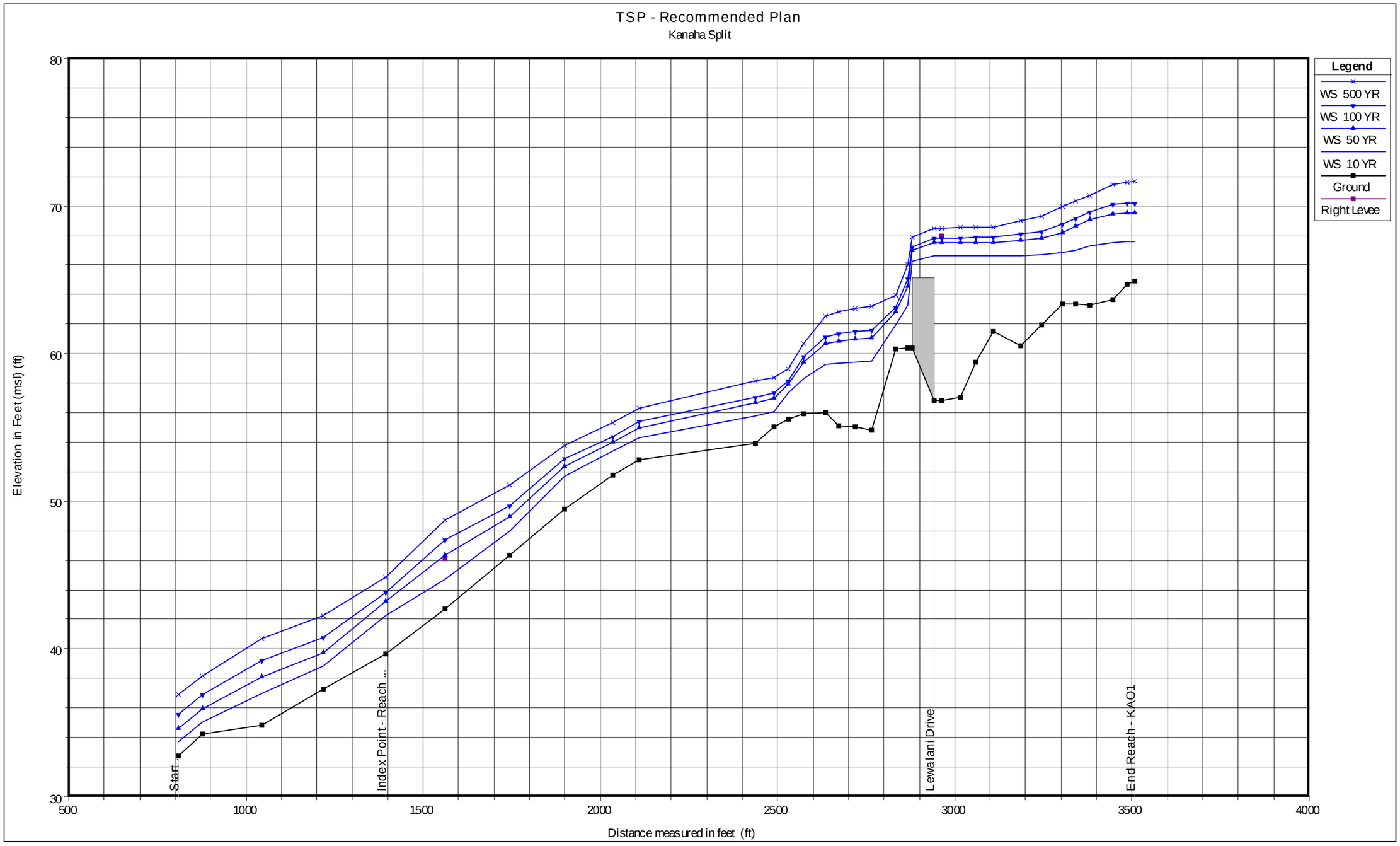

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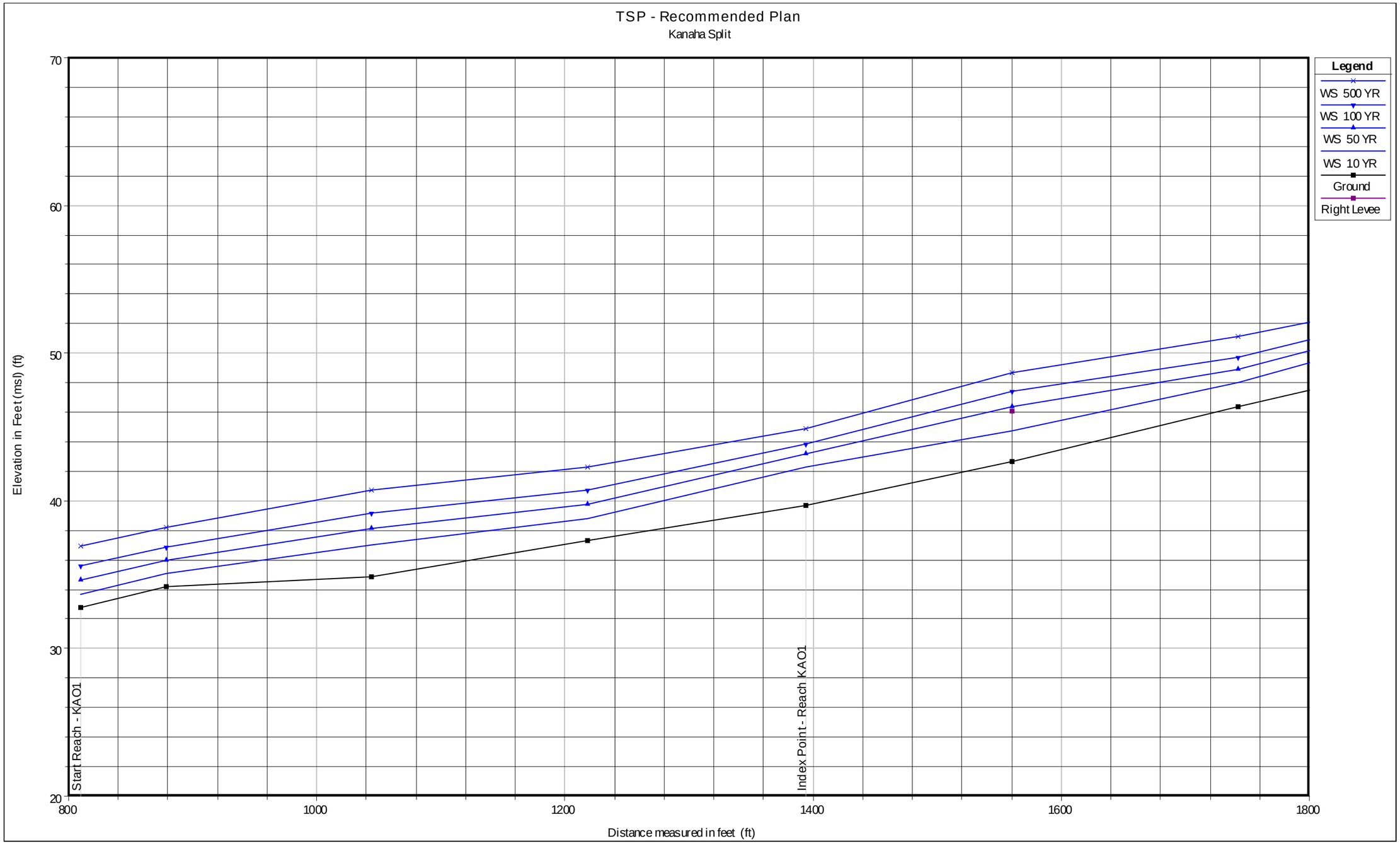

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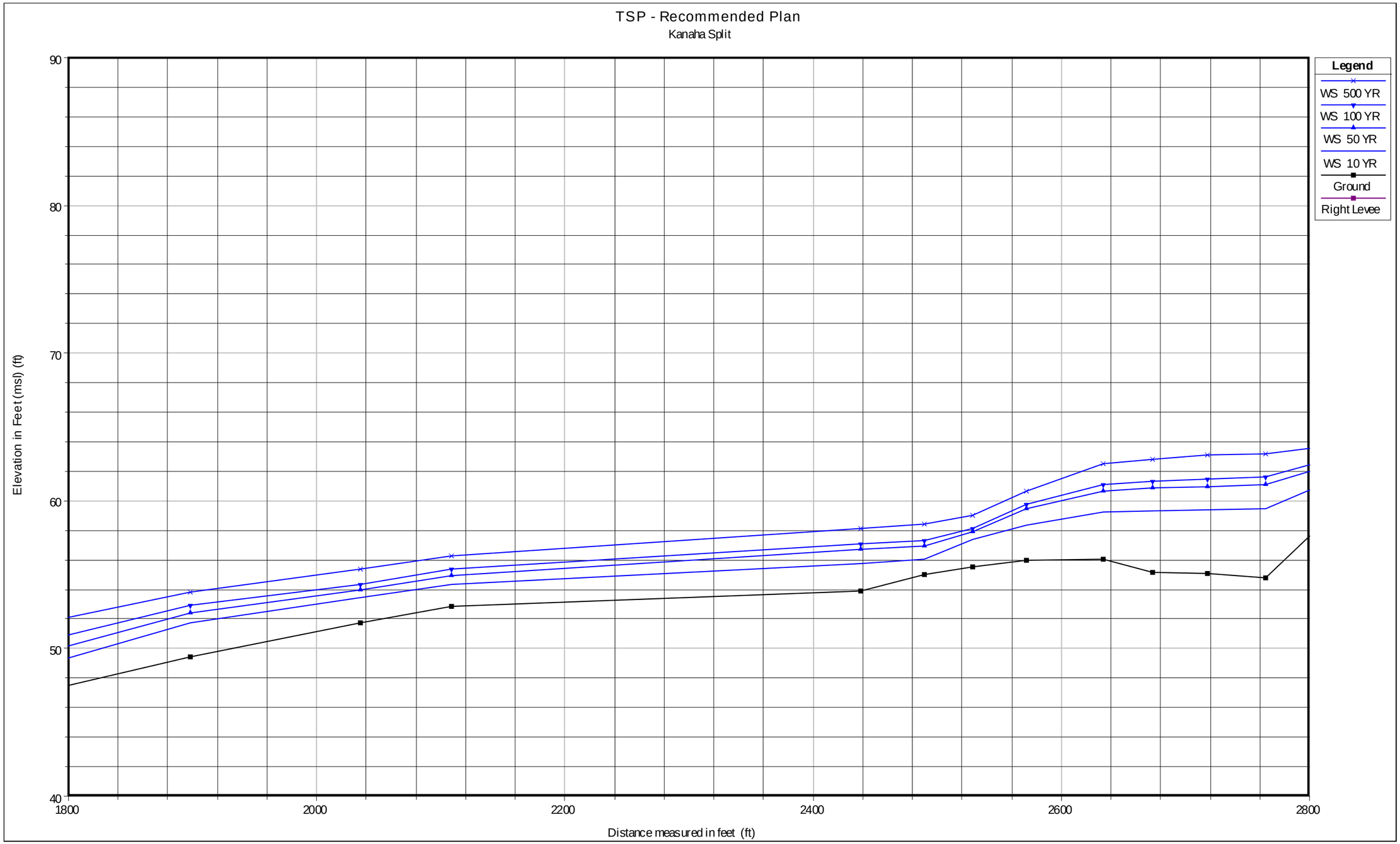

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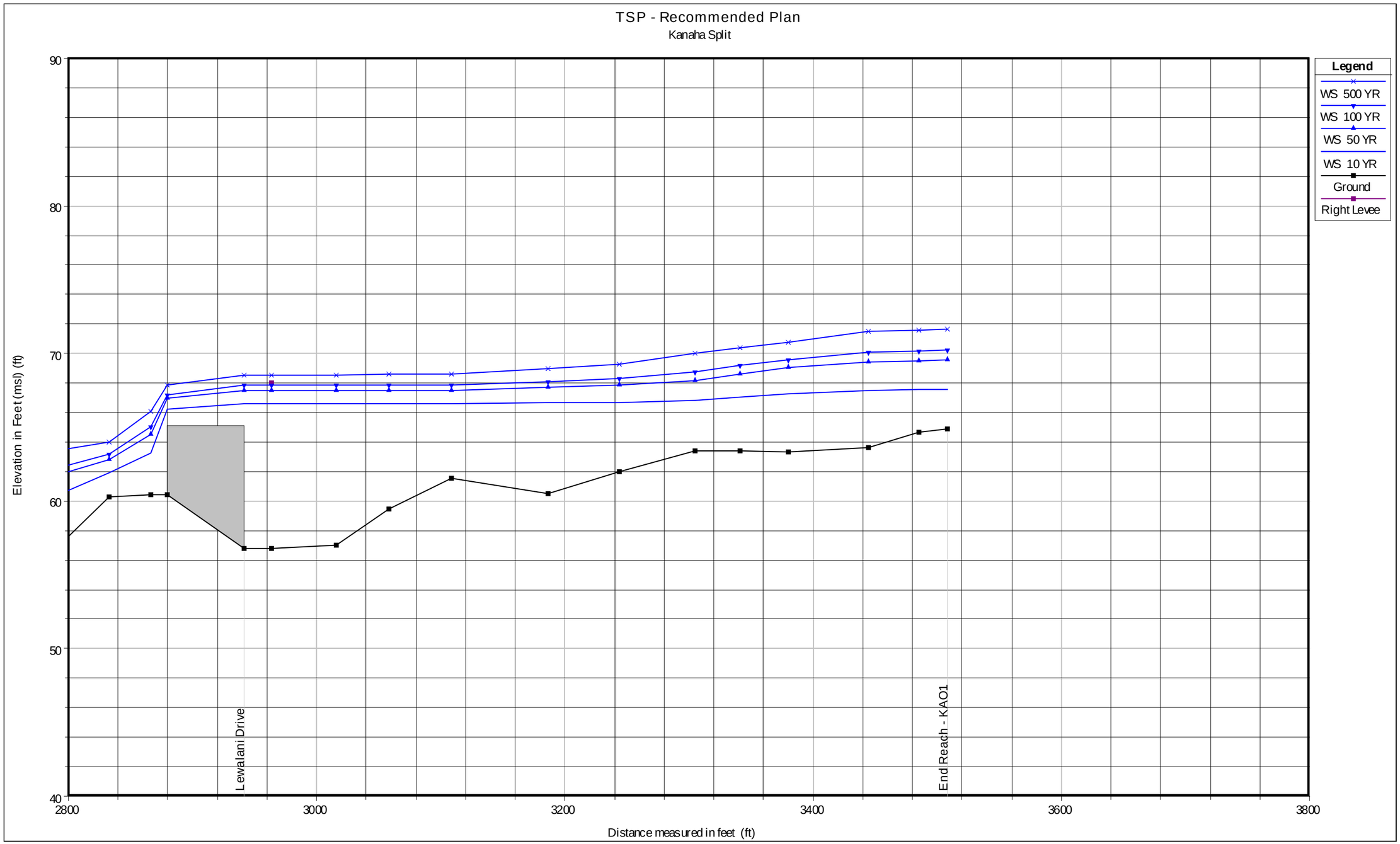

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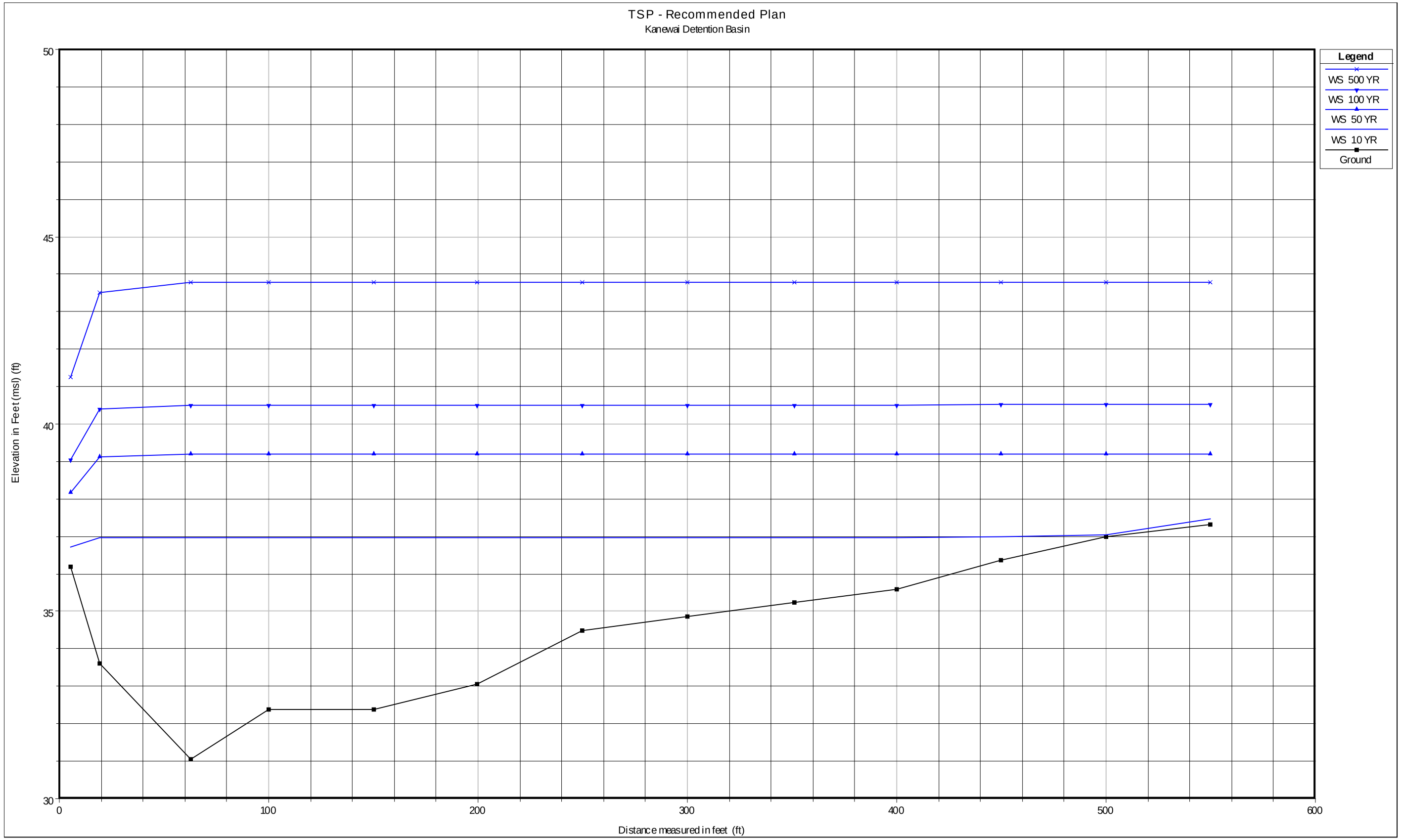

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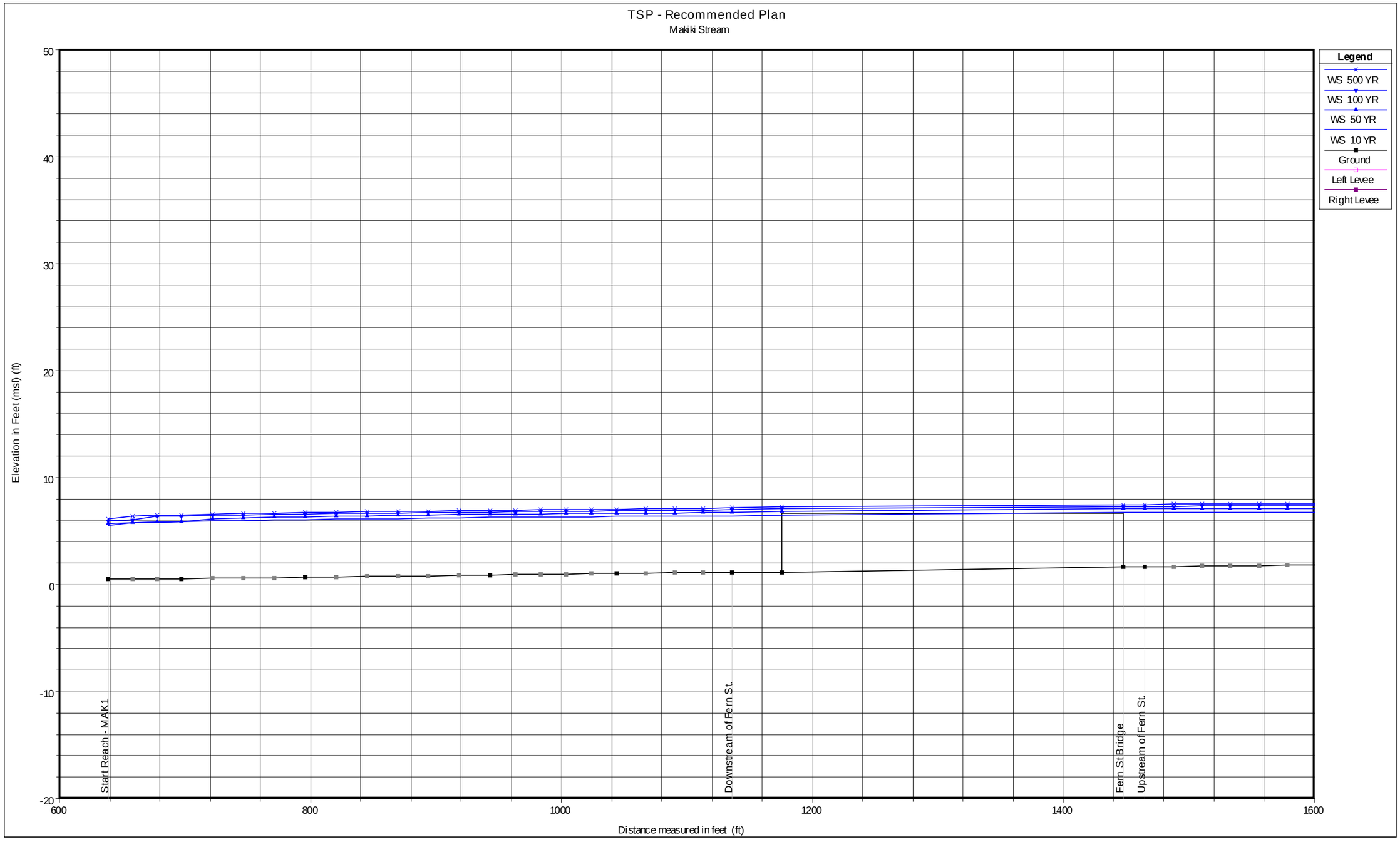

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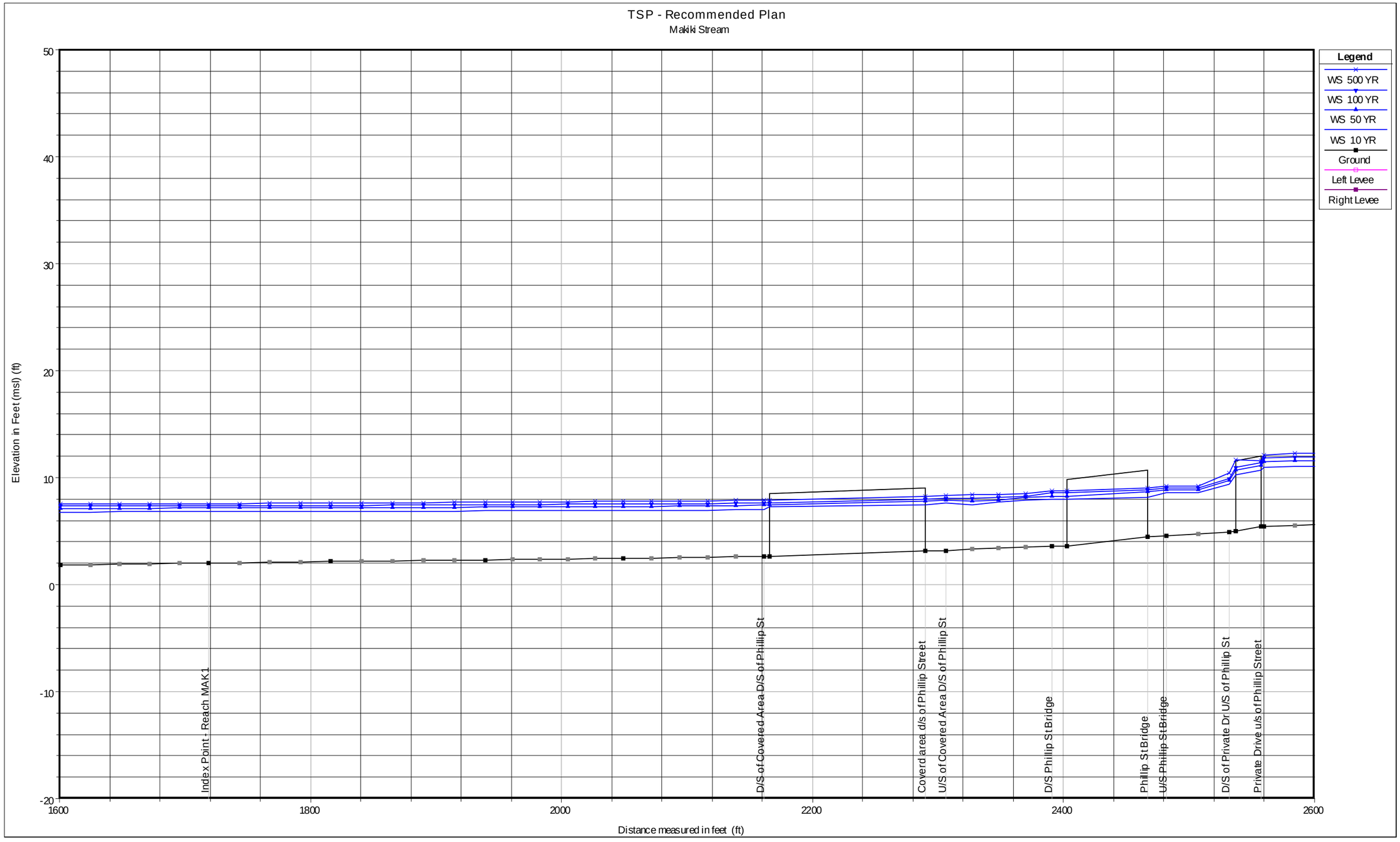

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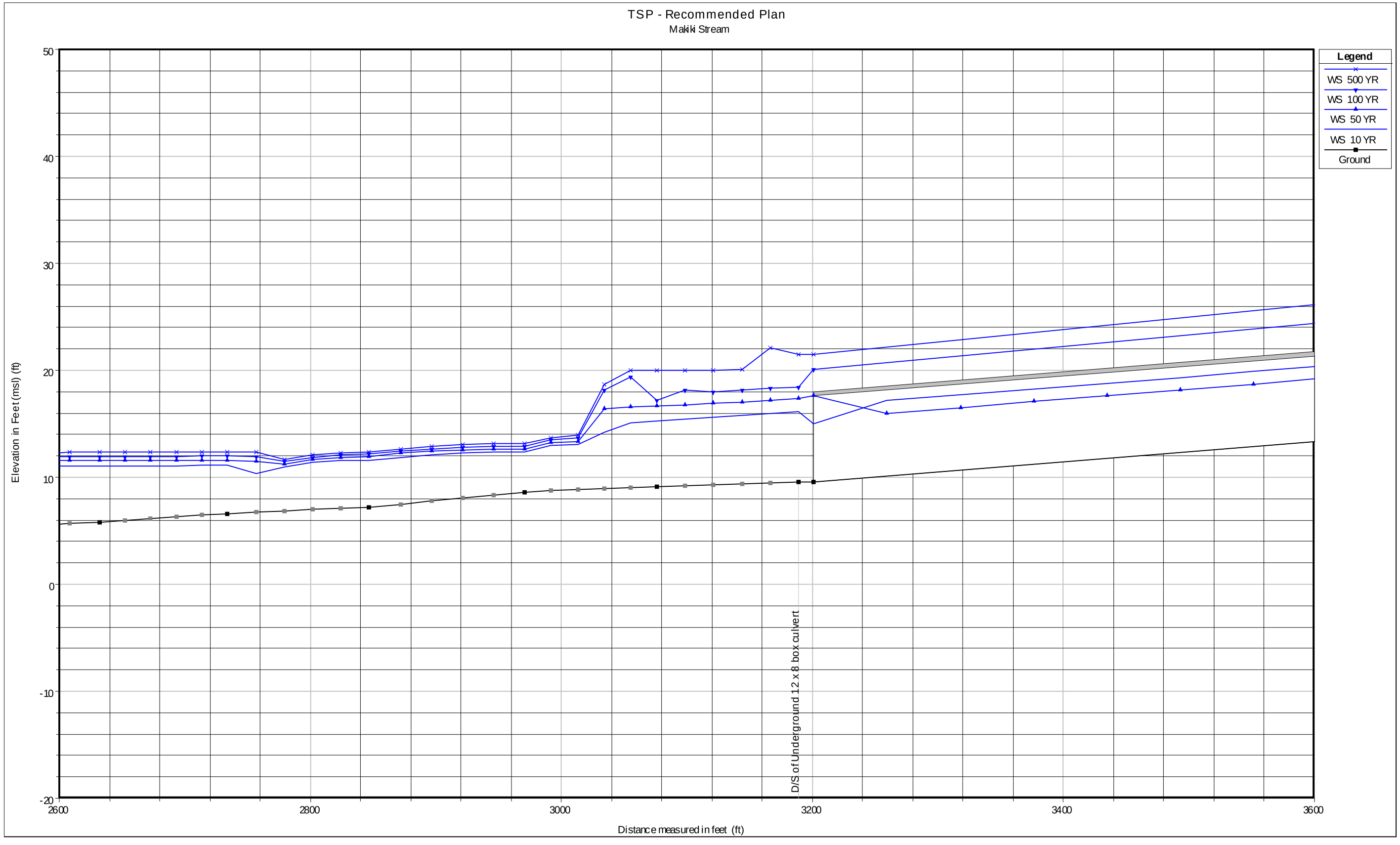

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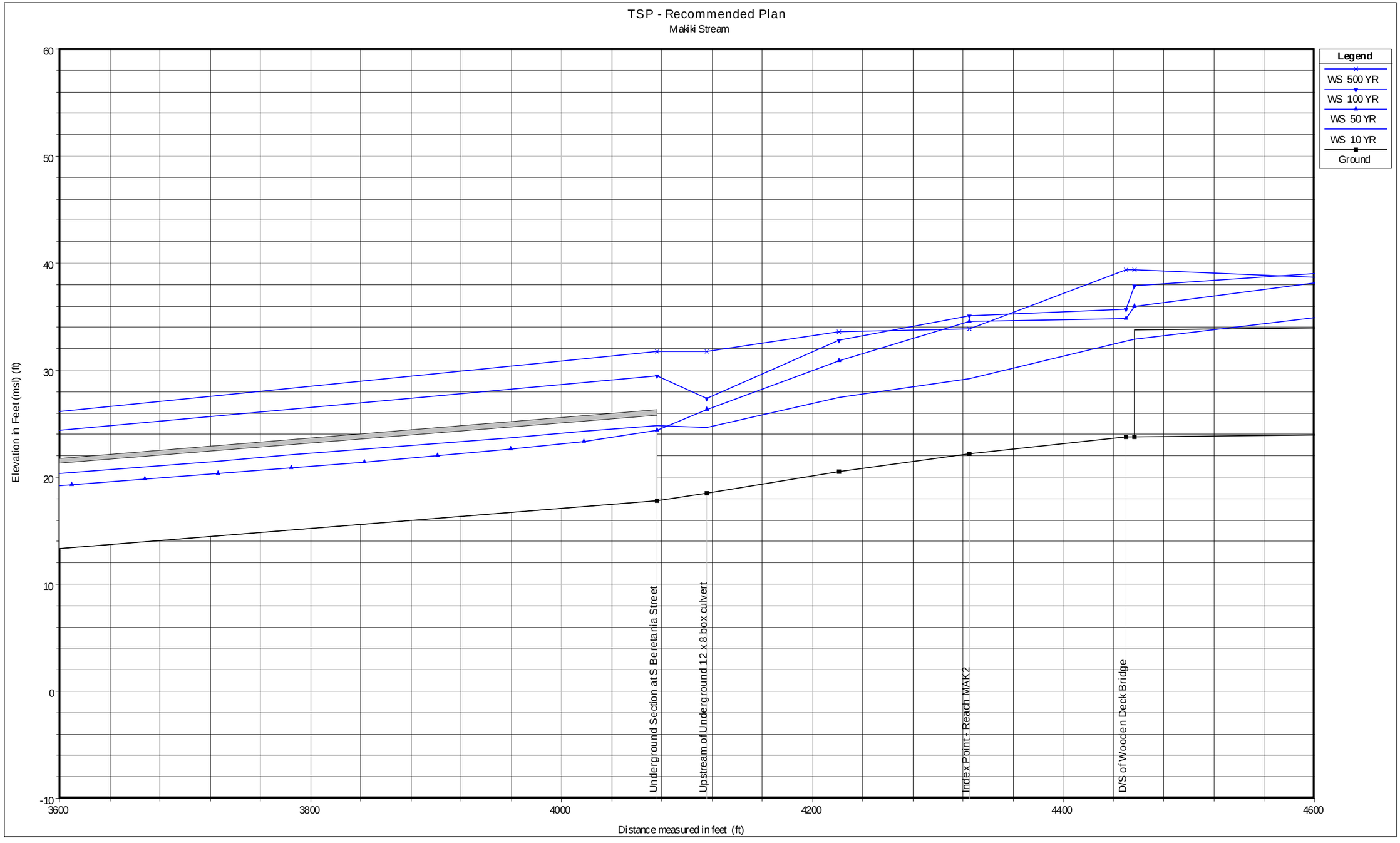
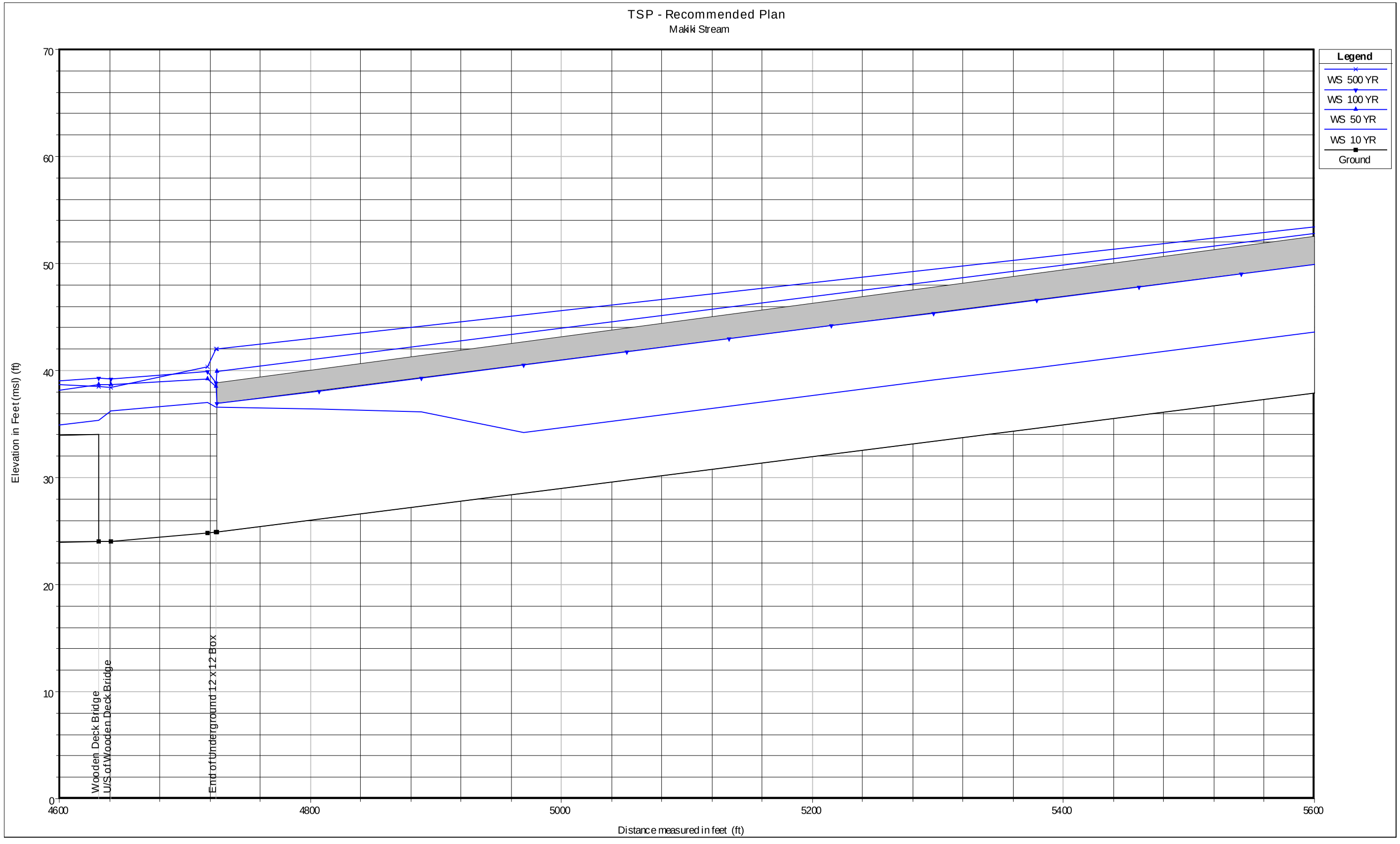


Plate 4 With-Project TSP Hydraulic Profiles



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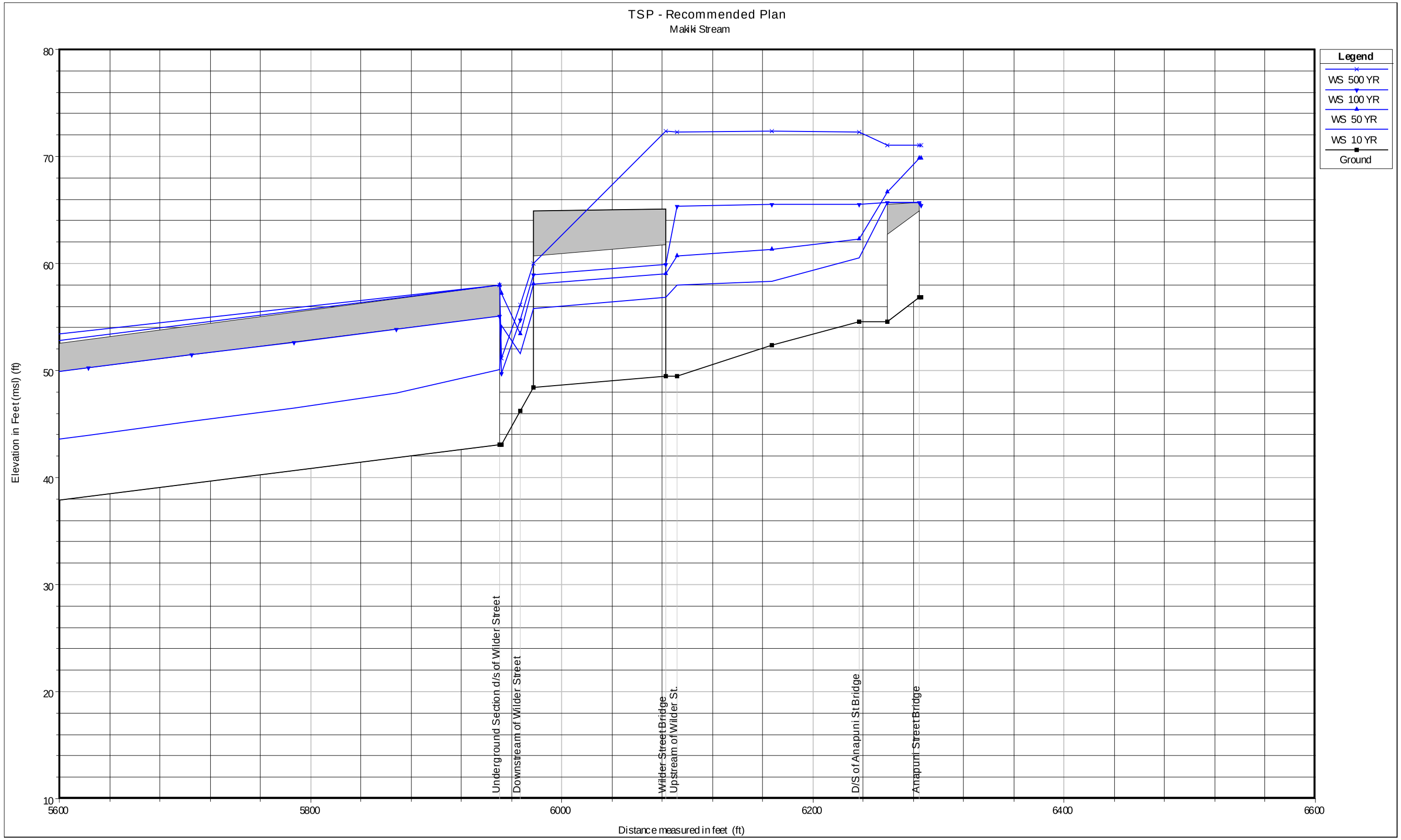

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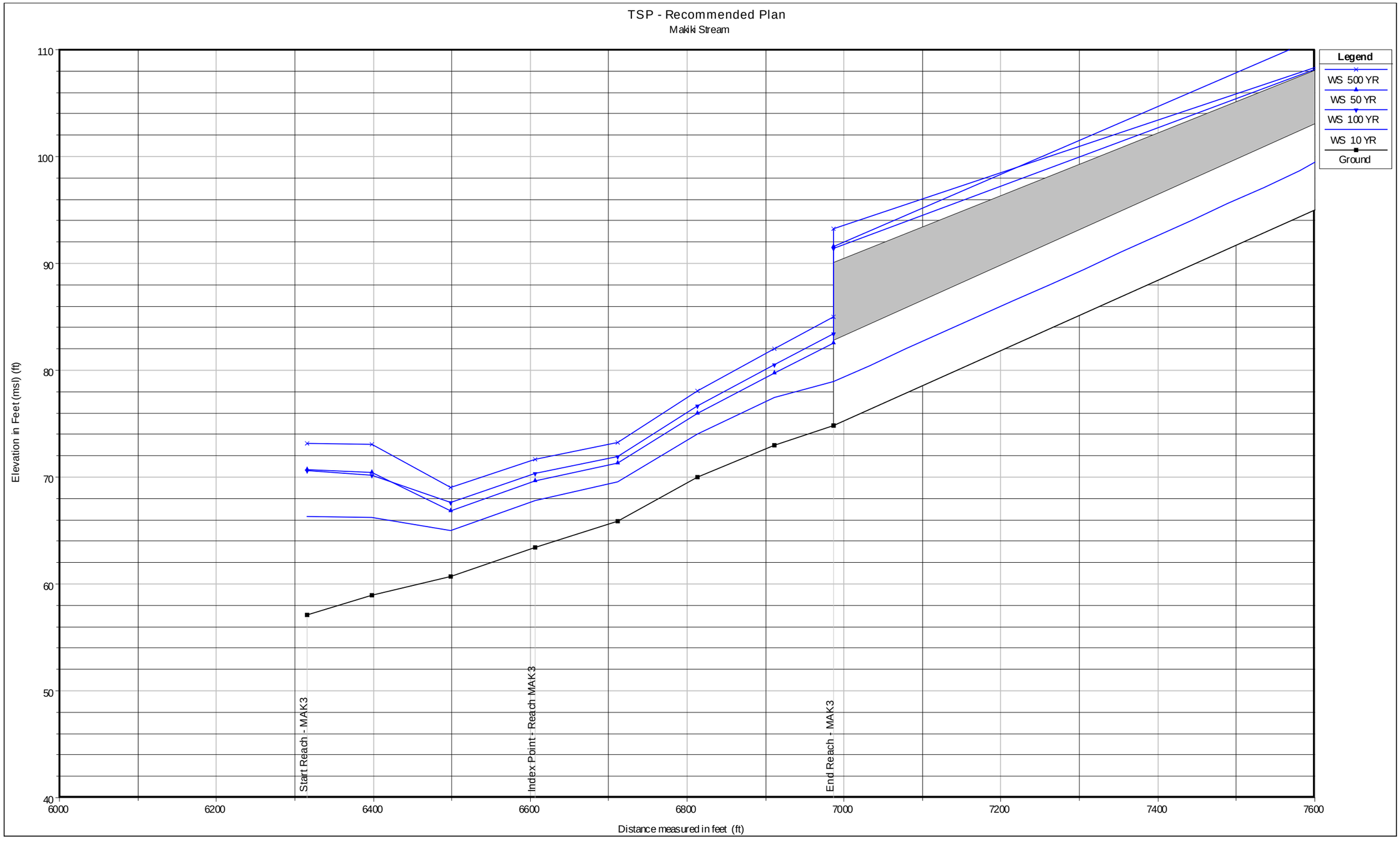

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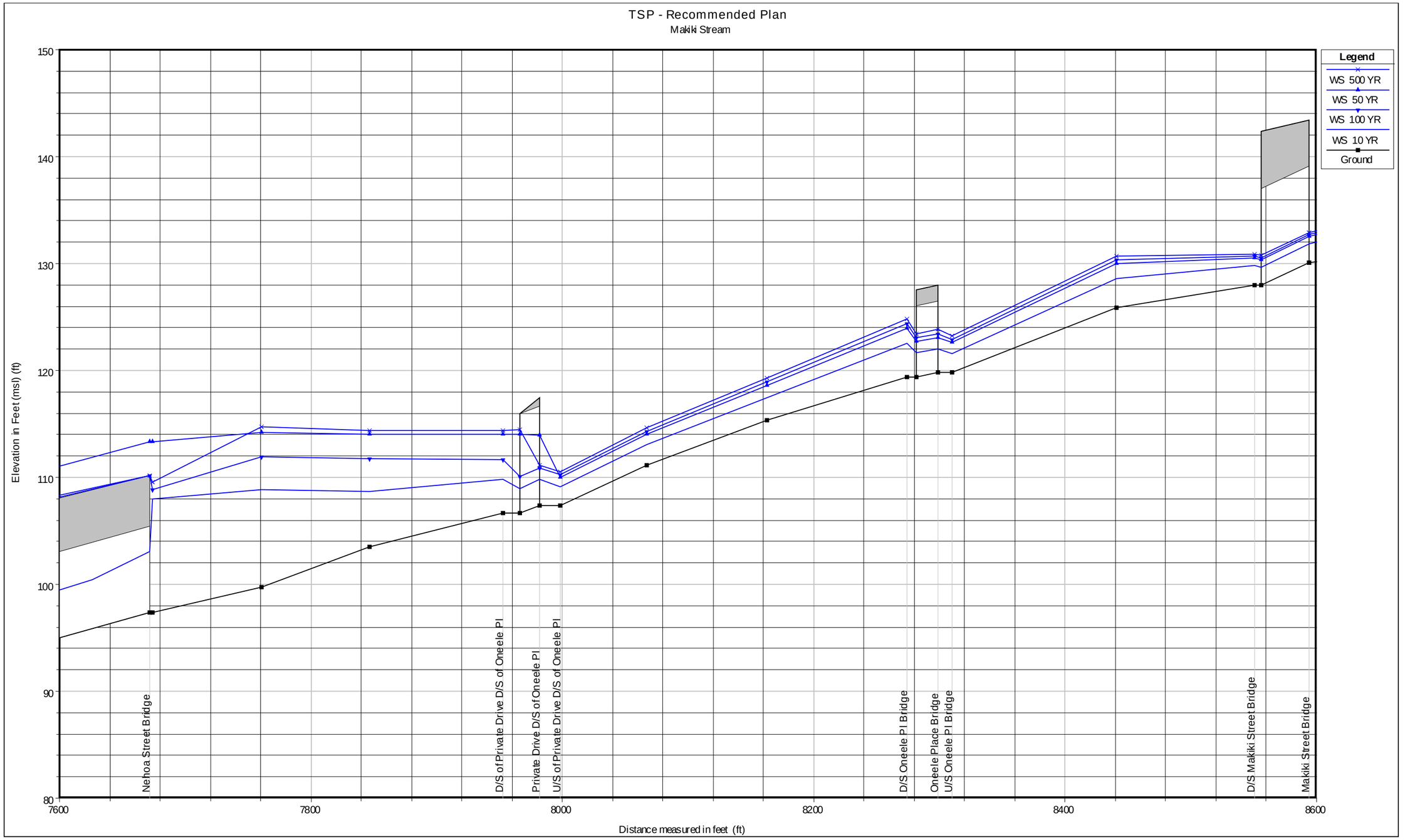

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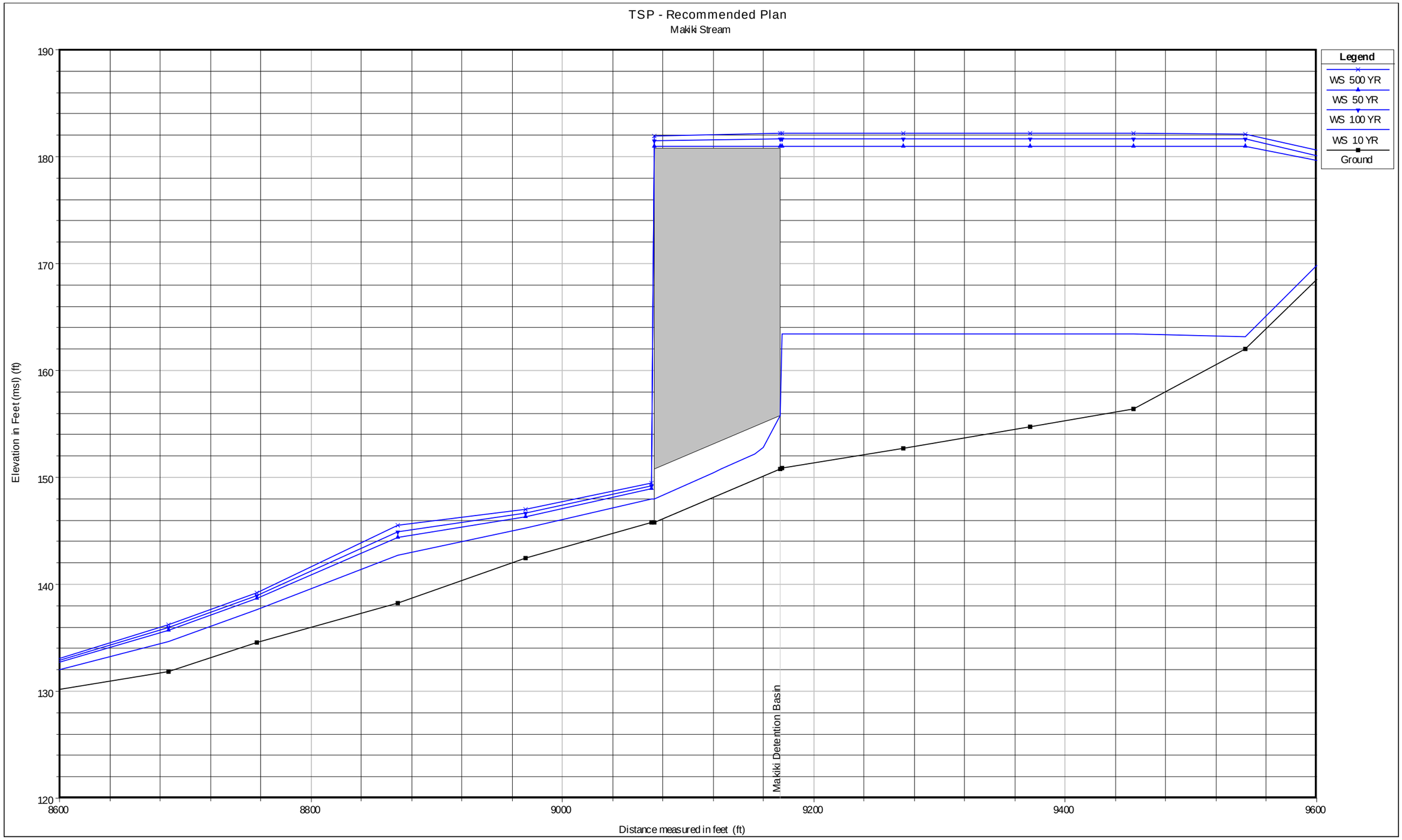

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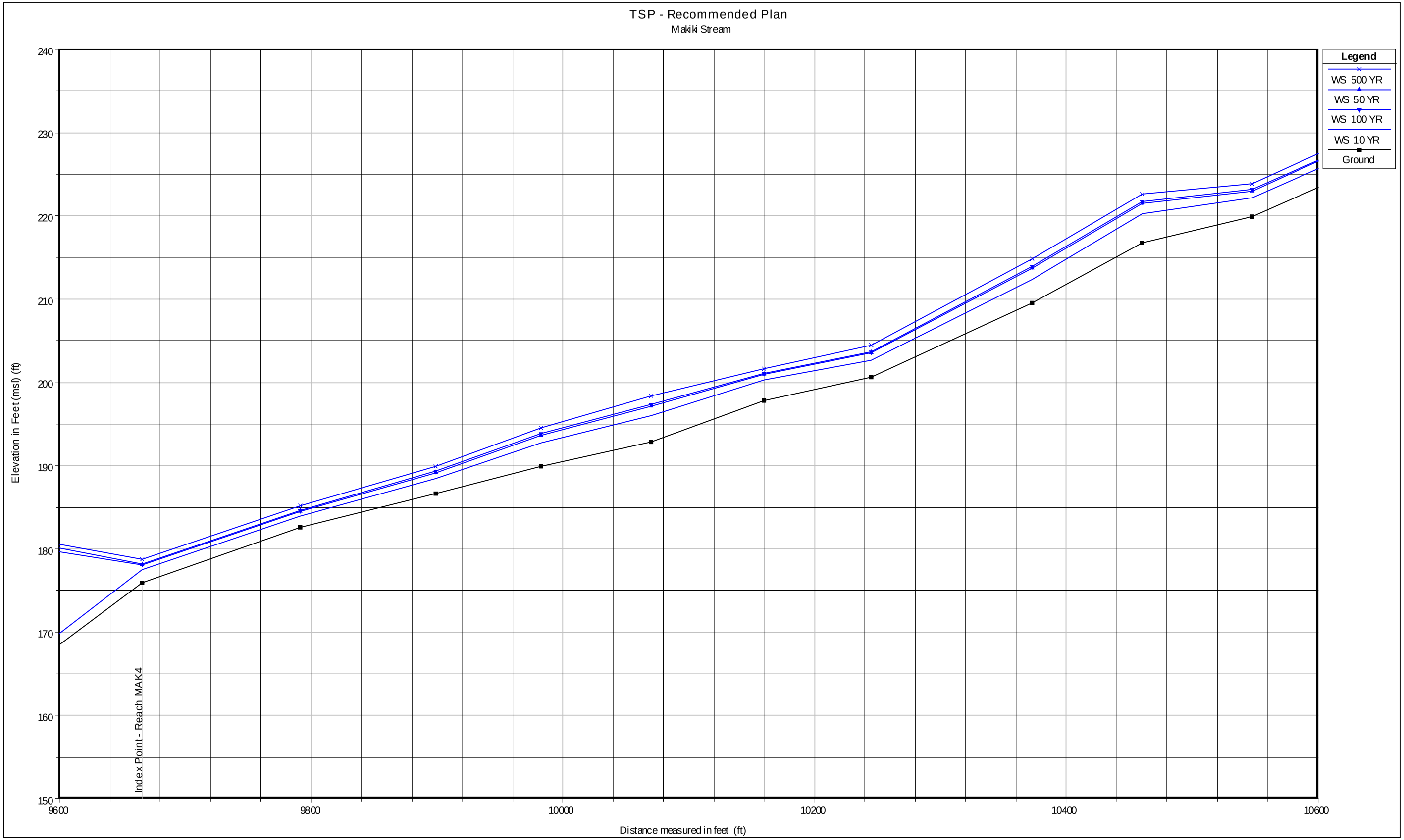

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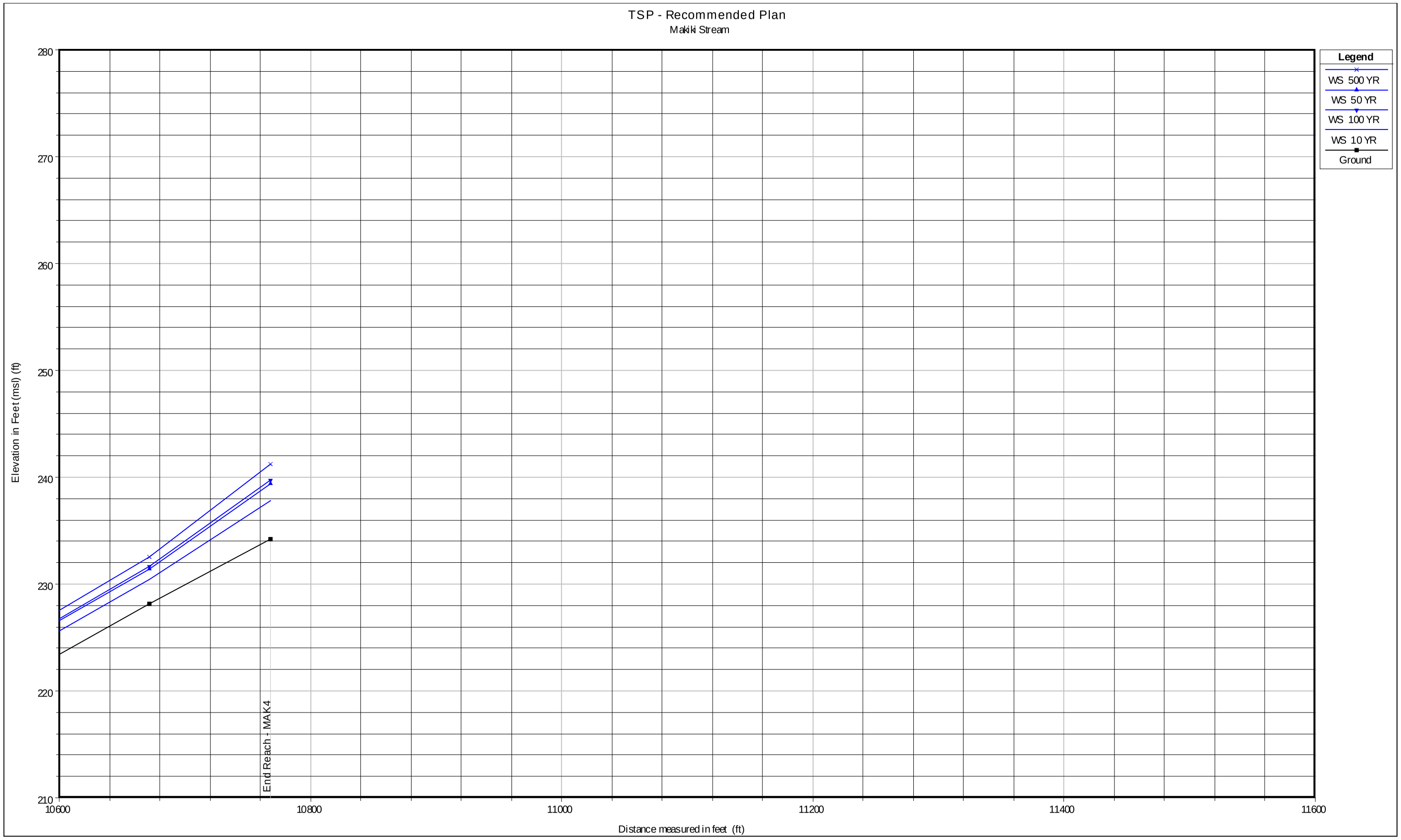

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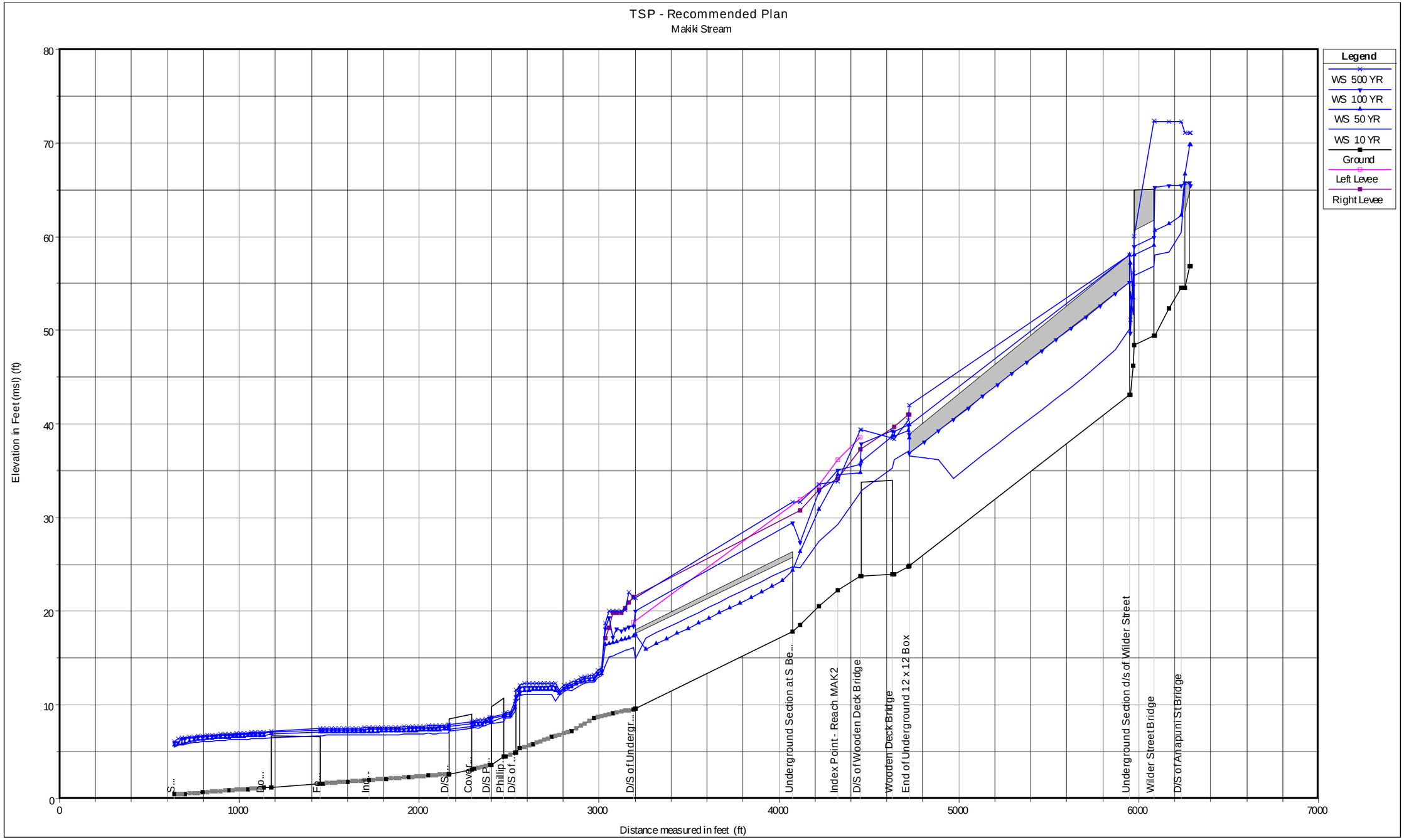

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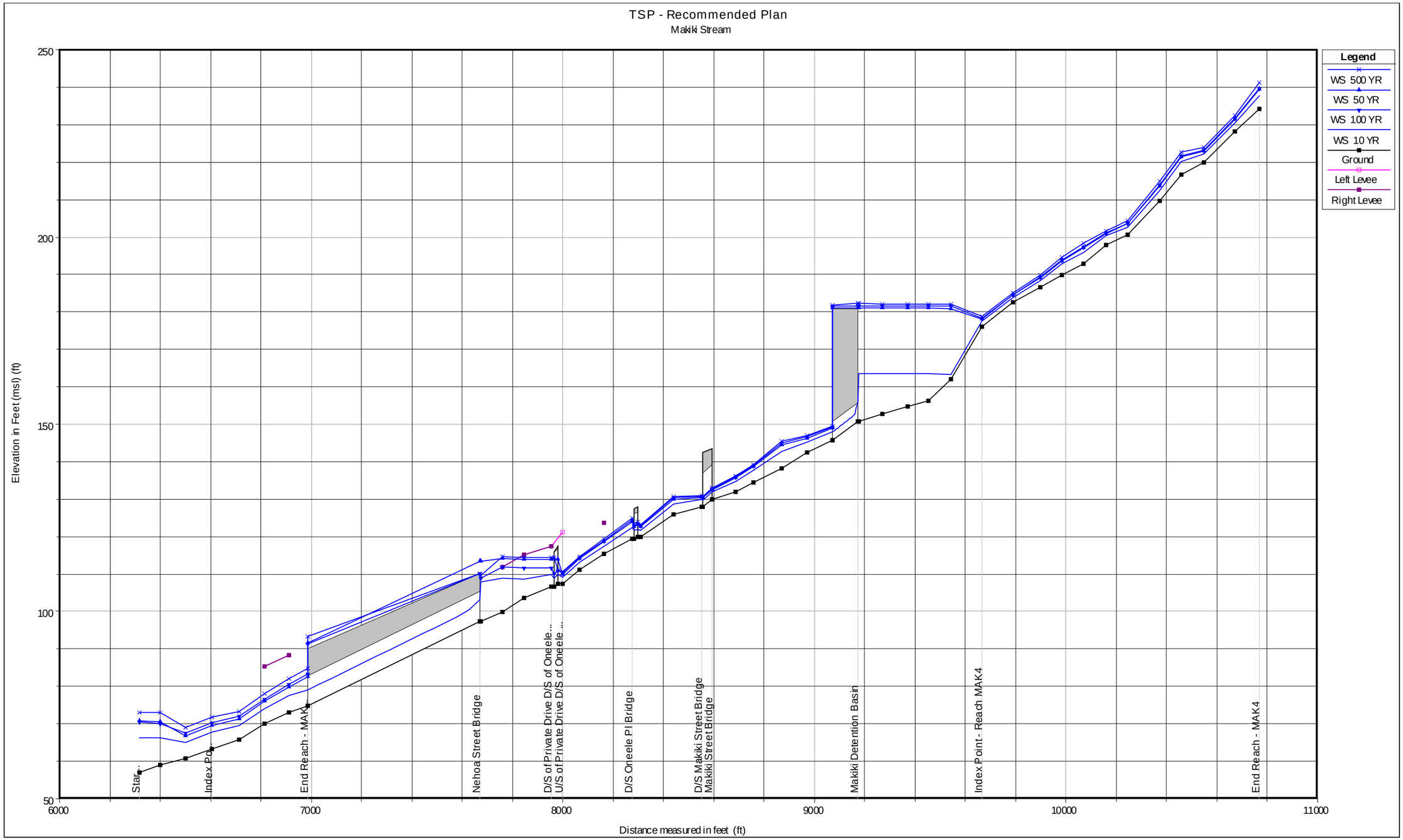

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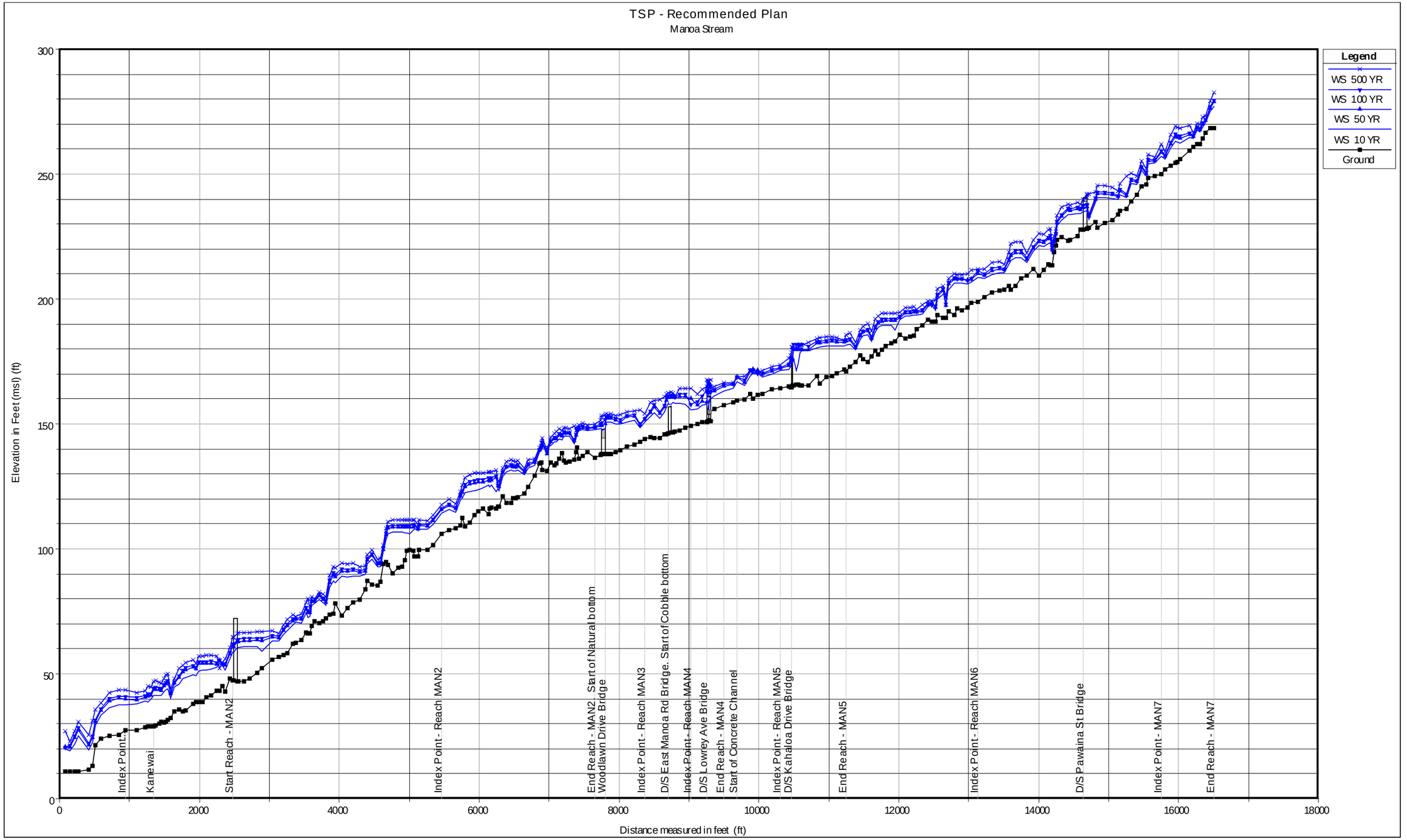

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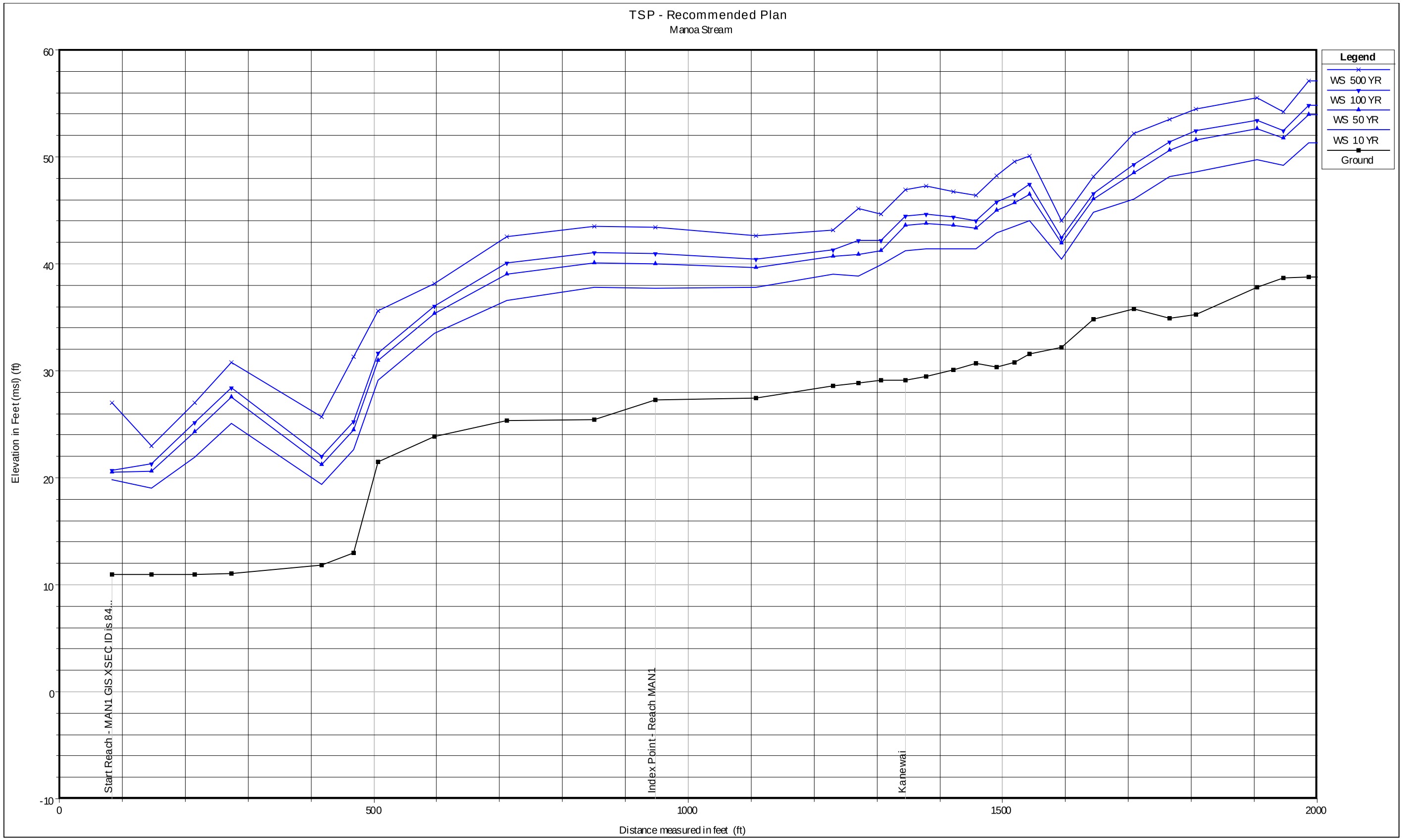

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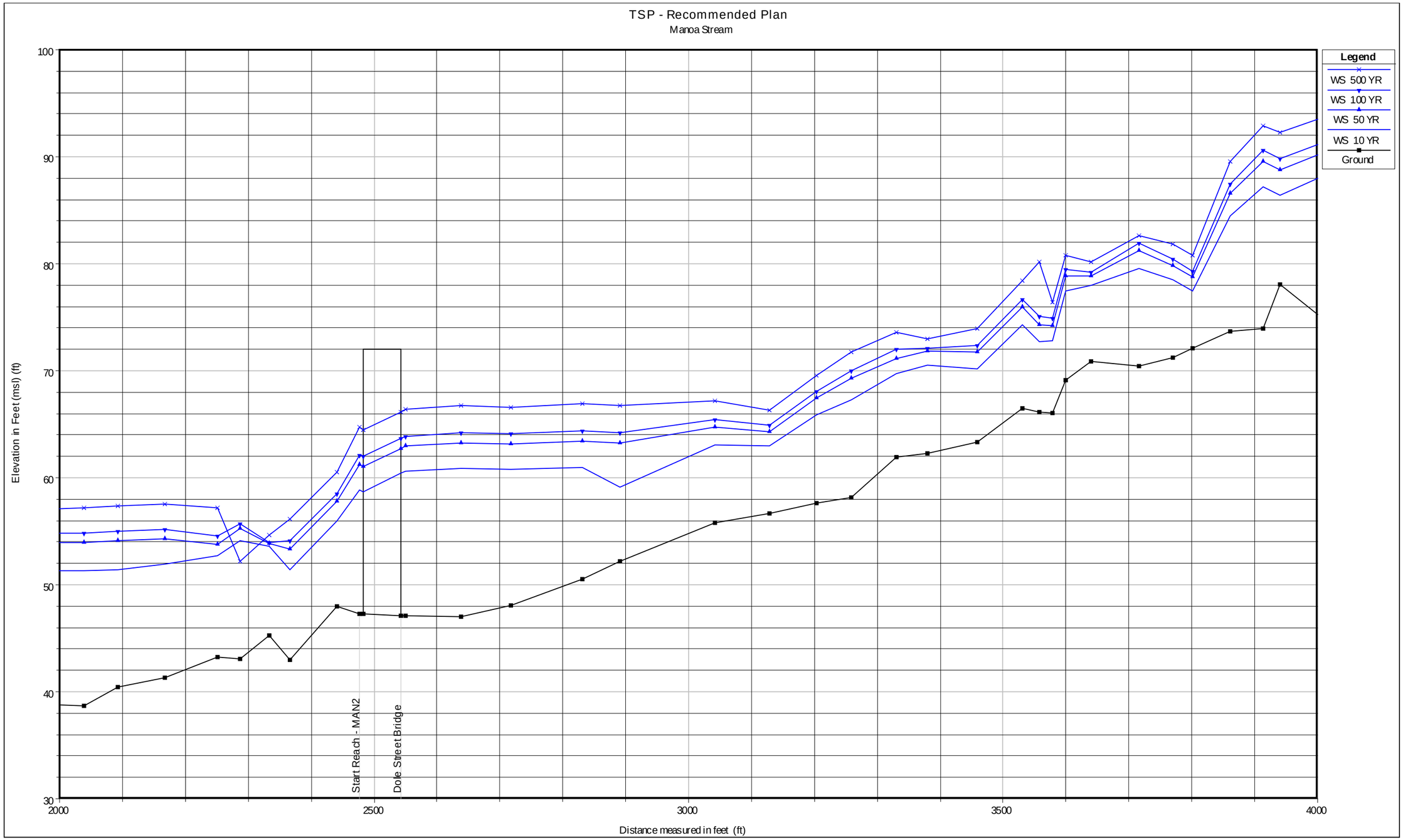

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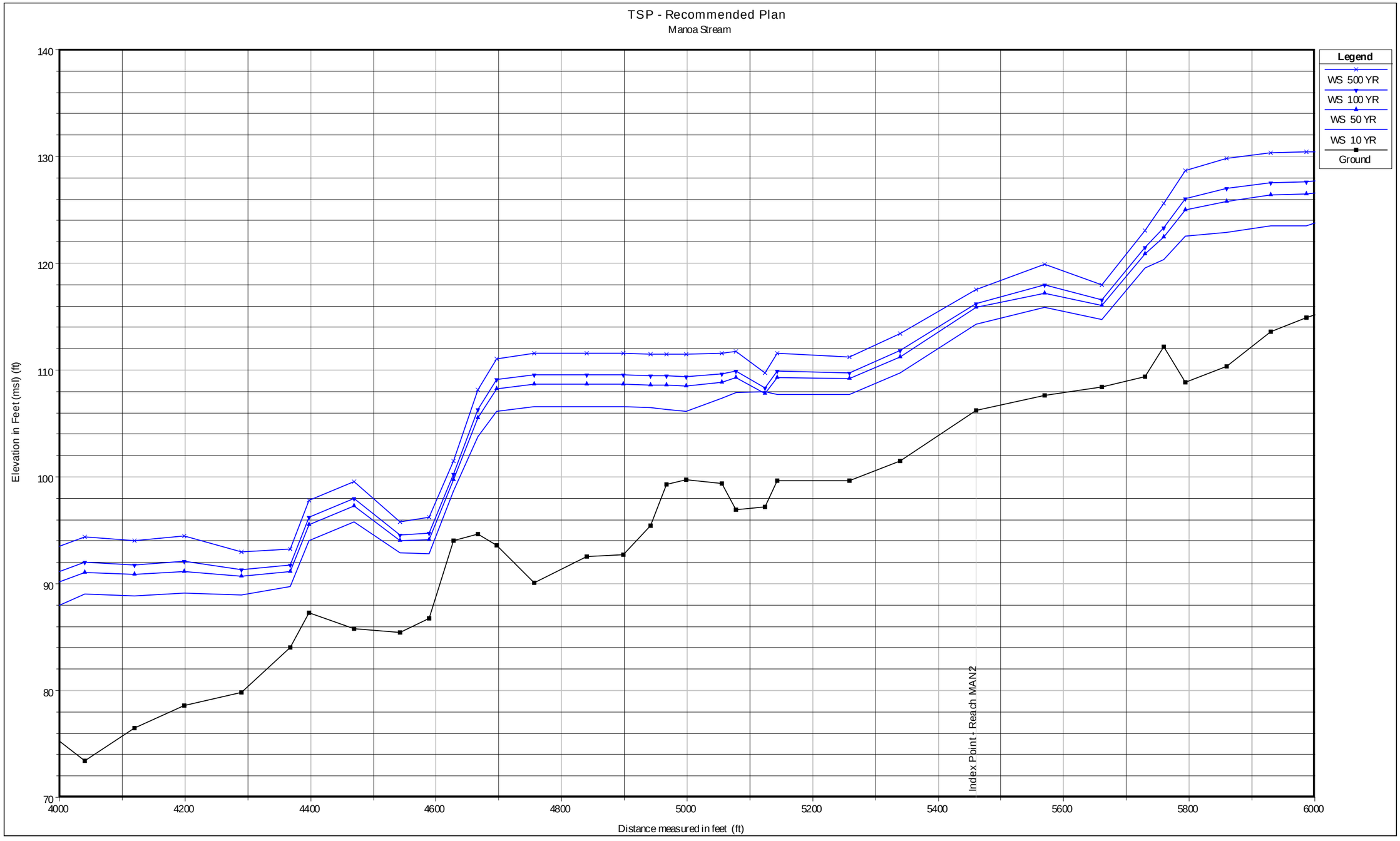

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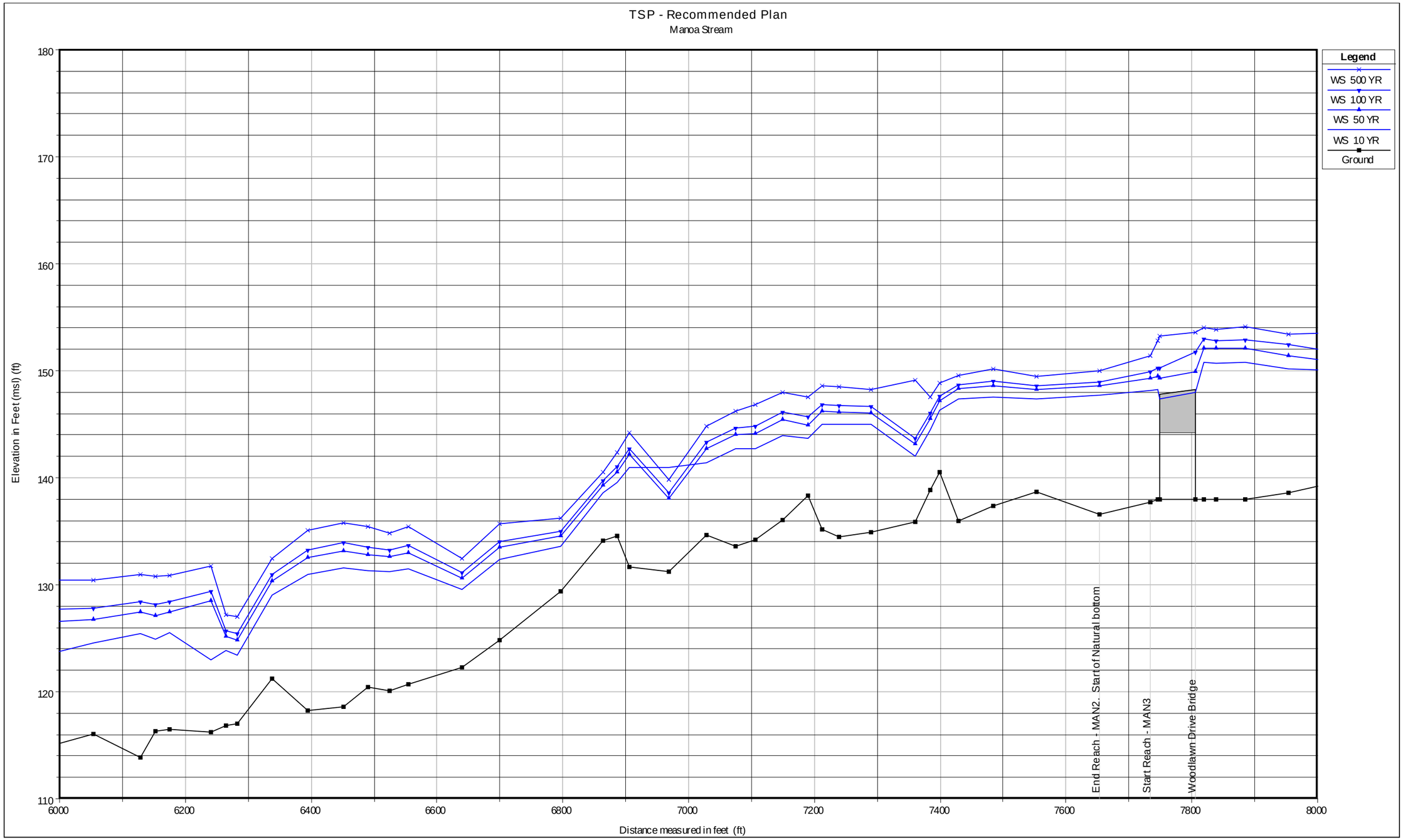

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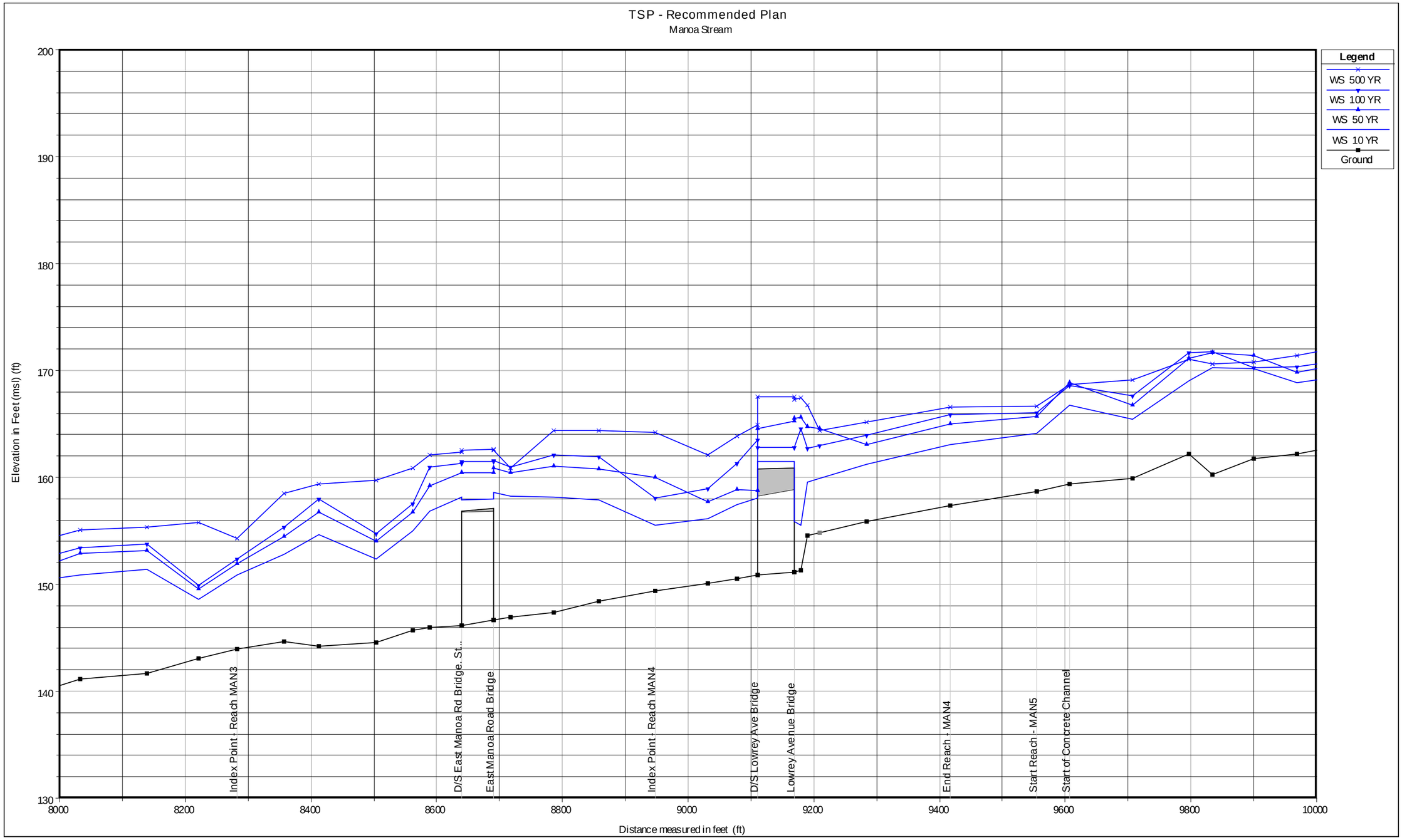

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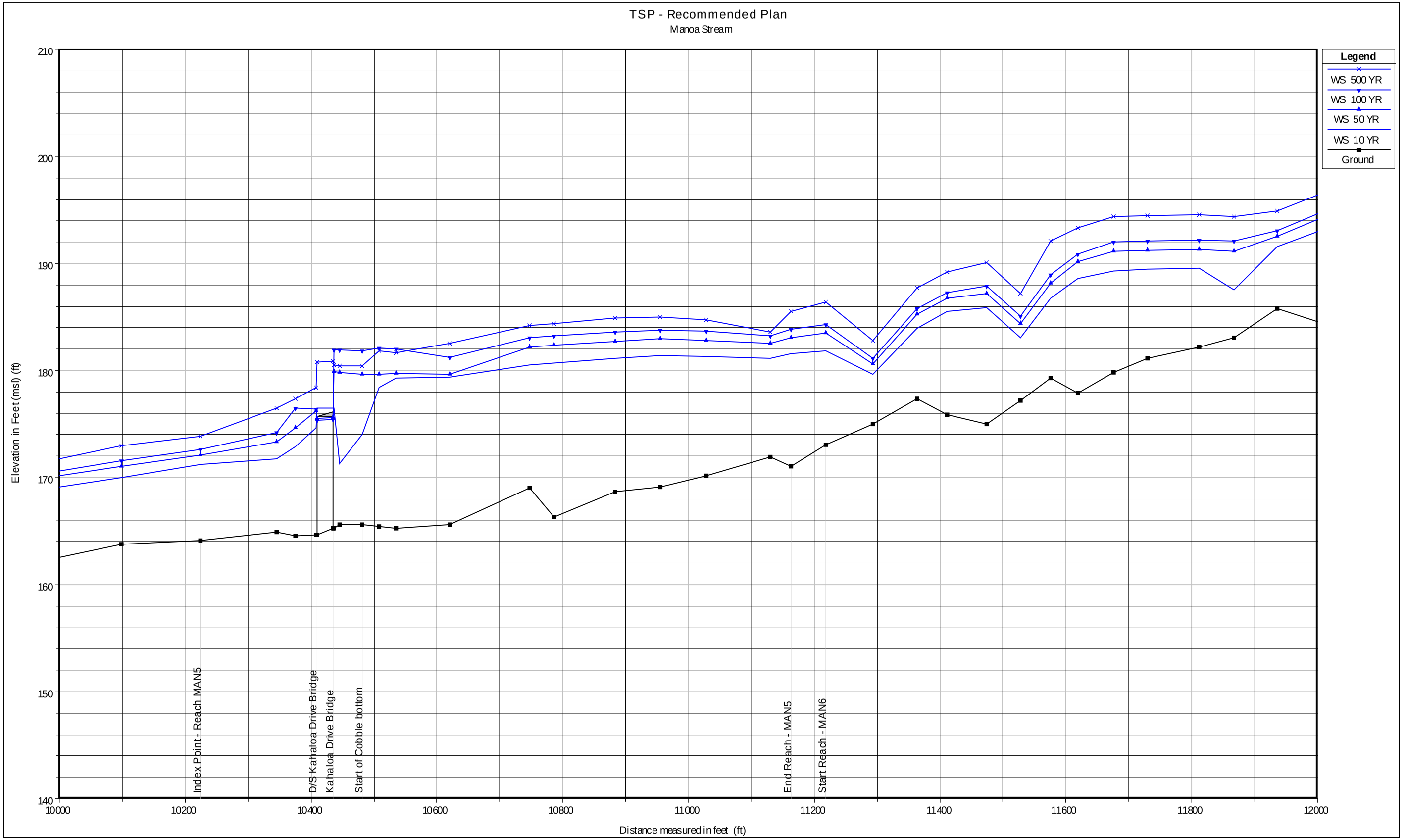

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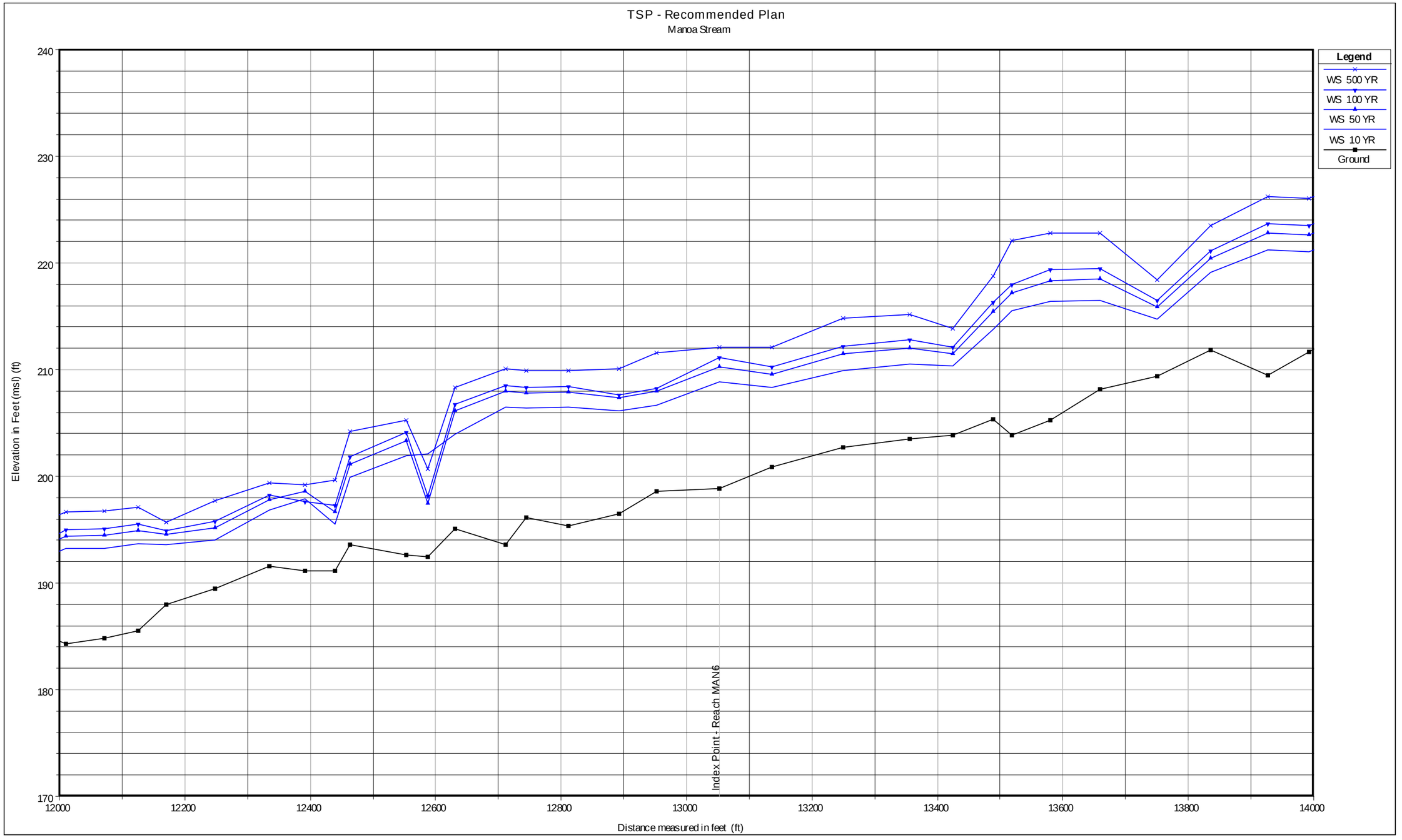

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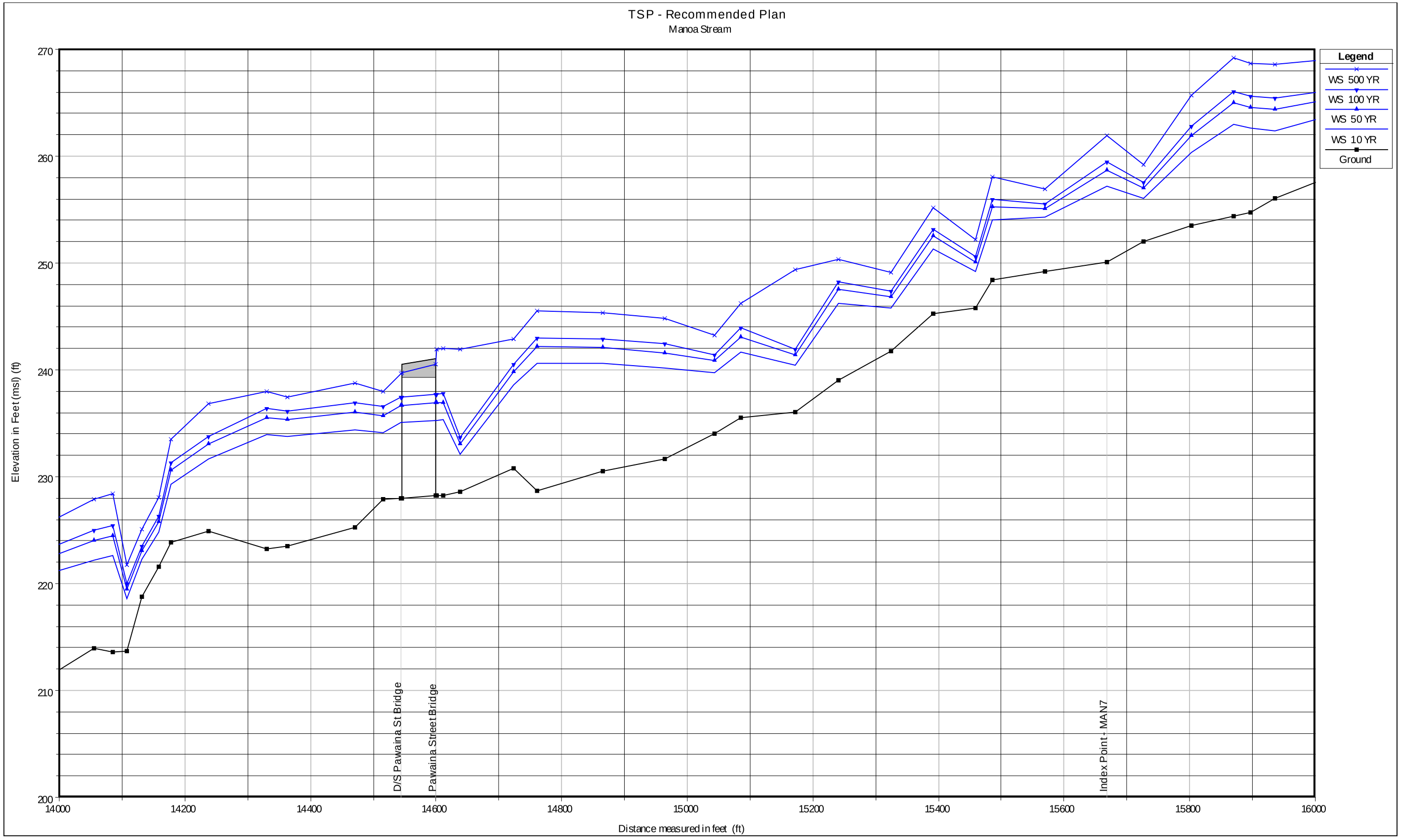

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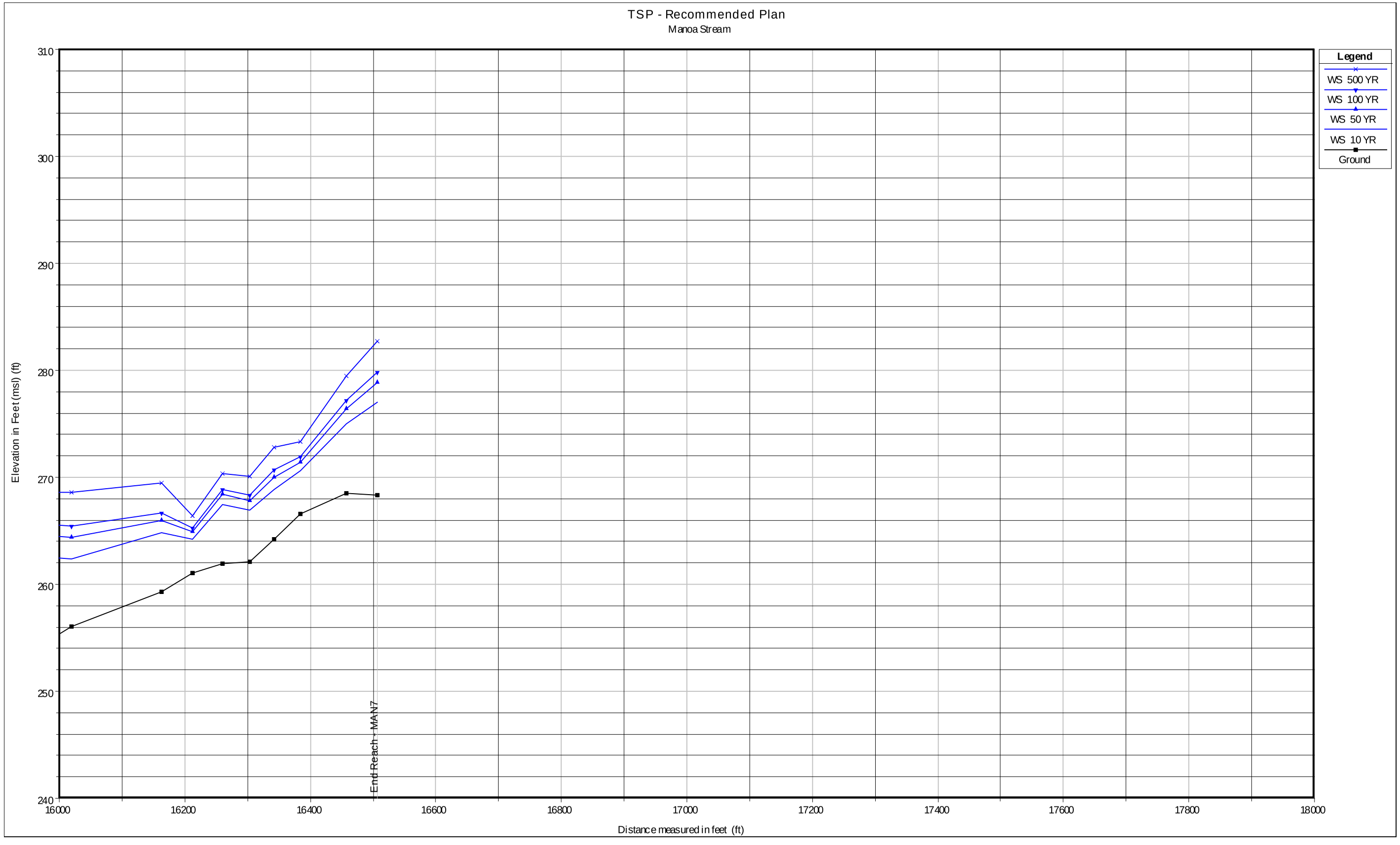

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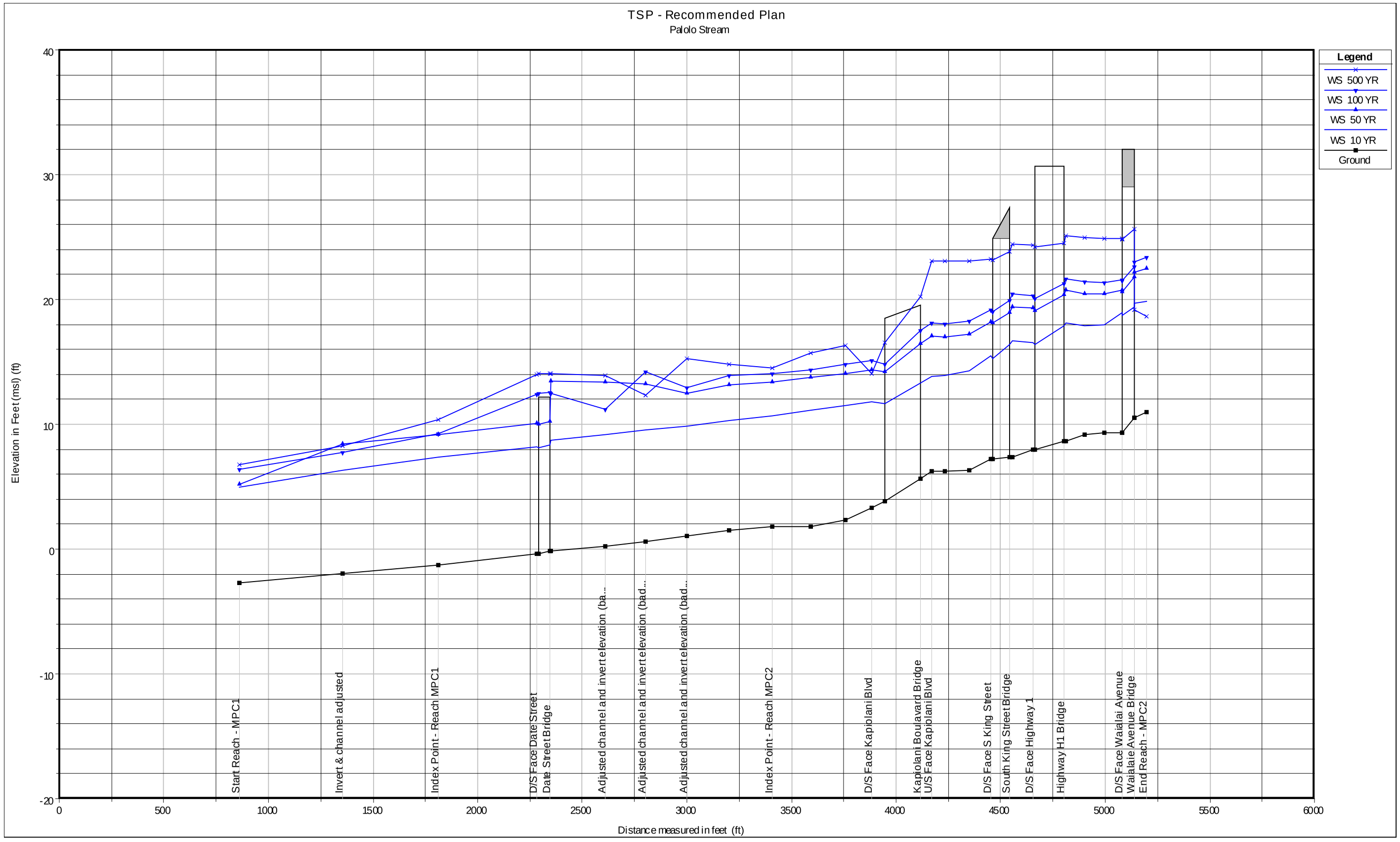

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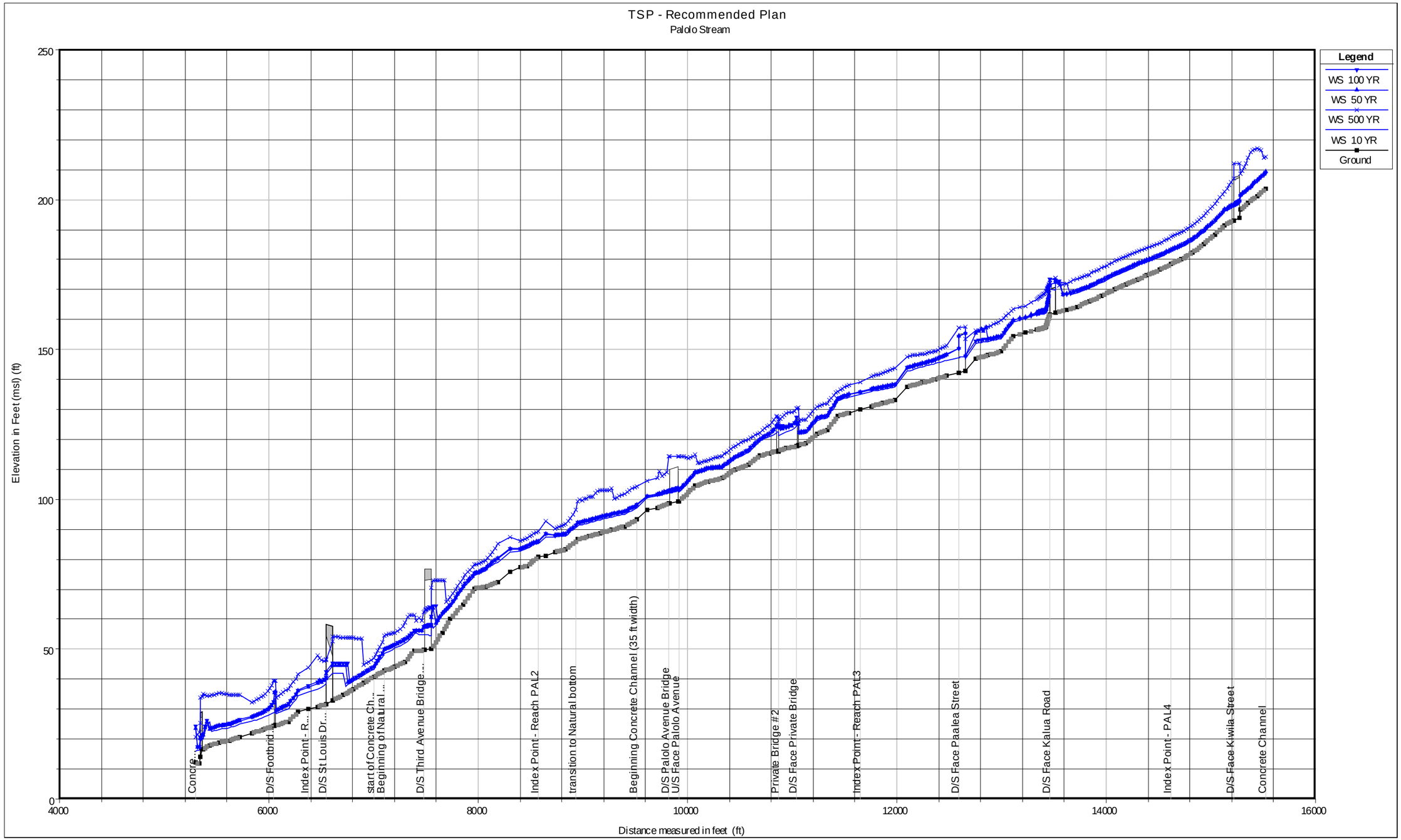

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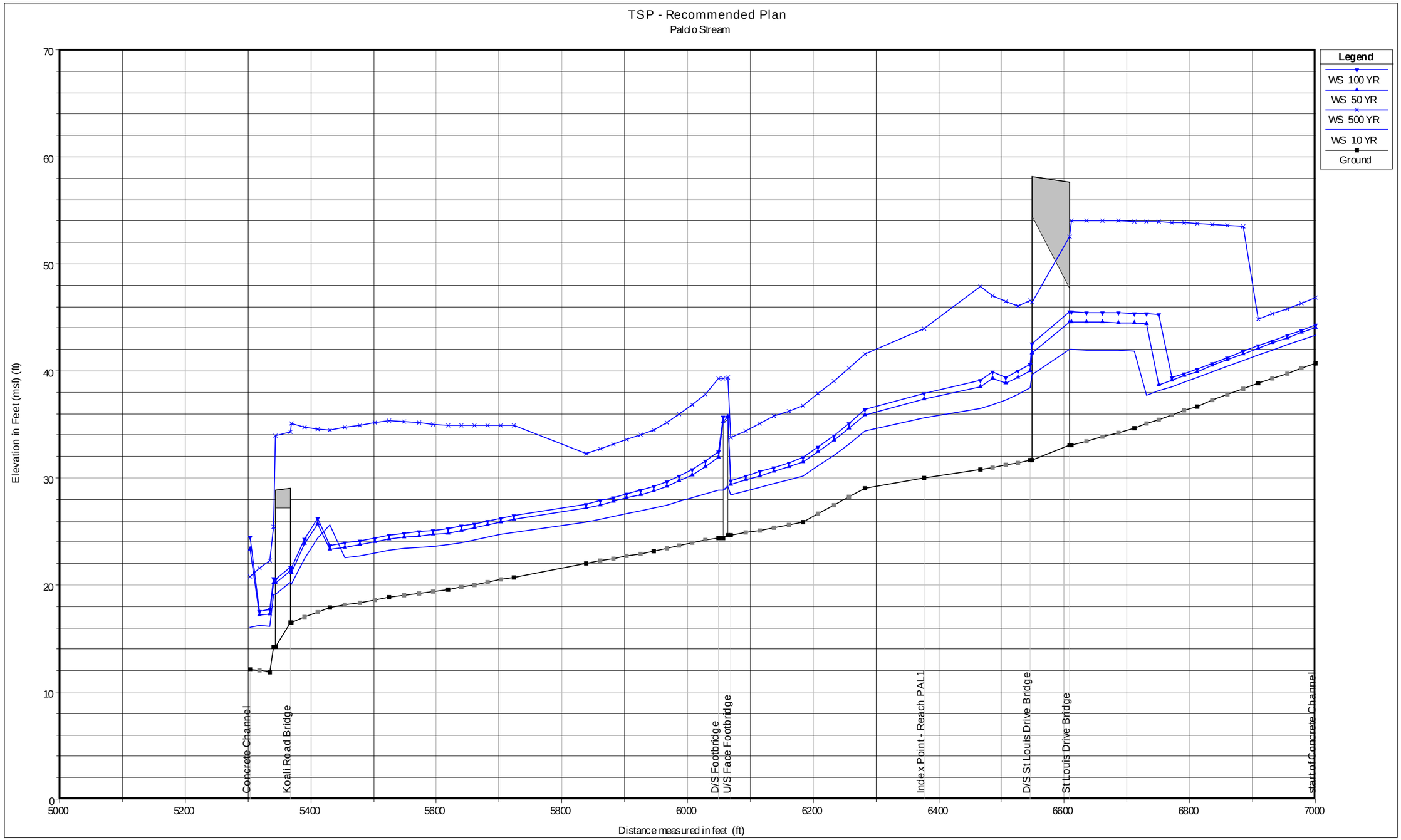

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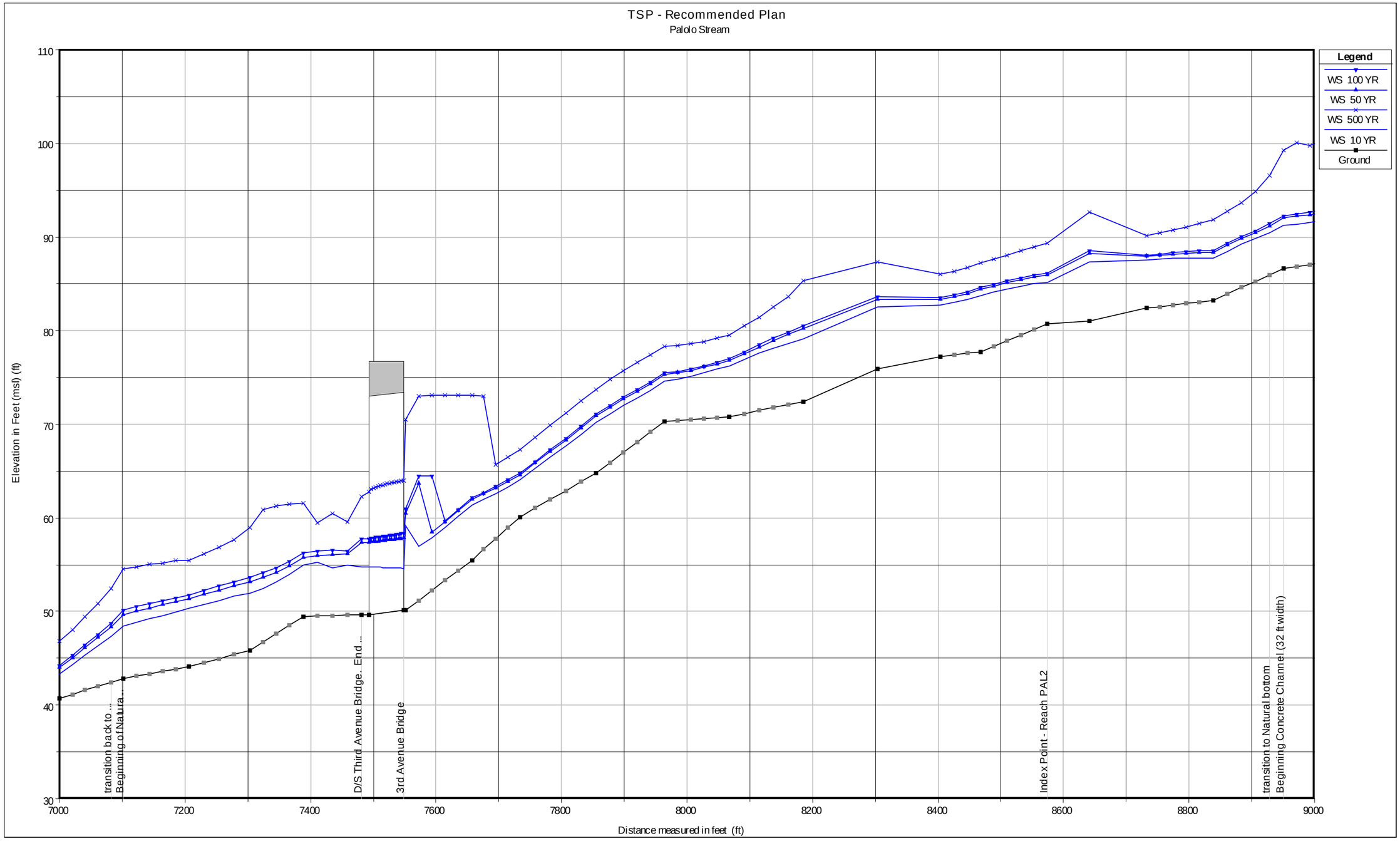

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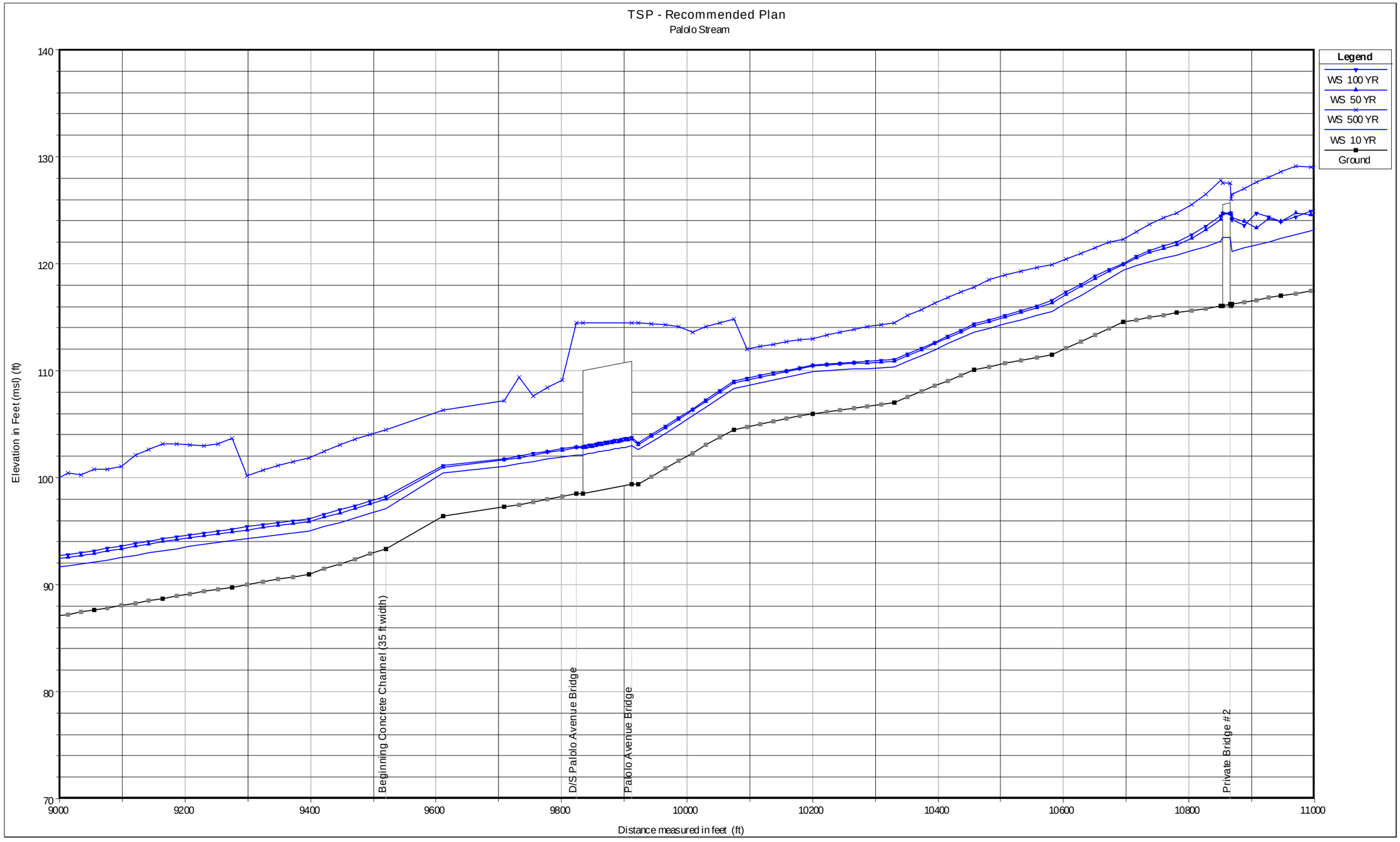

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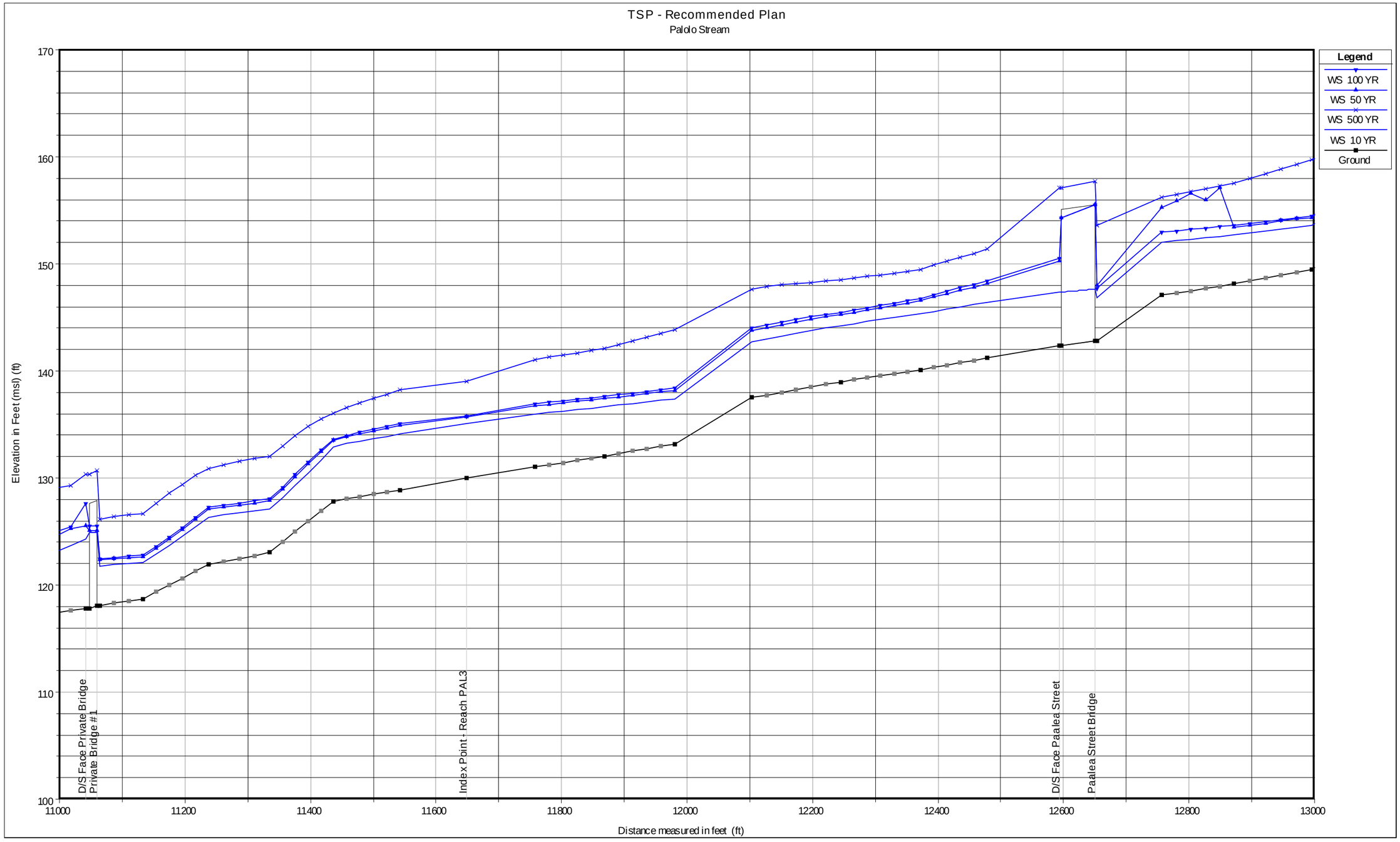

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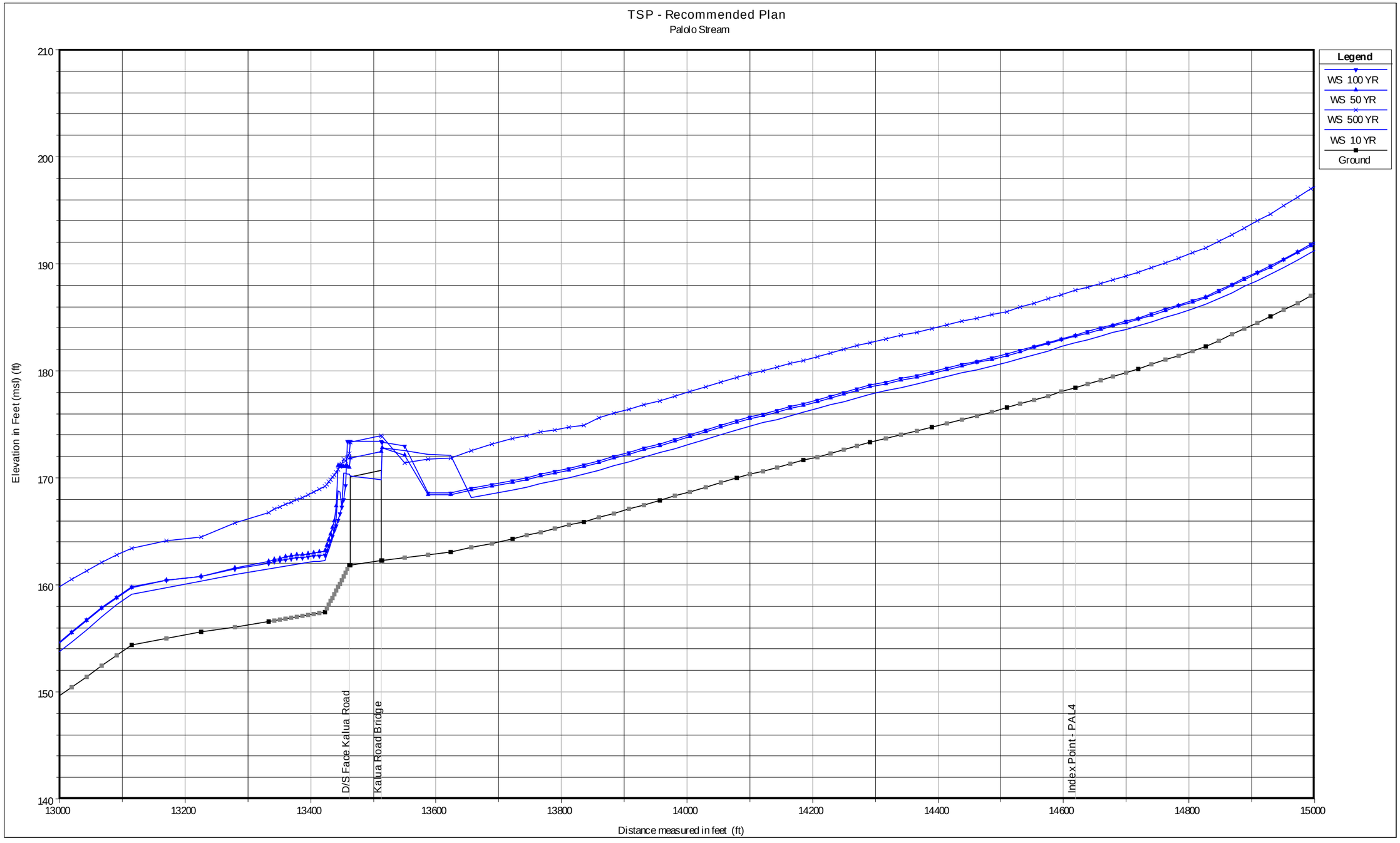

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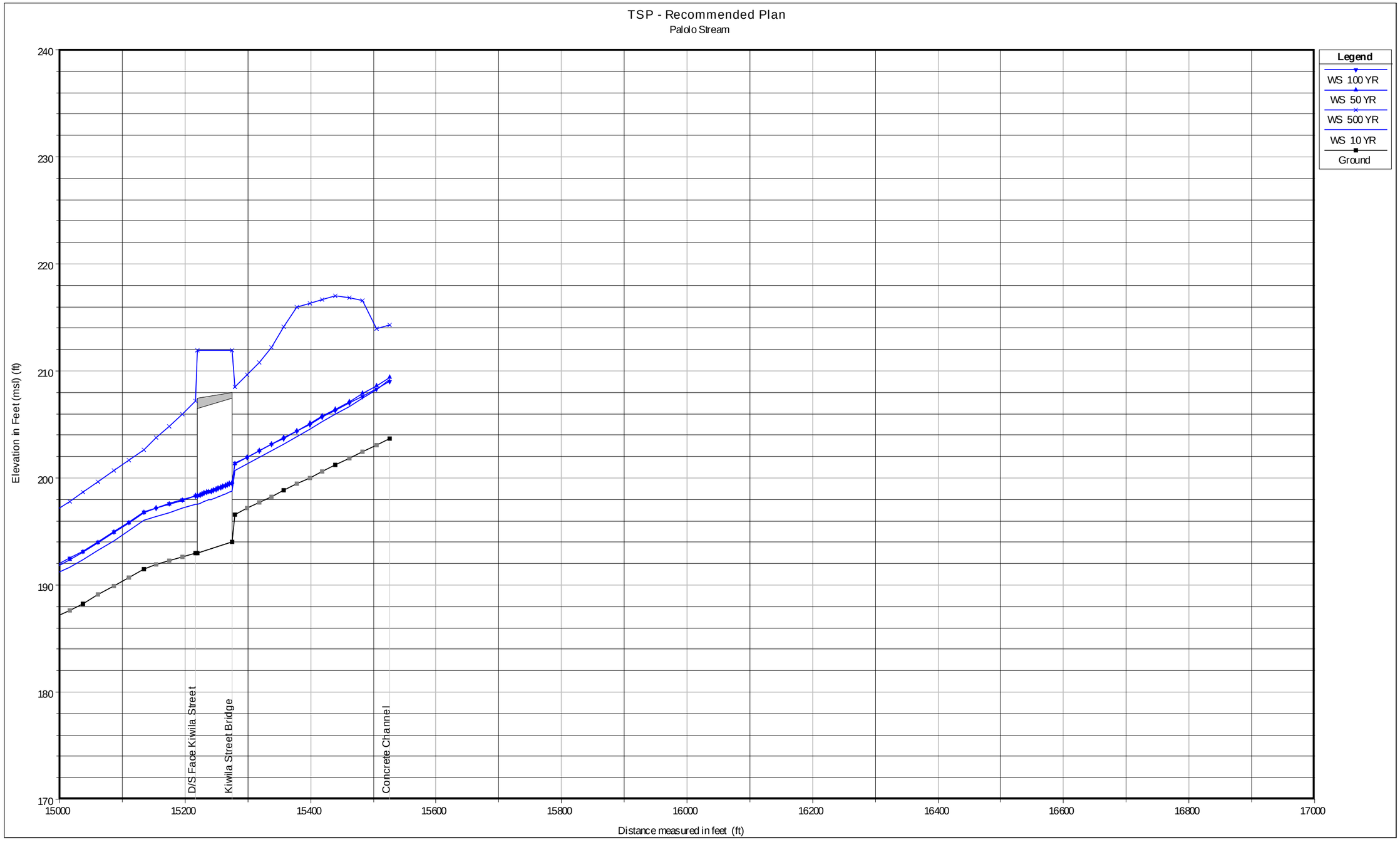

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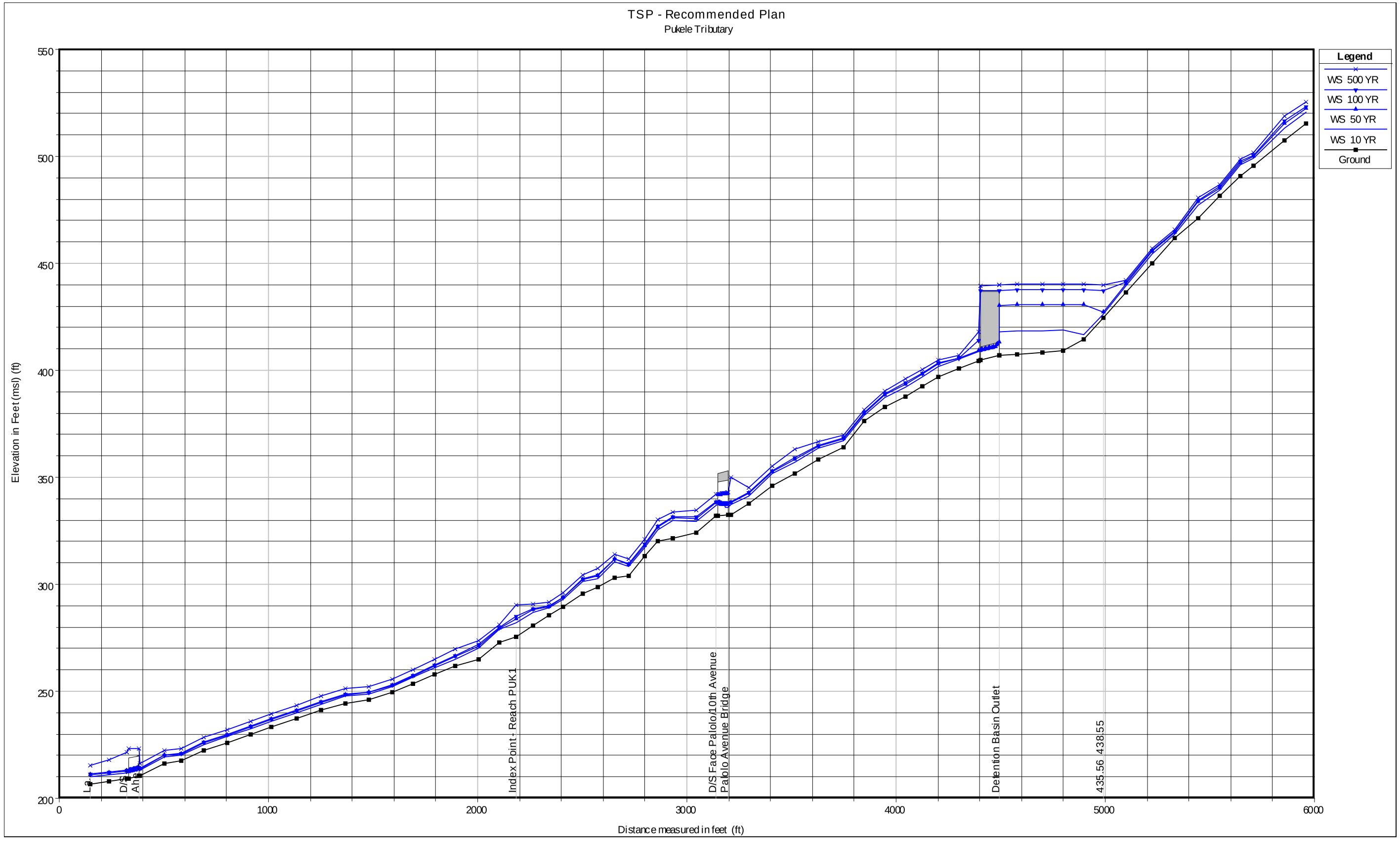

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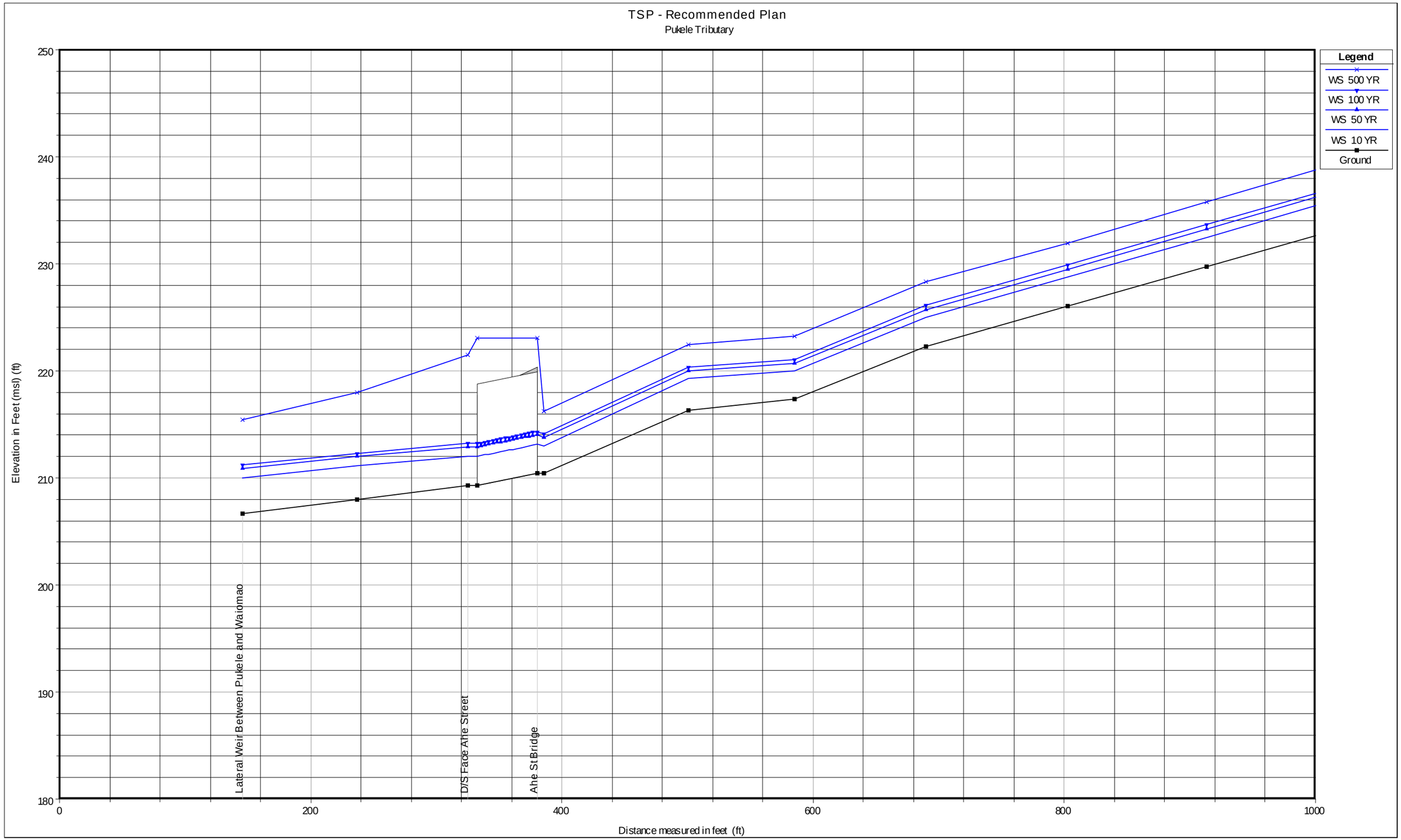

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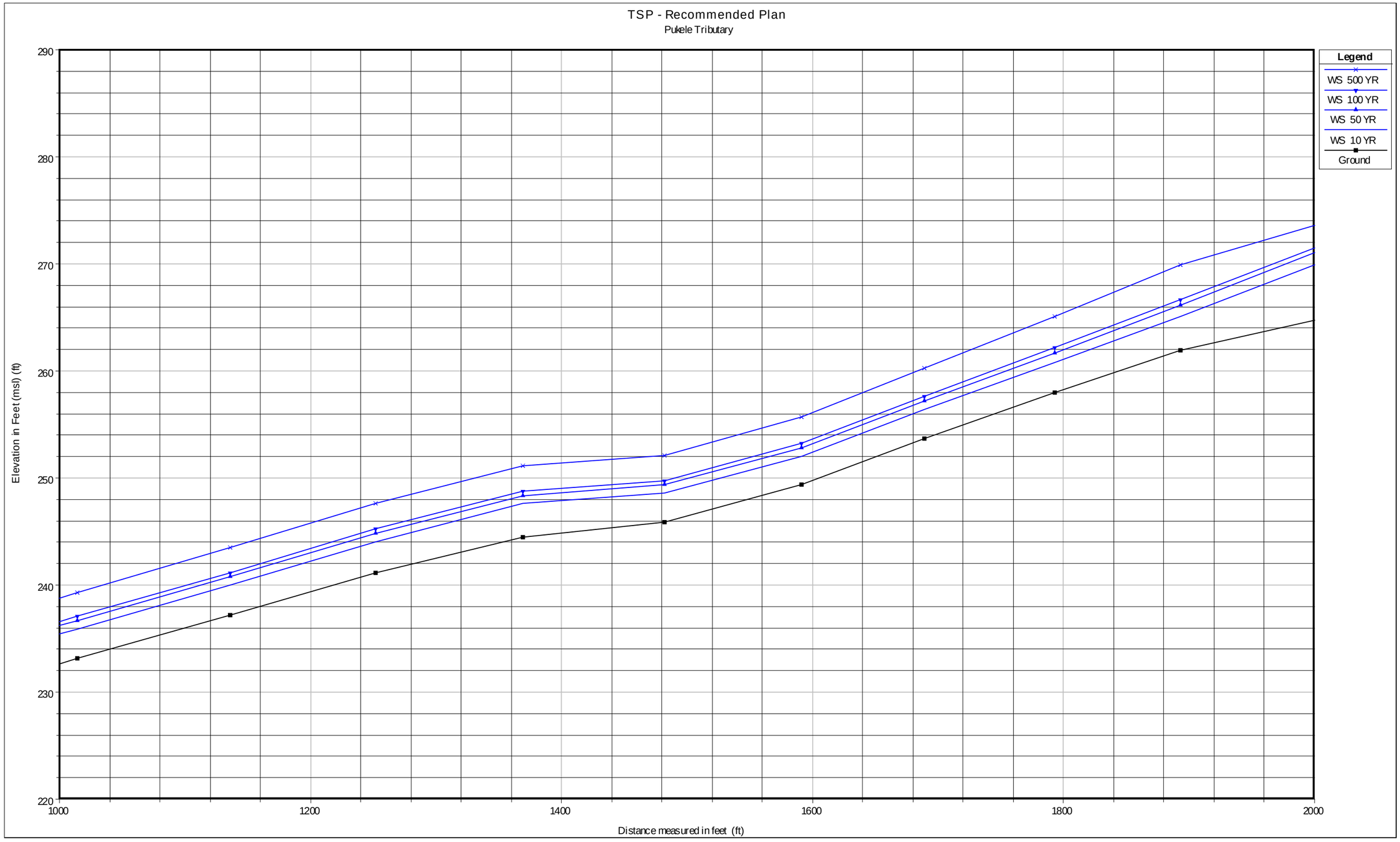

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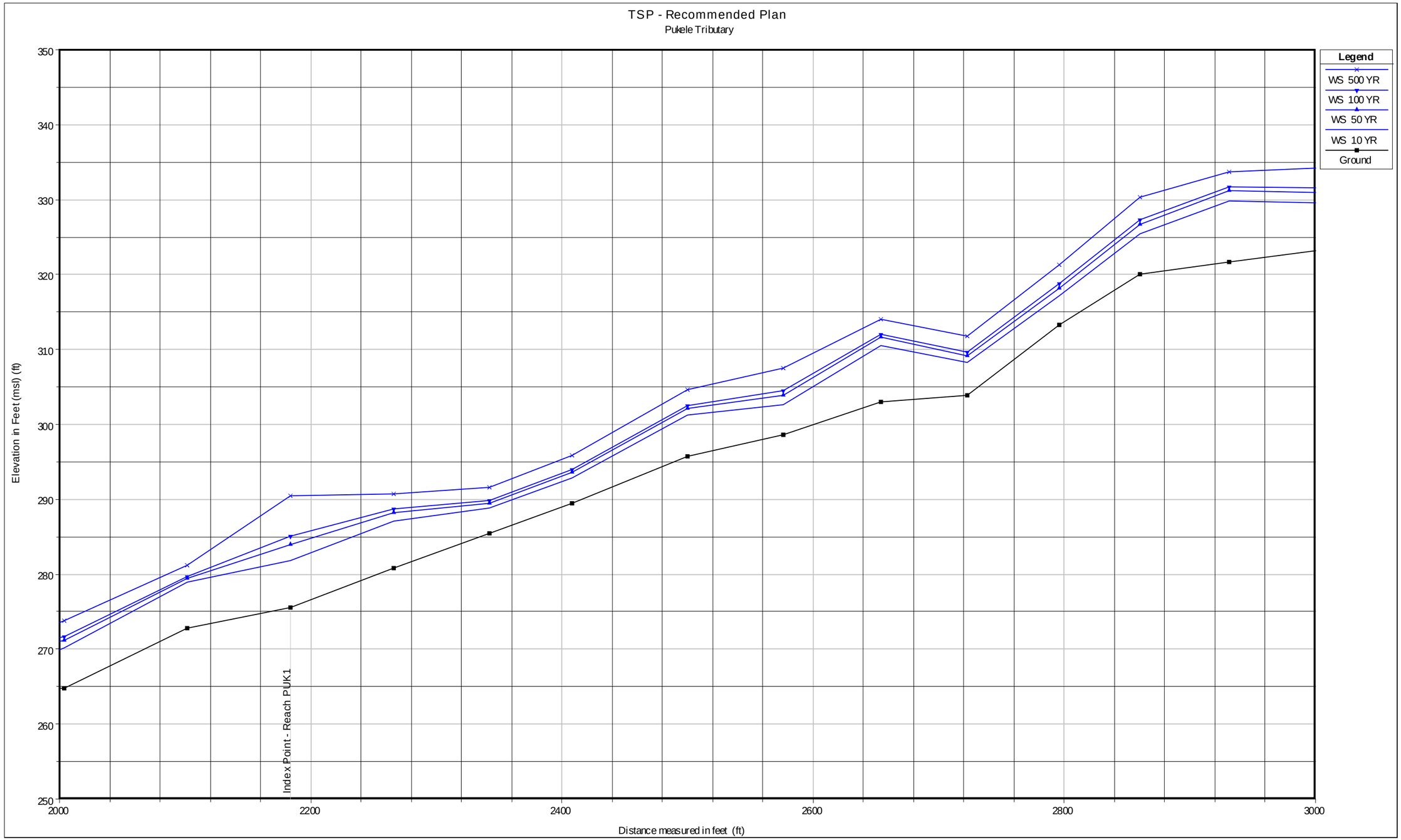

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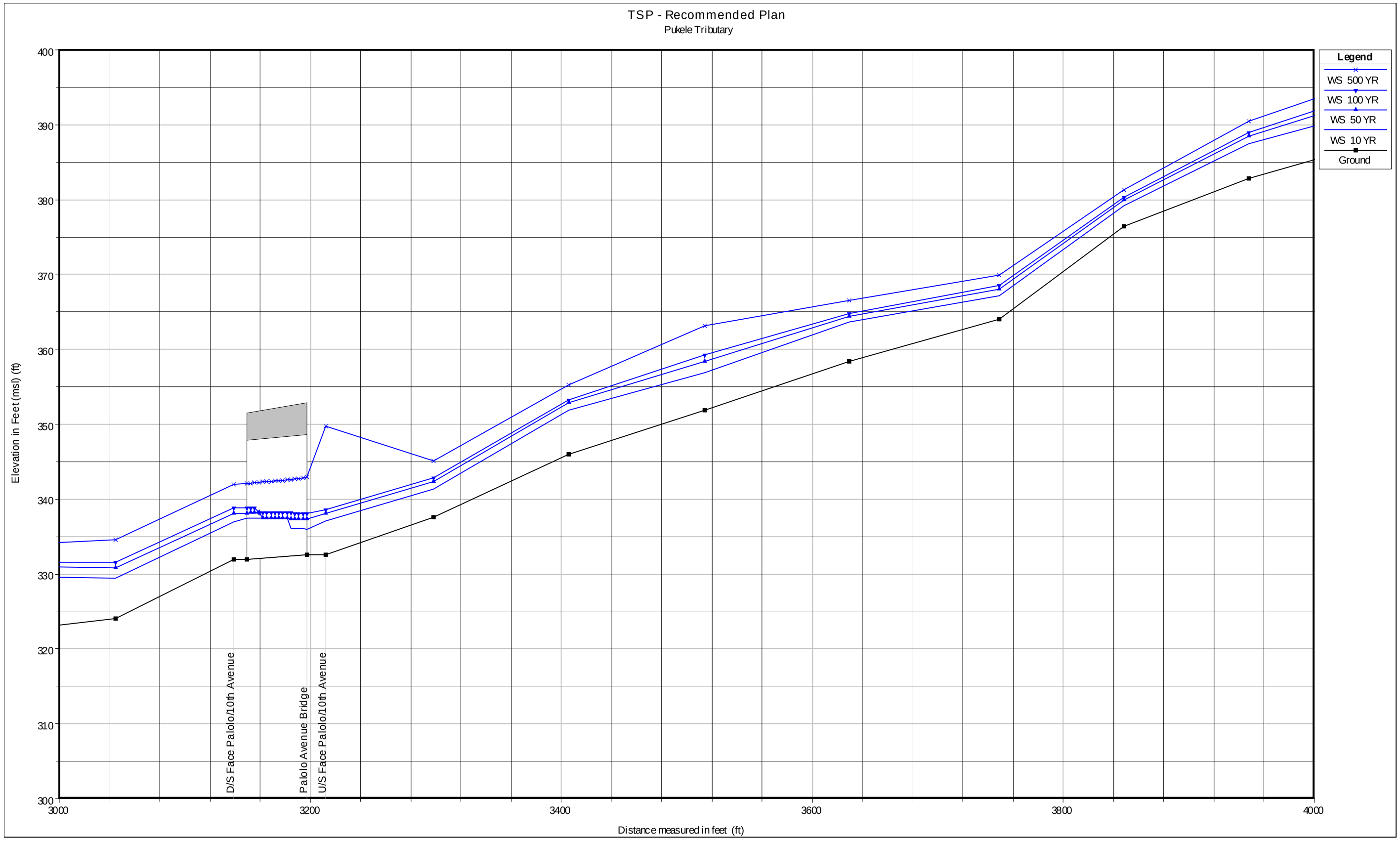

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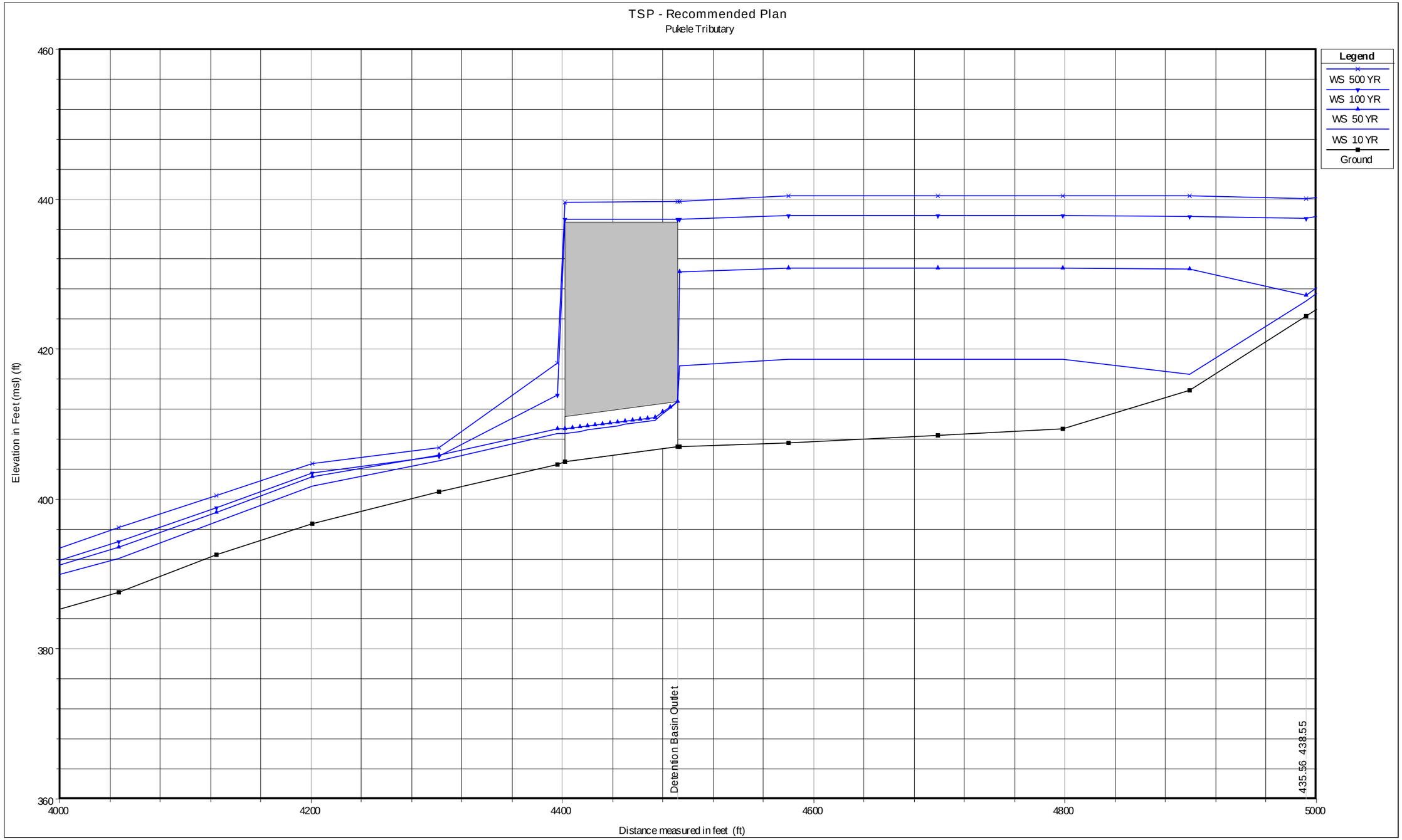

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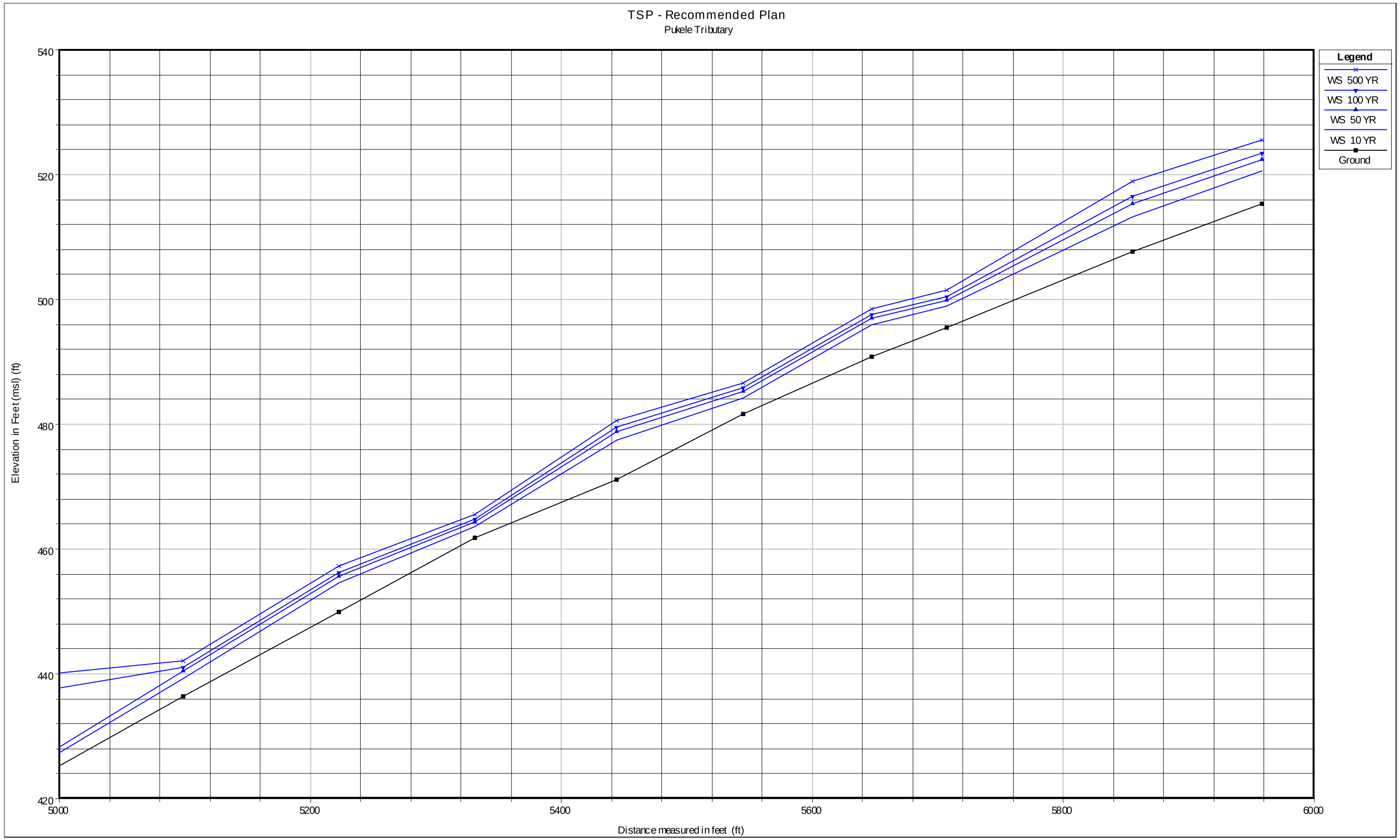

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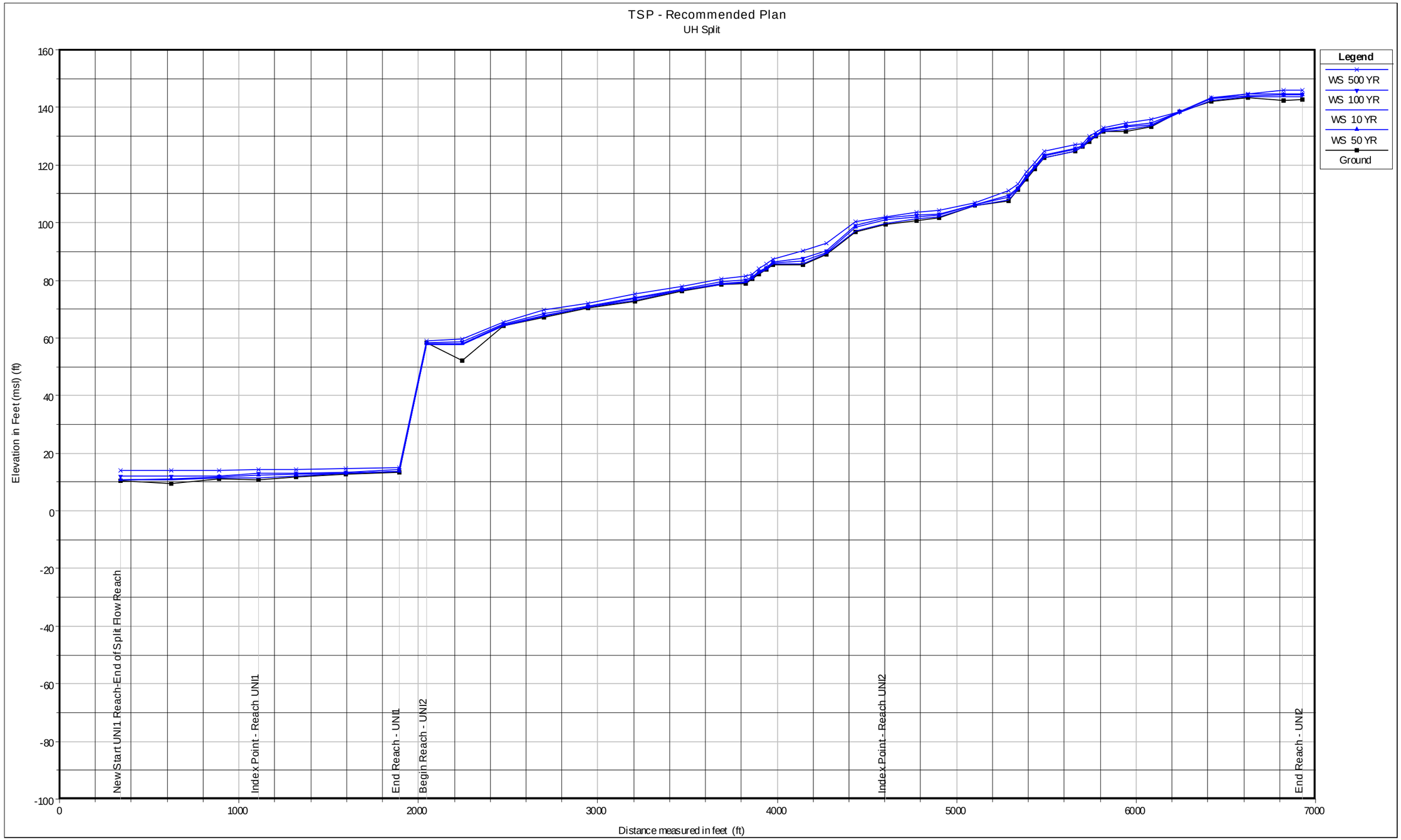

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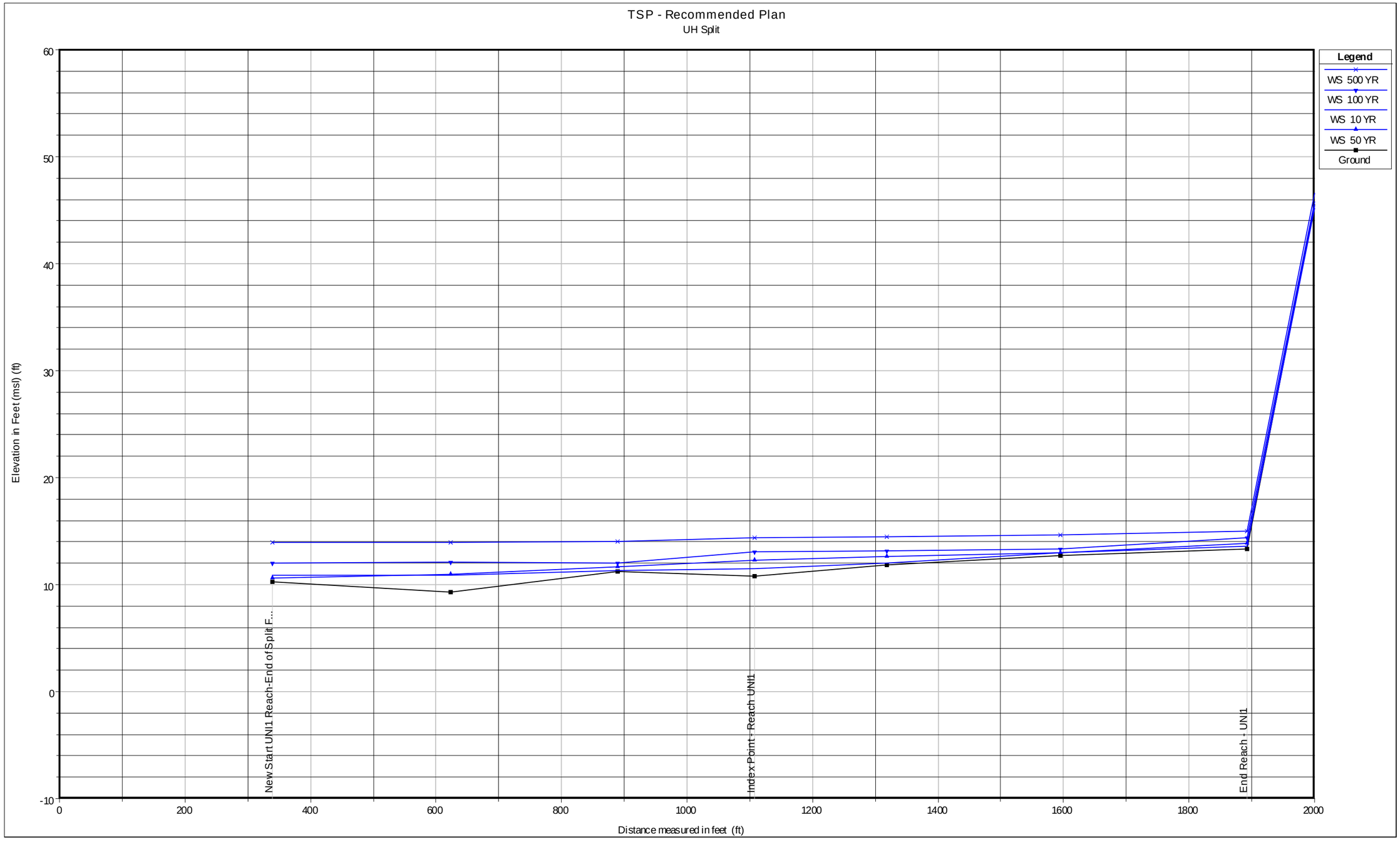

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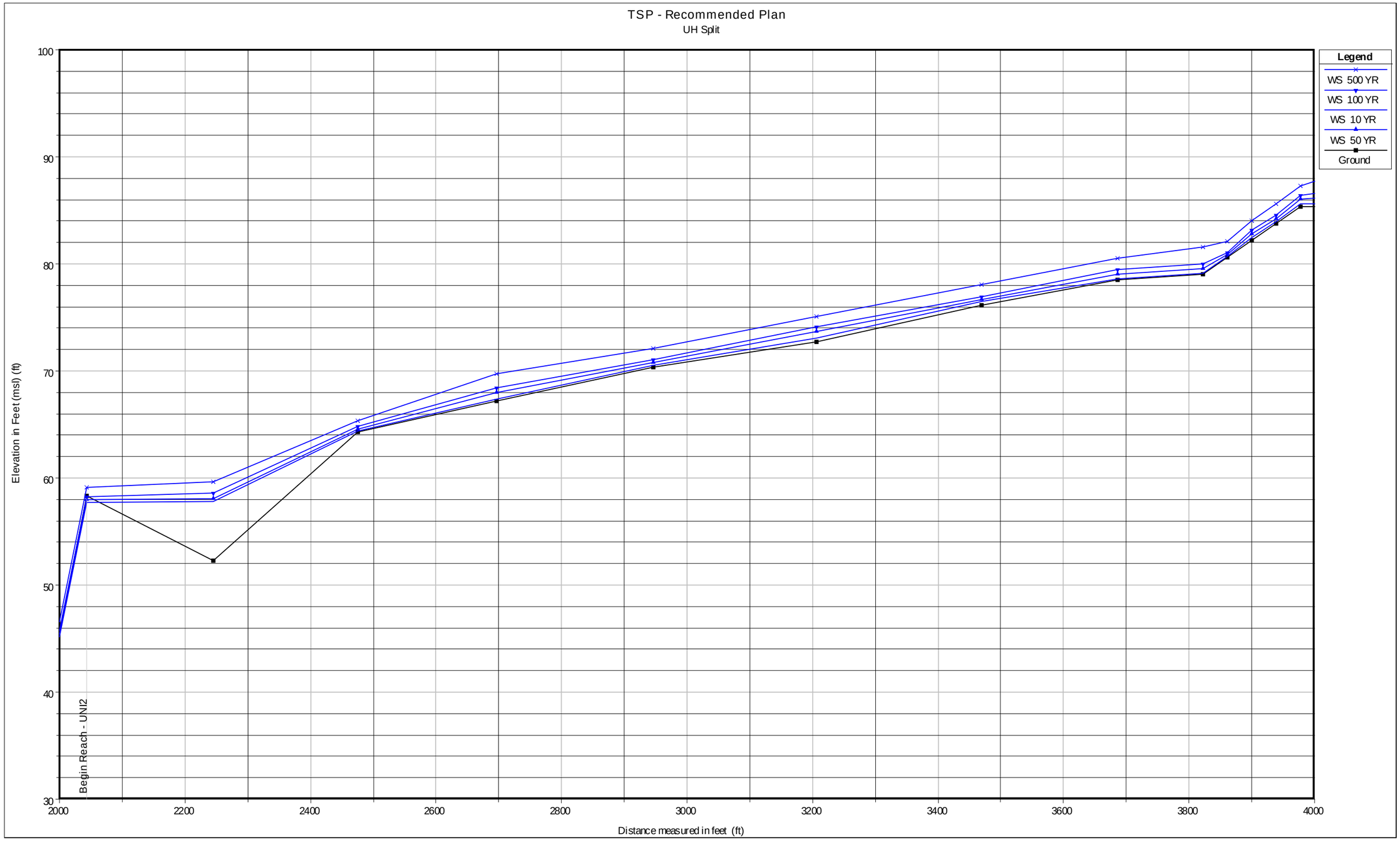

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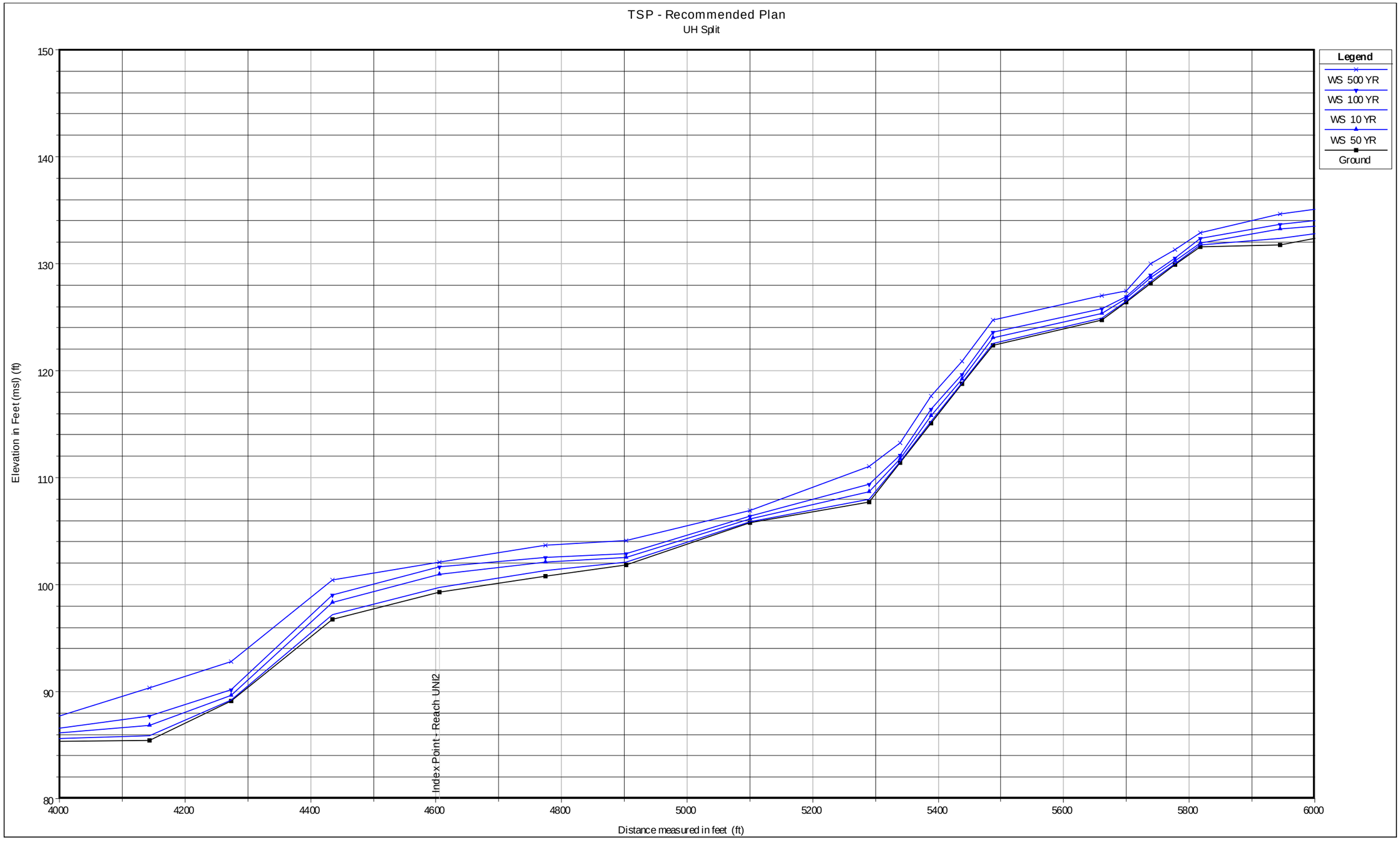

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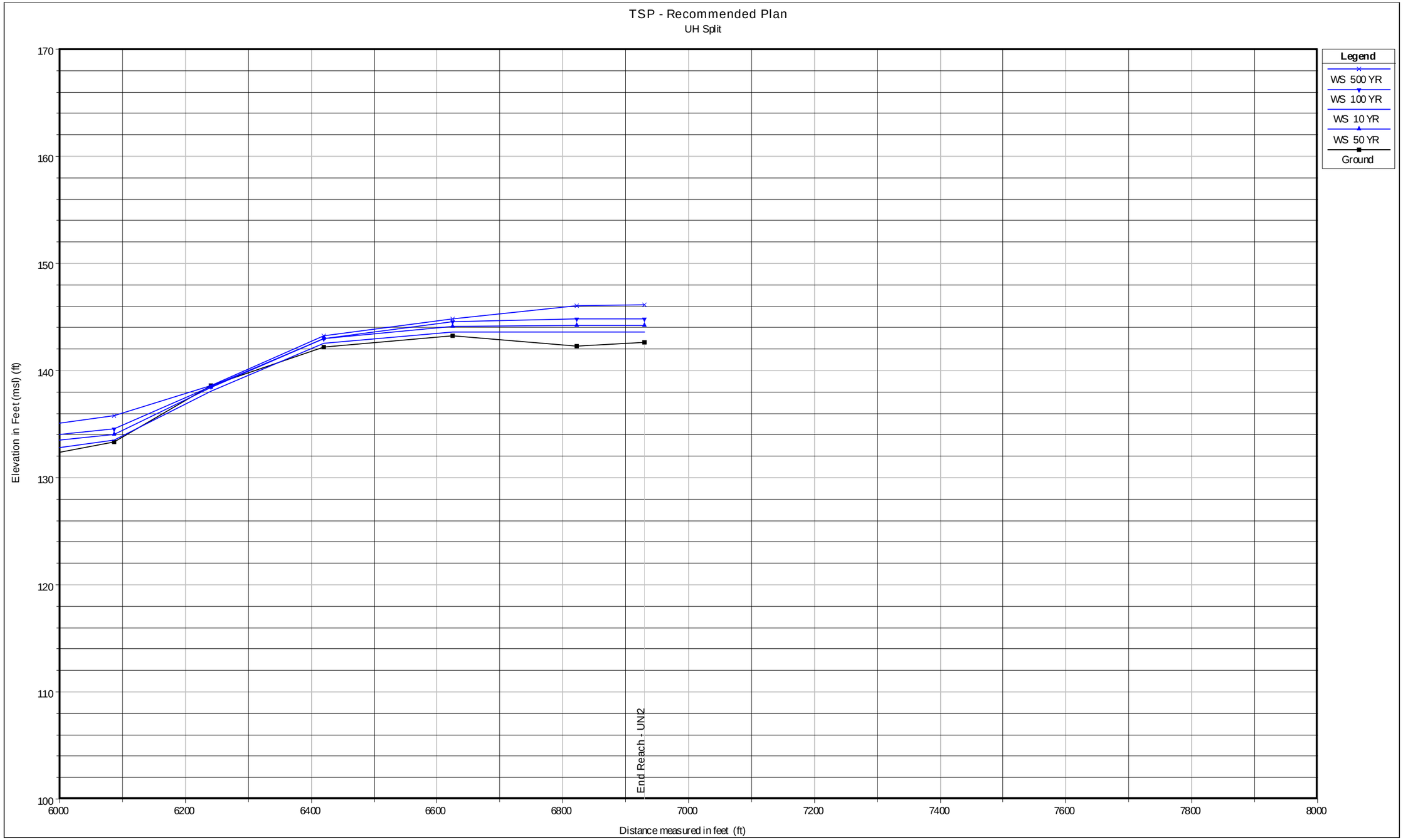

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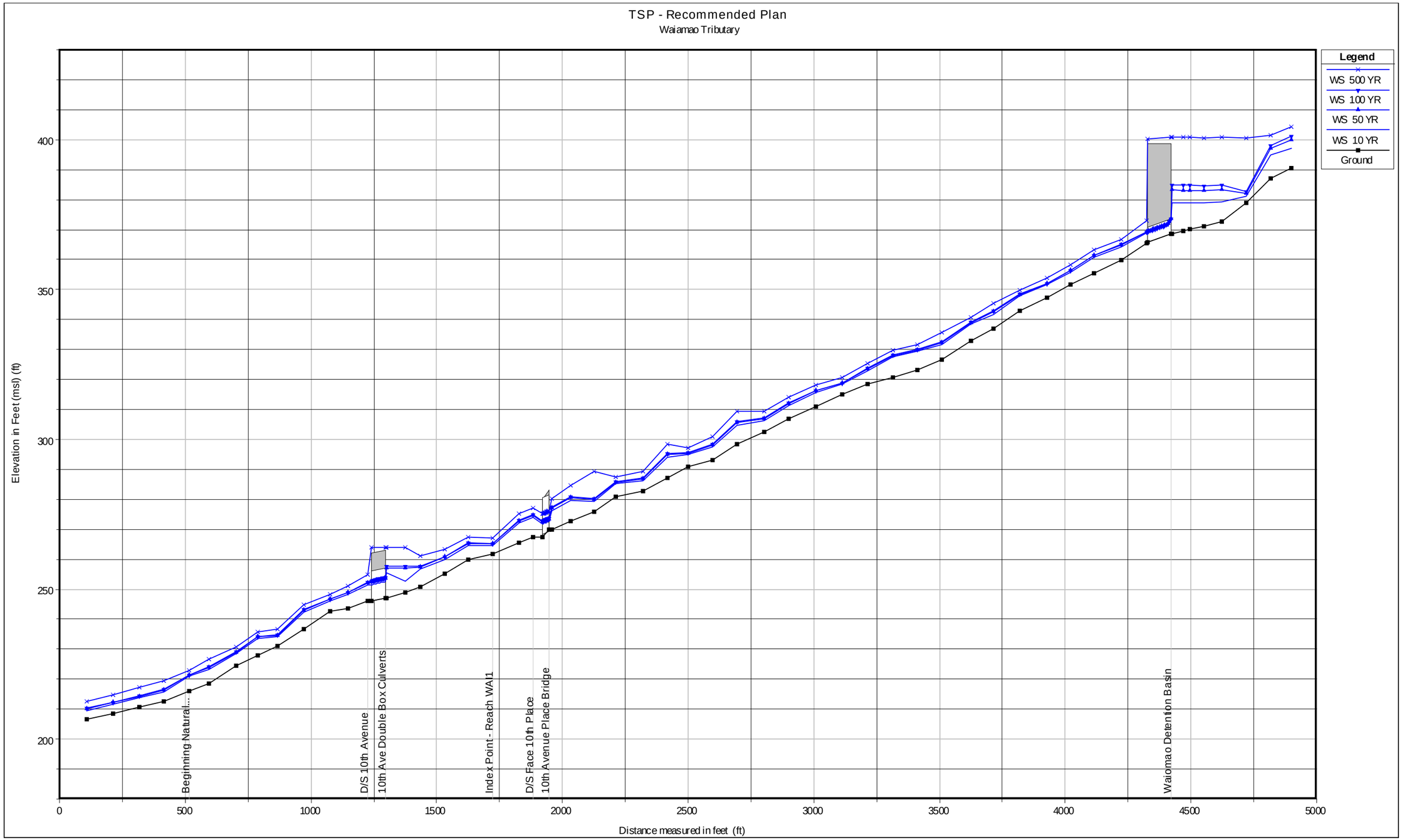

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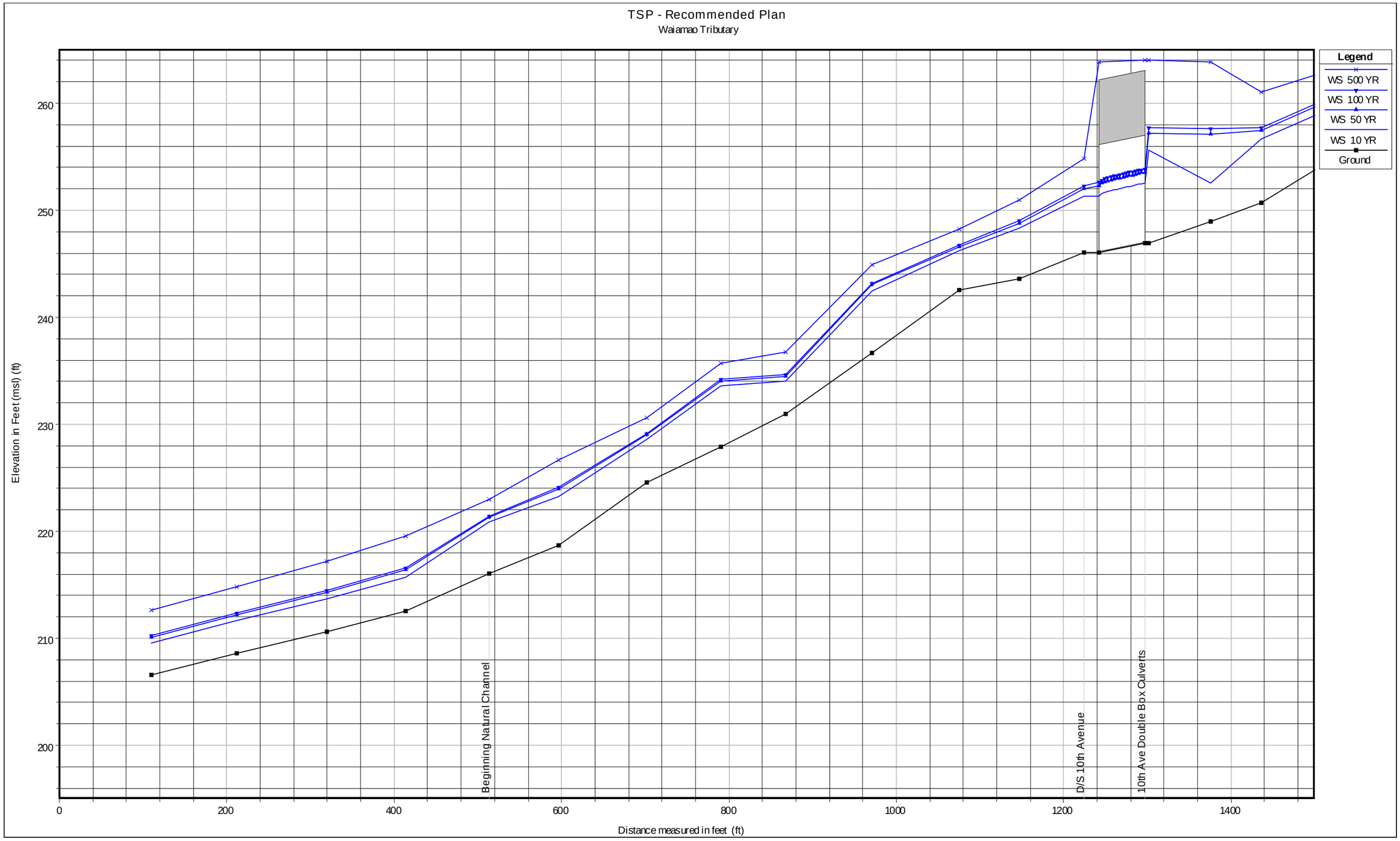

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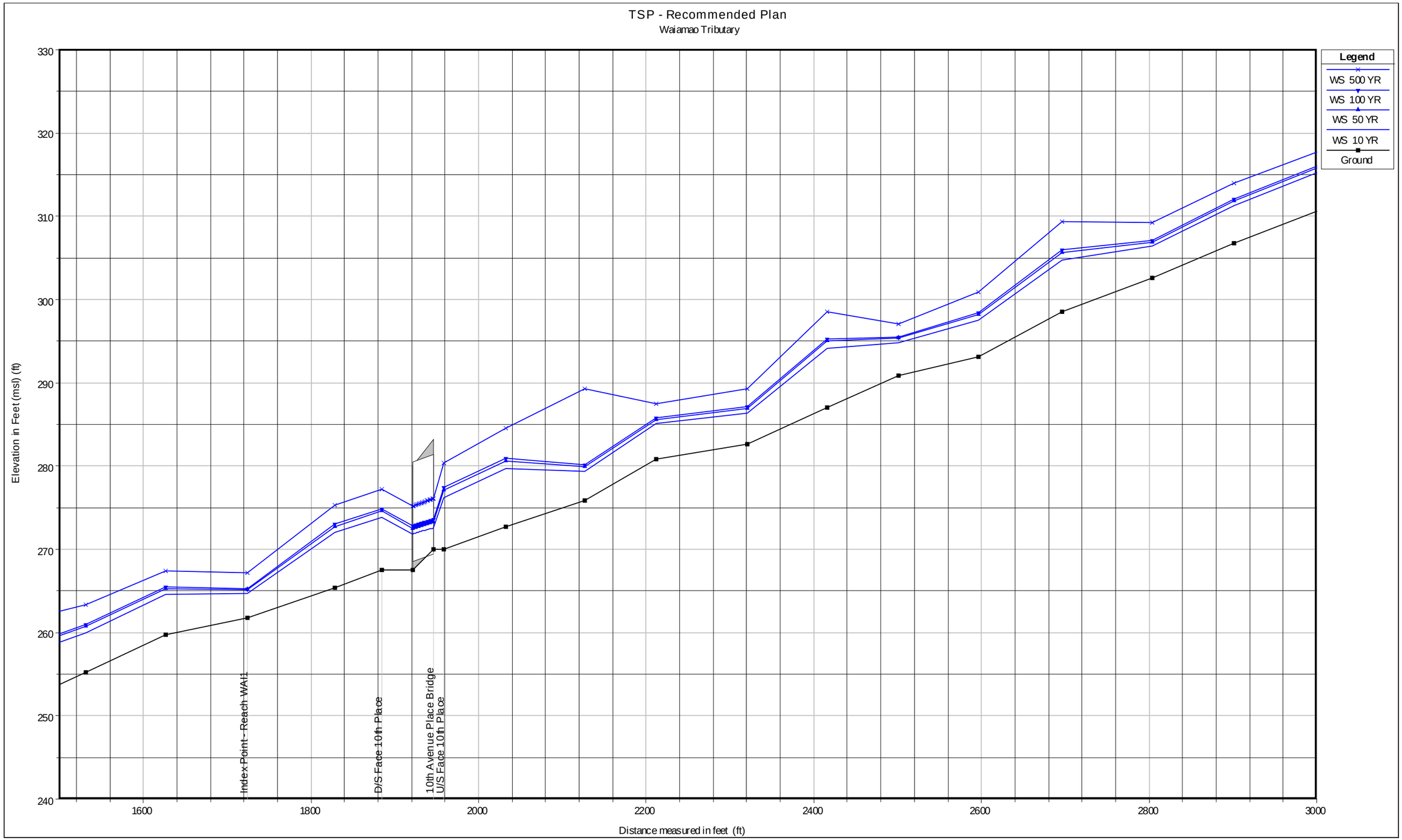

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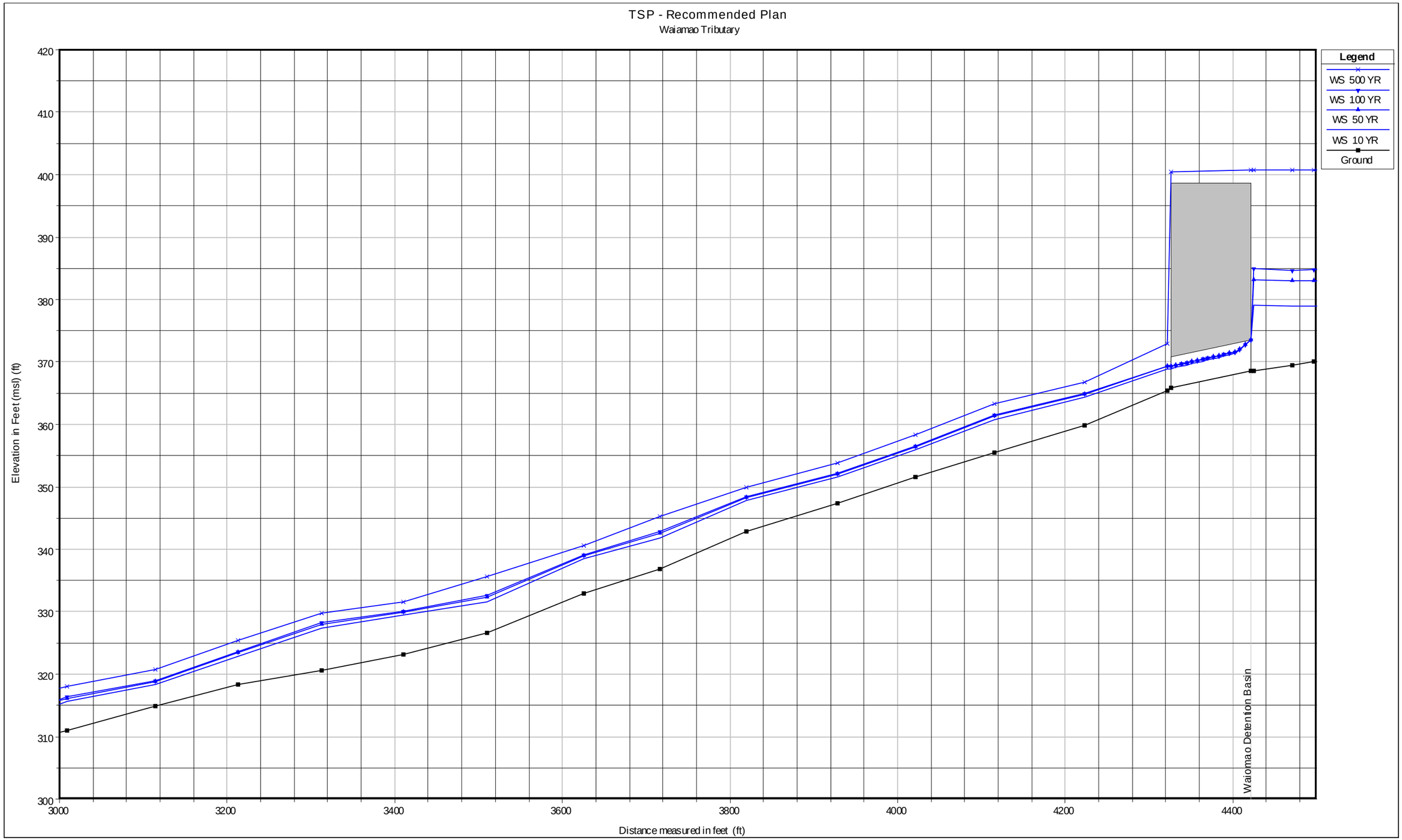

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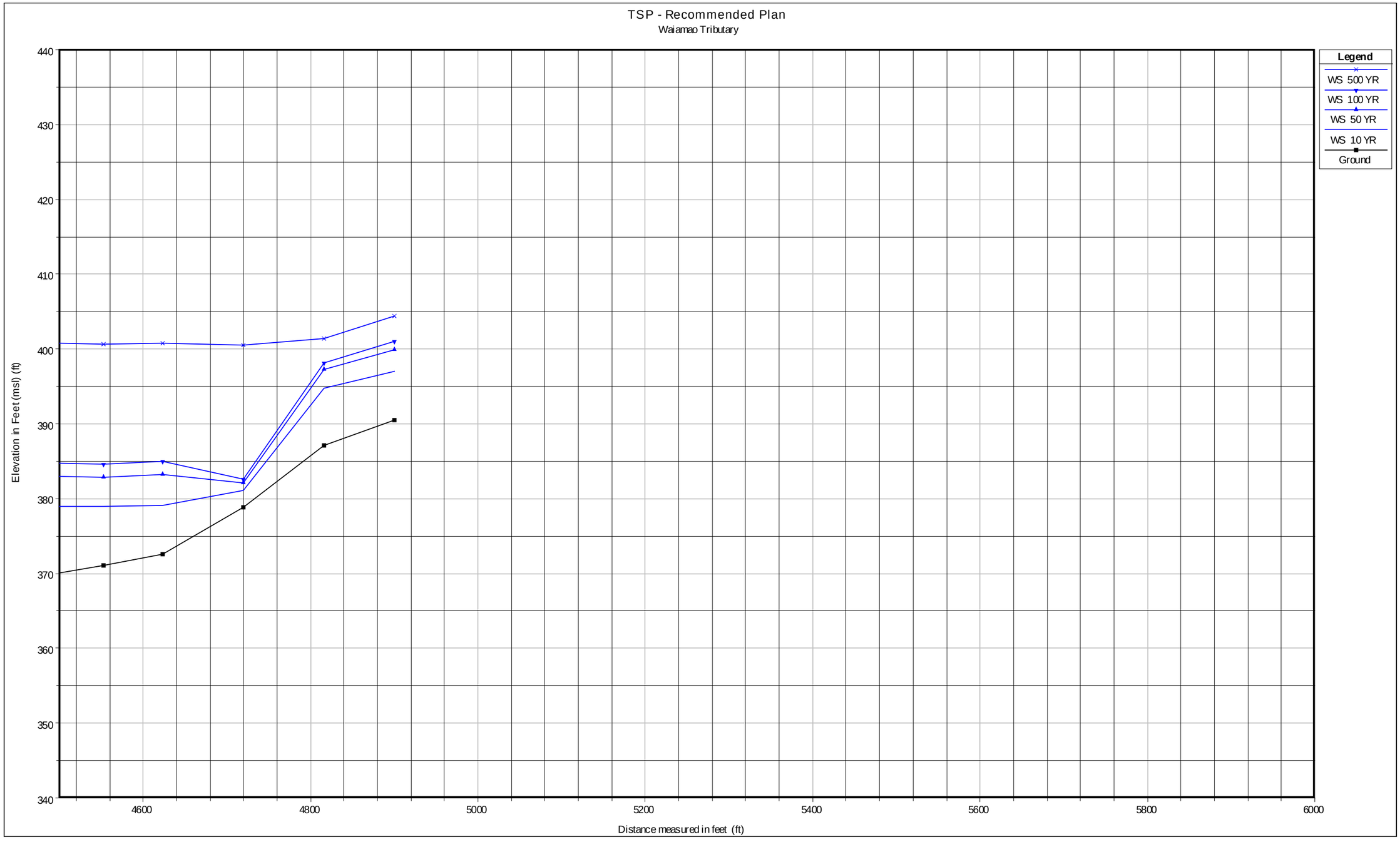
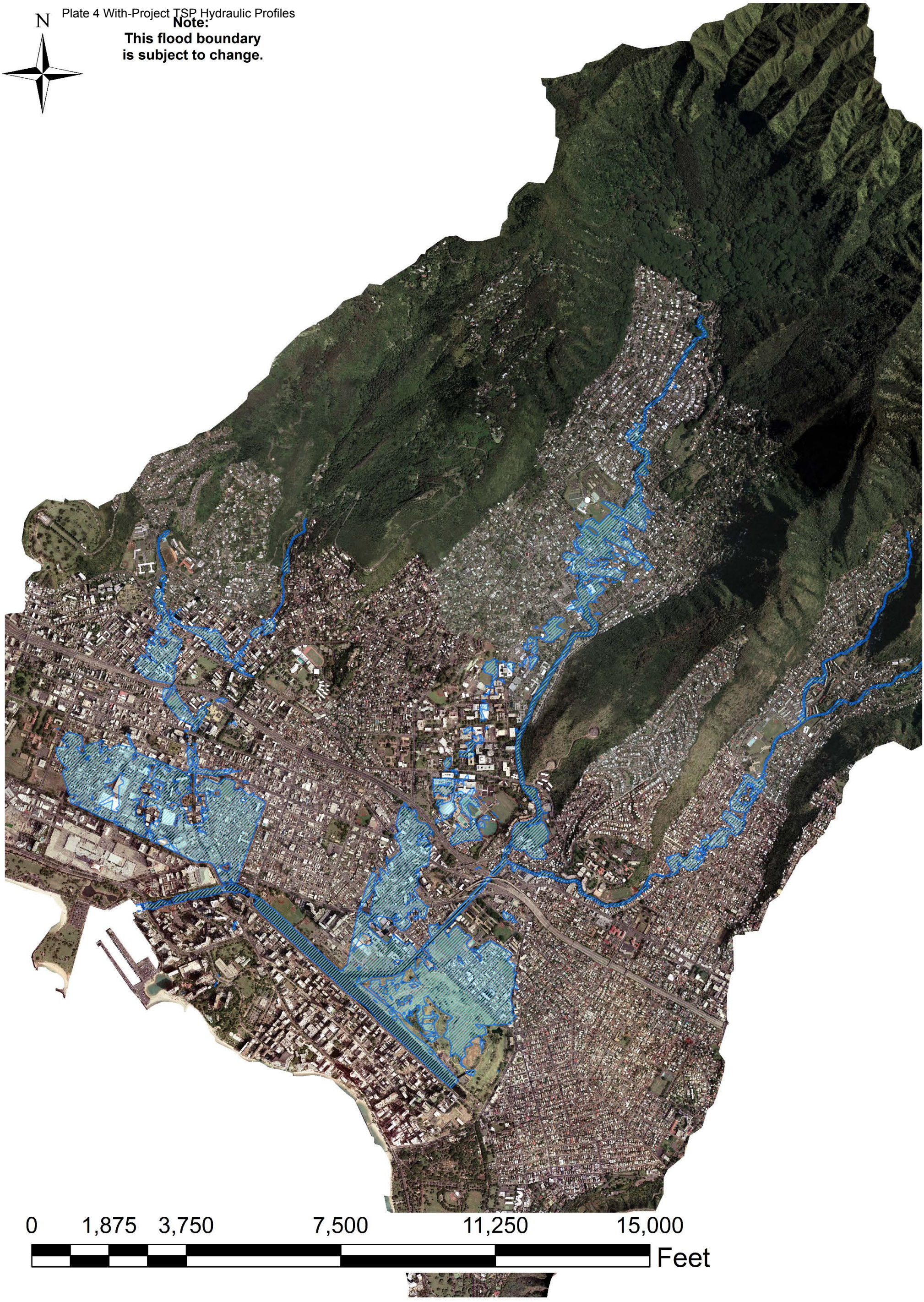


Plate 4 With-Project TSP Hydraulic Profiles

N

Note:
This flood boundary is subject to change.



0 1,875 3,750 7,500 11,250 15,000

Feet

ALA WAI CANAL PROJECT - ALTERNATIVE 3A

1% ACE (100-Year) Floodplain 2075 Intermediate Scenario

N

0 250 500 1,000 1,500 2,000

Feet

Ala Wai Canal Project - Alternative 2A

1-Percent ACE (100-Year) Floodplain

Note:
This flood boundary is subject to change.

N

0 250 500 1,000 1,500 2,000

Feet

Ala Wai Canal Project - Alternative 3A

Note:
This flood boundary is subject to change.

N

Note:
This flood boundary is subject to change.

0 250 500 1,000 1,500 2,000

Feet

ALA WAI CANAL PROJECT - ALTERNATIVES 2A &3A

Alternative 3A 1-Percent ACE (100-Year) Floodplain

Alternative 2A 1-Percent ACE (100-Year) Floodplain

Plate 8 - Existing Without Project, Alternative 2A, and Alternative 3A 1-Percent ACE Water Surface Elevations at HEC-FDA Index Points

HEC-RAS		HEC-FDA	HEC-RAS	HEC-RAS Water Surface Elevations (ft)		
River	Reach	Reach	River Station	Existing Without-Project	Alternative 2A	Alternative 3A
Ala Wai	Lower	ALA1	1477	3.56	3.44	3.27
Ala Wai	Middle	ALA2	4847	7.48	6.94	6.82
Ala Wai	Upper	ALA3	8015	8.26	7.65	7.58
Palolo	Lower	MPC1	1813	10.96	9.55	8.61
Palolo	Lower	MPC2	3406	16.91	13.64	12.96
Makiki	Lower	MAK1	1719	10.61	9.50	9.01
Makiki	Lower	MAK2	4325	33.31	32.80	27.88
Makiki	Upper	MAK3	6606	71.59	70.17	70.17
Makiki	Upper	MAK4	9666	178.40	177.94	177.94
Kanaha	Split	KAO1	1393	42.90	42.24	42.96
Kanaha	Ditch	KAH1	1874	73.12	72.05	70.37
Kanaha	Ditch	KAH2	3005	78.15	76.96	78.15
Manoa	Main	MAN1	948	40.75	37.61	38.06
Manoa	Main	MAN2	5461	116.78	113.11	113.87
Manoa	Main	MAN3	8367	153.06	150.71	151.25
Manoa	Main	MAN4	9032	164.16	157.98	159.58
Manoa	Main	MAN5	10309	173.33	173.51	171.54
Manoa	Main	MAN6	13136	212.02	212.02	208.09
Manoa	Main	MAN7	15753	260.74	260.74	256.48
UH_Split	UH_Split	UNI1	1107	13.70	11.45	11.45
UH_Split	UH_Split	UNI2	4606	102.20	99.72	99.72
Palolo	Main	PAL1	6376	41.77	41.79	39.10
Palolo	Main	PAL2	8574	89.06	89.06	87.40
Palolo	Main	PAL3	11649	140.63	140.63	139.57
Palolo	Main	PAL4	14619	187.18	187.18	184.59
Pukele	Tributary	PUK1	2184	287.58	287.58	283.77
Waiomao	Tributary	WAI1	1724	266.67	266.66	265.39

ALA WAI CANAL PROJECT
ALTERNATIVE 2A
HONOLULU, OAHU, HI

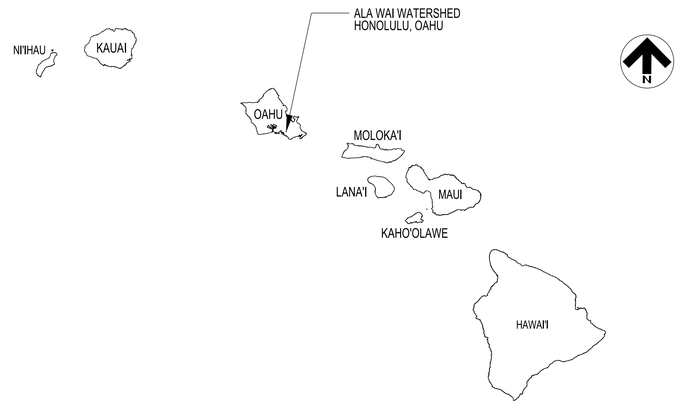
WAIHI DEBRIS CATCHMENT
WAIAKEAKUA DEBRIS CATCHMENT
POELUA DEBRIS BASIN
WOODLAWN DITCH DETENTION
ROOSEVELT DEBRIS AND DETENTION BASIN
MAKIKI DEBRIS AND DETENTION BASIN
MANOA PARK DETENTION BASIN
INNOVATION CENTER IMPROVEMENTS
PUKELE DEBRIS CATCHMENT
WAIOMAO DEBRIS CATCHMENT
KANEWAI FIELD MULTI-PURPOSE DETENTION BASIN
HAUSTEN DITCH DETENTION
MANOA-PALOLO DRAINAGE CANAL FLOODWALL
ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION
ALA WAI CANAL FLOODWALLS

Waihi Stream
Waiakeakua Stream
Kanaha Stream
Waiomao Stream
Makiki Stream
Pukele Stream
Manoa Stream
Palolo Stream
ALA WAI CANAL

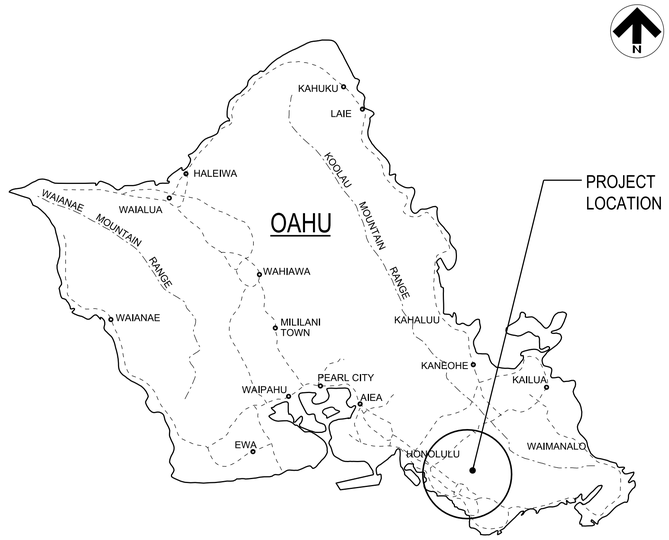
N

SITE LOCATIONS
NOT TO SCALE

PROJECT TITLE



VICINITY MAP
NOT TO SCALE



PROJECT LOCATION
NOT TO SCALE

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PLOT STYLE:
SIZE: ANSI D

DATE:
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PLOT DATE:
FILE NAME: Cover Sheet - Site Locations, Vicinity Map, Project Location.dgn

REVISION:
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LOCATION CODE
DRAWING NUMBER:

ALA WAI CANAL PROJECT

SITE LOCATIONS
PROJECT LOCATION & VICINITY MAP
ALTERNATIVE 2A

SHEET IDENTIFICATION
G-001
SHEET 1 OF 25

FILE: c:\pw\work\joh~1\j3ec9jhh\d0145830\Ala_Wai_G-001xxx.dgn
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ALA WAI CANAL PROJECT - ALTERNATIVE 2A
INDEX OF DRAWINGS

SHT. NO	SHT. REF. NO.	DESCRIPTION
1	G-001	COVER SHEET
2	G-002	INDEX TO DRAWINGS
3	C-101	ALA WAI CANAL FLOODWALLS, SITE PLAN
4	C-102	HAUSTEN DITCH DETENTION, PLAN
5	C-103	ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION, SITE PLAN
6	C-104	MANOA PARK DETENTION BASIN, PLAN
7	C-105	BY-PASS CULVERT TO MANOA PARK DETENSION BASIN, SITE PLAN
8	C-303	POELUA PLACE DEBRIS BASIN, PLAN AND PROFILE
9	C-304	INNOVATION CENTER IMPROVEMENTS, PLAN AND SECTIONS
10	C-305	WOODLAWN DITCH DETENTION BASIN, PLAN AND SECTIONS
11	C-306	KANEWAI FIELD MULTI-PURPOSE DETENTION BASIN, PLAN AND SECTIONS
12	C-307	MANOA-PALOLO DRAINAGE CANAL FLOODWALL; PLAN, PROFILE AND SECTION
13	C-309	ALA WAI CANAL MIDDLE AND LOWER RIGHT BANK, PROFILE AND SECTION
14	C-310	ALA WAI CANAL MIDDLE AND LOWER LEFT BANK, PROFILE
15	C-311	ALA WAI CANAL UPPER LEFT BANK, PROFILE AND SECTION
16	C-312	MANOA PARK DETENTION BASIN, PLAN AND SECTIONS
17	C-314	ROOSEVELT DEBRIS AND DETENTION BASIN, PLAN AND SECTIONS
18	C-315	MAKIKI DEBRIS AND DETENTION BASIN, PLAN AND PROFILE
19	C-316	HAUSTEN DITCH, PROFILE AND SECTION
20	C-317	ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION, PROFILE
21	C-319	WAIHI DEBRIS CATCHMENT, PLAN AND PROFILE
22	C-320	WAIAKEAKUA DEBRIS CATCHMENT, PLAN AND PROFILE
23	C-321	WAIOMAO DEBRIS CATCHMENT, PLAN AND SECTIONS
24	C-322	PUKELE DEBRIS CATCHMENT, PLAN AND SECTIONS
25	C-401	HAUSTEN BRIDGE; PLAN, SECTION AND PROFILE

GENERAL NOTES:

1. EXISTING CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE PLANS. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND ADJUST WORK PLAN ACCORDINGLY PRIOR TO BEGINNING CONSTRUCTION.
2. COORDINATE SYSTEM: NAD 1983 (HARN), HAWAII ZONE 3 (US FEET)
3. PROVIDE FENCING AS NECESSARY TO MAINTAIN SECURITY AT ALL TIMES.
4. UNLESS SHOWN OTHERWISE, ALL DISTURBED AREAS NOT RECEIVING A HARD SURFACE SHALL BE COVERED WITH GRASS.
5. CONTRACTOR SHALL SUBMIT A COMPLETE SOIL EROSION CONTROL PLAN FOR REGULATORY APPROVAL. CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING EROSION CONTROL DEVICES DURING CONSTRUCTION. CONTRACTOR SHALL TAKE ALL OTHER MEASURES TO POSITIVELY PRECLUDE EROSION MATERIALS FROM LEAVING THE SITE.
6. EXISTING UNDERGROUND UTILITIES OBTAINED FROM AS-BUILTS AND FROM FIELD SURVEYS. CONTRACTOR SHALL POTHOLE AND FIELD VERIFY DEPTH AND LOCATION PRIOR TO EXCAVATION AND PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION.
7. THERE WILL BE A FLOODWARNING SYSTEM INSTALLED FOR THIS PROJECT.

GENERAL ABBREVIATIONS

A.C.	ASHPALT CONCRETE
AVE	AVENUE
BLVD	BOULEVARD
CONC	CONCRETE
DIA	DIAMETER
EL	ELEVATION
EXIST	EXISTING
FT	FOOT, FEET
IN	INCH, INCHES
INV	INVERT
LB	LEFT BANK
MAX	MAXIMUM
MSL	MEAN SEA LEVEL
NTS	NOT TO SCALE
o.c.	ON CENTER
O&M	OPERATIONS AND MAINTENANCE
PL	PLACE
RB	RIGHT BANK
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
ST	STREET
STA	STATION
THK	THICK
TMK	TAX MAP KEY
TYP	TYPICAL
W.S.	WATER SURFACE
YR	YEAR

SYMBOLS

&	AND
@	AT
℄	CENTER LINE
'	FOOT, FEET
"	INCH, INCHES

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LOCATION CODE
DRAWING NUMBER:
FILE NAME: Index To Drawings, General Notes & Abbreviations - Alternative 2A.dgn
REVISION:

ALA WAI CANAL PROJECT

INDEX OF DRAWINGS, GENERAL NOTES
ABBREVIATIONS & SYMBOLS
ALTERNATIVE 2A

SHEET IDENTIFICATION
G-002
SHEET 2 OF 25

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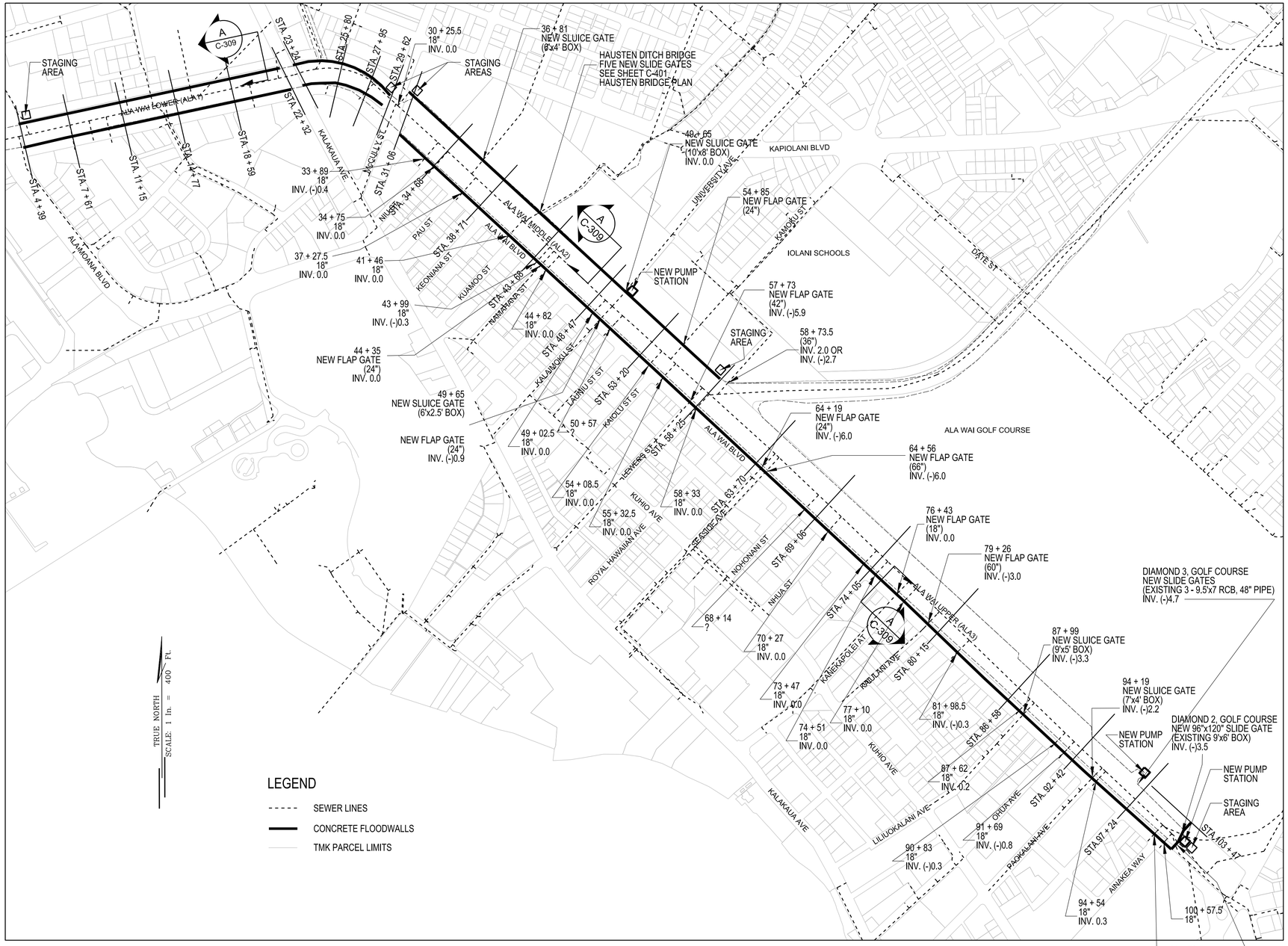

PLAN
ALA WAI CANAL FLOODWALLS

SCALE 1"=400'

ALA WAI CANAL INTERIOR DRAINAGE TABLE

CULVERT NAME	STATION	SIZE & TYPE	NOTES
DIAMOND 2, GOLF COURSE	102+45.5	96"x120" SLIDE GATE	PUMP STATION
DIAMOND 1, ALA WAI BLVD	101+75	2 - 60"x120" SLIDE GATES	
DIAMOND 3, GOLF COURSE	96+67	SLIDE GATES	PUMP STATION
100+57.5	100+57.5	18" FLAP GATE	
99+72.5	99+72.5	18" FLAP GATE	
94+54	94+54	18" FLAP GATE	INV. 0.3
94+19	94+19	SLUICE GATE	INV. (-)2.2
91+69	91+69	18" FLAP GATE	INV. (-)0.8
90+83	90+83	18" FLAP GATE	INV. (-)0.3
87+99	87+99	SLUICE GATE	INV. (-)3.3
87+62	87+62	18" FLAP GATE	INV. 0.2
81+98.5	81+98.5	18" FLAP GATE	INV. (-)0.3
79+26	79+26	60" FLAP GATE	INV. (-)3.0
77+10	77+10	18" FLAP GATE	
76+43	76+43	18" FLAP GATE	INV. 0.0
74+51	74+51	18" FLAP GATE	
73+47	73+47	18" FLAP GATE	
70+27	70+27	18" FLAP GATE	
68+14	68+14	?	
64+56	64+56	66" FLAP GATE	INV. (-)6.0
64+19	64+19	24" FLAP GATE	INV. (-)6.0
58+73.5	58+73.5	36" FLAP GATE	INV. 2.0 OR (-)2.7
58+33	58+33	18" FLAP GATE	
57+73	57+73	42" FLAP GATE	INV. (-)5.9
55+32.5	55+32.5	18" FLAP GATE	
54+08.5	54+08.5	18" FLAP GATE	
54+85	54+85	24" FLAP GATE	
50+57	50+57	?	
49+65, RB	49+65	SLUICE GATE	INV. 0.0, PUMP STATION
49+65	49+65	SLUICE GATE & 24" FLAP GATE	INV. ? & (-)0.9
49+02.5	49+02.5	18" FLAP GATE	
44+82	44+82	18" FLAP GATE	
44+35	44+35	24" FLAP GATE	
43+99	43+99	18" FLAP GATE	INV. (-)0.3
HAUSTEN DITCH BRIDGE	42+10	5 - SLIDE GATES	SEE SHEET C-401
41+46	41+46	18" FLAP GATE	
37+27.5	37+27.5	18" FLAP GATE	
36+81	36+81	SLUICE GATE	
34+75	34+75	18" FLAP GATE	
33+89	33+89	18" FLAP GATE	INV. (-)0.4
30+25.5	30+25.5	18" FLAP GATE	

NOTES:

1. SEE SHEET C-309 FOR THE RIGHT BANK (MOUNTAIN SIDE) PROFILE OF ALA WAI MIDDLE (ALA2) AND ALA WAI LOWER (ALA1).
2. SEE SHEET C-310 FOR THE LEFT BANK (OCEAN SIDE) PROFILE OF ALA WAI MIDDLE (ALA2) AND ALA WAI LOWER (ALA1).
3. SEE SHEET C-311 FOR THE LEFT BANK (OCEAN SIDE) PROFILE OF ALA WAI UPPER (ALA3).
4. PUMP STATIONS WILL BE 50'x50'.

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LOCATION CODE
DRAWING NUMBER:
PLOT SCALE: 1.000000
PLOT DATE: 12/15/2014
SIZE: ANSI D
FILE NAME: ALA WAI CANAL FLOODWALLS, PLAN

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HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ALA WAI LOWER, MIDDLE & UPPER FLOODWALLS
SITE PLAN
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-101
SHEET 3 OF 25

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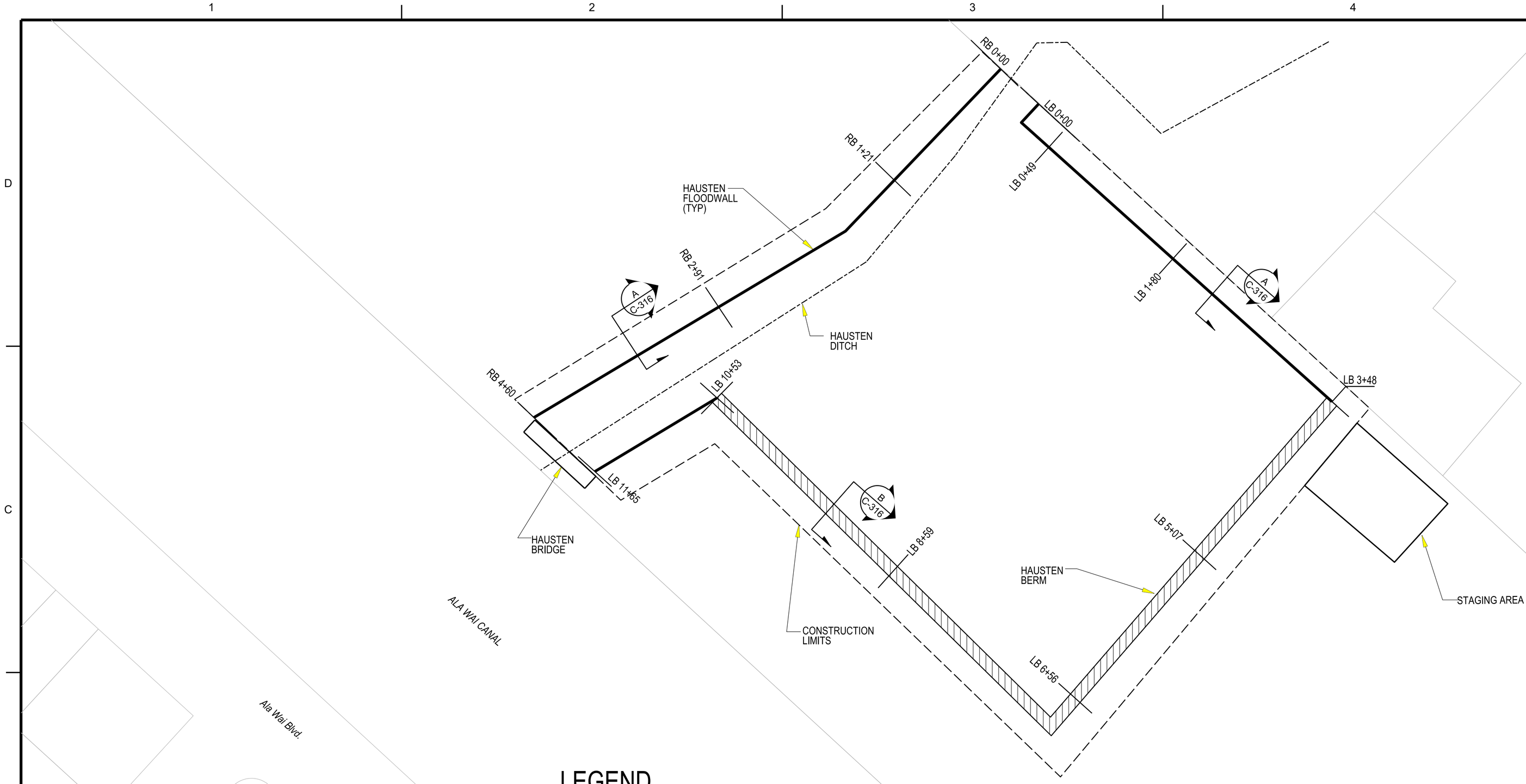

NOTES:

1. STAGING AREA WILL HAVE GEOTEXTILE AND 3" OF SURGE MATERIAL.
2. SEE SHEET C-316 FOR THE PLAN AND PROFILE OF THE FLOODWALLS AND BERM.
3. SEE SHEET C-401 FOR THE HAUSTEN DITCH BRIDGE NEW CONRETE WALL PLAN.

HAUSTEN DITCH DETENTION PLAN

SCALE: 1"=50'

TRUE NORTH
SCALE: 1 In. = 50 FT.

50' 25' 0 50' 100'
SCALE: 1" = 50'

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PLOT DATE: 12/15/2014
FILE NAME: HAUSTEN DITCH DETENTION PLAN
DATE:
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DRAWING NUMBER:
REVISION:
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ALA WAI CANAL PROJECT

HAUSTEN DITCH DETENTION PLAN
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-102
SHEET 4 OF 25

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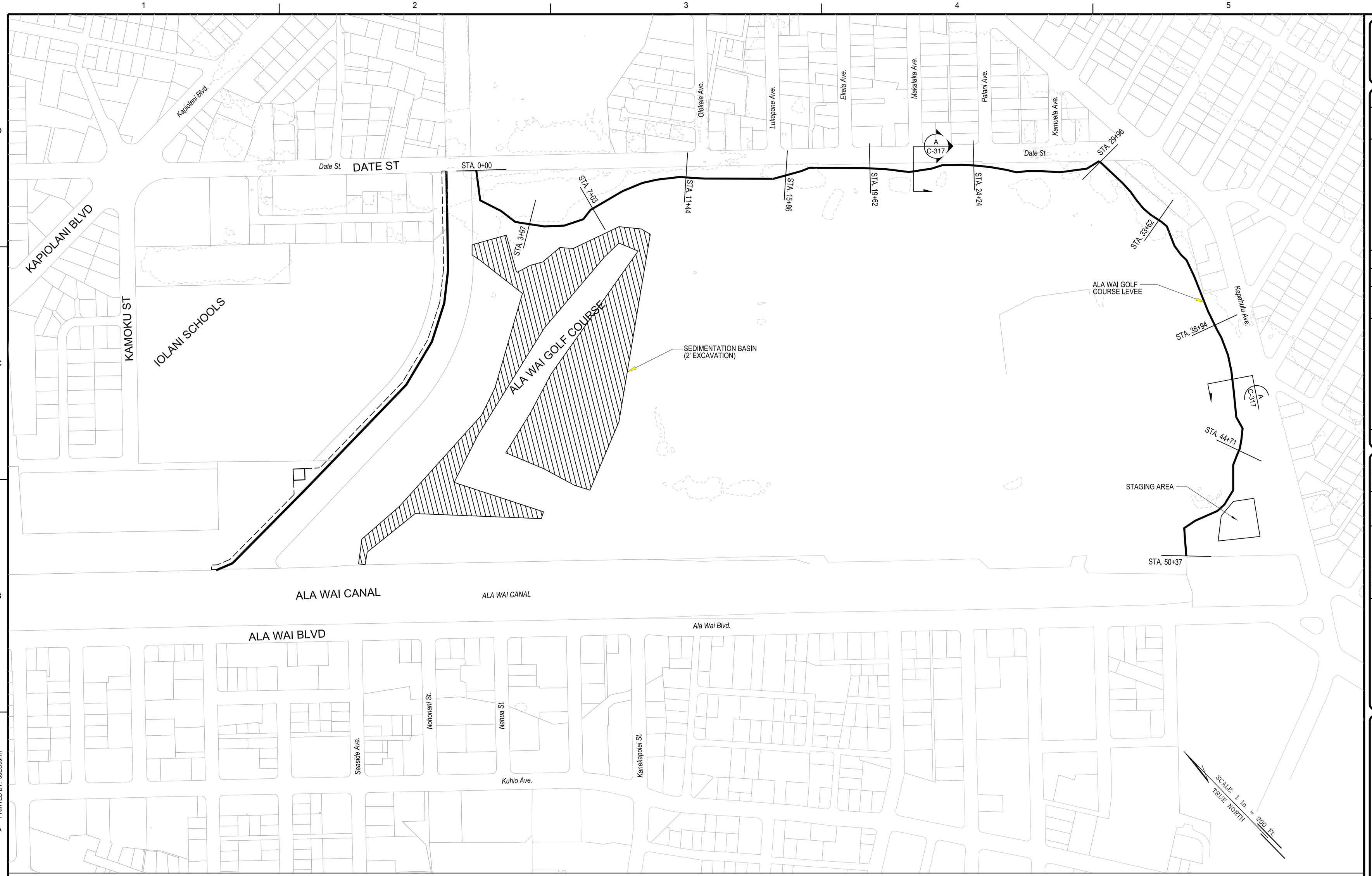

NOTES:

1. THE STAGING AREA WILL HAVE GEOTEXTILE AND 3" OF SURGE MATERIAL.

ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION
PLAN
SCALE: 1"=200'

SOLID LINE = 50' CONTOURS
DOTTED LINE = 10' CONTOURS

200' 100' 0 200' 300'
SCALE: 1" = 200'

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LOCATION CODE
DRAWING NUMBER:
PLOT SCALE: AS SHOWN SIZE: ANSI D
PLOT DATE: 10/30/14
FILE NAME: ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION

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ALA WAI CANAL PROJECT

ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION
PLAN
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-103
SHEET 5 OF 25

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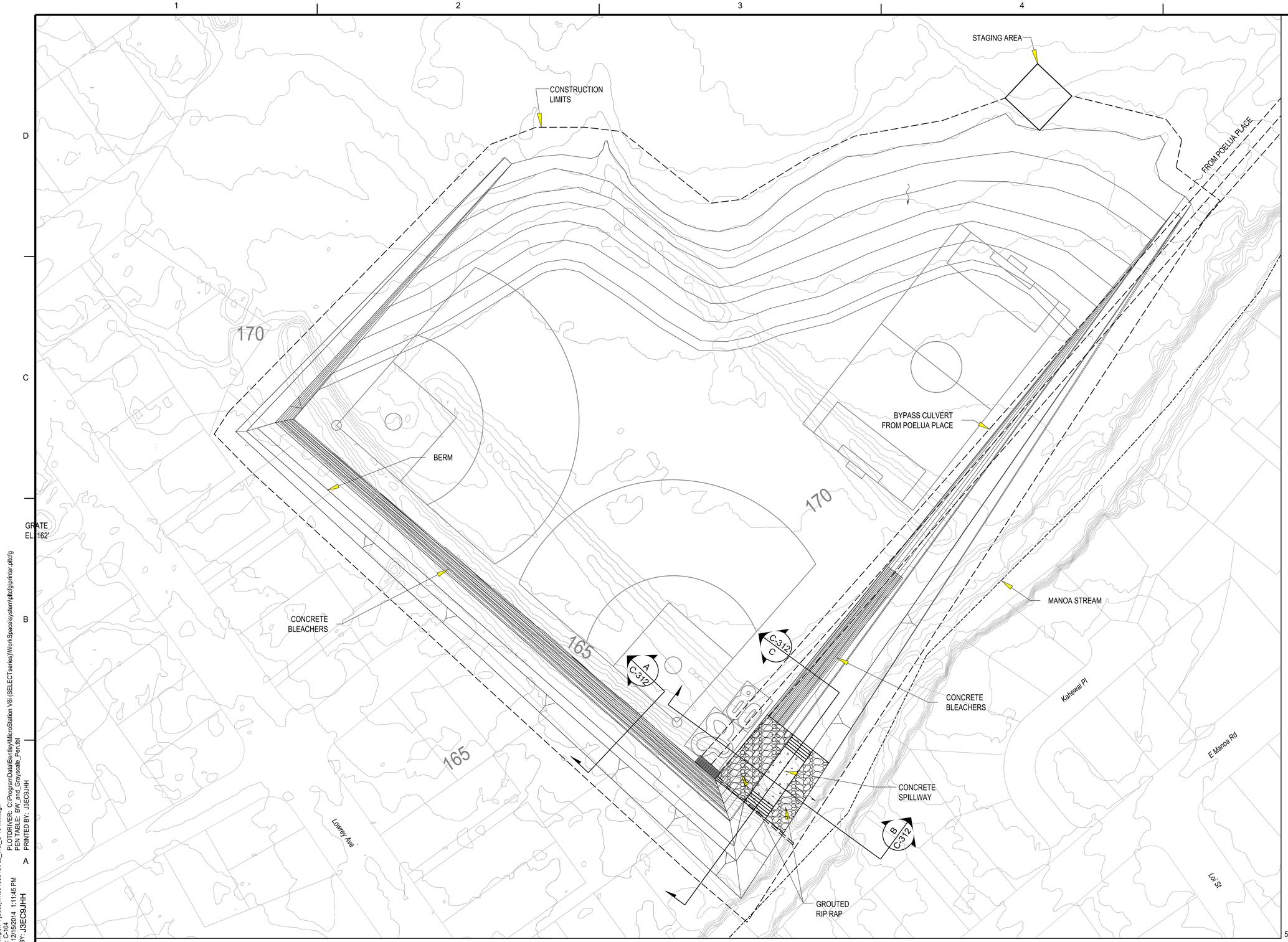

MANOA PARK DETENTION BASIN
PLAN

SOLID LINE = 5' CONTOURS
DOTTED LINE = 1' CONTOURS

50' 25' 0 50' 100'
SCALE: 1" = 50'

NOTES:

1. SEE SHEET C-312 FOR THE PLAN AND SECTIONS.

SCALE: 1 In. = 50 Ft.
TRUE NORTH

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REVISION:
SOLICIT. / CONTRACT NO.:
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ALA WAI CANAL PROJECT

MANOA PARK DETENTION BASIN
PLAN
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-104
SHEET 6 OF 25

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PRINTED BY: J3EC9JHH

BYPASS CULVERT TO MANOA PARK DETENTION BASIN
SITE PLAN

SCALE: 1"=80'

NOTES:

1. SEE SHEET C-104 FOR THE MANOA PARK DETENTION BASIN PLAN.
2. SEE SHEET C-303 FOR THE POELUA DEBRIS BASIN PLAN.

80' 0' 80' 160'

SCALE: 1" = 80'

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PLOT DATE:
FILE NAME: BY-PASS CULVERT TO MANOA PARK DETENTION BASIN

REVISION:
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LOCATION CODE
DRAWING NUMBER:

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ALA WAI CANAL PROJECT

POELUA PLACE DEBRIS BASIN
PLAN
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-105
SHEET 7 OF 25

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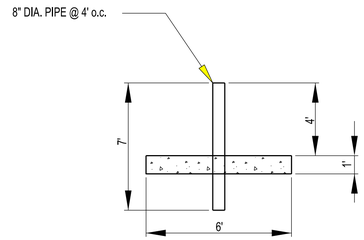

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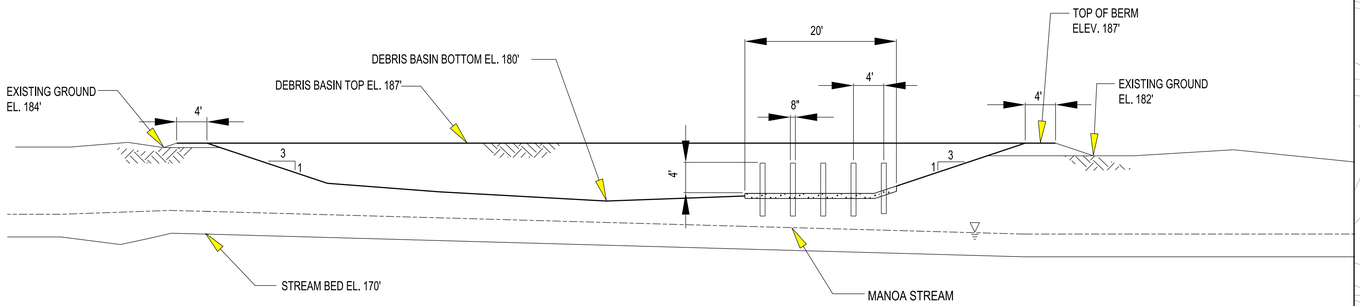
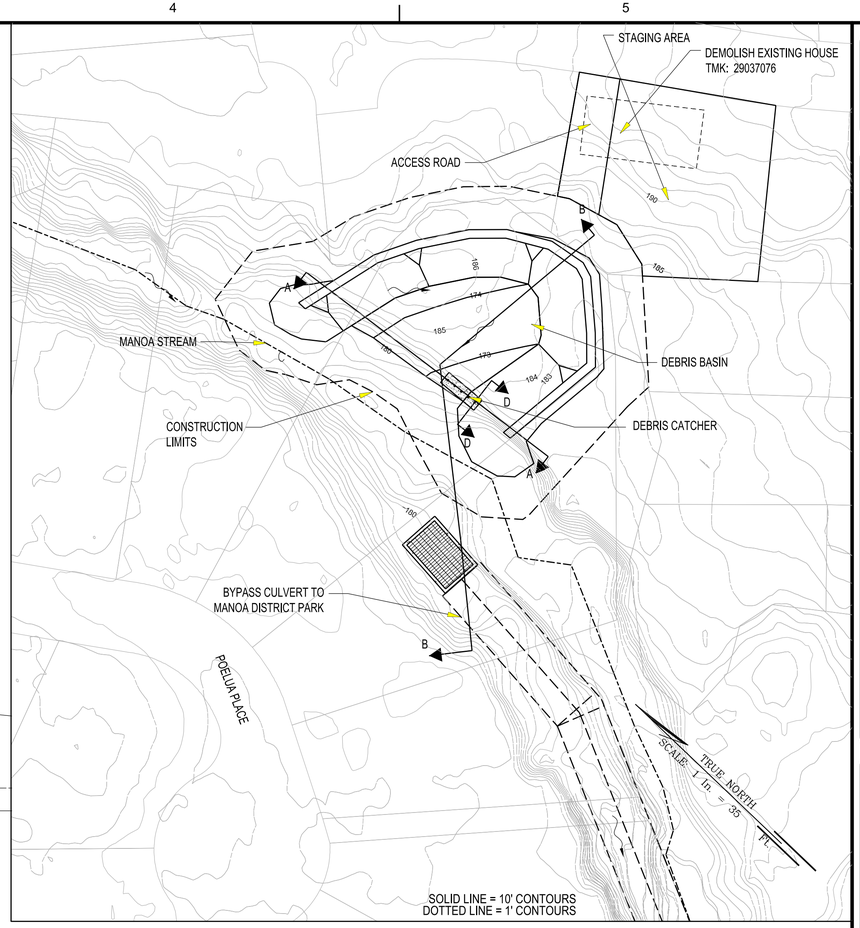
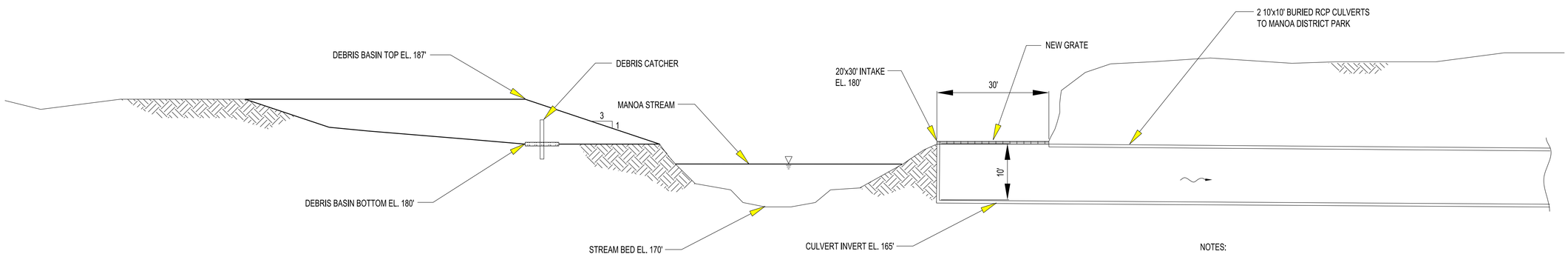


POELUA PLACE DEBRIS BASIN
SECTION A-A
SCALE: 1"=10'



PLAN
SCALE: 1"=35'



POELUA PLACE DEBRIS BASIN
SECTION B-B
SCALE: 1"=10'

10' 0' 10' 20'
SCALE: 1" = 10'

Note: All elevations are feet MSL

NOTES:

1. 6 FOOT HIGH CHAIN LINK FENCE AROUND ACCESS ROAD AND STAGING AREA.
2. 6 FOOT HIGH AND 24 FOOT WIDE CHAIN LINK FENCE GATE TO BE INSTALLED IN FRONT OF THE ACCESS ROAD.

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DATE:		SOLICIT. / CONTRACT NO.:		LOCATION CODE		DRAWING NUMBER:	SIZE: ANSI D

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ALA WAI CANAL PROJECT

POELUA PLACE DEBRIS BASIN
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-303
SHEET 8 OF 25

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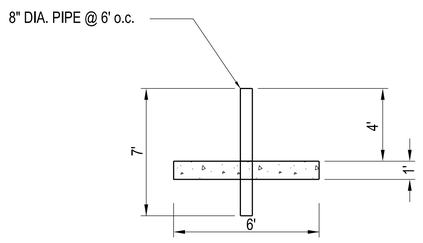
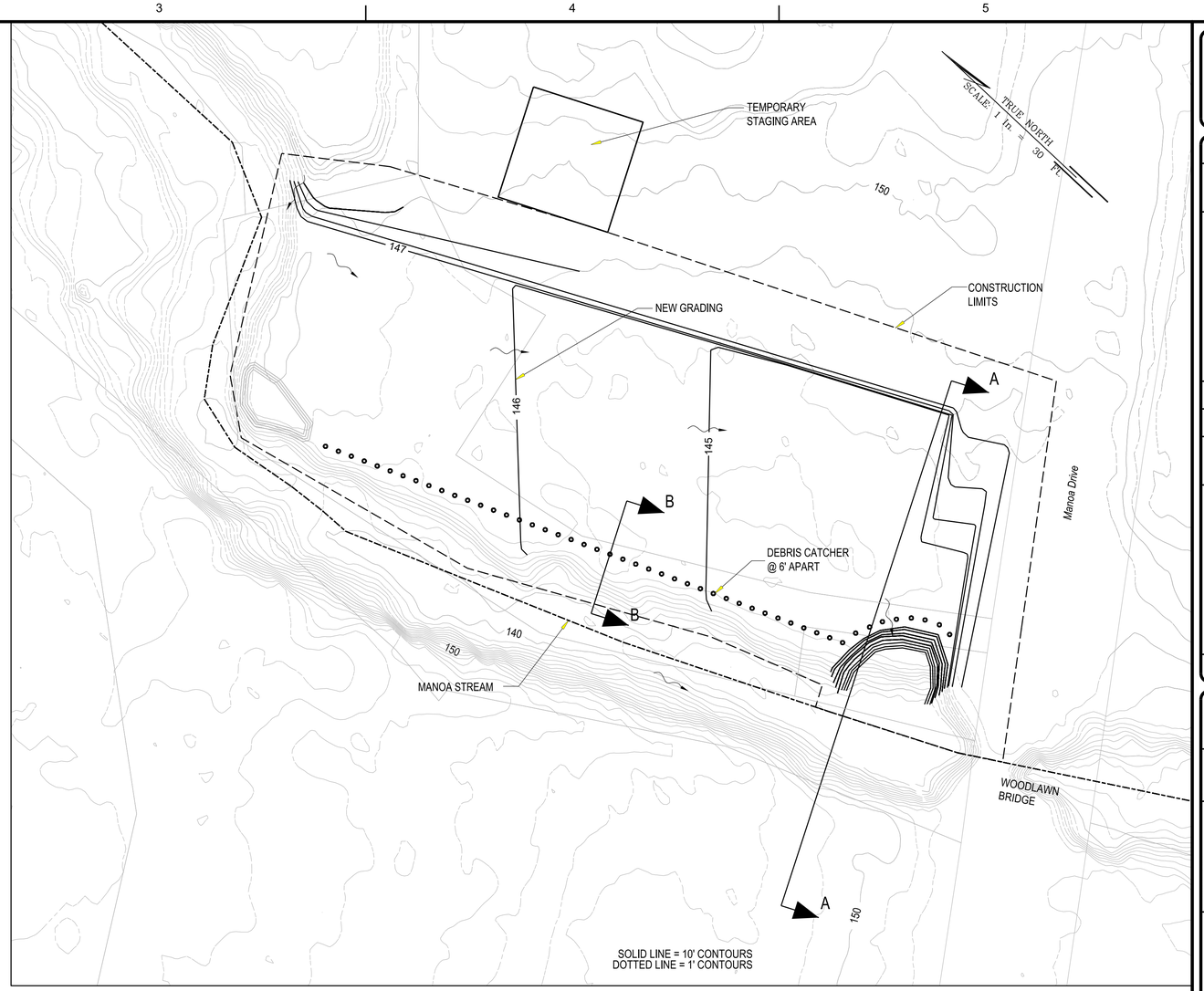


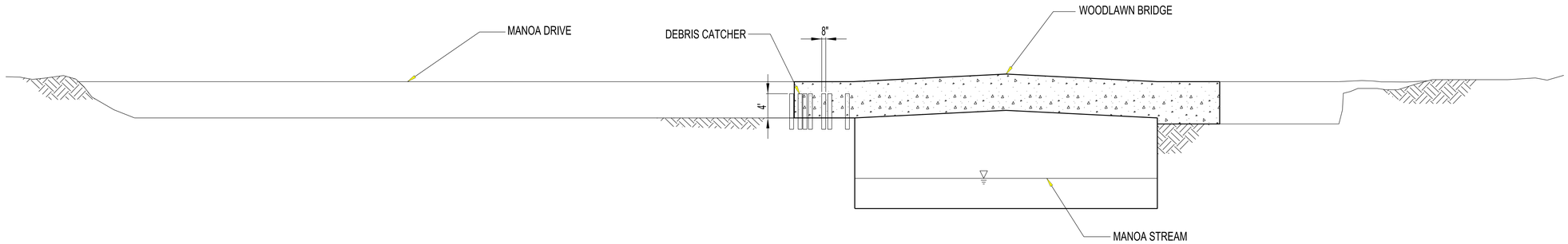
INNOVATION CENTER IMPROVEMENTS
SECTION B-B

SCALE: NTS



PLAN

SCALE: 1"=30'



10' 5' 0 10' 20'

SCALE: 1" = 10'

Note: All elevations are feet MSL

INNOVATION CENTER IMPROVEMENTS
SECTION A-A

SCALE: 1"=10'

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
PLOT SCALE:
PLOT DATE:
SIZE: ANSI D
DATE:
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
FILE NAME: INNOVATION CENTER IMPROVEMENTS, PLAN & SECTIONS

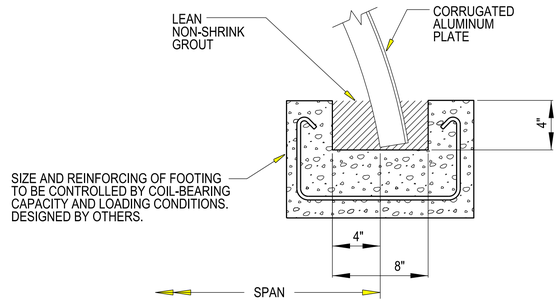
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

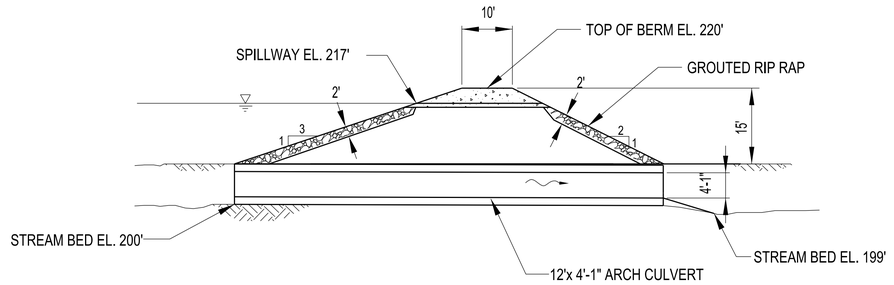
INNOVATION CENTER IMPROVEMENTS
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-304
SHEET 9 OF 25

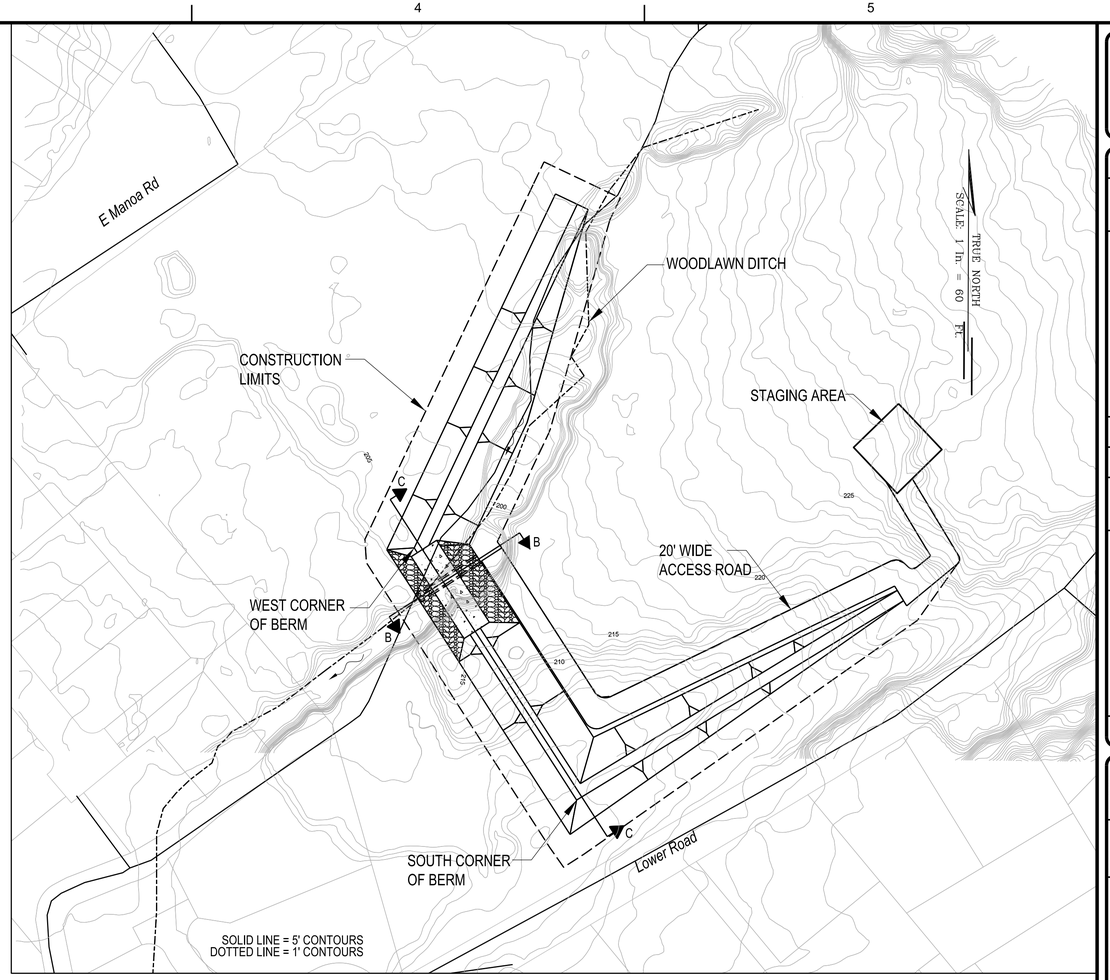
FILE: c:\pw_work\poh-1\j3ec9jhhd\d1139948\Ala_Wai_C-304xxx.dgn
MODEL NAME: C-304
DATE & TIME: 12/15/2014 1:20:22 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdrg\printer.plotdg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



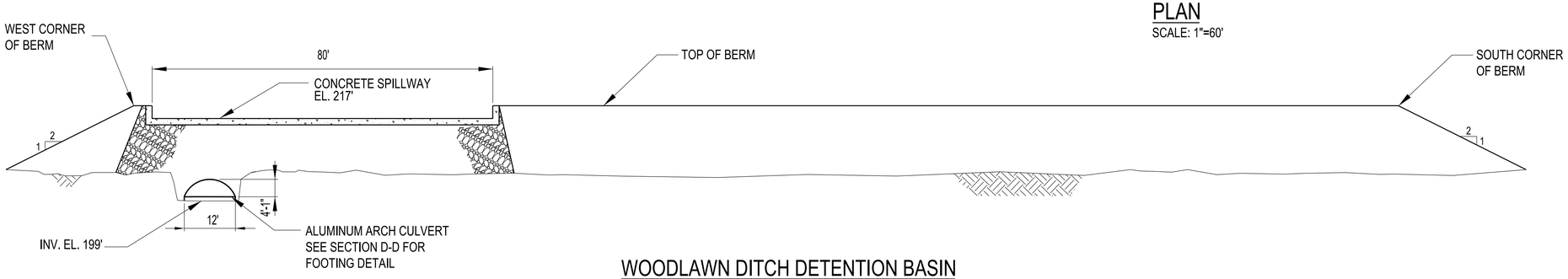
SLOTTED CONCRETE FOOTING
WOODLAWN DITCH DETENTION BASIN
SECTION D-D
SCALE: NTS



WOODLAWN DITCH DETENTION BASIN
SECTION B-B
SCALE: 1"=15'



PLAN
SCALE: 1"=60'



WOODLAWN DITCH DETENTION BASIN
SECTION C-C
SCALE: 1"=15'

15' 7.5' 0 15' 30'
SCALE: 1" = 15'

Note: All elevations are feet MSL

US Army Corps of Engineers
Honolulu District

			APPR.	DATE
			DESCRIPTION	
			APPR.	MARK
			DATE	
			DESCRIPTION	
			MARK	

DESIGNED BY: JJH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE: 12/15/14
FILE NAME: WOODLAWN DITCH DETENTION BASIN, PLAN & SECTIONS
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

WOODLAWN DITCH DETENTION
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-305
SHEET 10 OF 25

FILE: c:\pw_work\poh-1\j3ec9jhh\d01389484a_Wai_C-305x.dgn
MODEL NAME: C-305
DATE & TIME: 12/15/2014 1:48:51 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdrv\printer.plotdrv
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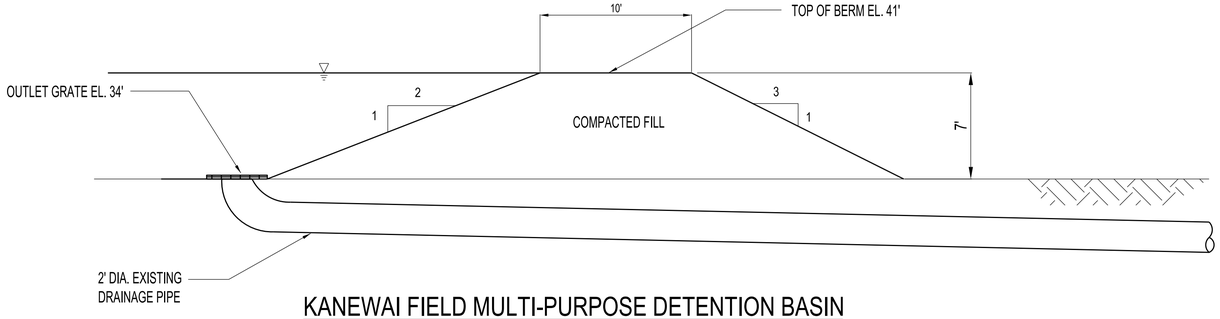
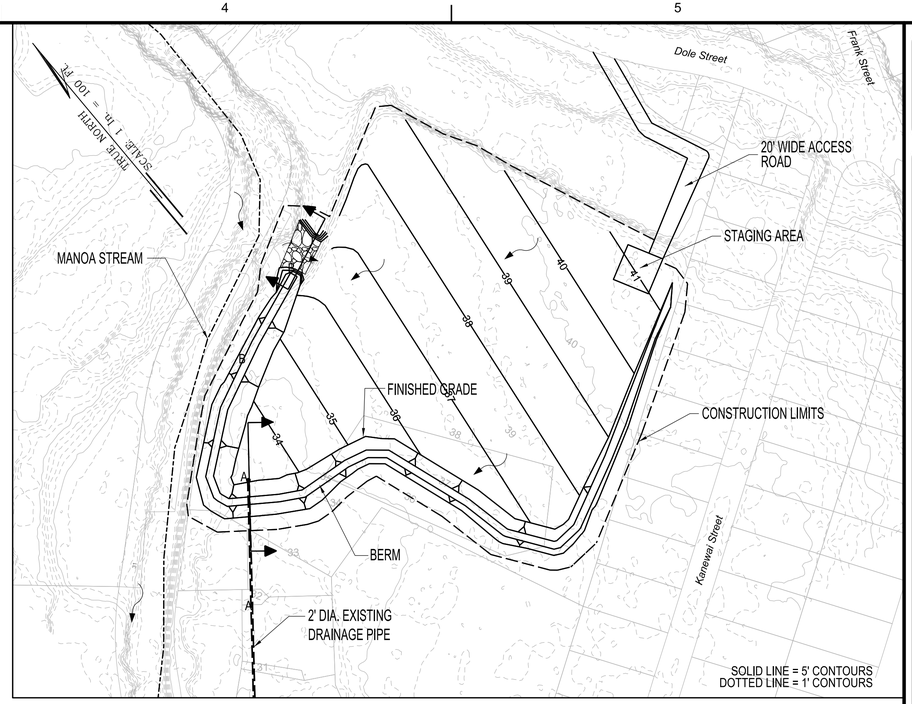
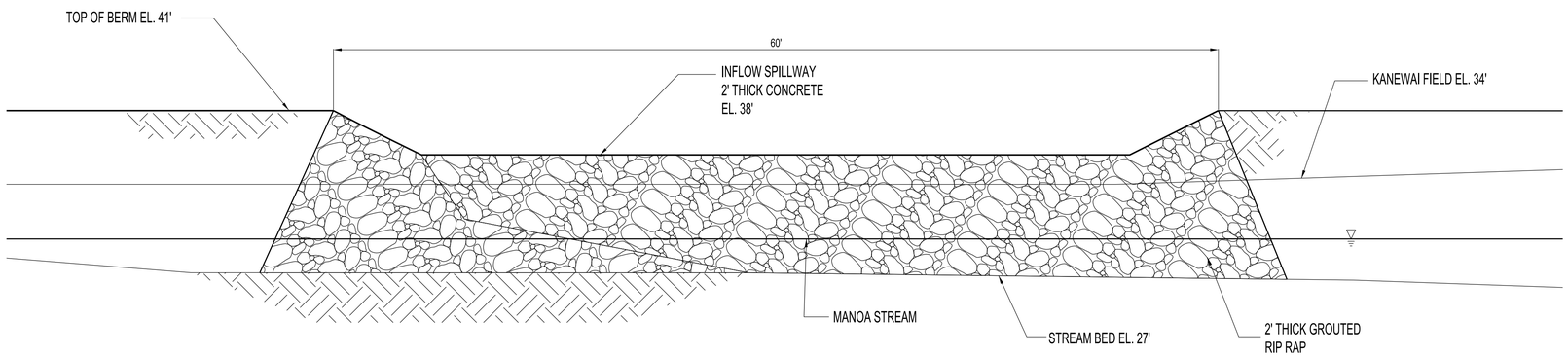
PRINTED BY: J3EC9JHH



KANEWAI FIELD MULTI-PURPOSE DETENTION BASIN
SECTION A-A
SCALE: 1" = 5'



PLAN
SCALE: 1" = 100'



KANEWAI FIELD MULTI-PURPOSE DETENTION BASIN
SECTION B-B
SCALE: 1" = 5'

5' 2.5' 0 5' 10'
SCALE: 1" = 5'
Note: All elevations are feet MSL

US Army Corps of Engineers
Honolulu District

10% DESIGN

NO.	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: 1:1 AS SHOWN
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE: 12/15/2014
FILE NAME: KANEWAI FIELD MULTI-PURPOSE DETENTION BASIN_PLAN AND SECTIONS
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

KANEWAI FIELD MULTI-PURPOSE DETENTION BASIN
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-306
SHEET 11 OF 25

FILE: c:\pw\work\poh-1\j3ec9jhh\d0139948\Alg_Wai_C-306xxx.dgn
MODEL NAME: C-306
DATE & TIME: 12/15/2014 1:52:44 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotg\printer.pltcfg
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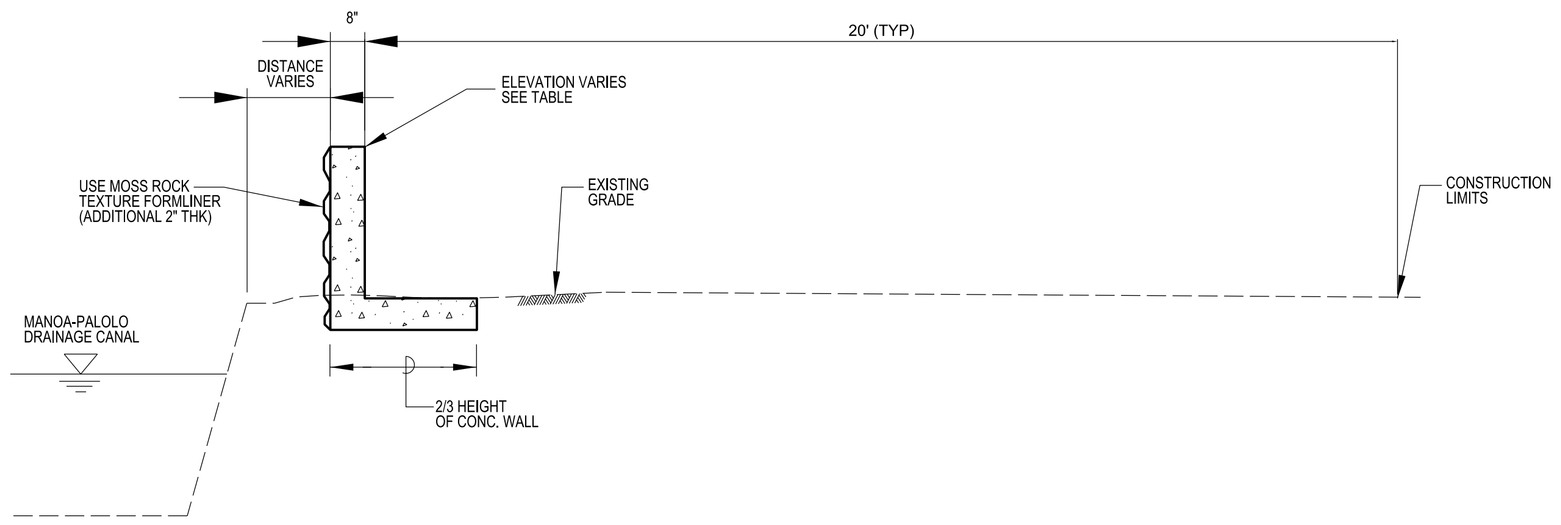
PRINTED BY: J3EC9JHH

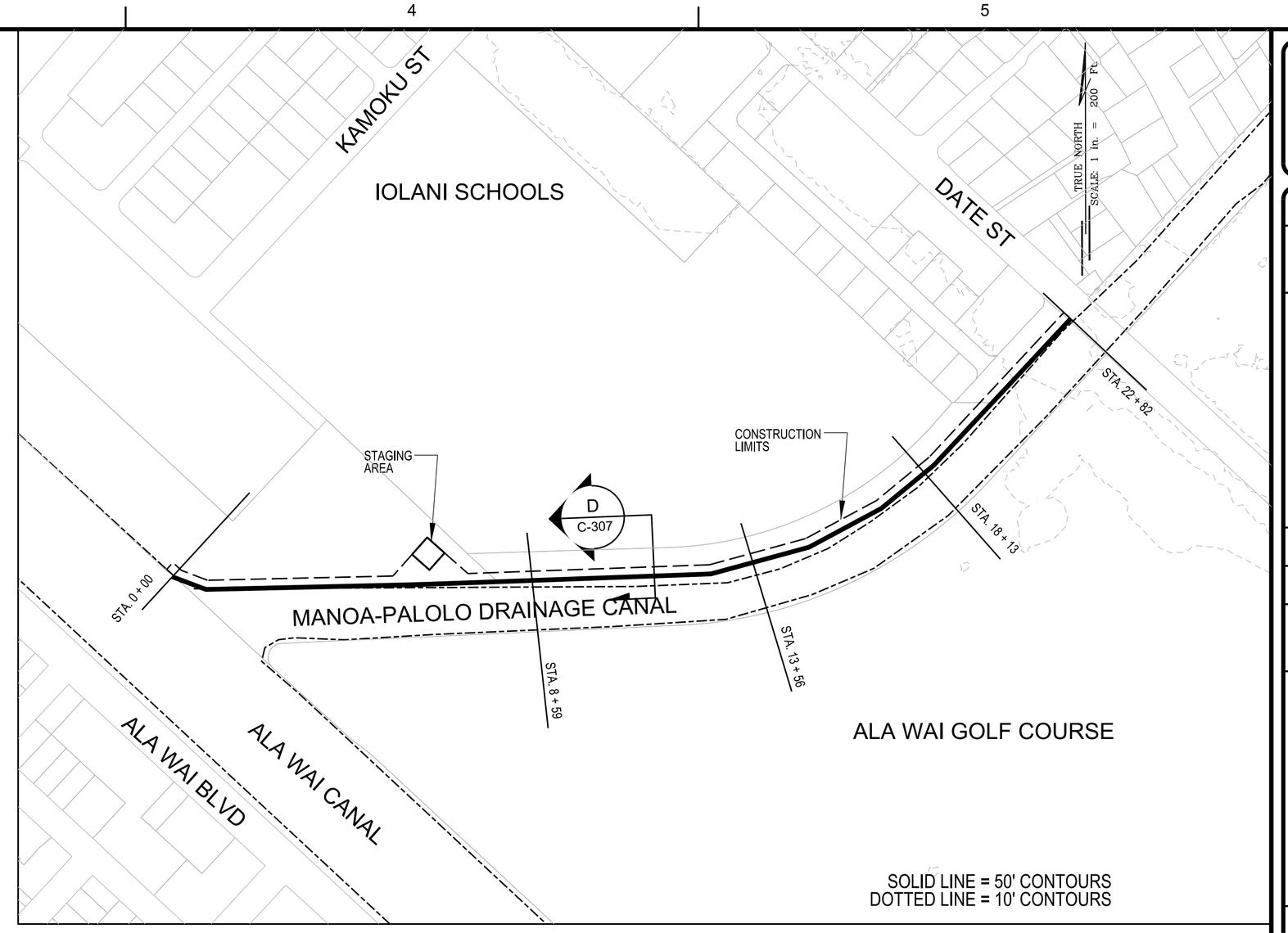


D TYPICAL CONCRETE FLOODWALL SECTION

NOT TO SCALE

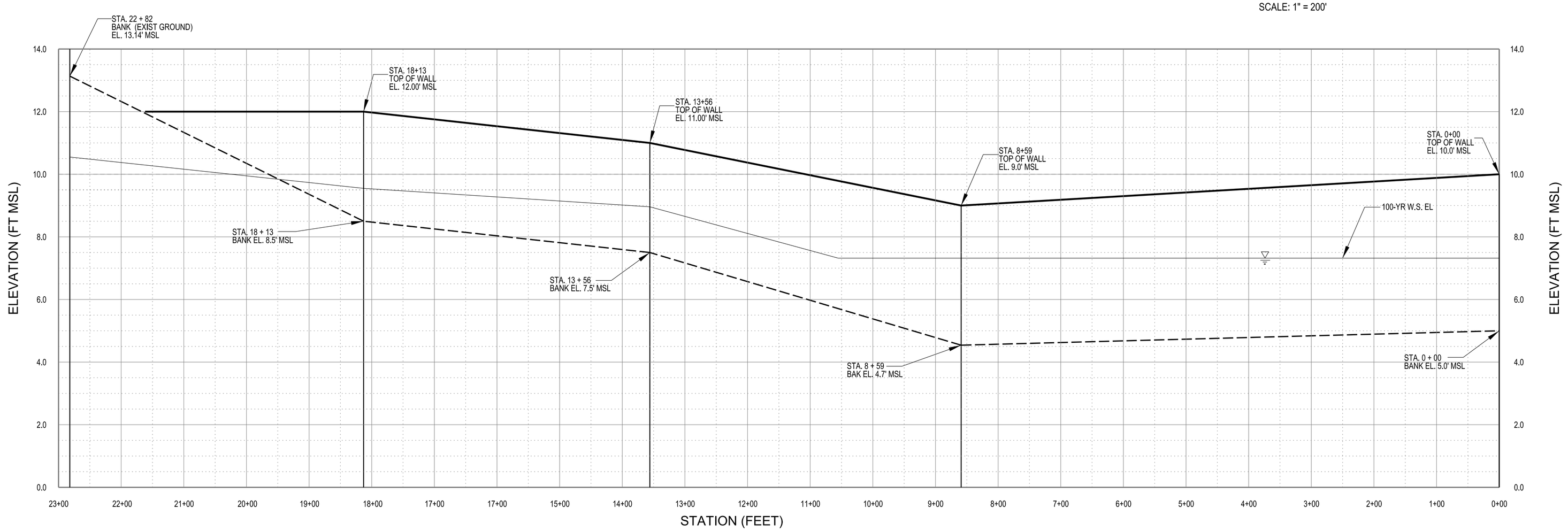
MANOA-PALOLO DRAINAGE CANAL
RIGHT BANK STA 22 + 82 TO 0 + 00

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
22 + 82	-	-
18 + 13	3.50	12.00
13 + 56	3.50	11.00
8 + 59	4.30	9.00
0 + 00	5.00	10.00



PLAN

SCALE: 1" = 200'



PROFILE
MANOA-PALOLO DRAINAGE CANAL FLOODWALL

SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'

US Army Corps of Engineers
HONOLULU DISTRICT

10% DESIGN

REVISION:	DESCRIPTION	DATE	APPR.	MARK	APPR.	DATE	DESCRIPTION	SECTION

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
CHECKED BY:
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
PLOT DATE: 12/15/2014
FILE NAME: MANOA-PALOLO DRAINAGE CANAL FLOODWALL PLAN_PROFILE_SECTION

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

MANOA-PALOLO DRAINAGE CANAL FLOODWALL
PLAN, PROFILE AND SECTION
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-307
SHEET 12 OF 25

FILE: c:\pw-work\poh-1\j3ec9jhh\d01399948\Ala_Wai_C-307-xxx.dgn
MODEL NAME: C-301
DATE & TIME: 12/15/2014 1:55:16 PM
LAST SAVED BY: J3ECSJHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdrv\printer.pltcfg
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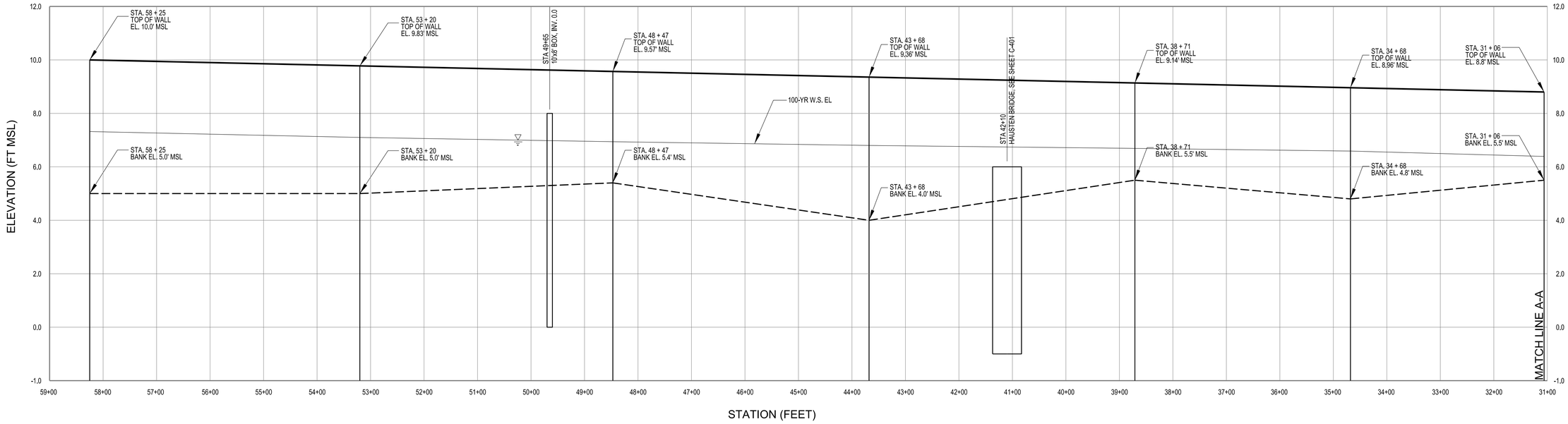

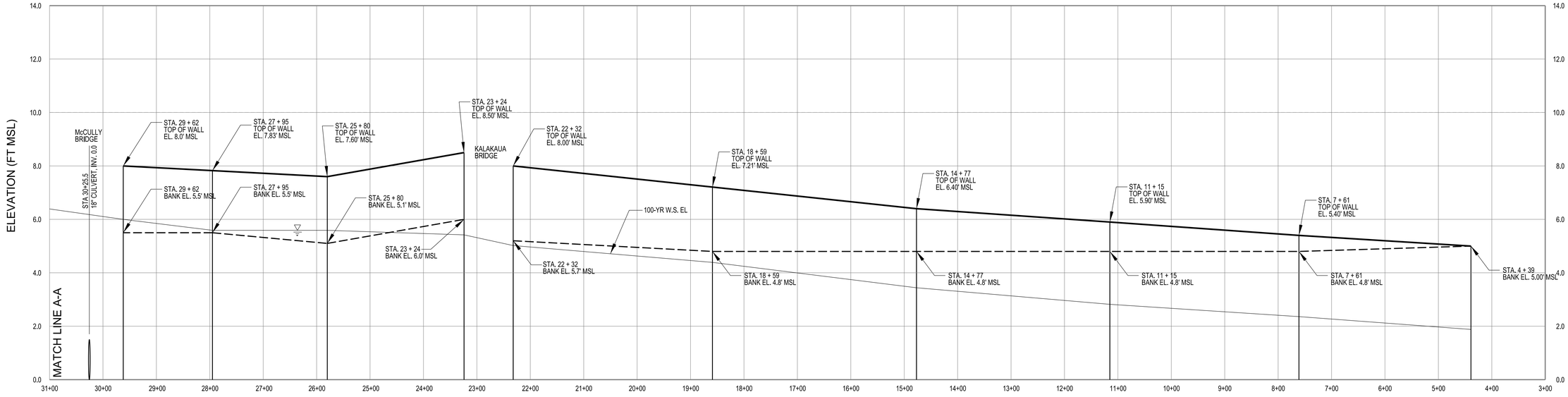

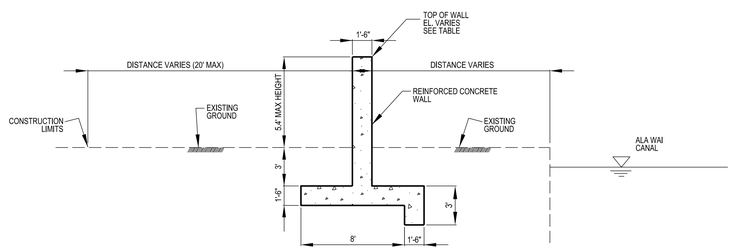

A TYPICAL RIGHT BANK REINFORCED CONCRETE FLOODWALL SECTION

NOT TO SCALE

PROFILE

ALA WAI MIDDLE (ALA2) AND LOWER (ALA1) RIGHT BANK FLOODWALLS

SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'

ALA WAI CANAL MIDDLE (ALA2) RIGHT BANK
STA 58 + 25 TO 25+80

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
58 + 25	5.00	10.00
53 + 20	4.78	9.83
48 + 47	4.17	9.57
43 + 68	5.36	9.36
38 + 71	3.64	9.14
34 + 68	4.16	8.96
31 + 06	3.39	8.80
MCCLULLY BRIDGE		
29 + 62	2.50	8.00
27 + 95	2.33	7.83
25 + 80	2.50	7.60

ALA WAI CANAL LOWER (ALA1) RIGHT BANK
STA 23 + 24 TO 4 + 39

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
23 + 24	2.50	8.50
KALAKAUA AVE BRIDGE		
22 + 32	2.80	8.00
18 + 59	2.41	7.21
14 + 77	1.60	6.40
11 + 15	1.10	5.90
7 + 61	0.60	5.40
4 + 39	0	5.00

US Army Corps of Engineers
HONOLULU DISTRICT

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: 1=100'
PLOT SHOWN: MODEL
SIZE: ANSI D

DATE:
CHECKED BY:
LOCATION CODE
PLOT DATE: 12/15/2014
FILE NAME: ALA WAI CANAL MIDDLE & LOWER RIGHT BANK PROFILE & SECTION

REVISION:
SOLICIT. / CONTRACT NO.:
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ALA WAI MIDDLE & LOWER RIGHT BANK FLOODWALLS
PROFILE AND SECTION
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-309
SHEET 13 OF 25

FILE: c:\pw-workpoh-1\j3ec9jhh\d01399948\Ala_Wai_C-309xxx.dgn
MODEL NAME: C-309
DATE & TIME: 12/15/2014 1:57:35 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdg\printer.plotdg
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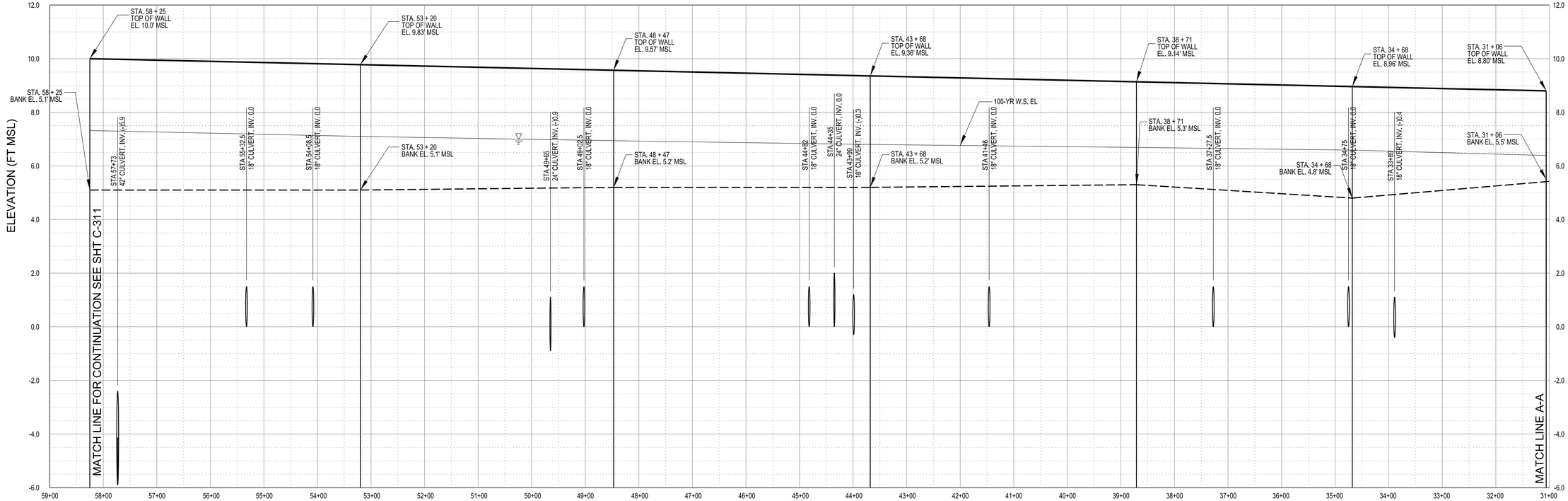
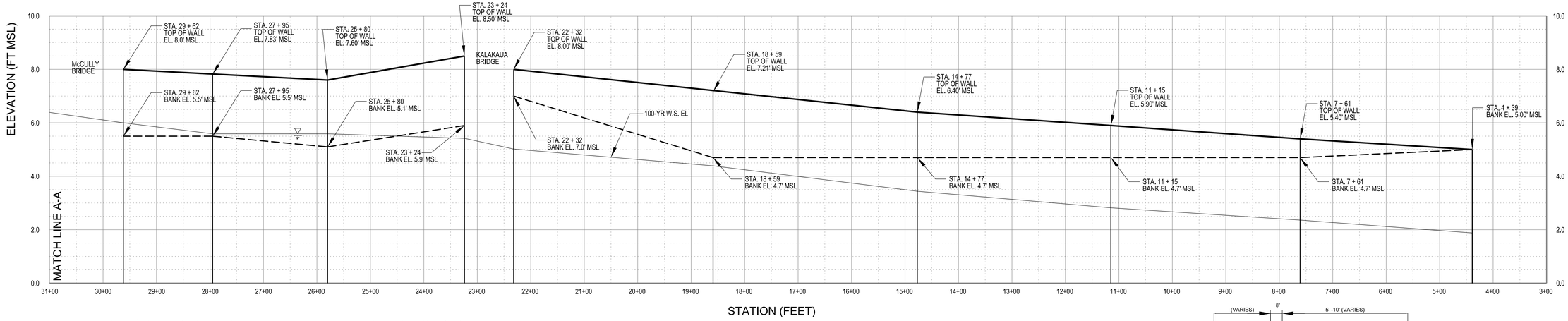
PRINTED BY: J3EC9JHH





ALA WAI CANAL MIDDLE (ALA2) LEFT BANK
STA TO 58 + 25 TO 25+80

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
58 + 25	4.90	10.00
53 + 20	4.68	9.83
48 + 47	4.30	9.57
43 + 68	4.16	9.36
38 + 71	3.84	9.14
34 + 68	4.16	8.96
31 + 06	3.39	8.80
MCCLULLY BRIDGE		
29 + 62	2.50	8.00
27 + 95	2.33	7.83
25 + 80	2.50	7.60

ALA WAI CANAL LOWER (ALA1)LEFT BANK
STA TO 23 + 24 TO 4 + 39

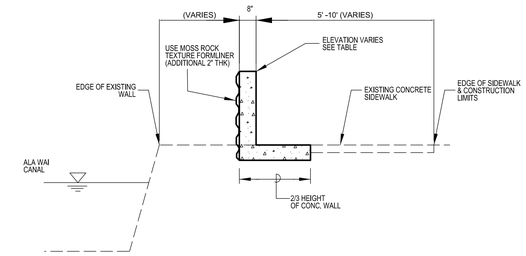
STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
23 + 24	2.6	8.5
KALAKAUA BRIDGE		
22 + 32	1.00	8.00
18 + 59	2.51	7.21
14 + 77	1.70	6.40
11 + 15	1.20	5.90
7 + 61	0.70	5.40
4 + 39	0	5

PROFILE
ALA WAI CANAL MIDDLE (ALA2) AND LOWER (ALA1) LEFT BANK FLOODWALLS

SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'

NOTES:

1. SEE DETAIL "C" ON SHEET C-311 FOR ALA WAI CANAL MIDDLE (ALA2) TYPICAL LEFT BANK CONCRETE FLOODWALL SECTION.
2. ALA WAI CANAL LOWER (ALA 1) IS FROM STATION 23+24 TO STATION 4+39.



B TYPICAL ALA WAI LOWER (ALA1) LEFT BANK CONCRETE FLOODWALL SECTION

NOT TO SCALE

US Army Corps of Engineers
POHONOLULU DISTRICT

10% DESIGN

	DESCRIPTION	DATE	APPR.
MARK			

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
CHECKED BY:
PLOT SCALE: 1:1 SHOWN ON SIZE: ANSI D
PLOT DATE:
FILE NAME: ALA WAI CANAL MIDDLE & LOWER LEFT BANK PROFILE
DRAWING NUMBER:
LOCATION CODE
SOLICIT. / CONTRACT NO.:
REVISION:
DATE:

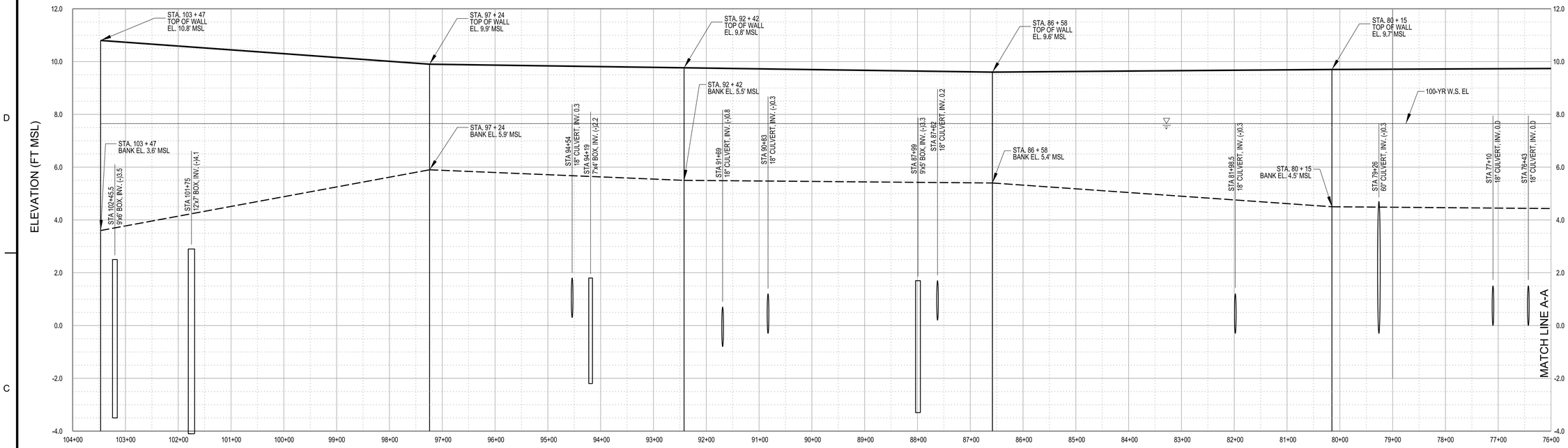
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

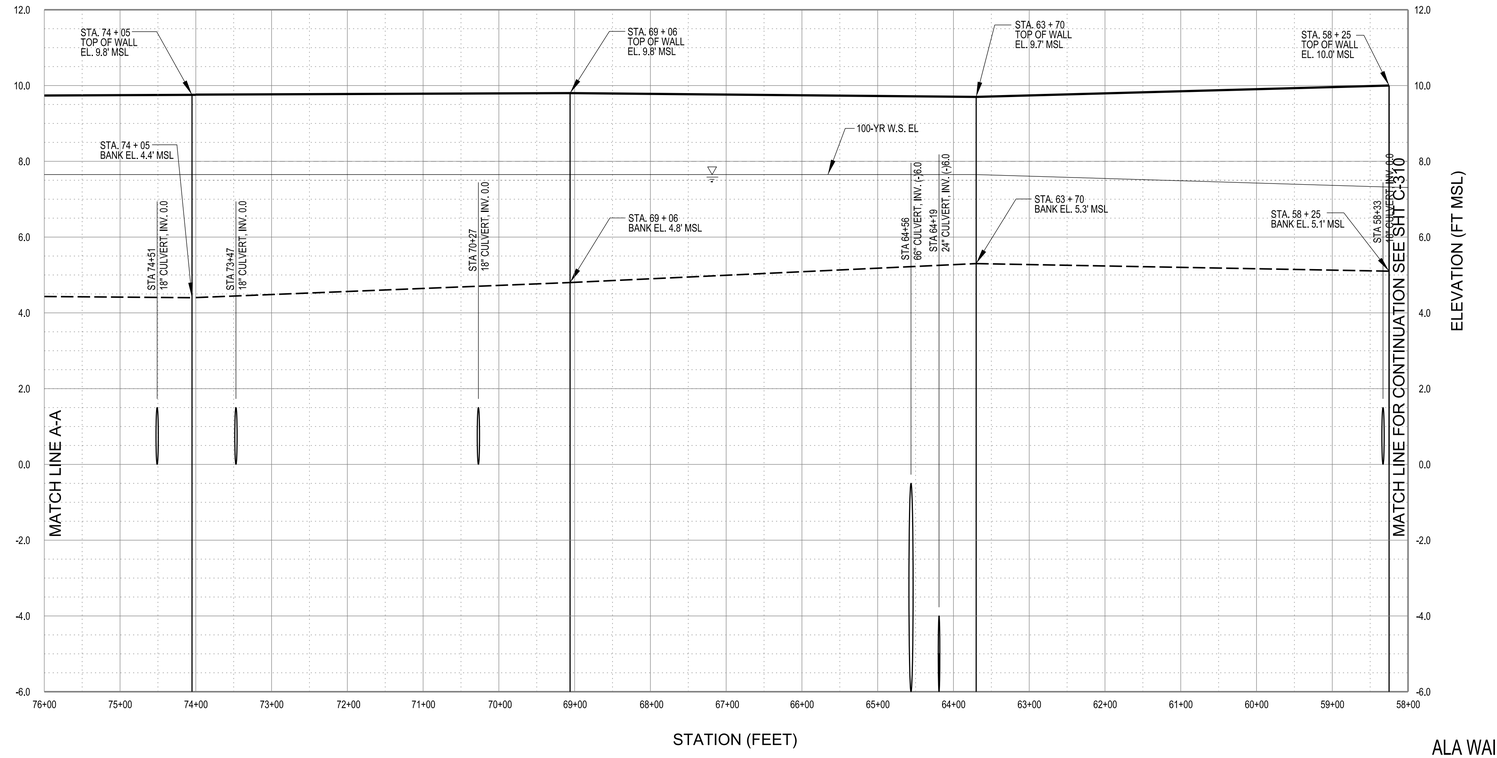
ALA WAI CANAL PROJECT

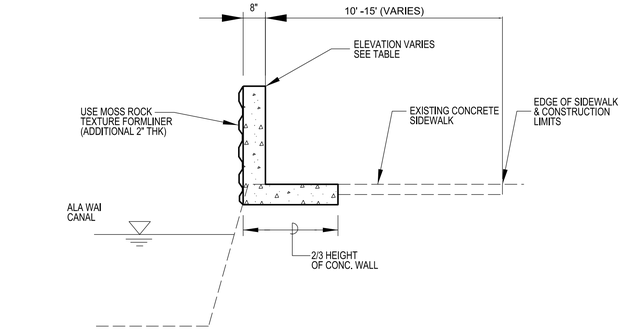
ALA WAI MIDDLE & LOWER LEFT BANK FLOODWALLS
PROFILE
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-310
SHEET 14 OF 25

FILE: c:\pw_work\poh-1\j3ec9jhh\d01399848/Ala_Wai_C-310xxx.dgn
MODEL NAME: C-310
DATE & TIME: 12/15/2014 2:06:11 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries1)\WorkSpace\system\plotdg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH







C TYPICAL LEFT BANK CONCRETE FLOODWALL SECTION

NOT TO SCALE

ALA WAI CANAL UPPER (ALA3) LEFT BANK
STA 101 + 24 TO 58 + 25

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
101 + 24	7.20	10.80
97 +24	4.00	9.90
92 + 42	4.30	9.80
86 + 58	4.20	9.60
80 + 15	5.20	9.70
74 + 05	5.40	9.80
69 + 06	5.00	9.80
63 + 70	4.40	9.70
58 + 25	4.90	10.00

PROFILE

ALA WAI CANAL UPPER (ALA3) LEFT BANK FLOODWALLS

SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'

US Army Corps of Engineers®
HONOLULU DISTRICT

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: 1:1
PLOT SHOWN: FULL SIZE
SIZE: ANSI D

DATE:
CHECKED BY:
PLOT DATE:
FILE NAME: ALA WAI CANAL UPPER LEFT BANK, PROFILE & SECTIO

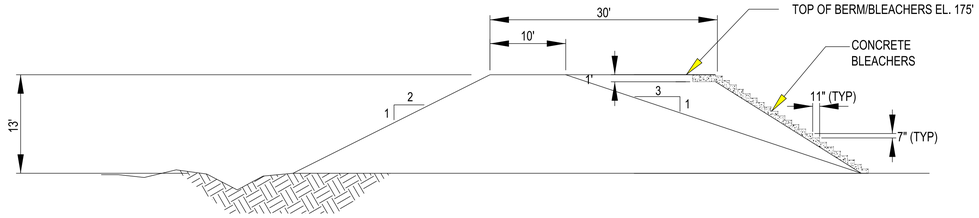
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

ALA WAI CANAL PROJECT

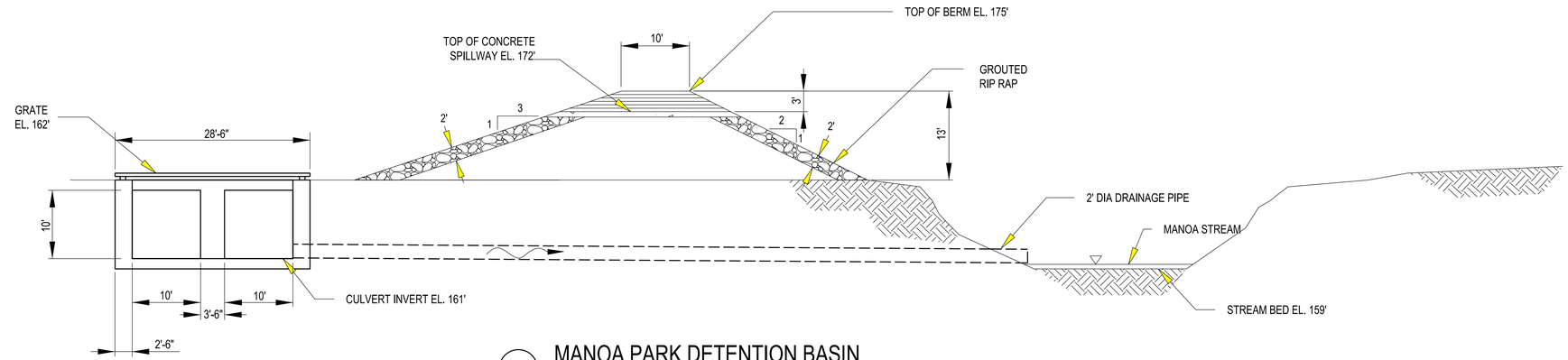
ALA WAI UPPER LEFT BANK FLOODWALLS
PROFILE
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-311
SHEET 15 OF 25

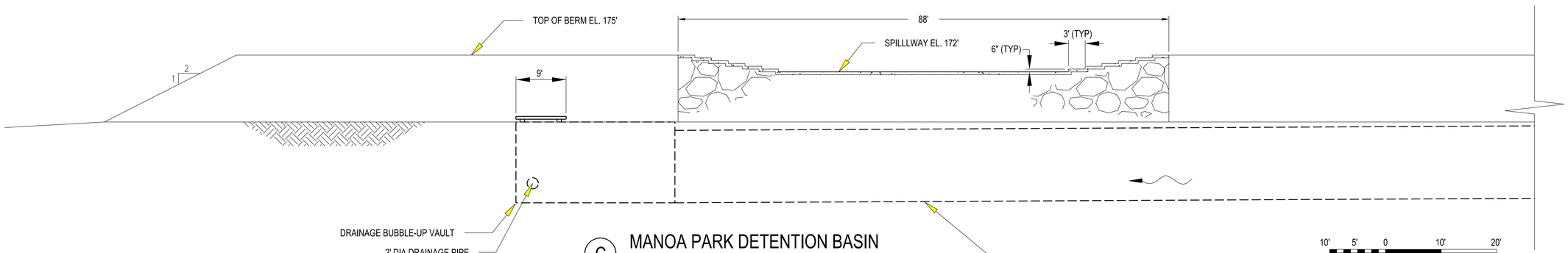
FILE: c:\pw_work\poh-1\j3ec9jhh\d0139948\Ala_Wai_C-311xxx.dgn
MODEL NAME: C-311
DATE & TIME: 12/15/2014 2:08:09 PM
LAST SAVED BY: j3ec9cp9
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdg\printer.plotdg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



A MANOA PARK DETENTION BASIN
SECTION A-A
SCALE: 1"=10'



B MANOA PARK DETENTION BASIN
SECTION B-B
SCALE: 1"=10'



C MANOA PARK DETENTION BASIN
SECTION C-C
SCALE: 1"=10'

SCALE: 1" = 10'

Note: All elevations are feet MSL

US Army Corps of Engineers®
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE: 1/2/2014
FILE NAME: MANOA PARK DETENTION BASIN, SECTIONS
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

ALA WAI CANAL PROJECT

MANOA PARK DETENTION BASIN
SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-312
SHEET16 OF25

FILE: c:\pw-work\poh-1\j3ec9jhh\d01399948\Ala_Wai_C-312xxx.dgn
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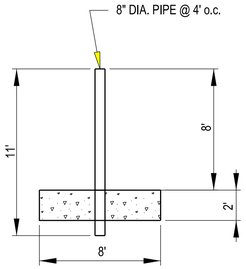
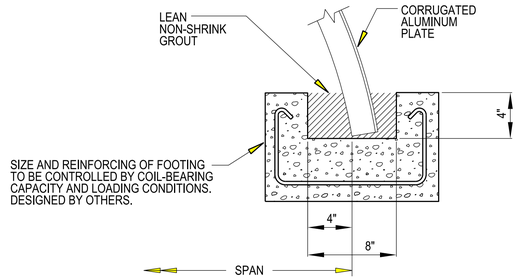
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotfg\printer.plotcfg
PEN TABLE: BW_incl_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH

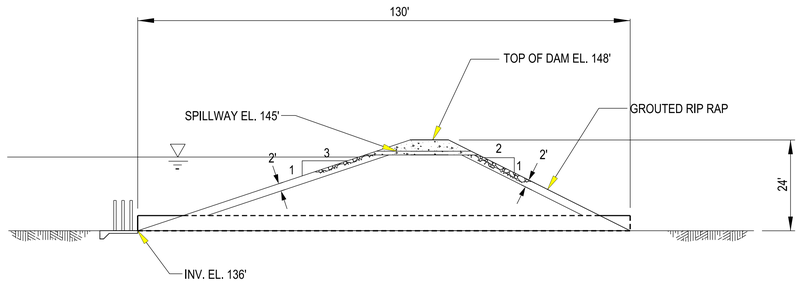


ROOSEVELT DEBRIS AND DETENTION BASIN
SECTION A-A
SCALE: 1"=5'



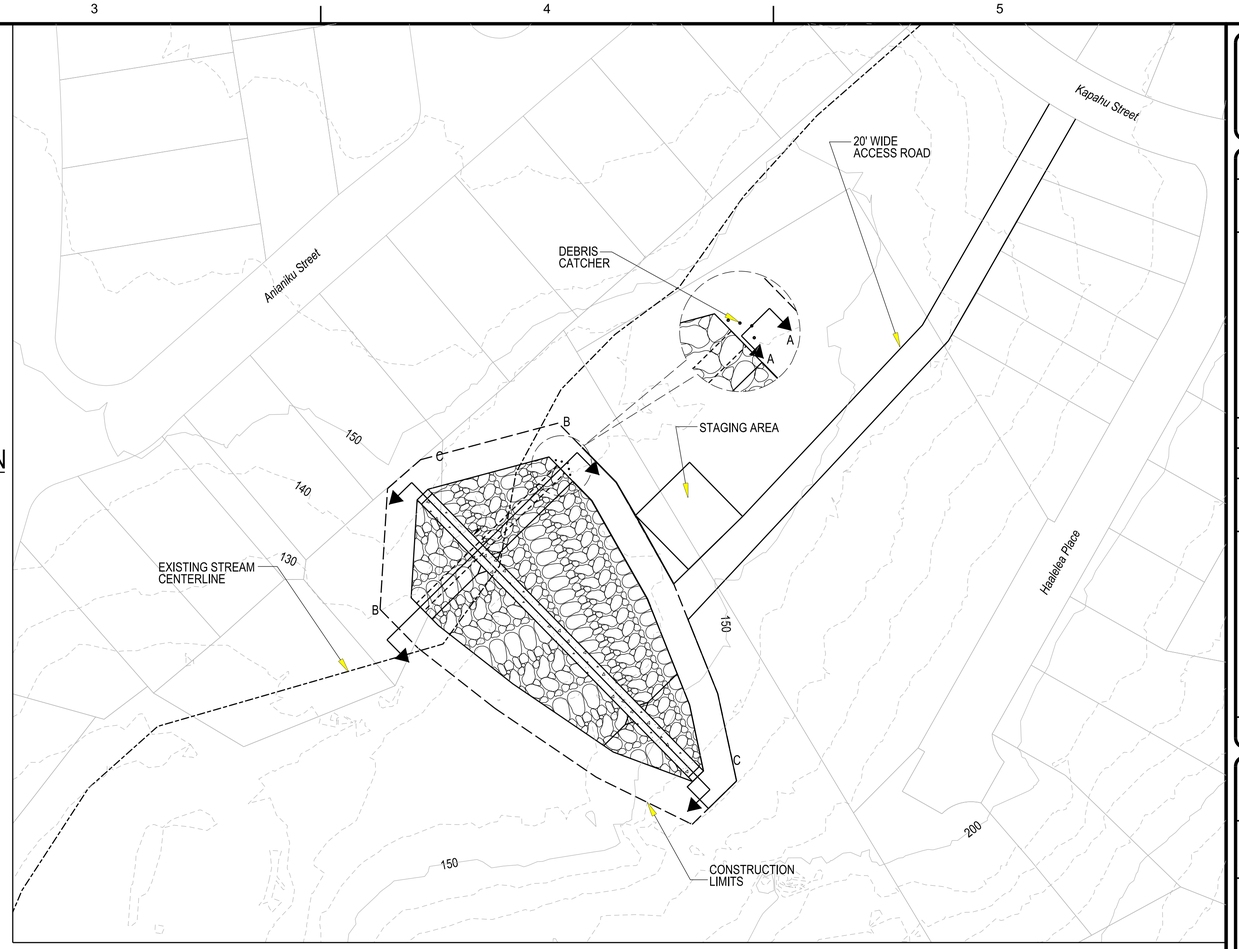
SLOTTED CONCRETE FOOTING

ROOSEVELT DEBRIS AND DETENTION BASIN
SECTION D-D
SCALE: NTS

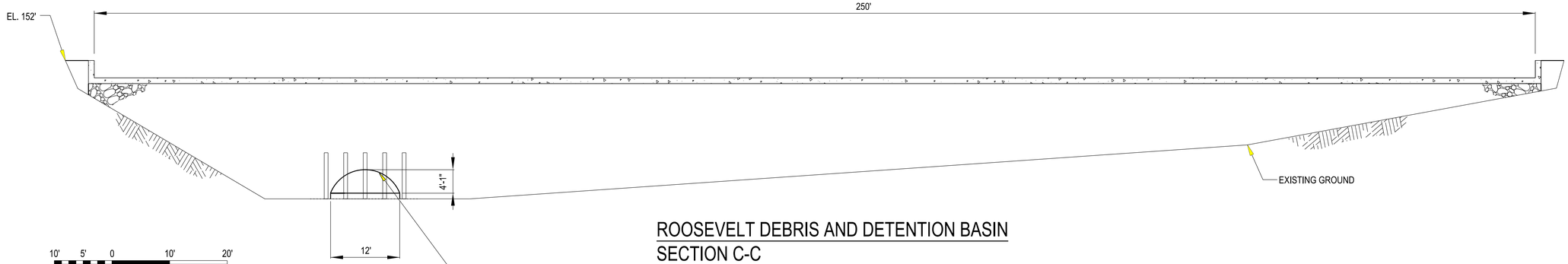


20' 10' 0 20' 40'
SCALE: 1" = 20'
Note: All elevations are feet MSL

ROOSEVELT DEBRIS AND DETENTION BASIN
SECTION B-B
SCALE: 1"=20'



SOLID LINE = 50' CONTOURS
DOTTED LINE = 10' CONTOURS



10' 5' 0 10' 20'
SCALE: 1" = 10'
Note: All elevations are feet MSL

ROOSEVELT DEBRIS AND DETENTION BASIN
SECTION C-C
SCALE: 1"=20'

US Army Corps of Engineers®
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JPH
DRAWN BY:
SUBMITTED BY:
CHECKED BY:
DATE:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
PLOT SCALE: AS SHOWN
PLOT DATE:
REVISION:
FILE NAME: ROOSEVELT DEBRIS & DETENTION BASIN, PLAN & SECTIONS
SIZE: ANSI D

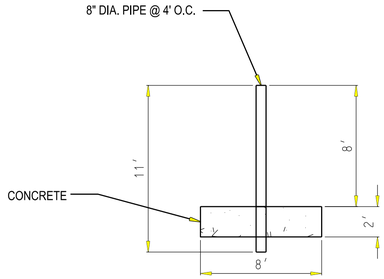
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ROOSEVELT DEBRIS AND DETENTION BASIN
PLAN AND SECTIONS
ALTERNATIVE 2A

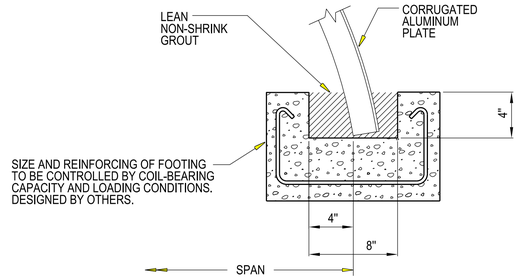
SHEET IDENTIFICATION
C-314
SHEET 17 OF 25

FILE: c:\pw-work\poh-1\j3ec9jhh\d0139948\Ala_Wai_C-314xxx.dgn
MODEL NAME: C-314
DATE & TIME: 12/15/2014 2:14:03 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotf\gprinter.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



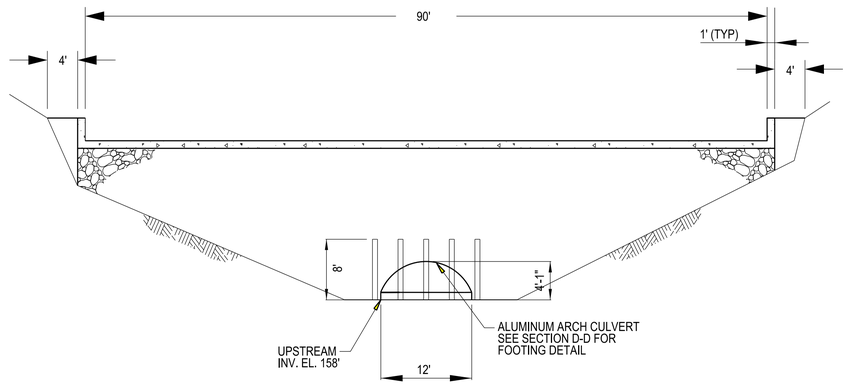
MAKIKI DEBRIS AND DETENTION BASIN
SECTION A-A

SCALE: 1"=5'



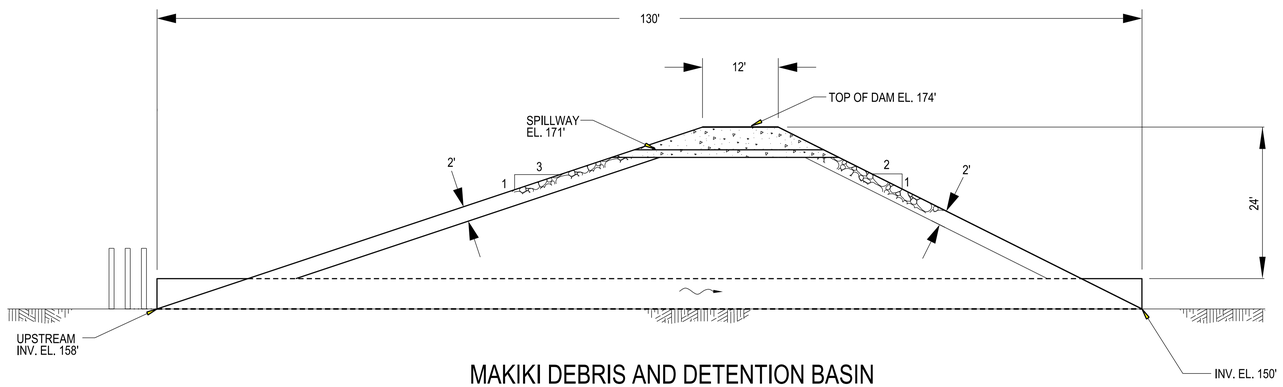
SLOTTED CONCRETE FOOTING
MAKIKI DEBRIS AND DETENTION
SECTION D-D

SCALE: NTS



MAKIKI DEBRIS AND DETENTION BASIN
SECTION B-B

SCALE: 1"=10'



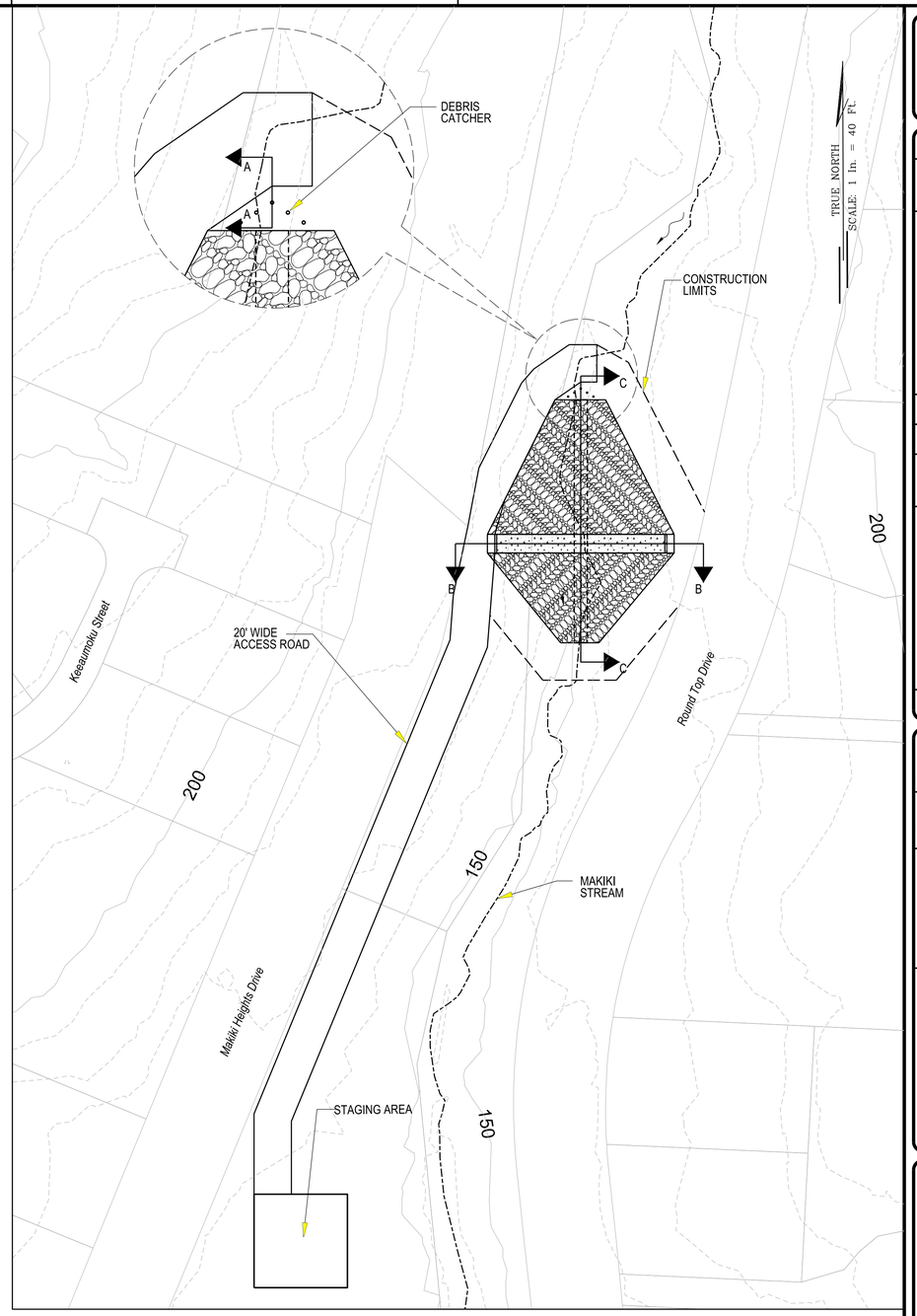
MAKIKI DEBRIS AND DETENTION BASIN
SECTION C-C

SCALE: 1"=10'

10' 5' 0 10' 20'

SCALE: 1" = 10'

Note: All elevations are feet MSL



SOLID LINE = 50' CONTOURS
DOTTED LINE = 10' CONTOURS

PLAN

SCALE: 1"=40'

US Army Corps of Engineers®
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
CHECKED BY:
PLOT SCALE: AS SHOWN
PLOT DATE: 1/15/2014
FILE NAME: MAKIKI DEBRIS & DETENTION BASIN, PLAN & SECTIONS
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
DATE:
REVISION:

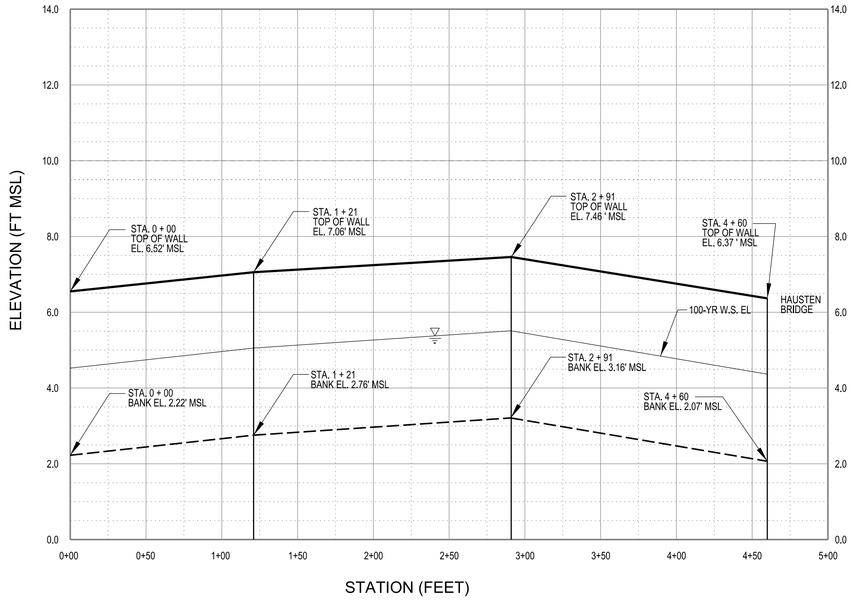
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

MAKIKI DEBRIS AND DETENTION BASIN
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-315
SHEET 18 OF 25

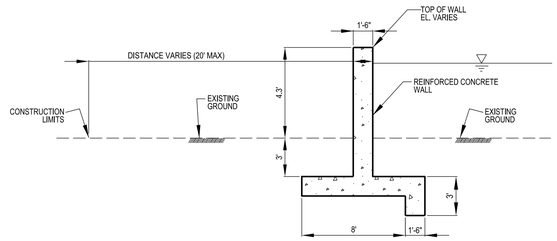
FILE: c:\pwwork\poh-1\j3aec9jhh\d0139948\Ala_Wai_C-315xxx.dgn
MODEL NAME: C-315
DATE & TIME: 12/15/2014 2:27:43 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries1)\WorkSpace\system\plotcfg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



PROFILE

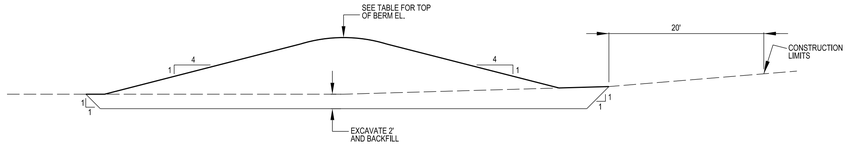
HAUSTEN DITCH RIGHT BANK FLOODWALL

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 2'



A TYPICAL REINFORCED CONCRETE FLOODWALL SECTION

NOT TO SCALE



B HAUSTEN TYPICAL EARTHEN BERM SECTION

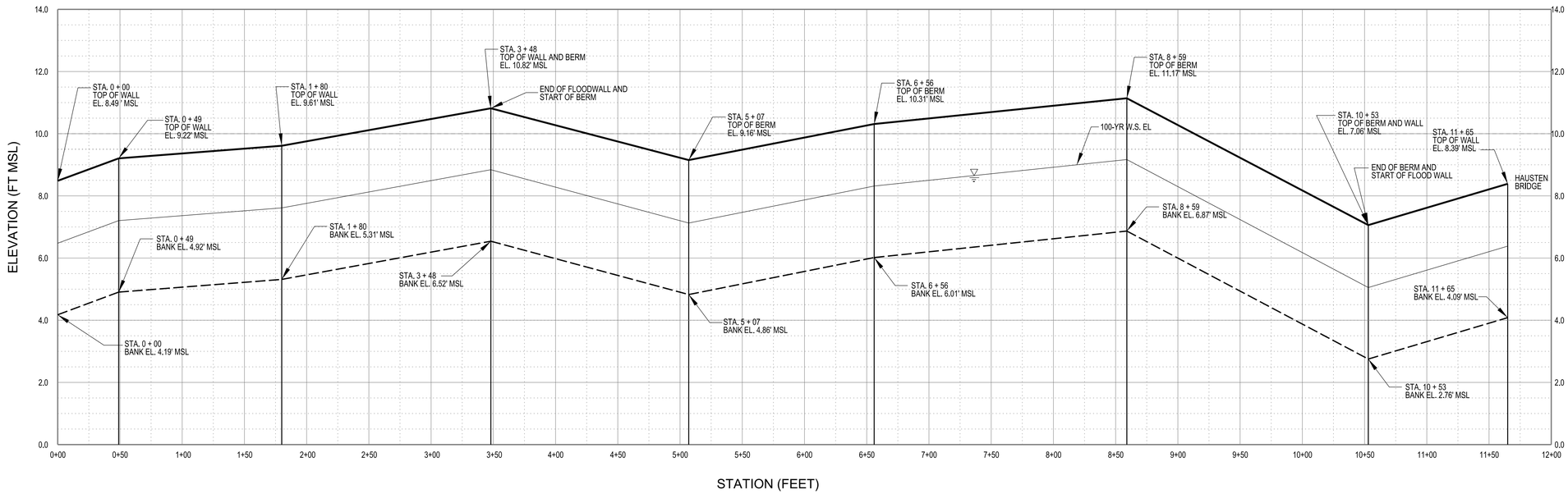
NOT TO SCALE

HAUSTEN DITCH RIGHT BANK FLOODWALL
STA TO 0 + 00 TO 4 + 60

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
0 + 00	4.30	6.52
1 + 21	4.30	7.06
2 + 91	4.30	7.46
4 + 60	4.30	6.37
HAUSTEN BRIDGE		

HAUSTEN DITCH LEFT BANK
FLOODWALL AND BERM
STA TO 0 + 00 TO 11 + 65

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
0 + 00	4.30	8.49
0 + 49	4.30	9.22
1 + 80	4.30	9.61
3 + 48	4.30	10.82
END OF FLOODWALL AND START OF BERM		
3 + 48	4.30	10.82
5 + 07	4.30	9.16
6 + 56	4.30	10.31
8 +59	4.30	11.17
10 + 53	4.30	7.06
END OF BERM AND START OF FLOODWALL		
10 + 53	4.30	7.06
11 + 65	4.30	8.39
HAUSTEN BRIDGE		



PROFILE

HAUSTEN DITCH LEFT BANK FLOODWALL AND BERM

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 2'

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
DATE:
CHECKED BY:
PLOT SCALE: 1=1 FULL SCALE
SIZE: ANSI D
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
PLOT DATE:
FILE NAME: HAUSTEN DITCH PROFILE & SECTIONS

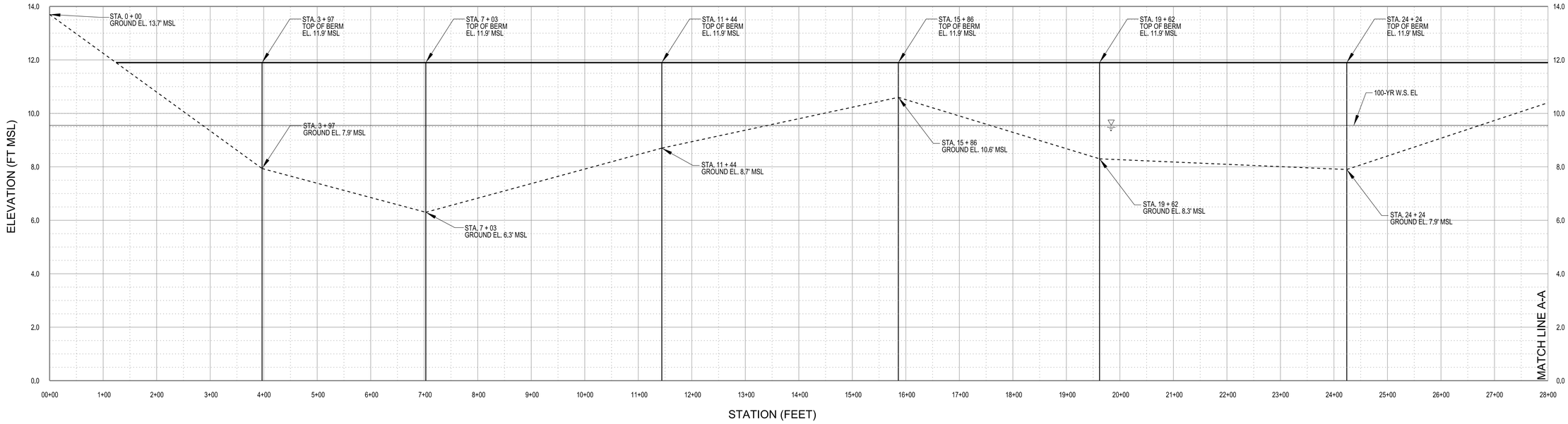
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

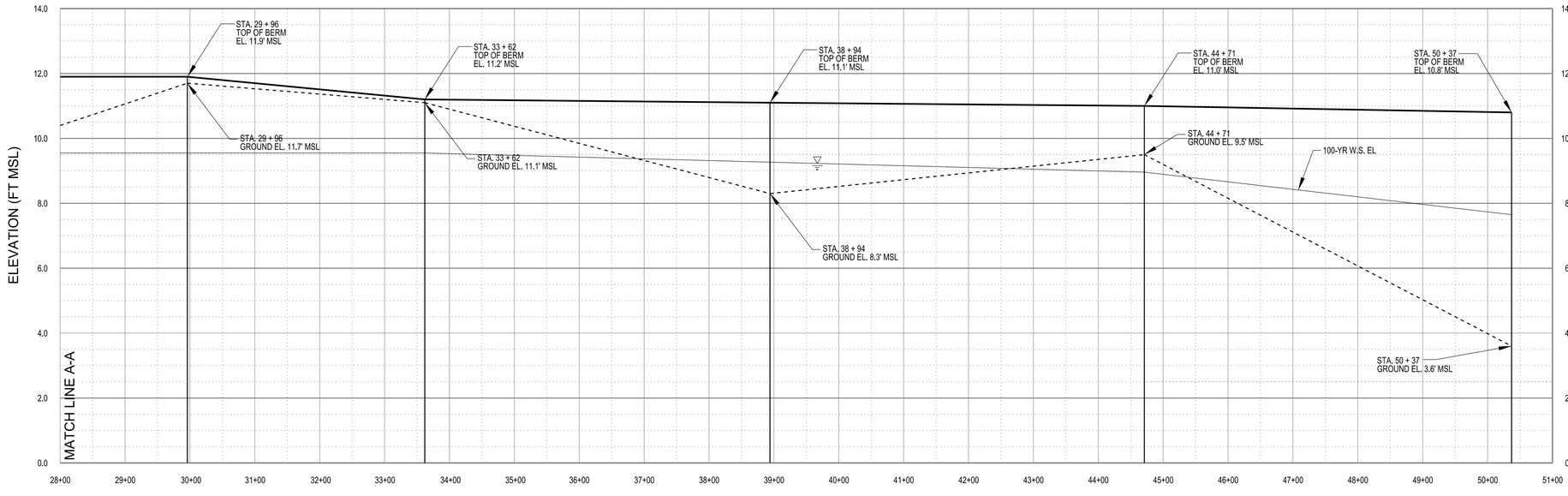
ALA WAI CANAL PROJECT

HAUSTEN DITCH FLOODWALL AND BERM
PROFILE AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-316
SHEET 19 OF 25

FILE: c:\pw\work\poh-1\j3ec9jhh\d0139948\Ala_Wai_C-316xxx.dgn
MODEL NAME: C-316
DATE & TIME: 12/15/2014 2:30:16 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotcfg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH





ALA WAI GOLF COURSE BERM PROFILE

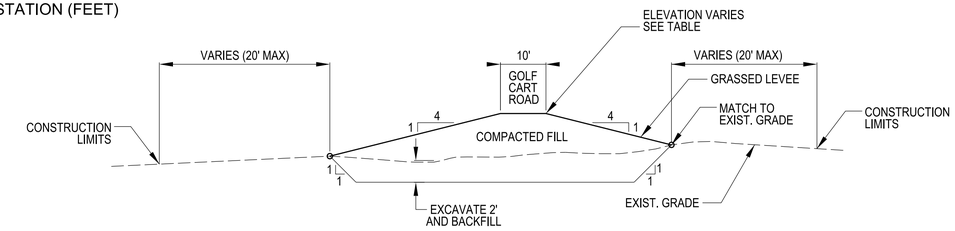
SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'

ALA WAI GOLF COURSE BERM
STA 0 + 00 TO 50 + 37

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
0 + 00	-	-
3 + 97	4.0	11.9
7 + 03	5.6	11.9
11 + 44	3.2	11.9
15 + 86	1.3	11.9
19 + 62	3.6	11.9
24 + 24	4.0	11.9
29 + 96	0.2	11.9
33 + 62	0.1	11.2
38 + 94	2.8	11.1
44 + 71	1.5	11.0
50 + 37	7.2	10.8

NOTES:

1. NEW GOLF CART ROAD IS 2' THICK AC PAVEMENT.



A TYPICAL LEVEE SECTION
NOT TO SCALE

US Army Corps of Engineers®
HONOLULU DISTRICT

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
SIZE: ANSI D
PLOT DATE: 2014
FILE NAME: ALA WAI GOLF COURSE, PROFILE & SECTION
DATE:
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

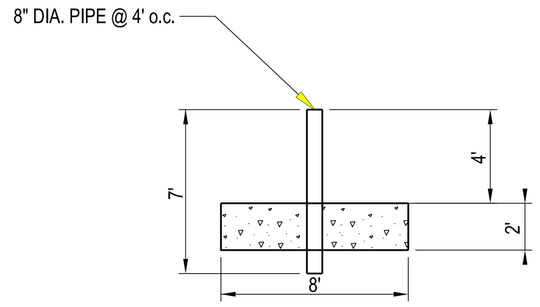
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ALA WAI GOLF COURSE BERMING
PROFILE AND SECTION
ALTERNATIVE 2A

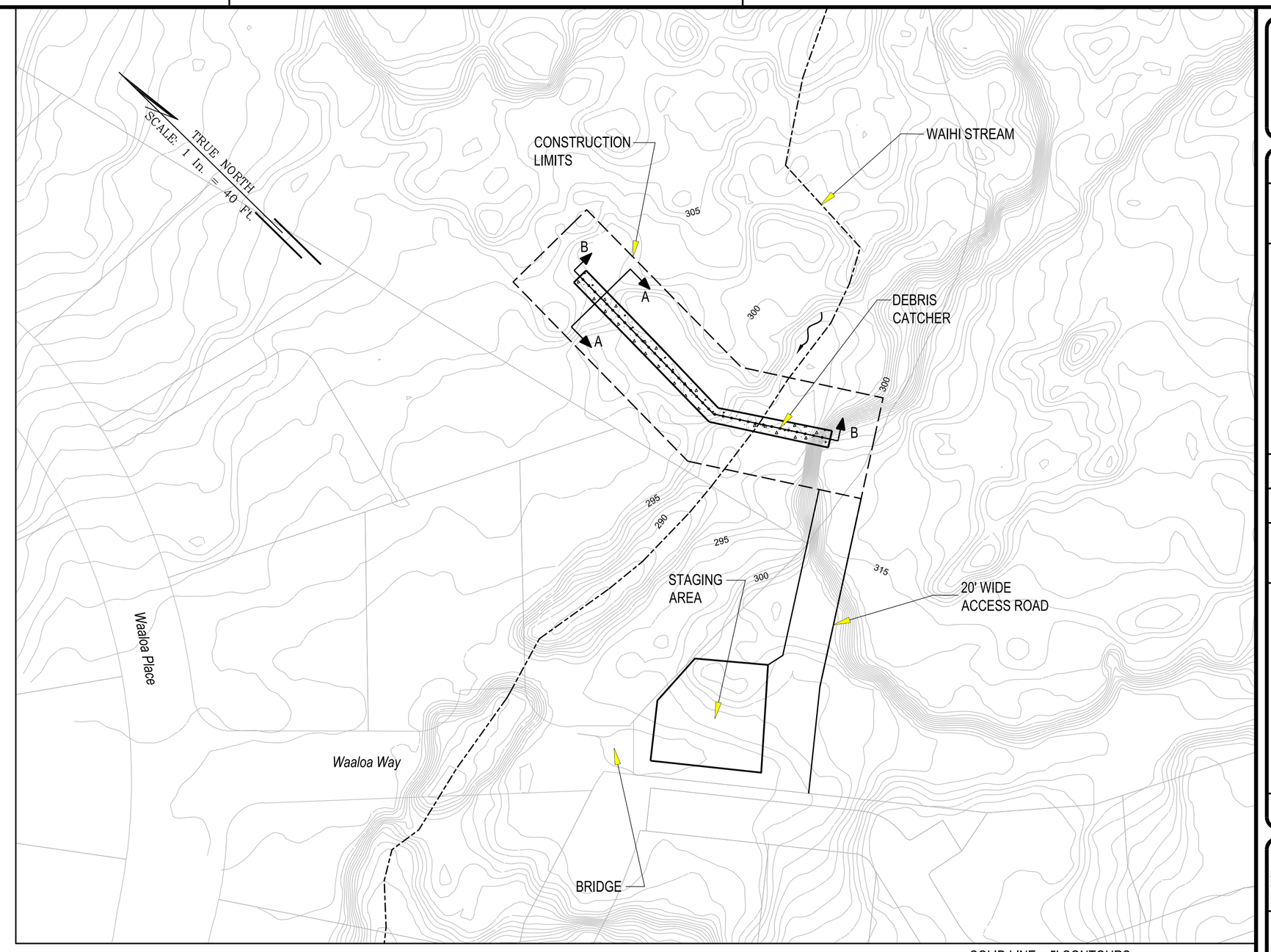
SHEET IDENTIFICATION
C-317
SHEET 20 OF 25

FILE: c:\pw-workpoh-1\j3ec9jhh\d0139948\Ala_Wai_C-317xxx.dgn
MODEL NAME: C-309
DATE & TIME: 12/15/2014 2:55:28 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdrv\printer.pltcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



WAIHI DEBRIS CATCHMENT SECTION A-A

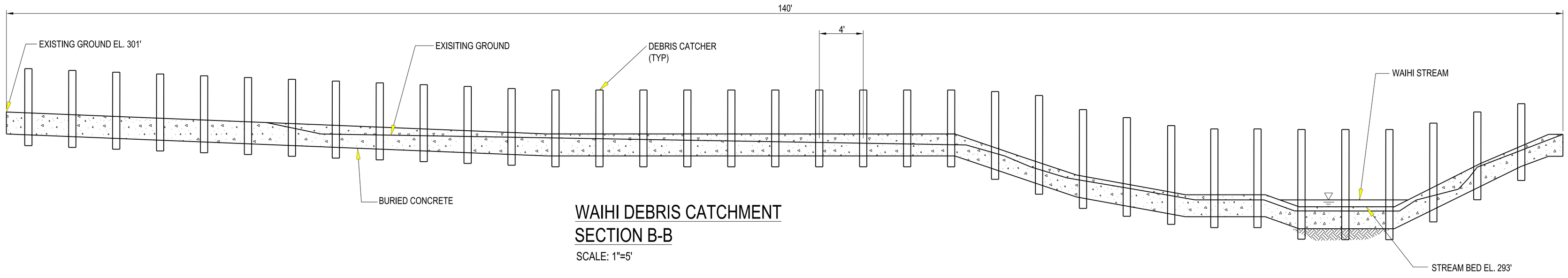
SCALE: 1"=5'



PLAN

SCALE: 1"=40'

SOLID LINE = 5' CONTOURS
DOTTED LINE = 1' CONTOURS



WAIHI DEBRIS CATCHMENT SECTION B-B

SCALE: 1"=5'

5' 2.5' 0' 5' 10'

SCALE: 1" = 5'

Note: All elevations are feet MSL

US Army Corps of Engineers®
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY: JHH
SUBMITTED BY:
PLOT SCALE: AS SHOWN
PLOT DATE: 12/20/2014
SIZE: ANSI D
FILE NAME: WAIHI DEBRIS CATCHMEN, PLAN & SECTIONS
DATE:
REVISION:
SOLICIT / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

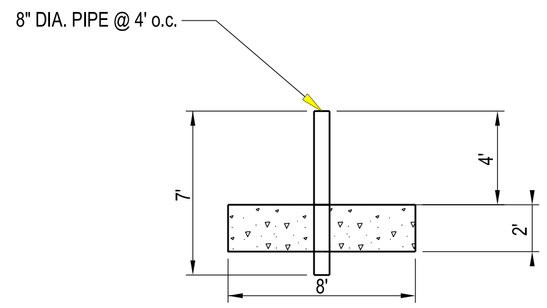
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

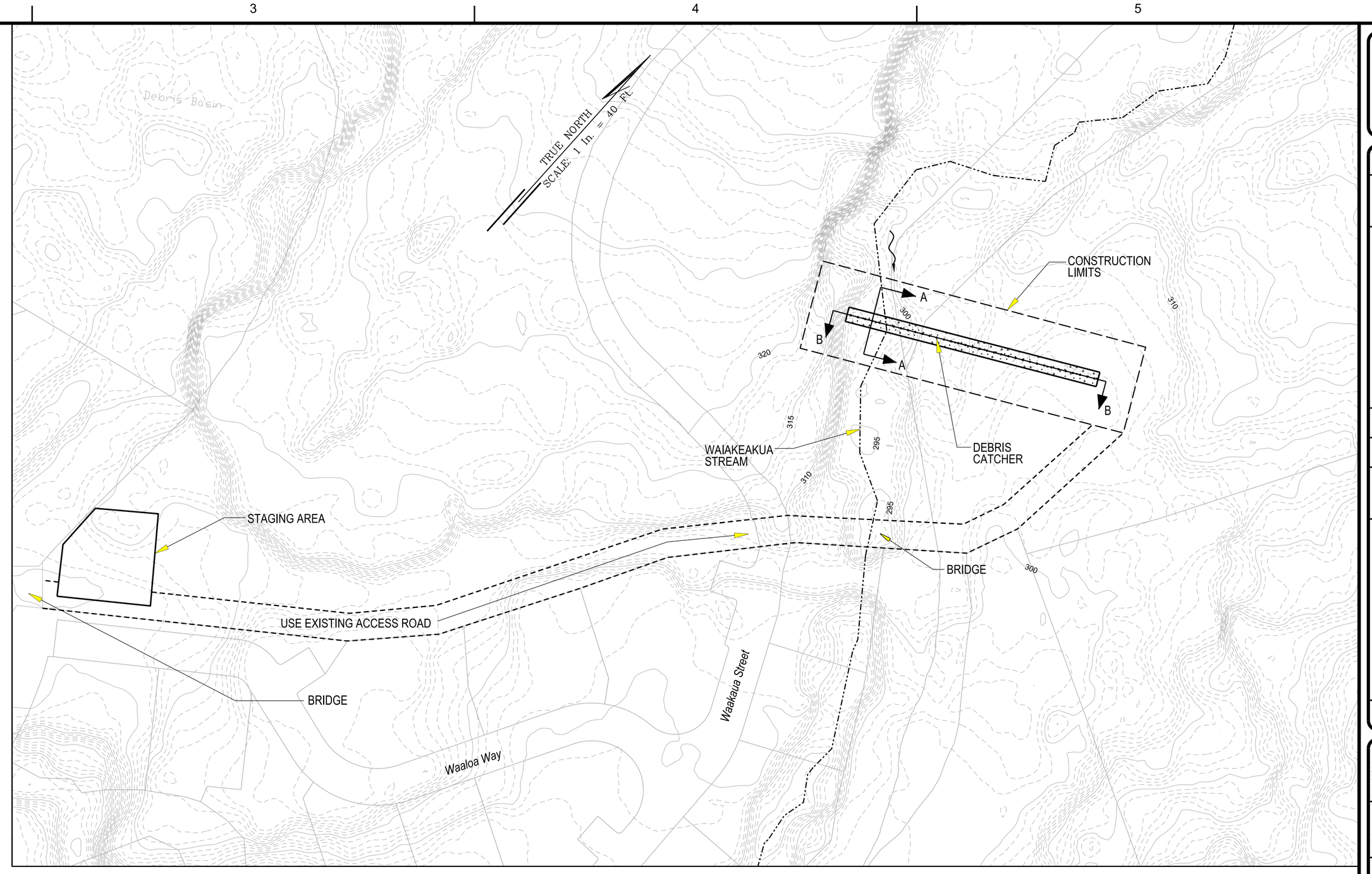
WAIHI DEBRIS CATCHMENT
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-319
SHEET 21 OF 25

FILE: c:\pw-work\poh-1\j3ec9jhh\d01399948\Ala_Wai_C-319xxx.dgn
MODEL NAME: C-301A
DATE & TIME: 12/15/2014 3:00:45 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotcfg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH

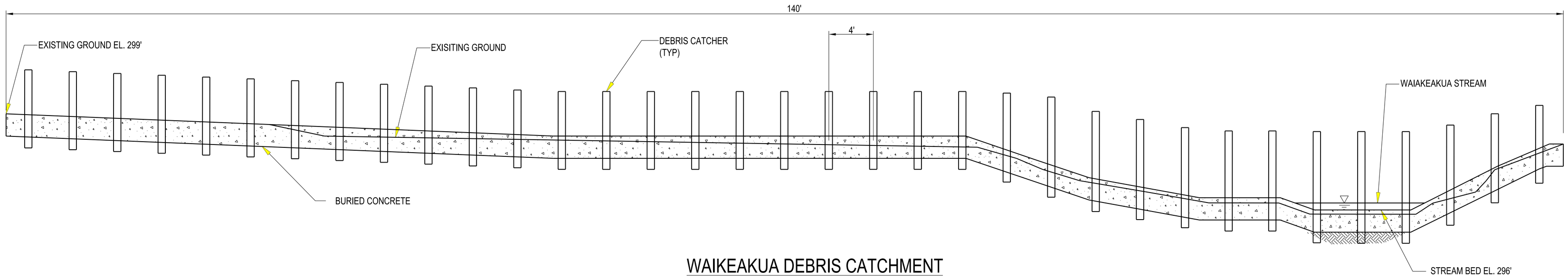


WAIAKEAKUA DEBRIS CATCHMENT
SECTION A-A
SCALE: 1"=5'



PLAN
SCALE: 1"=40'

SOLID LINE = 5' CONTOURS
DOTTED LINE = 1' CONTOURS



WAIKEAKUA DEBRIS CATCHMENT
SECTION B-B
SCALE: 1"=5'

5 2.5' 0 5 10
SCALE: 1" = 5'
Note: All elevations are feet MSL

US Army Corps of Engineers®
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JPH
DRAWN BY:
SUBMITTED BY:
CHECKED BY:
PLOT SCALE: AS SHOWN ISO/ANSI SIZE D
PLOT DATE: 2/3/2014
FILE NAME: WAIAKEAKUA DEBRIS CATCHMENT, PLAN & SECTIONS
DATE:
REVISION:
SOLICIT / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

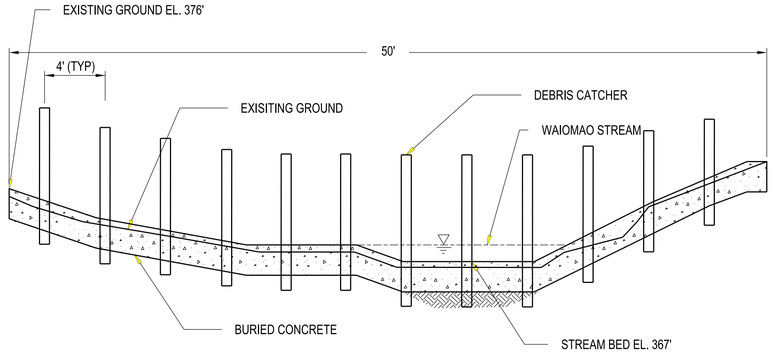
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

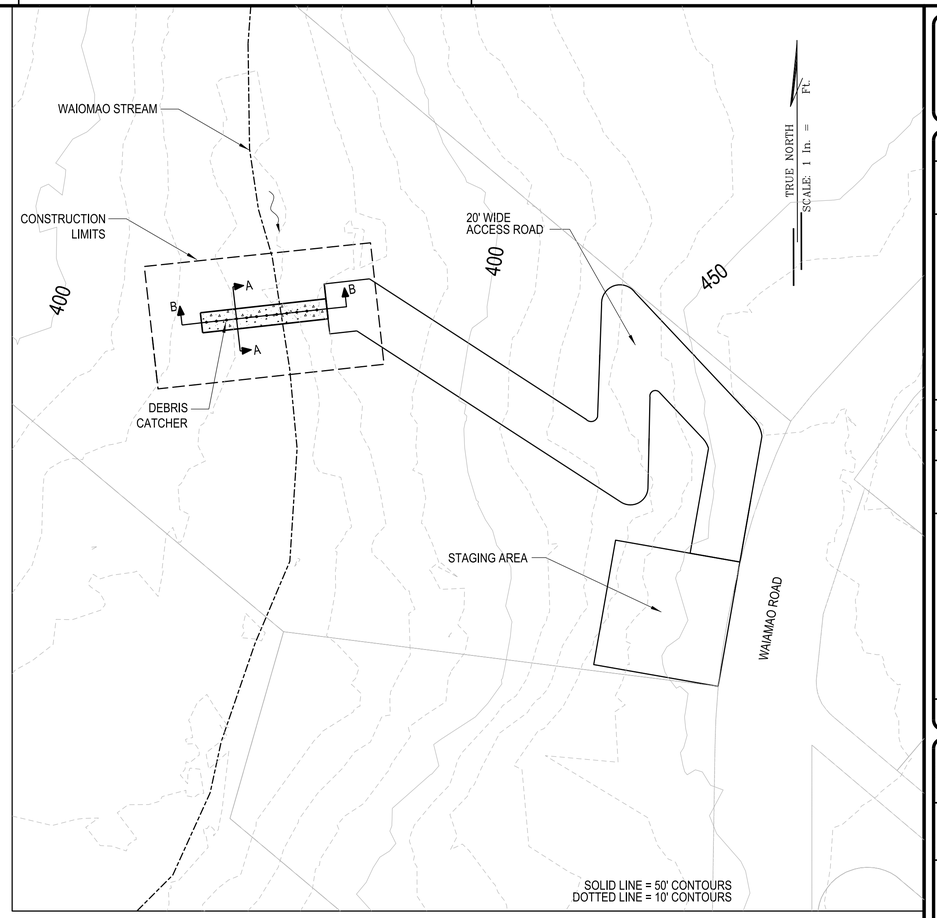
WAIAKEAKUA DEBRIS CATCHMENT
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-320
SHEET 22 OF 25

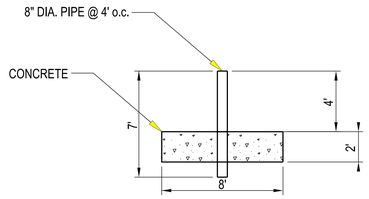
FILE: c:\pw-work\poh-1\j3ec9jhh\d01399948\Ala_Wai_C-320xxx.dgn
MODEL NAME: C-302
DATE & TIME: 12/15/2014 3:02:40 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: c:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\hcfg\printer.pltcfg
PEN TABLE: BW_and_Greyscale_Pen.tbl
PRINTED BY: J3EC9JHH



WAIOMAO DEBRIS CATCHMENT
SECTION B-B
SCALE: 1"=5'



PLAN
SCALE: 1"=35'



WAIOMAO DEBRIS CATCHMENT
SECTION A-A
SCALE: 1"=5'

10 5 0 10 20
SCALE: 1" = 10'

Note: All elevations are feet MSL

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: 1:1
SIZE: ANSI D

DATE:
CHECKED BY:
LOCATION CODE
PLOT DATE: 12/15/2014
FILE NAME: WAIOMAO DEBRIS CATCHMENT PLAN & SECTIONS

REVISION:
SOLICIT. / CONTRACT NO.:
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

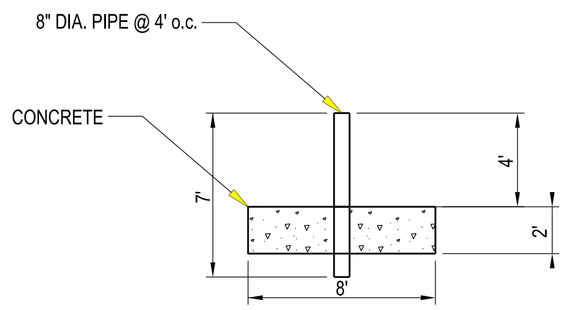
ALA WAI CANAL PROJECT

WAIOMAO DEBRIS CATCHMENT
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-321
SHEET 23 OF 25

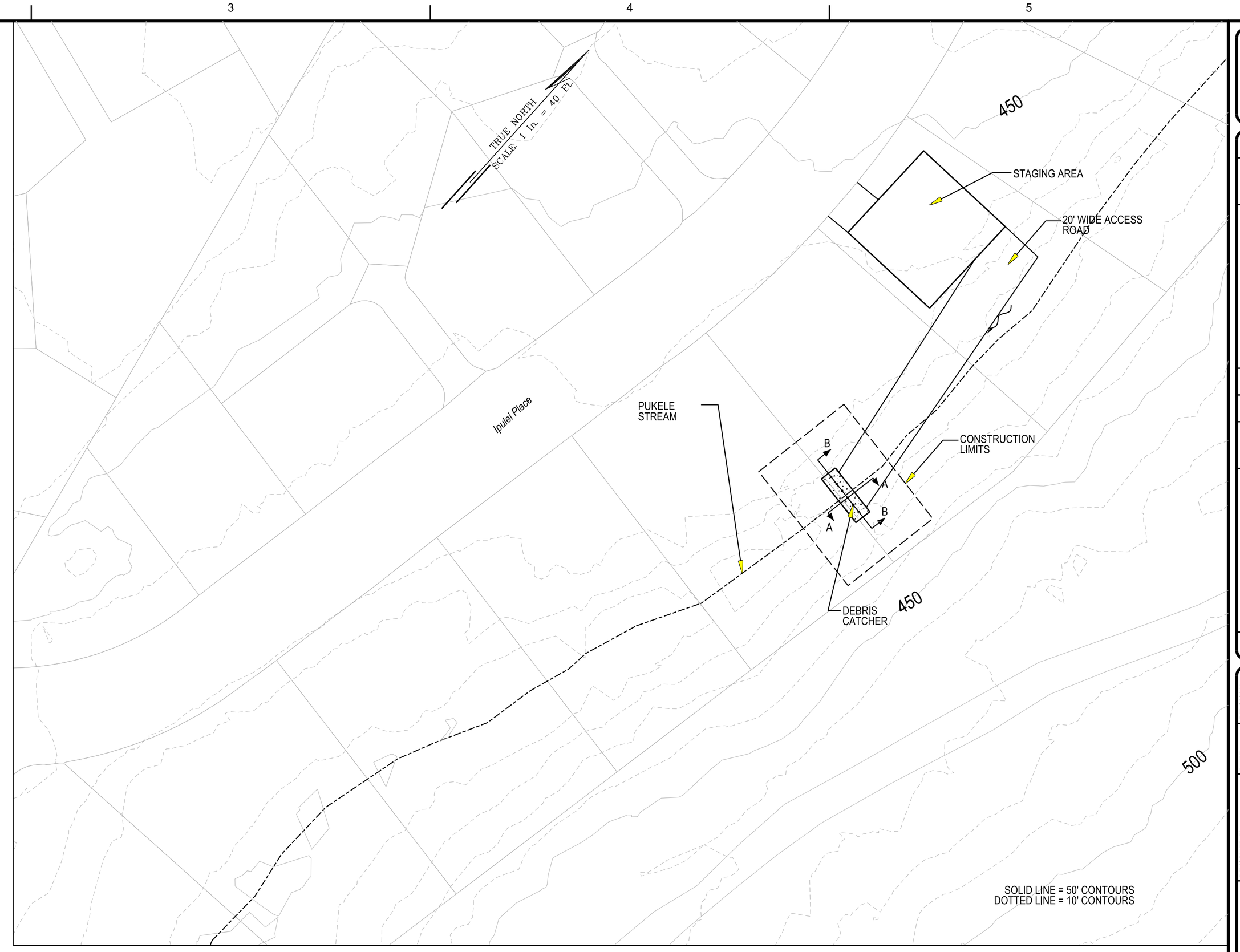
JHH

FILE: c:\pw_work\poh-1\j3ec9jhh\d0139948\Ala_Wai_C-321xxx.dgn
MODEL NAME: C-308A
DATE & TIME: 12/15/2014 3:08:23 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



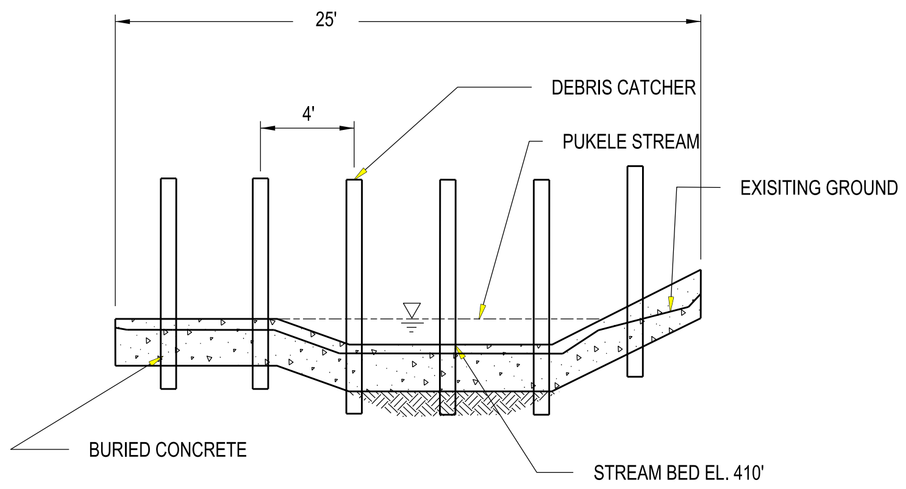
PUKELE DEBRIS CATCHMENT BASIN SECTION A-A

SCALE: 1"=5'



PLAN

SCALE: 1"=40'



PUKELE DEBRIS CATCHMENT SECTION B-B

SCALE: 1"=5'

5 2.5' 0 5 10

SCALE: 1" = 5'

Note: All elevations are feet MSL

US Army Corps of Engineers®
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MARK	DESCRIPTION	DATE	APPR.

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
SCALE IS ANSI D
DATE:
CHECKED BY:
PLOT DATE:
VERSION:
FILE NAME: PUKELE DEBRIS CATCHMENT_PLAN & SECTIONS
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

ALA WAI CANAL PROJECT

PUKELE DEBRIS CATCHMENT
PLAN AND SECTIONS
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-322
SHEET 24 OF 25

FILE: c:\pw\work\joh-1\j3ec9jhhd\01399948\Ala_Wai_C-322xxx.dgn
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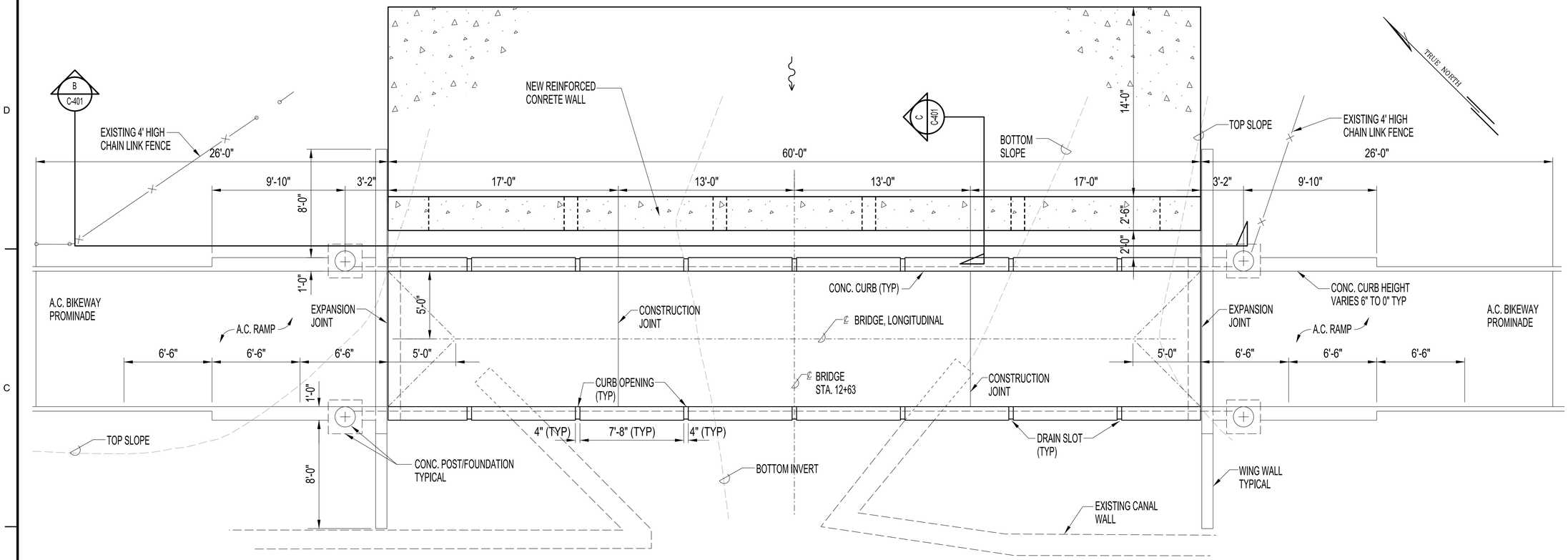
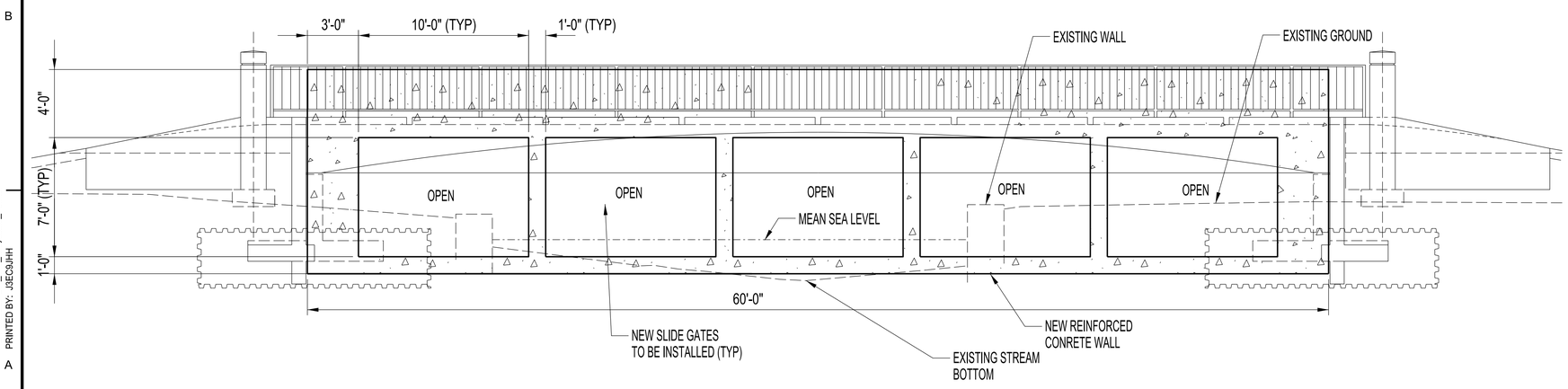
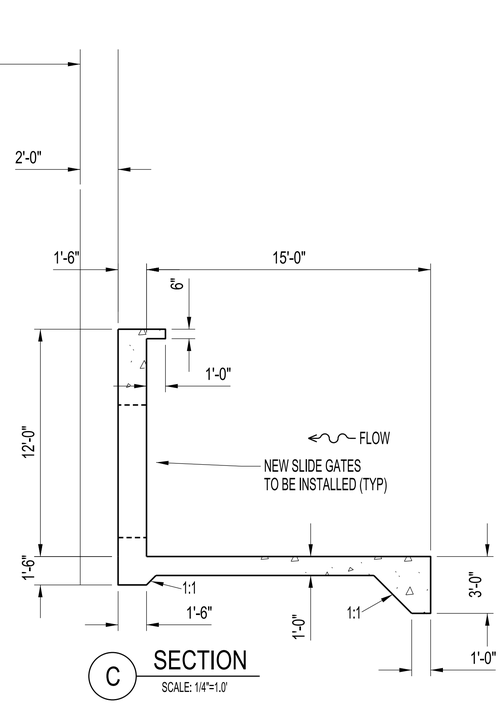


ALA WAI CANAL

A PLAN
SCALE: 1/4"=1.0'



B ELEVATION
SCALE: 1/4"=1.0'



C SECTION
SCALE: 1/4"=1.0'

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DESIGNED BY: JHH
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CHECKED BY:
PLOT SCALE: 1 = 1.0000
PLOT DATE:
FILE NAME: HAUSTEN BRIDGE PLAN & SECTIONS
DATE:
REVISION:
SOLICIT./ CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
SIZE: ANSI D

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

HAUSTEN BRIDGE CONCRETE WALL
PLAN, SECTION AND ELEVATION
ALTERNATIVE 2A

SHEET IDENTIFICATION
C-401
SHEET 25 OF 25

FILE: c:\pw\work\poh-1\j3ec9jhh\d0139948\Ala_Wai_C-401xxx.dgn
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PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH

ALA WAI CANAL PROJECT
ALTERNATIVE 3A
HONOLULU, OAHU, HI

WAIHI DEBRIS AND DETENTION BASIN

WAIAKEAKUA DEBRIS AND DETENTION BASIN

ROOSEVELT DEBRIS AND DETENTION BASIN

MAKIKI DEBRIS AND DETENTION BASIN

WOODLAWN DITCH DETENTION

INNOVATION CENTER IMPROVEMENTS

MANOA IN-STREAM DEBRIS CATCHMENT

PUKELE DEBRIS AND DETENTION BASIN

WAIOMAO DEBRIS AND DETENTION BASIN

HAUSTEN DITCH DETENTION

ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION

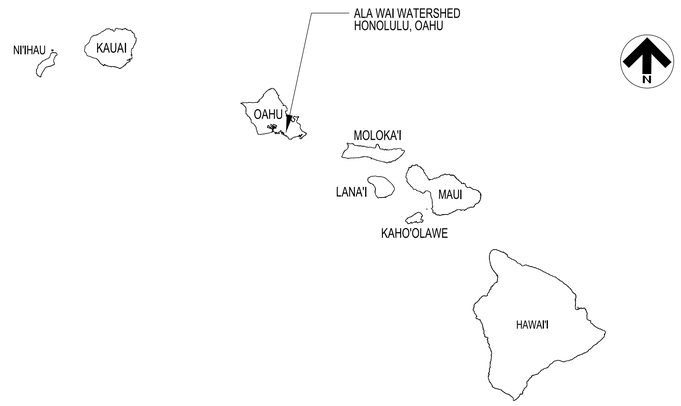
ALA WAI CANAL FLOODWALLS

Kanaha Stream
Makiki Stream
Waiakeakua Stream
Waihi Stream
Waiomao Stream
Pukele Stream
Manoa Stream
Palolo Stream
ALA WAI CANAL

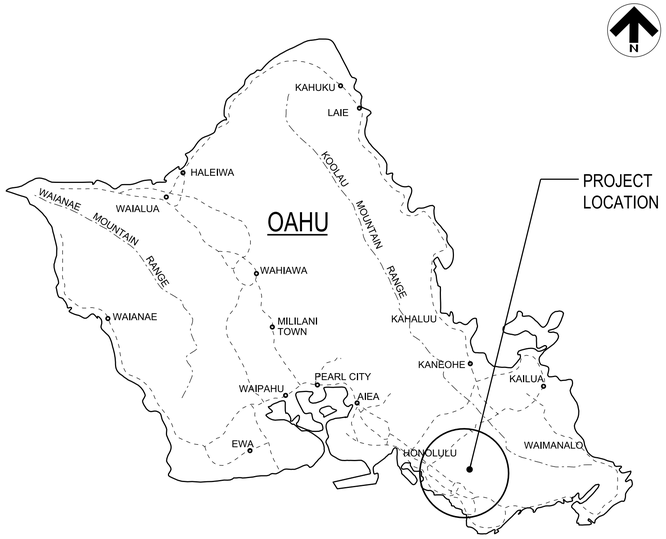
N

SITE LOCATIONS
NOT TO SCALE

PROJECT TITLE



VICINITY MAP
NOT TO SCALE



PROJECT LOCATION
NOT TO SCALE

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DESCRIPTION	DATE	APPR. MARK

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PLOT STYLE:
SIZE: ANSI D

DATE:
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PLOT DATE:
FILE NAME: Cover Sheet - Site Locations, Vicinity Map, Project Location.dgn

REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

SITE LOCATIONS
PROJECT LOCATION & VICINITY MAP
ALTERNATIVE 3A

SHEET IDENTIFICATION
G-001A
SHEET 1 OF 20

FILE: c:\pw\work\poh-1\j3ec9jhh\d01458330\Ala_Wai_G-001Axx.dgn
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PRINTED BY: J3EC9JHH

ALA WAI CANAL PROJECT - ALTERNATIVE 3A
INDEX TO DRAWINGS

SHT. NO	SHT. REF. NO.	DESCRIPTION
1	G-001A	SITE LOCATIONS, PROJECT LOCATION AND VICINITY MAP
2	G-002A	INDEX TO DRAWINGS
3	C-101A	ALA WAI CANAL FLOODWALLS, SITE PLAN
4	C-102A	HAUSTEN DITCH DETENTION, SITE PLAN
5	C-103A	ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION, PLAN
6	C-301	WAIHI DEBRIS AND DETENTION BASIN, PLAN AND SECTIONS
7	C-302	WAIAKEAKUA DEBRIS AND DETENTION BASIN, PLAN AND SECTIONS
8	C-304A	INNOVATION CENTER IMPROVEMENTS, PLAN AND SECTIONS
9	C-305A	WOODLAWN DITCH DETENTION BASIN, PLAN AND SECTIONS
10	C-308	WAIOMAO DEBRIS AND DETENTION BASIN, PLAN AND SECTIONS
11	C-309A	ALA WAI CANAL MIDDLE AND LOWER RIGHT BANK, PROFILE AND SECTION
12	C-310A	ALA WAI CANAL MIDDLE AND LOWER RIGHT BANK, PROFILE
13	C-311A	ALA WAI CANAL UPPER LEFT BANK, PROFILE
14	C-313	PUKELE DEBRIS AND DETENTION BASIN, PLAN AND SECTIONS
15	C-314A	ROOSEVELT DEBRIS AND DETENTION BASIN, PLAN AND SECTIONS
16	C-315A	MAKIKI DEBRIS AND DETENTION BASIN, PLAN AND SECTIONS
17	C-316A	HAUSTEN DITCH DETENTION FLOODWALLS AND BERM, PROFILE AND SECTIONS
18	C-317A	ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION, PROFILE AND SECTION
19	C-318	MANOA IN-STREAM DEBRIS CATCHMENT, PLAN AND SECTIONS
20	C-401A	HAUSTEN BRIDGE CONCRETE WALL, PLAN, SECTION AND ELEVATION

GENERAL NOTES:

1. EXISTING CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE PLANS. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND ADJUST WORK PLAN ACCORDINGLY PRIOR TO BEGINNING CONSTRUCTION.
2. COORDINATE SYSTEM: NAD 1983 (HARN), HAWAII ZONE 3 (US FEET)
3. PROVIDE FENCING AS NECESSARY TO MAINTAIN SECURITY AT ALL TIMES.
4. UNLESS SHOWN OTHERWISE, ALL DISTURBED AREAS NOT RECEIVING A HARD SURFACE SHALL BE COVERED WITH GRASS.
5. CONTRACTOR SHALL SUBMIT A COMPLETE SOIL EROSION CONTROL PLAN FOR REGULATORY APPROVAL. CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING EROSION CONTROL DEVICES DURING CONSTRUCTION. CONTRACTOR SHALL TAKE ALL OTHER MEASURES TO POSITIVELY PRECLUDE EROSION MATERIALS FROM LEAVING THE SITE.
6. EXISTING UNDERGROUND UTILITIES OBTAINED FROM AS-BUILTS AND FROM FIELD SURVEYS. CONTRACTOR SHALL POTHOLE AND FIELD VERIFY DEPTH AND LOCATION PRIOR TO EXCAVATION AND PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION.
7. THERE WILL BE A FLOODWARNING SYSTEM INSTALLED FOR THIS PROJECT.

GENERAL ABBREVIATIONS

A.C.	ASHPALT CONCRETE
AVE	AVENUE
BLVD	BOULEVARD
CONC	CONCRETE
DIA	DIAMETER
EL	ELEVATION
EXIST	EXISTING
FT	FOOT, FEET
IN	INCH, INCHES
INV	INVERT
LB	LEFT BANK
MAX	MAXIMUM
MSL	MEAN SEA LEVEL
NTS	NOT TO SCALE
o.c.	ON CENTER
O&M	OPERATIONS AND MAINTENANCE
PL	PLACE
RB	RIGHT BANK
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
ST	STREET
STA	STATION
THK	THICK
TMK	TAX MAP KEY
TYP	TYPICAL
W.S.	WATER SURFACE
YR	YEAR

SYMBOLS

&	AND
@	AT
℄	CENTER LINE
'	FOOT, FEET
"	INCH, INCHES

US Army Corps of Engineers
Honolulu District

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US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

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PLOT SCALE: 1:1
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE: 12/18/2014
FILE NAME: Index Of Drawings, General Notes & Abbreviations - Alternative 3A.dgn
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

ALA WAI CANAL PROJECT

INDEX OF DRAWINGS, GENERAL NOTES
ABBREVIATIONS & SYMBOLS
ALTERNATIVE 3A

SHEET IDENTIFICATION
G-002A
SHEET 2 OF 20

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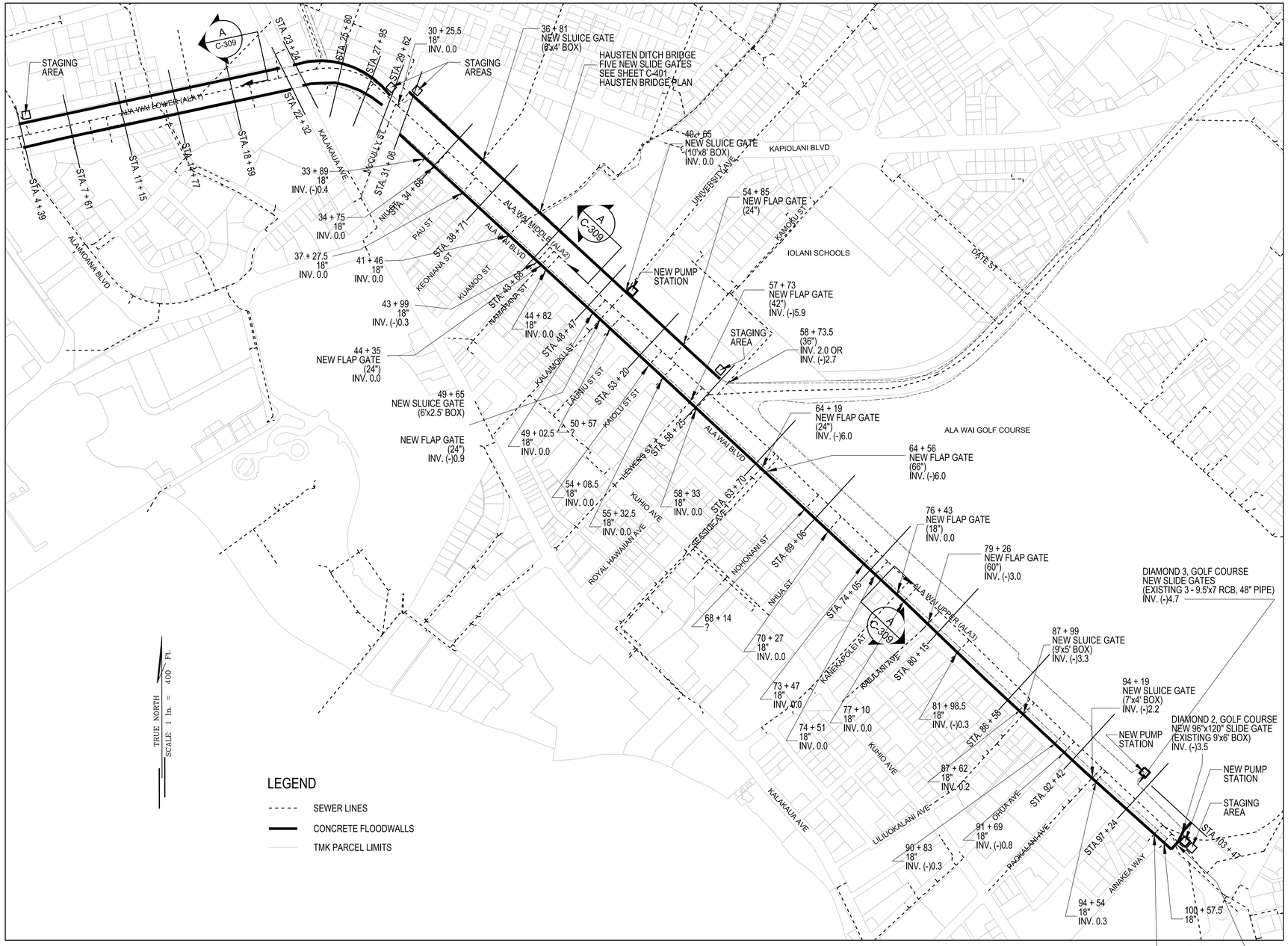

PLAN
ALA WAI CANAL FLOODWALLS

SCALE 1"=400'

ALA WAI CANAL INTERIOR DRAINAGE TABLE

CULVERT NAME	STATION	SIZE & TYPE	NOTES
DIAMOND 2, GOLF COURSE	102+45.5	96"x120" SLIDE GATE	PUMP STATION
DIAMOND 1, ALA WAI BLVD	101+75	2 - 60"x120" SLIDE GATES	
DIAMOND 3, GOLF COURSE	96+67	SLIDE GATES	PUMP STATION
100+57.5	100+57.5	18" FLAP GATE	
99+72.5	99+72.5	18" FLAP GATE	
94+54	94+54	18" FLAP GATE	INV. 0.3
94+19	94+19	SLUICE GATE	INV. (-)2.2
91+69	91+69	18" FLAP GATE	INV. (-)0.8
90+83	90+83	18" FLAP GATE	INV. (-)0.3
87+99	87+99	SLUICE GATE	INV. (-)3.3
87+62	87+62	18" FLAP GATE	INV. 0.2
81+98.5	81+98.5	18" FLAP GATE	INV. (-)0.3
79+26	79+26	60" FLAP GATE	INV. (-)3.0
77+10	77+10	18" FLAP GATE	
76+43	76+43	18" FLAP GATE	INV. 0.0
74+51	74+51	18" FLAP GATE	
73+47	73+47	18" FLAP GATE	
70+27	70+27	18" FLAP GATE	
68+14	68+14	?	
64+56	64+56	66" FLAP GATE	INV. (-)6.0
64+19	64+19	24" FLAP GATE	INV. (-)6.0
58+73.5	58+73.5	36" FLAP GATE	INV. 2.0 OR (-)2.7
58+33	58+33	18" FLAP GATE	
57+73	57+73	42" FLAP GATE	INV. (-)5.9
55+32.5	55+32.5	18" FLAP GATE	
54+08.5	54+08.5	18" FLAP GATE	
54+85	54+85	24" FLAP GATE	
50+57	50+57	?	
49+65, RB	49+65	SLUICE GATE	INV. 0.0, PUMP STATION
49+65	49+65	SLUICE GATE & 24" FLAP GATE	INV. ? & (-)0.9
49+02.5	49+02.5	18" FLAP GATE	
44+82	44+82	18" FLAP GATE	
44+35	44+35	24" FLAP GATE	
43+99	43+99	18" FLAP GATE	INV. (-)0.3
HAUSTEN DITCH BRIDGE	42+10	5 - SLIDE GATES	SEE SHEET C-401
41+46	41+46	18" FLAP GATE	
37+27.5	37+27.5	18" FLAP GATE	
36+81	36+81	SLUICE GATE	
34+75	34+75	18" FLAP GATE	
33+89	33+89	18" FLAP GATE	INV. (-)0.4
30+25.5	30+25.5	18" FLAP GATE	

NOTES:

1. SEE SHEET C-309A FOR THE RIGHT BANK (MOUNTAIN SIDE) PROFILE OF ALA WAI MIDDLE (ALA2) AND ALA WAI LOWER (ALA1).
2. SEE SHEET C-310A FOR THE LEFT BANK (OCEAN SIDE) PROFILE OF ALA WAI MIDDLE (ALA2) AND ALA WAI LOWER (ALA1).
3. SEE SHEET C-311A FOR THE LEFT BANK (OCEAN SIDE) PROFILE OF ALA WAI UPPER (ALA3).
4. PUMP STATIONS WILL BE 50'x50'.

US Army Corps of Engineers
HONOLULU DISTRICT

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MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
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SUBMITTED BY:
PLOT SCALE: 1 = 1
PLOT DATE: 12/15/2014
SIZE: ANSI D
DATE:
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
FILE NAME: ALA WAI CANAL FLOODWALLS, PLAN

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ALA WAI LOWER, MIDDLE & UPPER FLOODWALLS
SITE PLAN
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-101A
SHEET 3 OF 20

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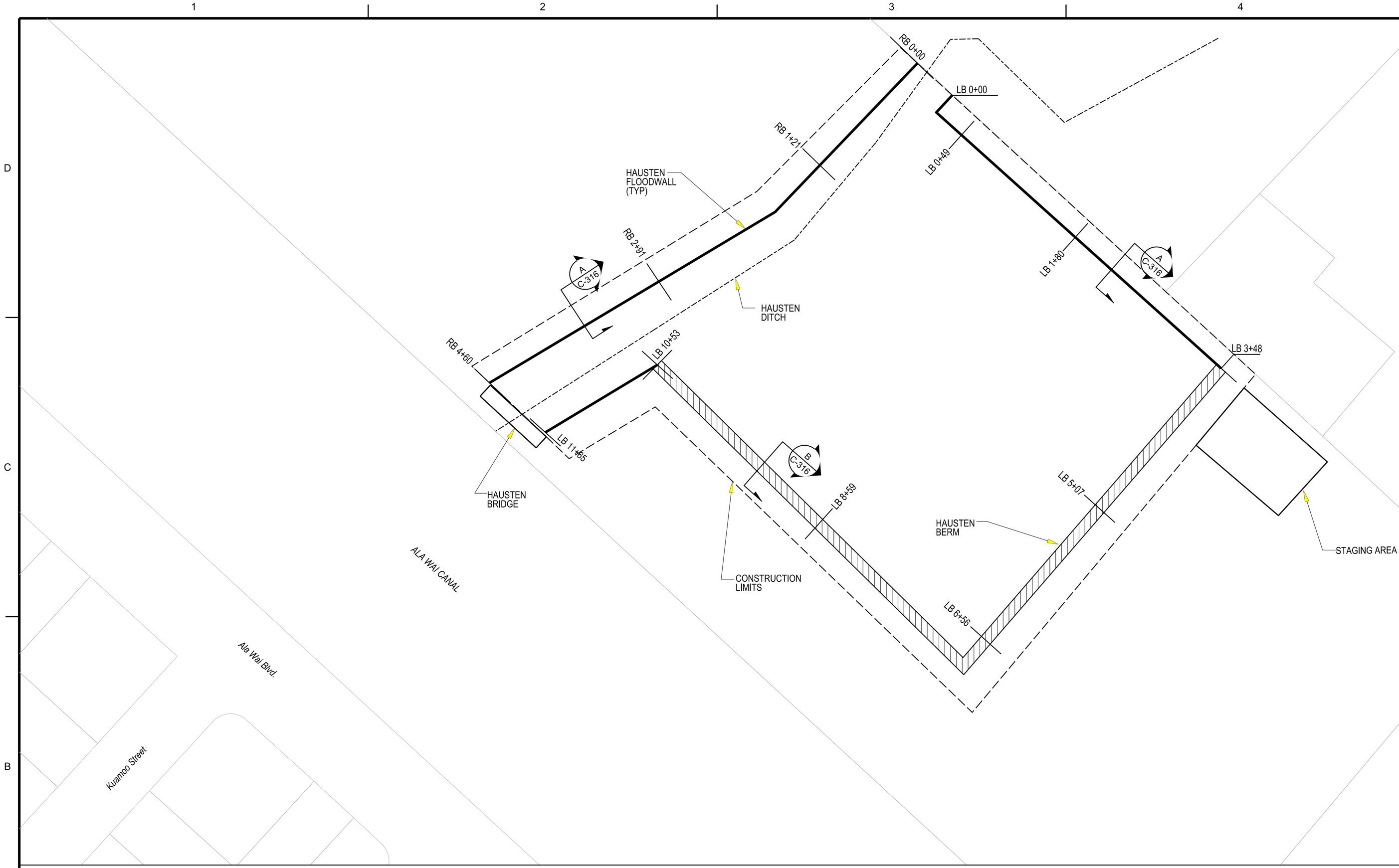

NOTES:

1. STAGING AREA WILL HAVE GEOTEXTILE AND 3" OF SURGE MATERIAL.
2. SEE SHEET C-401A FOR THE HAUSTEN DITCH BRIDGE NEW CONRETE WALL PLAN.

HAUSTEN DITCH DETENTION PLAN

SCALE: 1"=50'

TRUE NORTH
SCALE: 1 In. = 50 FT.

50' 25' 0 50' 100'
SCALE: 1" = 50'

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HONOLULU, HAWAII

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PLOT SCALE: AS SHOWN
PLOT SIZE: ANSI D
DATE:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
PLOT DATE:
FILE NAME: HAUSTEN DITCH DETENTION PLAN
REVISION:

ALA WAI CANAL PROJECT

HAUSTEN DITCH DETENTION
SITE PLAN
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-102A
SHEET 4 OF 20

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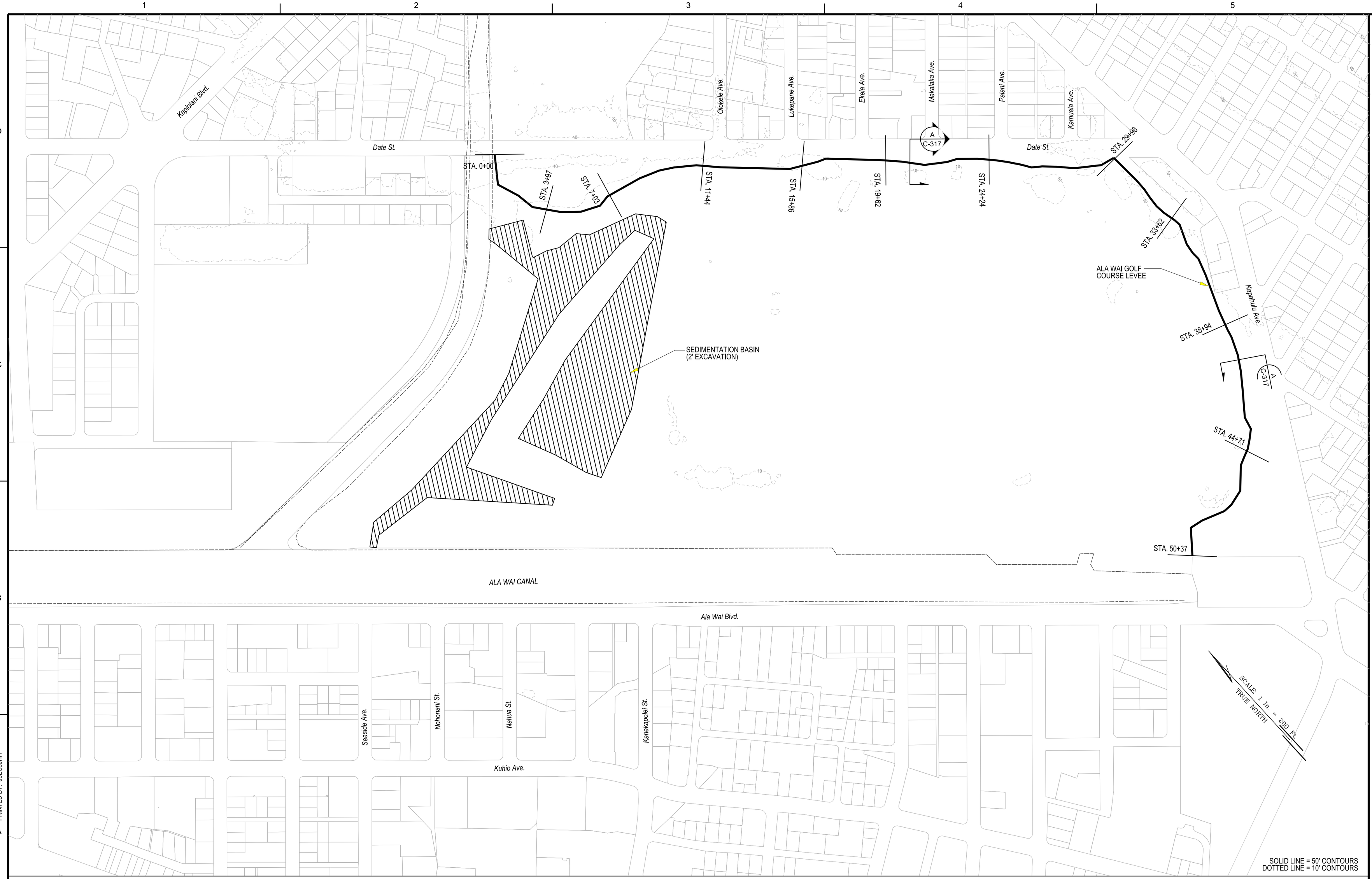

ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION
PLAN
SCALE: 1"=200'

200' 100' 0 200' 300'
SCALE: 1" = 200'

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PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
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PLOT DATE:
STATUS:
FILE NAME: ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION, PLAN, ALTERNATIVE 3A
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION
PLAN
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-103A
SHEET 5 OF 20

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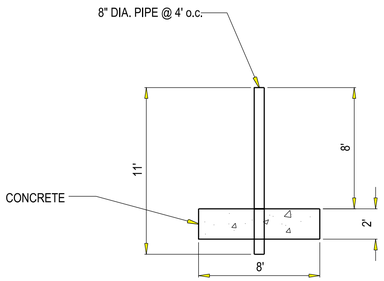
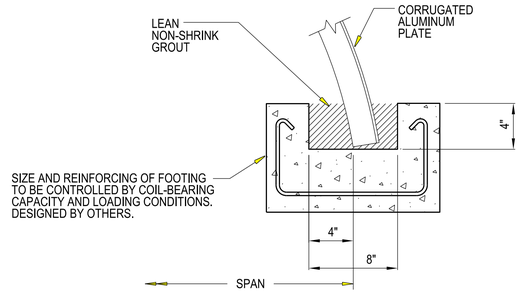
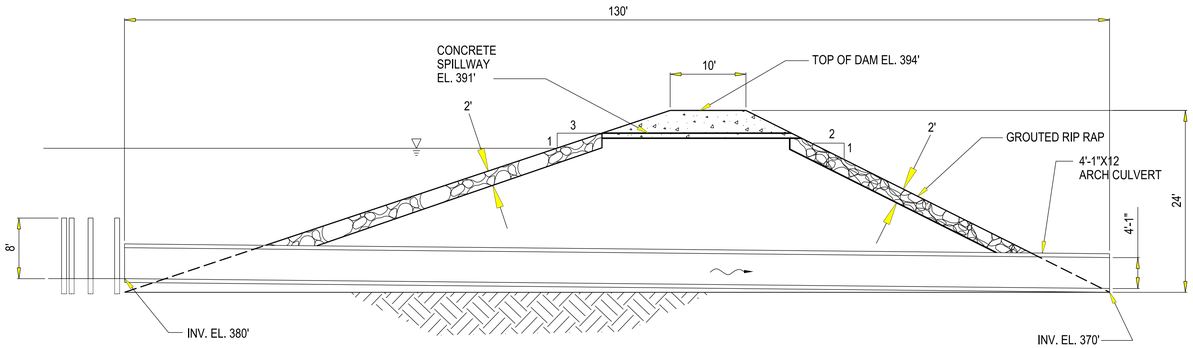


WAIHI DEBRIS AND DETENTION BASIN
SECTION C-C
SCALE: 1"=5'

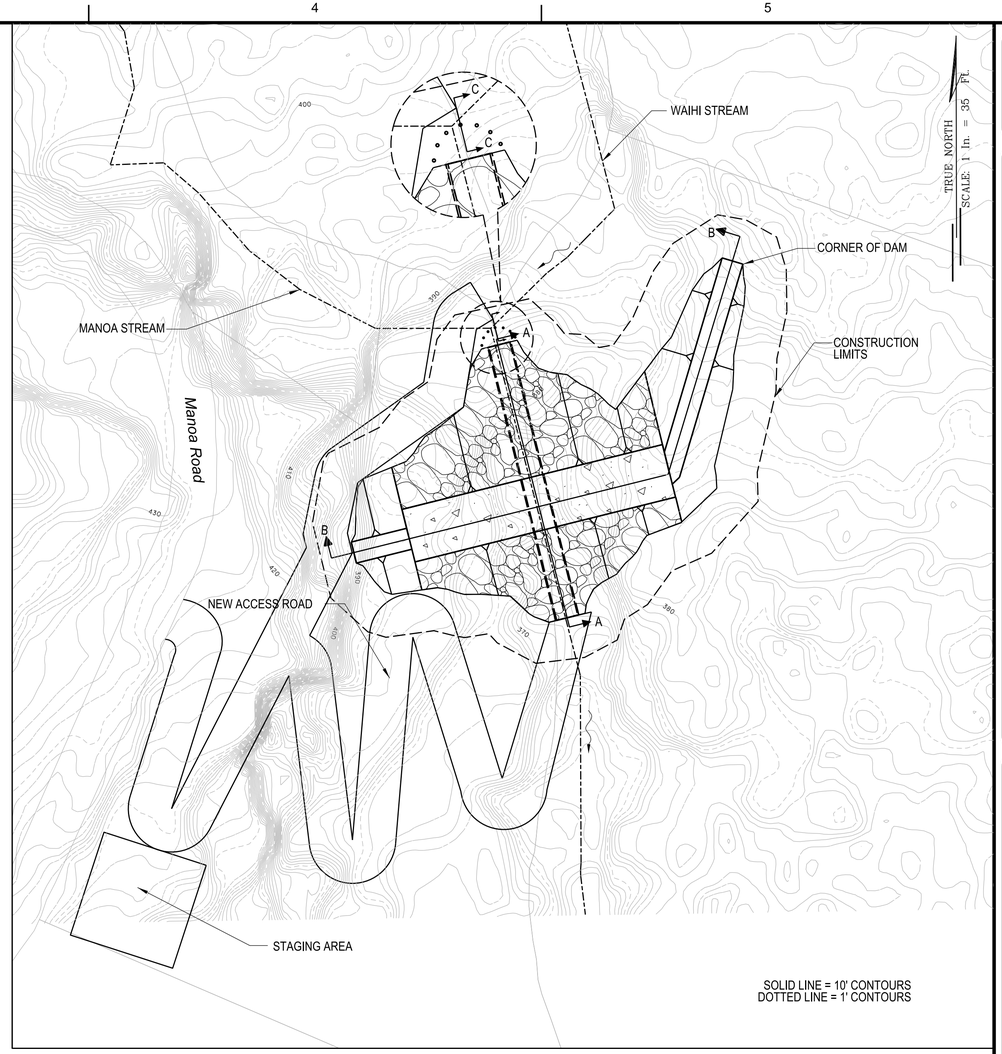


SLOTTED CONCRETE FOOTING

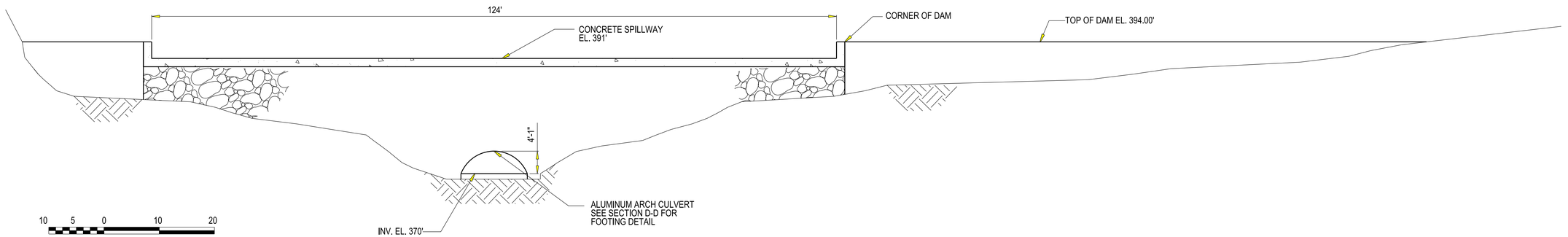
WAIHI DEBRIS AND DETENTION BASIN
SECTION D-D
SCALE: NTS



WAIHI DEBRIS AND DETENTION BASIN
SECTION A-A
SCALE: 1"=10'



PLAN
SCALE: 1"=35'



Note: All elevations are feet MSL

WAIHI DEBRIS AND DETENTION BASIN
SECTION B-B
SCALE: 1"=10'

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PLOT DATE:
SIZE: ANSI D
DATE:
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
FILE NAME: WAIHI DEBRIS & DETENTION BASIN, PLAN & SECTIONS

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

WAIHI DEBRIS AND DETENTION BASIN
PLAN AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-301
SHEET 6 OF 20

FILE: c:\pw\work\poh-1\j3ec9jhh\d0133359\Ala_Wai_C-301xxx.dgn
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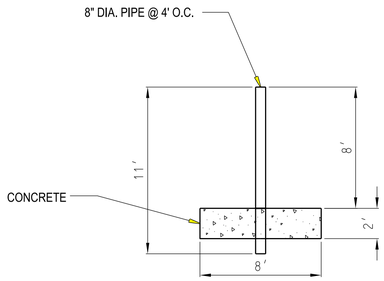
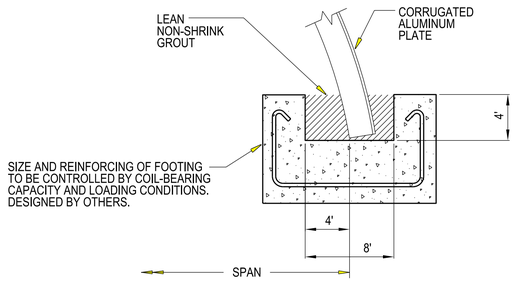
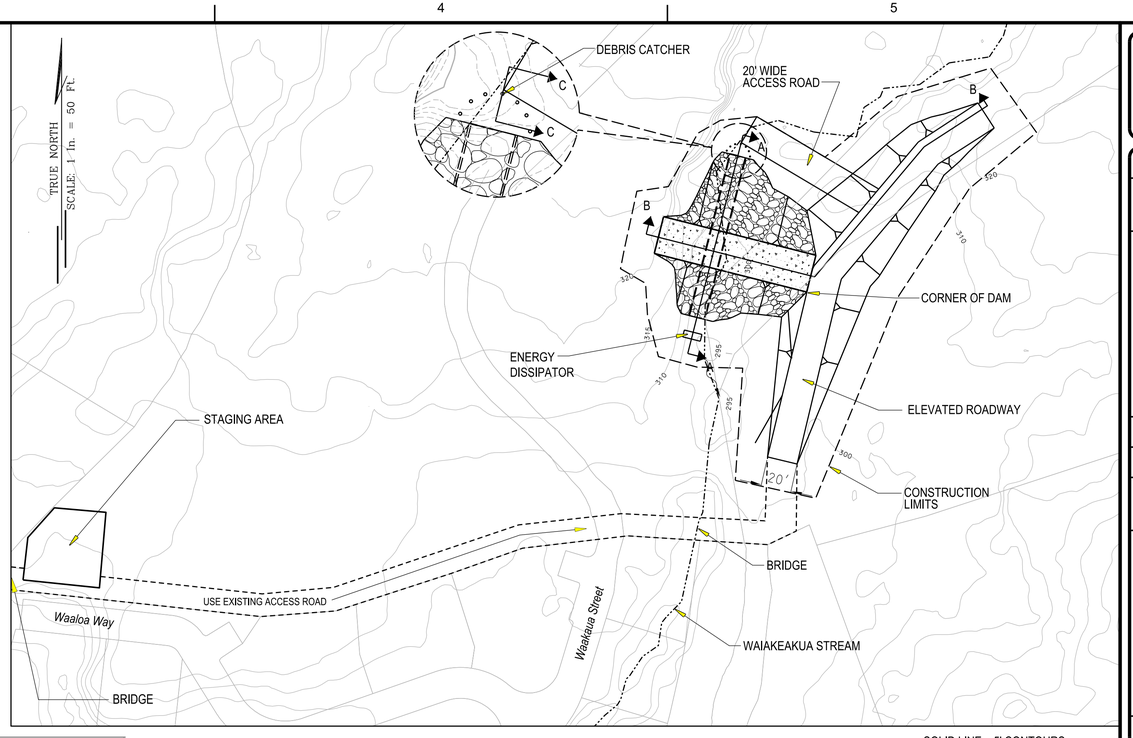
DATE & TIME: 12/15/2014 3:54:42 PM
LAST SAVED BY: j3ec9cp9
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\pltcfg\prnter.pltcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



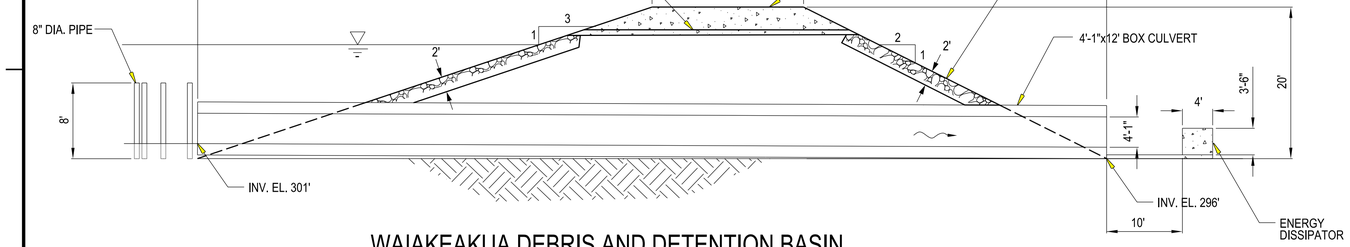
WAIAKEAKUA DEBRIS AND DETENTION BASIN
SECTION C-C
SCALE: 1"=5'



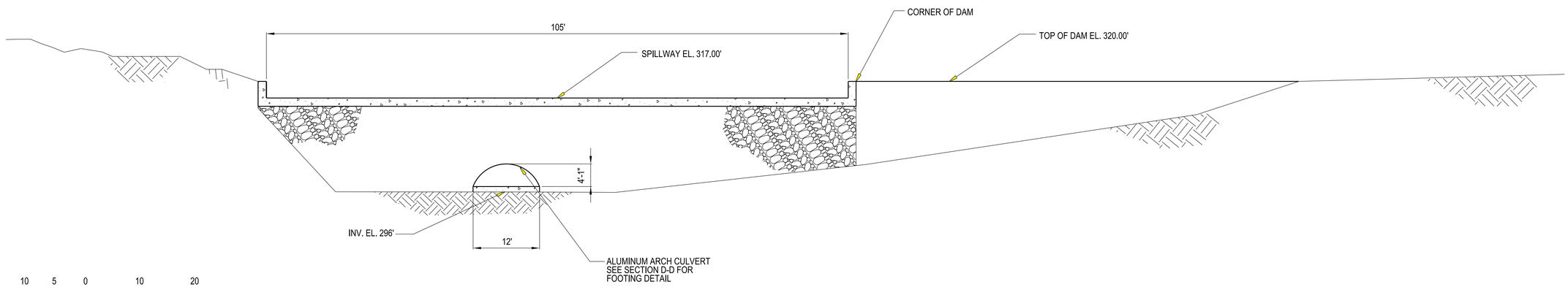
SLOTTED CONCRETE FOOTING
WAIAKEAKUA DEBRIS AND DETENTION BASIN
SECTION D-D
SCALE: NTS



PLAN
SCALE: 1"=50'



WAIAKEAKUA DEBRIS AND DETENTION BASIN
SECTION A-A
SCALE: 1"=10'



WAIAKEAKUA DEBRIS AND DETENTION BASIN
SECTION B-B
SCALE: 1"=10'

10 5 0 10 20
SCALE: 1" = 10'

Note: All elevations are feet MSL

US Army Corps of Engineers
Honolulu District

10% DESIGN

DESIGNED BY: JPH	DRAWN BY:	SUBMITTED BY:	PLOT SCALE: AS SHOWN	SIZE: ANSI D
CHECKED BY:			PLOT DATE: 12/15/2014	FILE NAME: WAIAKEAKUA DEBRIS & DETENTION BASIN, PLAN & SECTIONS.dgn
SOLICIT. / CONTRACT NO.:			LOCATION CODE	DRAWING NUMBER:

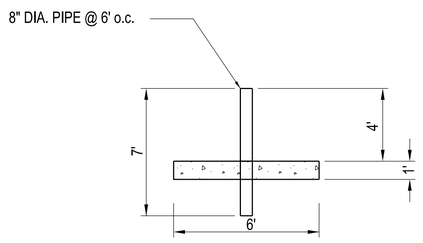
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

WAIAKEAKUA DEBRIS AND DETENTION
PLAN AND SECTIONS
ALTERNATIVE 3A

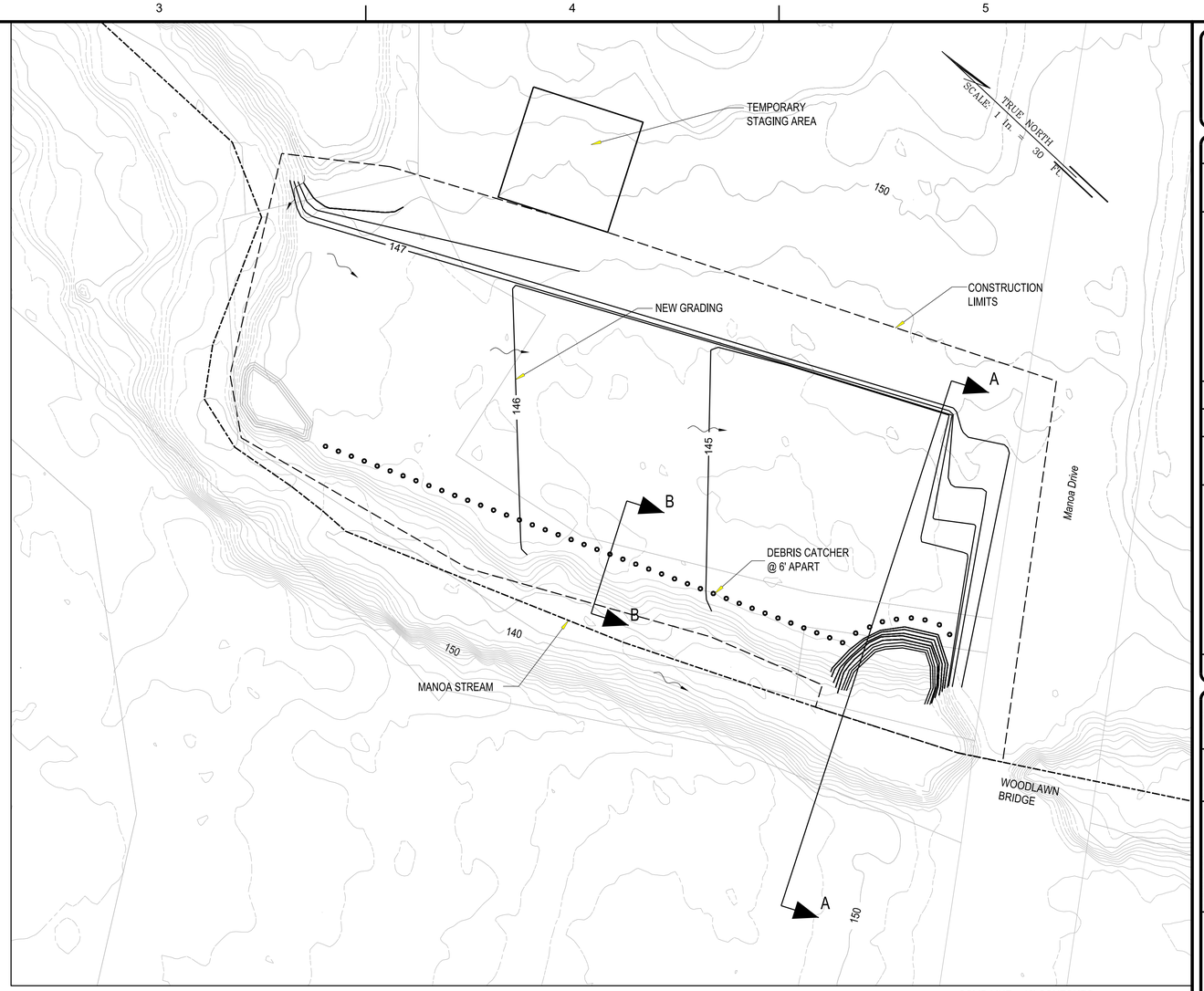
SHEET IDENTIFICATION
C-302
SHEET 77 OF 2020

FILE: c:\pw-work\jph-1\j3ec9jhh\d0133359\Ala_Wai_C-302xxx.dgn
MODEL NAME: C-302
DATE & TIME: 12/15/2014 4:10:45 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdrv\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



INNOVATION CENTER IMPROVEMENTS
SECTION B-B

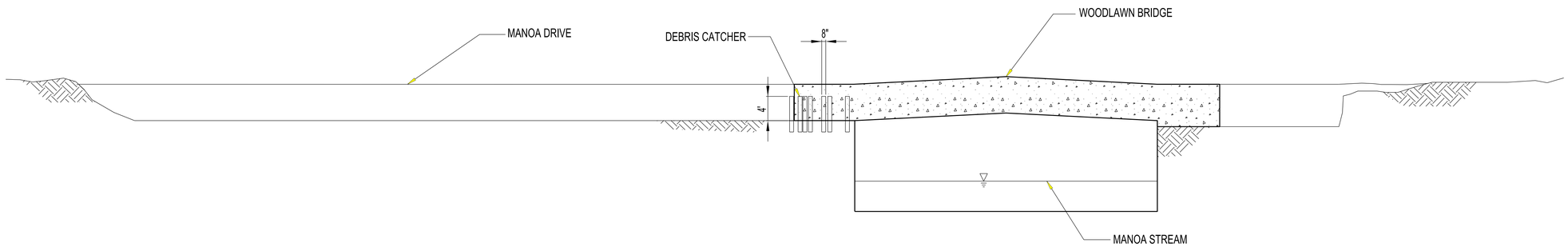
SCALE: NTS



SOLID LINE = 10' CONTOURS
DOTTED LINE = 1' CONTOURS

PLAN

SCALE: 1"=30'



10' 5' 0 10' 20'

SCALE: 1" = 10'

Note: All elevations are feet MSL

INNOVATION CENTER IMPROVEMENTS
SECTION A-A

SCALE: 1"=10'

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
CHECKED BY:
SUBMITTED BY:
PLOT SCALE:
PLOT DATE: 12/15/2014
FILE NAME: INNOVATION CENTER IMPROVEMENTS, PLAN & SECTIONS
SIZE: ANSI D
DATE:
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

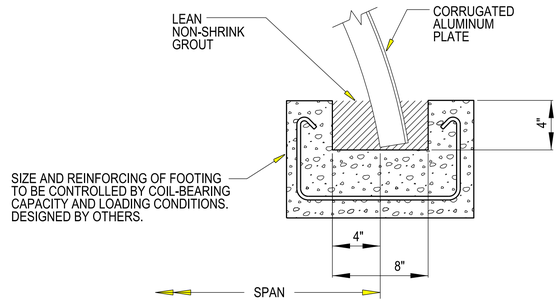
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

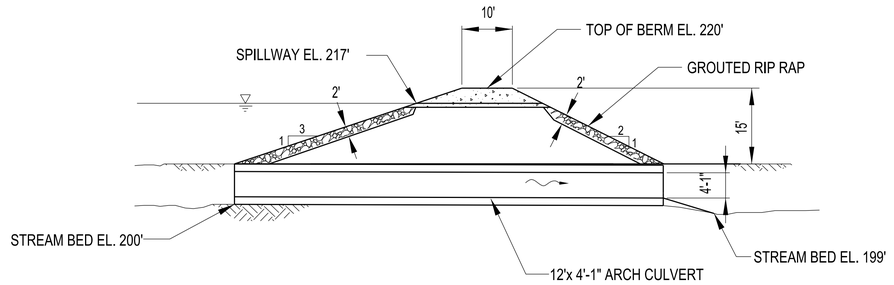
INNOVATION CENTER IMPROVEMENTS
PLAN AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-304A
SHEET 8 OF 20

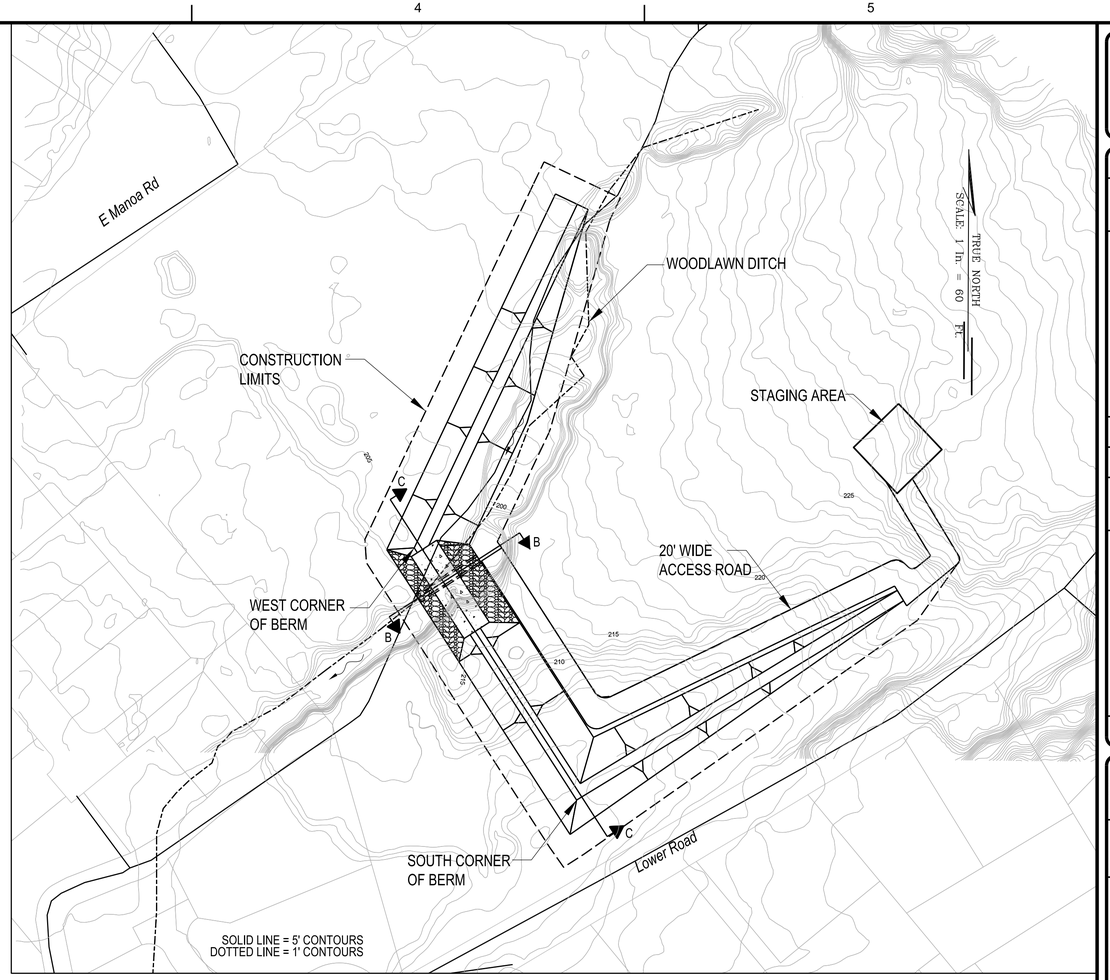
FILE: c:\pw_work\poh-1\j3ec9jhhd\d0133359\Ala_Wai_C-304Axx.dgn
MODEL NAME: C-304
DATE & TIME: 12/15/2014 4:23:28 PM
LAST SAVED BY: j3ec9cp9
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdrg\printer.plotdg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



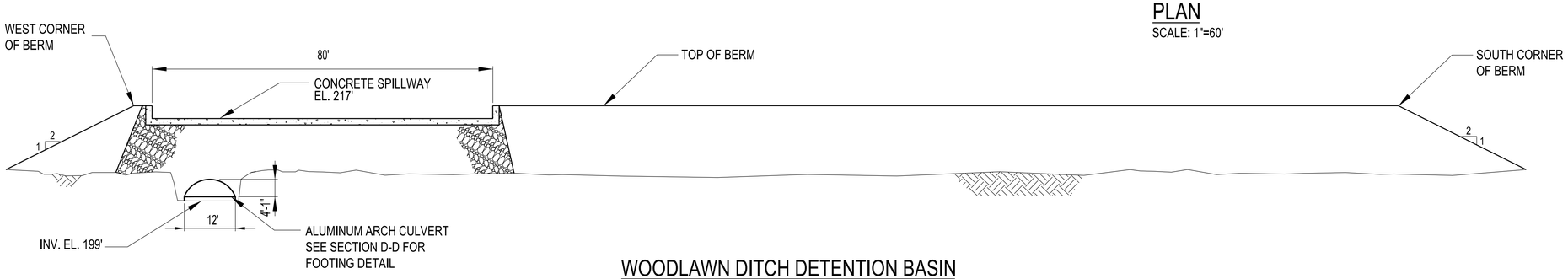
SLOTTED CONCRETE FOOTING
WOODLAWN DITCH DETENTION BASIN
SECTION D-D
SCALE: NTS



WOODLAWN DITCH DETENTION BASIN
SECTION B-B
SCALE: 1"=15'



PLAN
SCALE: 1"=60'



WOODLAWN DITCH DETENTION BASIN
SECTION C-C
SCALE: 1"=15'

15' 7.5' 0 15' 30'
SCALE: 1" = 15'

Note: All elevations are feet MSL

US Army Corps of Engineers
Honolulu District

DESIGNED BY: JJH	DRAWN BY:	CHECKED BY:	SUBMITTED BY:	PLOT SCALE: AS SHOWN	PLOT DATE:
SIZE: ANSI D	FILE NAME: WOODLAWN DITCH DETENTION BASIN, PLAN & SECTIONS				

REVISION:	DATE:	APPR.

DESCRIPTION	MARK	DATE	APPR.

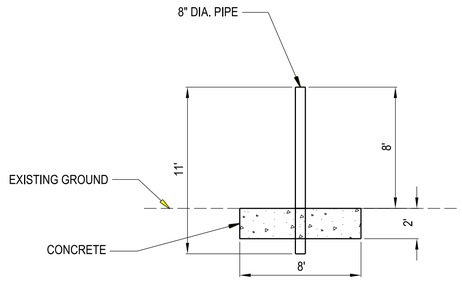
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

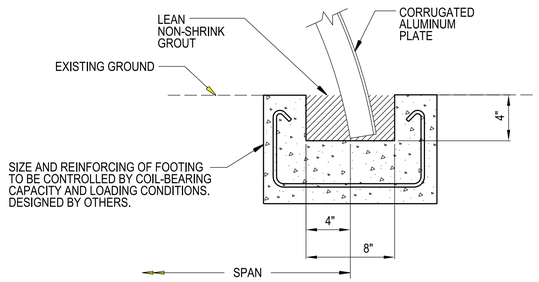
WOODLAWN DITCH DETENTION
PLAN AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-305A
SHEET 9 OF 20

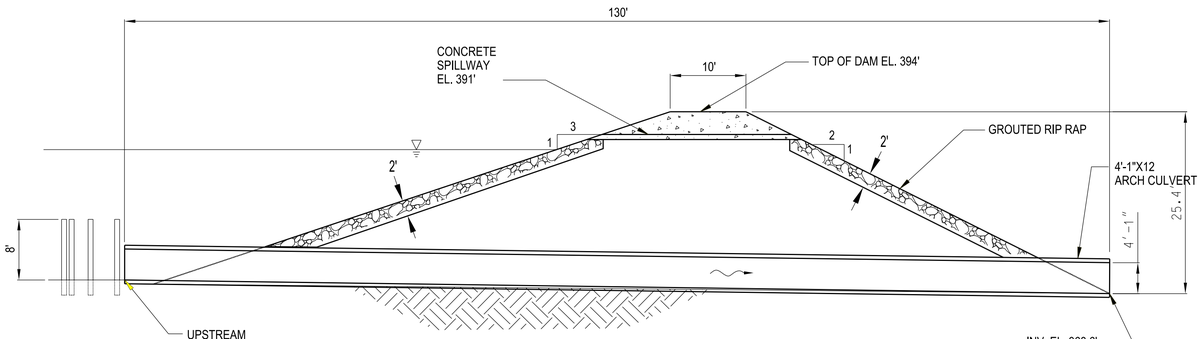
FILE: c:\pw\work\poh-1\j3ec9jhh\d01333594a_Wai_C-305Axx.dgn
MODEL NAME: C-305
DATE & TIME: 12/15/2014 4:26:49 PM
LAST SAVED BY: j3ec9cp9
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdrv\printer.pltcfg
PEN TABLE: BW_and_Greyscale_Pen.tbl
PRINTED BY: J3EC9JHH



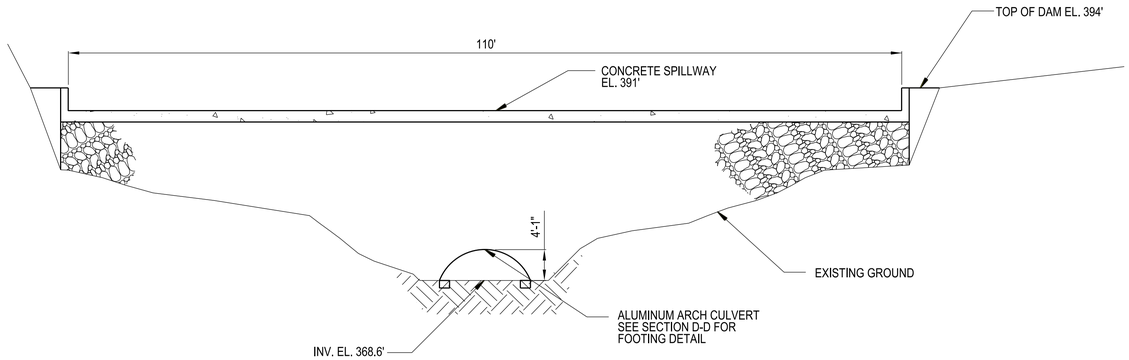
WAIOMAO DEBRIS AND DETENTION BASIN
SECTION C-C
SCALE: 1"=5'



SLOTTED CONCRETE FOOTING
WAIOMAO DEBRIS AND DETENTION BASIN
SECTION D-D
SCALE: NTS



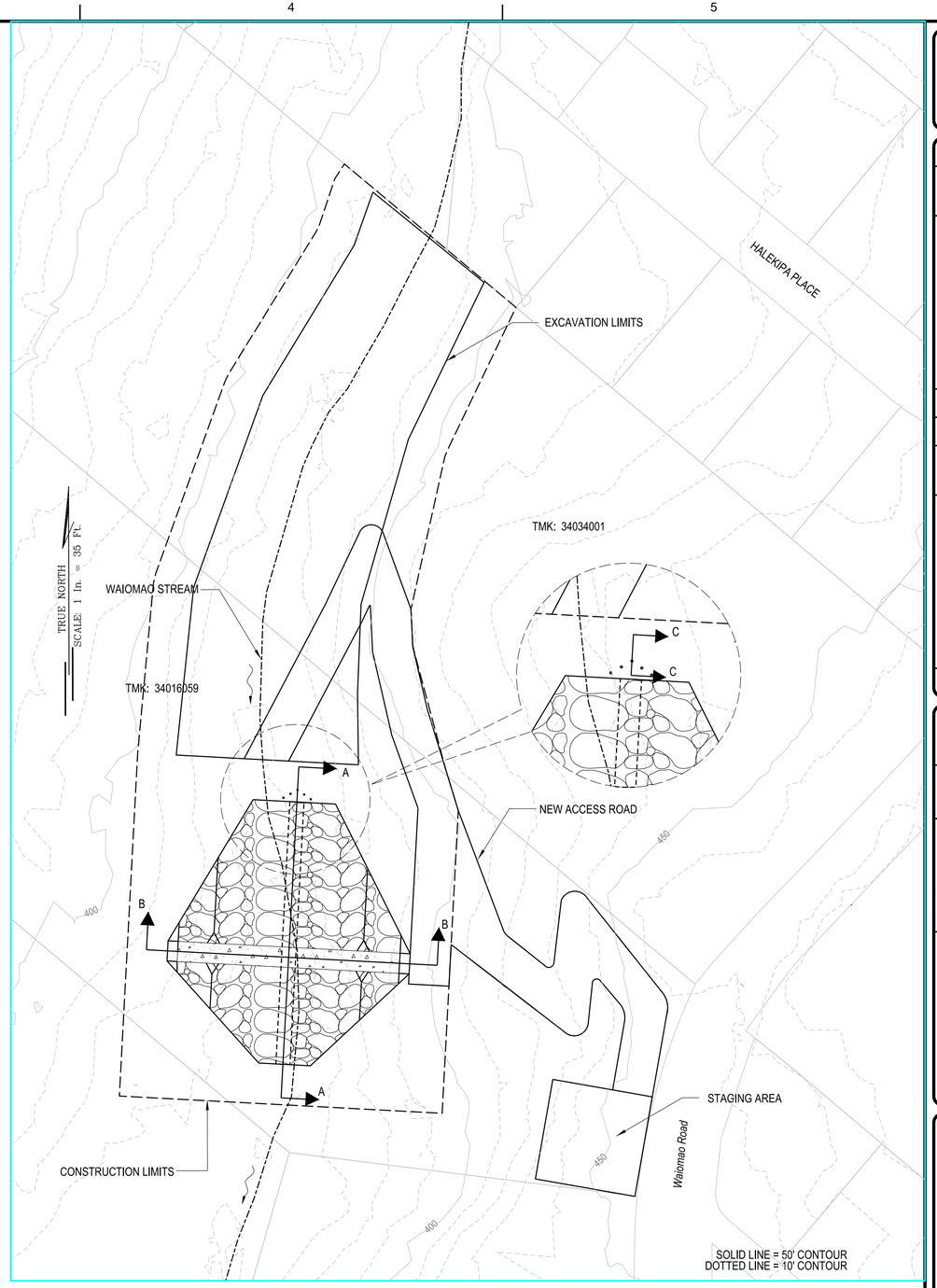
WAIOMAO DEBRIS AND DETENTION BASIN
SECTION A-A
SCALE: 1"=10'



WAIOMAO DEBRIS AND DETENTION BASIN
SECTION B-B
SCALE: 1"=10'

10 5 0 10 20
SCALE: 1" = 10'

Note: All elevations are feet MSL



PLAN
SCALE: 1"=35'

35 17.5 0 35 70
SCALE: 1" = 35'

NOTES:

1. ALUMINUM ARCH CULVERT METAL THICHNESS IS 1.50". WITH A NATURAL BOTTOM.
2. THE APPROXIMATE AREA UNDER THE ARCH CULVERT IS 35.3 SQ FT.

US Army Corps of Engineers®
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH	DRAWN BY:	SUBMITTED BY:	PLOT SCALE: 1:1
CHECKED BY:			PLOT DATE: 12/15/2014
DATE:	REVISION:	SOLICIT. / CONTRACT NO.:	LOCATION CODE
			DRAWING NUMBER:
SIZE: ANSI D	FILE NAME: WAIOMAO DEBRIS & DETENTION BASIN, PLAN & SECTIONS		

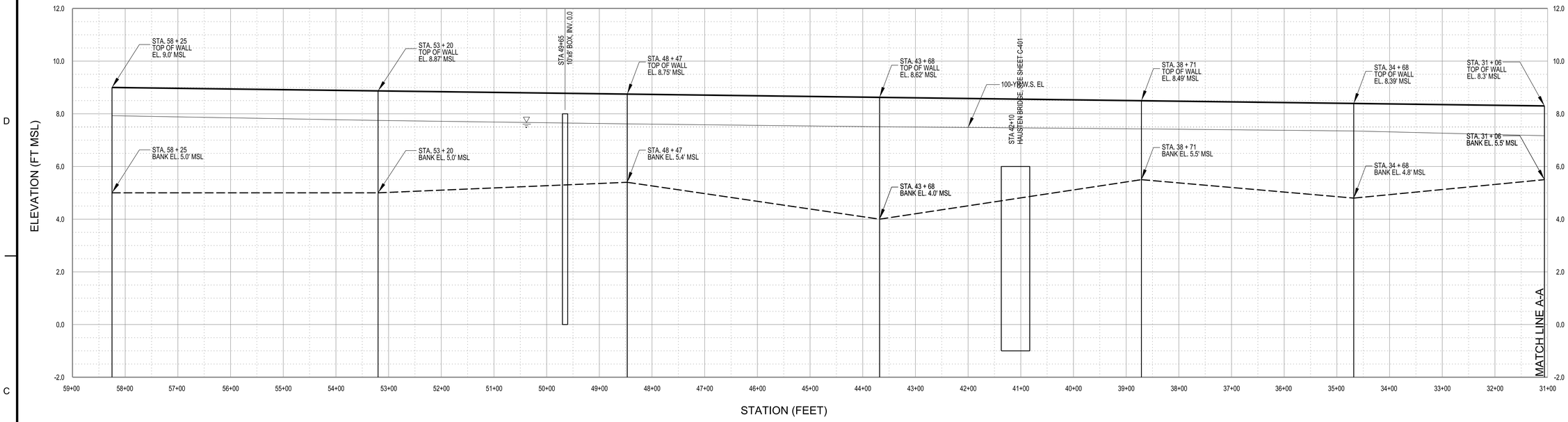
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

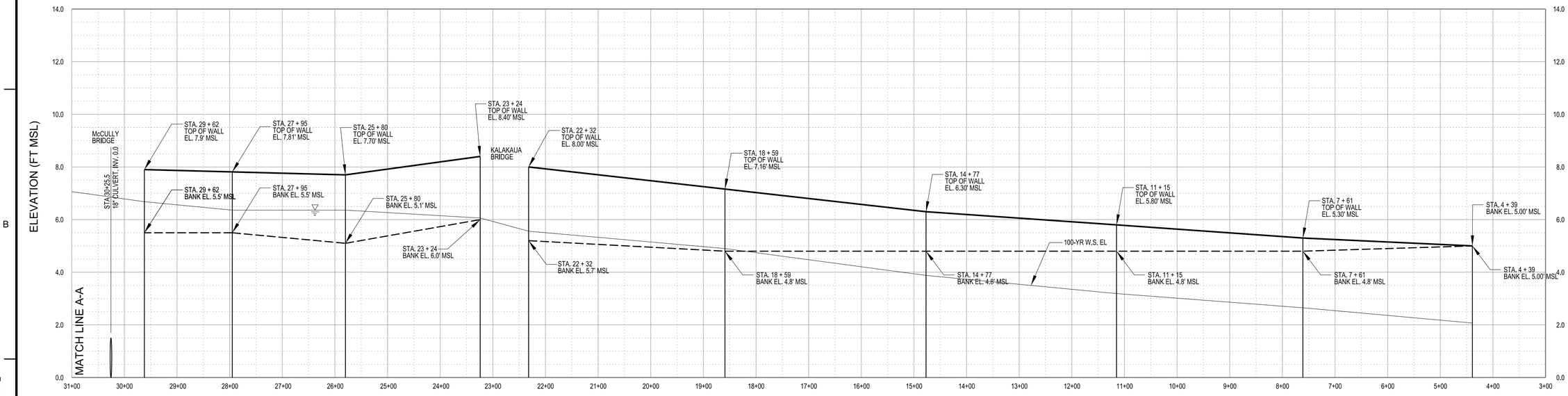
ALA WAI CANAL PROJECT

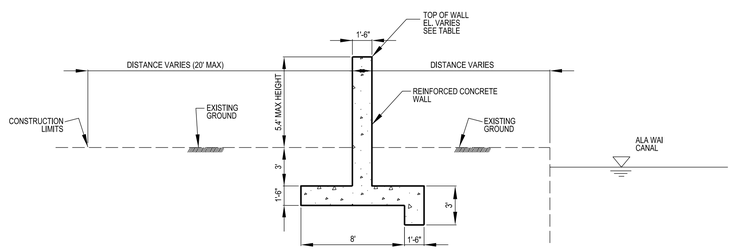
WAIOMAO DEBRIS AND DETENTION BASIN
PLAN AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-308
SHEET 10 OF

FILE: c:\pw_work\poh-1\j3ec9jhh\d01333599\Ala_Wai_C-308xxx.dgn
MODEL NAME: C-308
DATE & TIME: 12/15/2014 4:33:49 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdg\printer.plotdg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH







A TYPICAL RIGHT BANK REINFORCED CONCRETE FLOODWALL SECTION

NOT TO SCALE

PROFILE

ALA WAI MIDDLE (ALA2) AND LOWER (ALA1) RIGHT BANK FLOODWALLS

SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'

ALA WAI CANAL RIGHT BANK
STA 58 + 25 TO 25+80

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
58 + 25	4.00	9.00
53 + 20	3.87	8.87
48 + 47	3.35	8.75
43 + 68	4.62	8.62
38 + 71	2.99	8.49
34 + 68	3.59	8.39
31 + 06	2.80	8.30
MCCLULLY BRIDGE		
29 + 62	2.40	7.90
27 + 95	2.31	7.81
25 + 80	2.60	7.70

ALA WAI CANAL RIGHT BANK
STA 23 + 24 TO 4 + 39

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
23 + 24	2.40	8.40
22 + 32	2.80	8.00
18 + 59	2.36	7.16
14 + 77	1.50	6.30
11 + 15	1.00	5.80
7 + 61	0.50	5.30
4 + 39	0	5.00

US Army Corps of Engineers
POHONOLULU DISTRICT

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE:
FILE NAME: ALA WAI CANAL MIDDLE & LOWER RIGHT BANK PROFILE
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ALA WAI MIDDLE & LOWER RIGHT BANK FLOODWALLS
PROFILE AND SECTION
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-309A
SHEET 11 OF 20

FILE: c:\pw-workpoh-1\j3ec9jhh\d01333593Ala_Wai_C-309Axx.dgn
MODEL NAME: C-309A
DATE & TIME: 12/15/2014 4:35:51 PM
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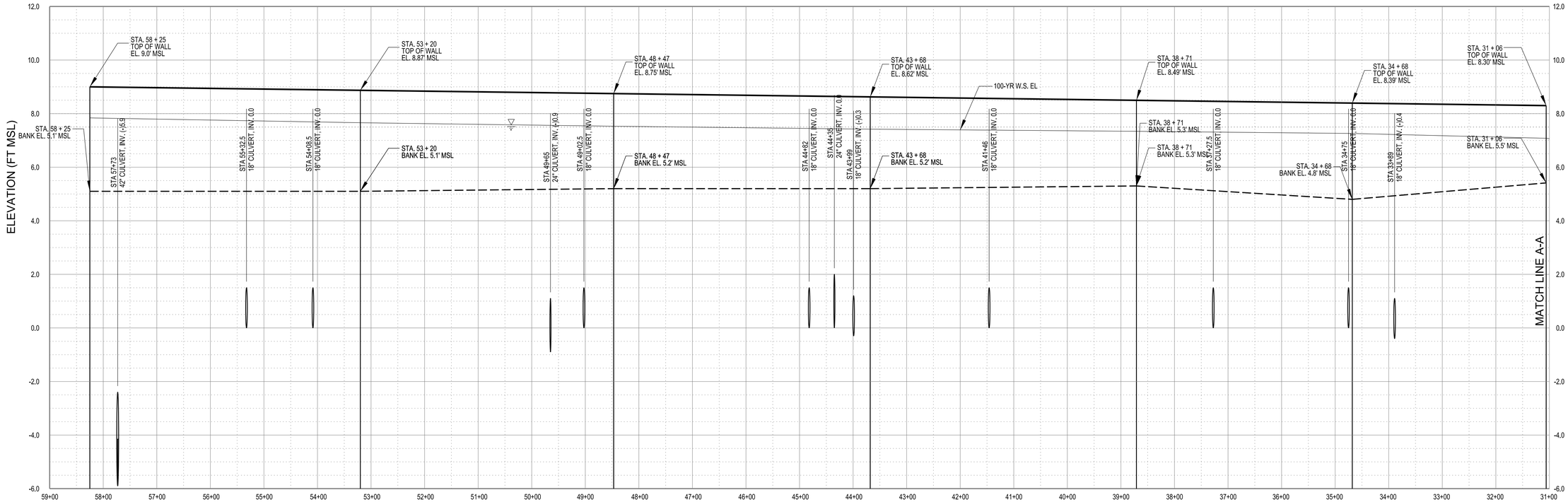
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotg\printer.plctg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



ALA WAI CANAL LEFT BANK
STA TO 58 + 25 TO 25+80

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
58 + 25	3.90	9.00
53 + 20	3.77	8.87
48 + 47	3.55	8.75
43 + 68	3.42	8.62
38 + 71	3.19	8.49
34 + 68	3.59	8.39
31 + 06	2.80	8.30
MCCLULLY BRIDGE		
29 + 62	2.40	7.90
27 + 95	2.31	7.81
25 + 80	2.60	7.70

ALA WAI CANAL LEFT BANK
STA TO 23 + 24 TO 4 + 39

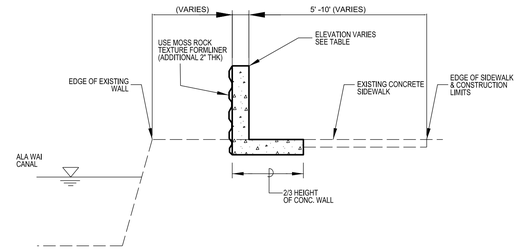
STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
23 + 24	2.50	8.40
KALAKAUA BRIDGE		
22 + 32	1.00	8.00
18 + 59	2.46	7.16
14 + 77	1.60	6.30
11 + 15	1.10	5.80
7 + 61	0.60	5.30
4 + 39	0	5.00

PROFILE
ALA WAI CANAL MIDDLE (ALA2) AND LOWER (ALA1) LEFT BANK FLOODWALLS

SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'

NOTES:

1. SEE DETAIL "C" ON SHEET C-311A FOR ALA WAI CANAL MIDDLE (ALA2) TYPICAL LEFT BANK CONCRETE FLOODWALL SECTION.
2. ALA WAI CANAL LOWER (ALA1) IS FROM STATION 23+24 TO STATION 4+39.



B TYPICAL ALA WAI LOWER (ALA1) LEFT BANK CONCRETE FLOODWALL SECTION

NOT TO SCALE

US Army Corps of Engineers
HONOLULU DISTRICT

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: 1:1 (FULL SCALE SHOWN)
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE:
FILE NAME: ALA WAI CANAL MIDDLE & LOWER LEFT BANK_PROFILE
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ALA WAI MIDDLE & LOWER LEFT BANK FLOODWALLS
PROFILE
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-310A
SHEET 12 OF 20

FILE: c:\pw_work\poh-1\j3ec9jhh\d01333599\Ala_Wai_C-310Axx.dgn
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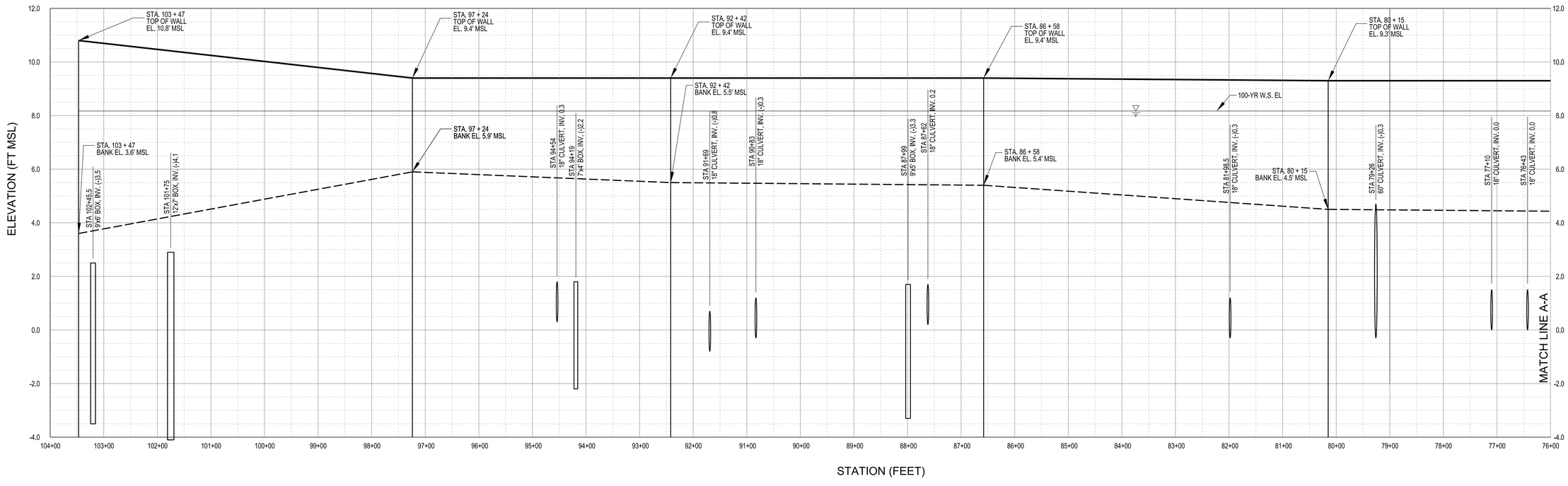
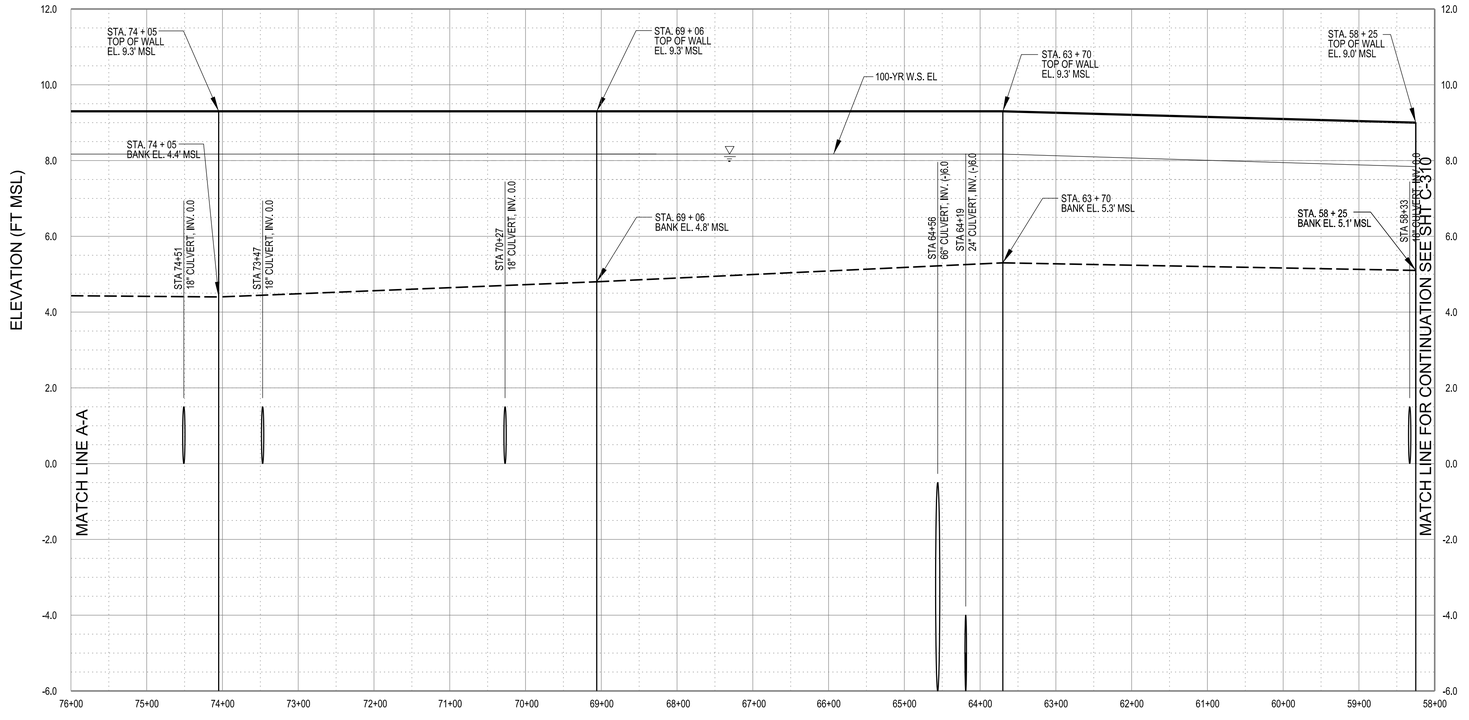
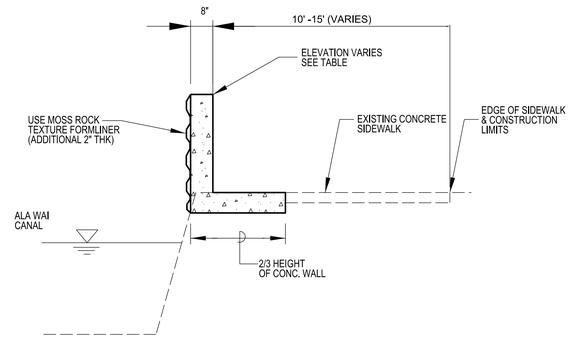
DATE & TIME: 12/15/2014 4:37:32 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries1)\WorkSpace\system\plotdg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH







C TYPICAL LEFT BANK CONCRETE FLOODWALL SECTION

NOT TO SCALE

ALA WAI CANAL LEFT BANK
STA 101 + 24 TO 58 + 25

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
101 + 24	7.20	10.80
97 +24	3.50	9.40
92 + 42	3.90	9.40
86 + 58	4.00	9.40
80 + 15	4.70	9.30
74 + 05	4.80	9.30
69 + 06	4.50	9.30
63 + 70	4.00	9.30
58 + 25	3.90	9.00

PROFILE
ALA WAI CANAL UPPER (ALA3) LEFT BANK FLOODWALLS

SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: 1=1 SHOWN
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE:
FILE NAME: ALA WAI CANAL UPPER LEFT BANK, PROFILE & SECTIONS
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

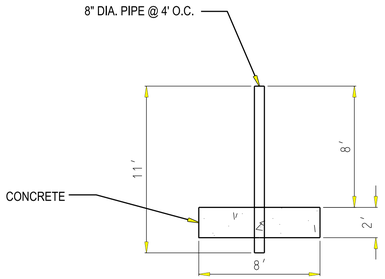
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

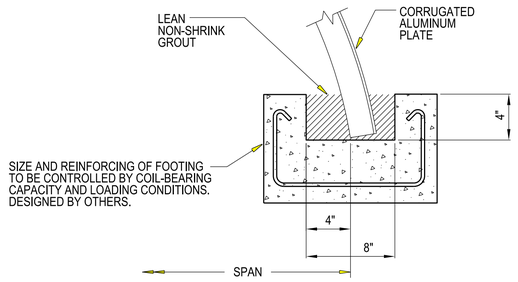
ALA WAI UPPER LEFT BANK FLOODWALLS
PROFILE AND SECTION
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-311A
SHEET 13 OF 20

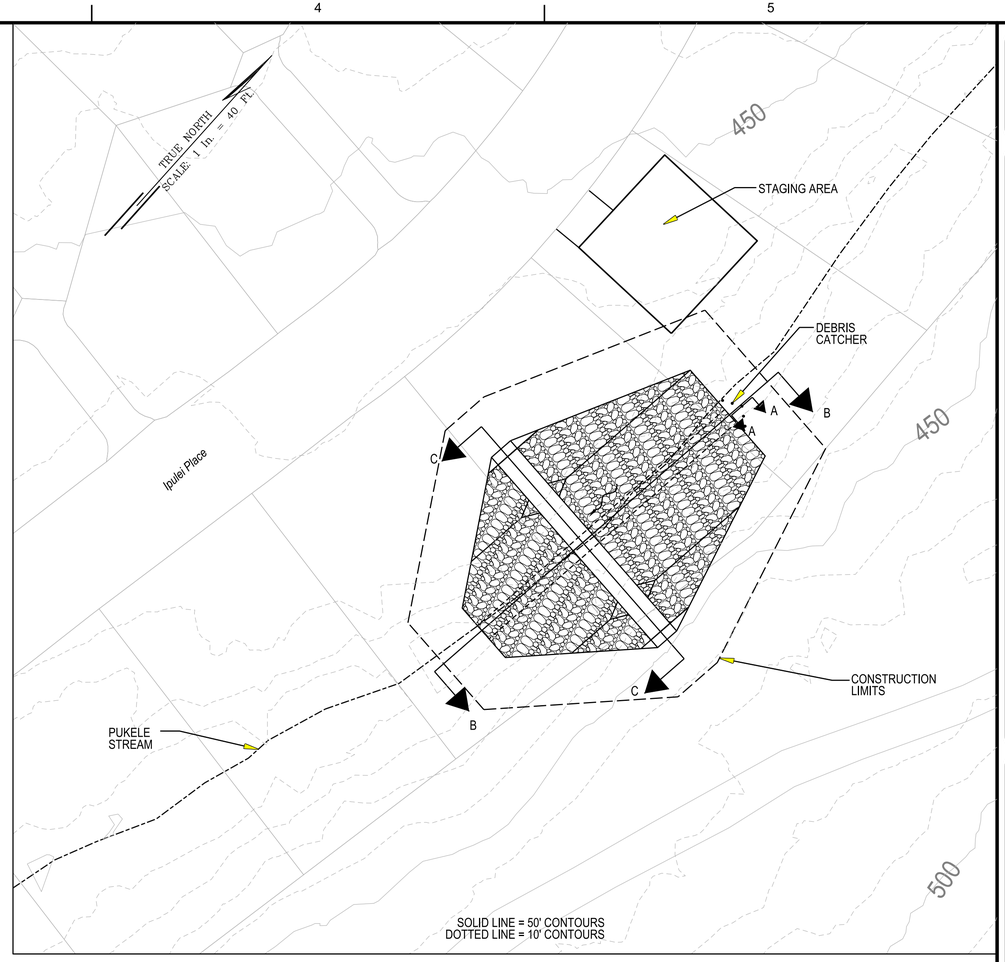
FILE: c:\pw_work\poh-1\j3ec9jhh\d01333599Ala_Wal_C-311Axx.dgn
MODEL NAME: C-311A
DATE & TIME: 12/15/2014 4:49:46 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotcfg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



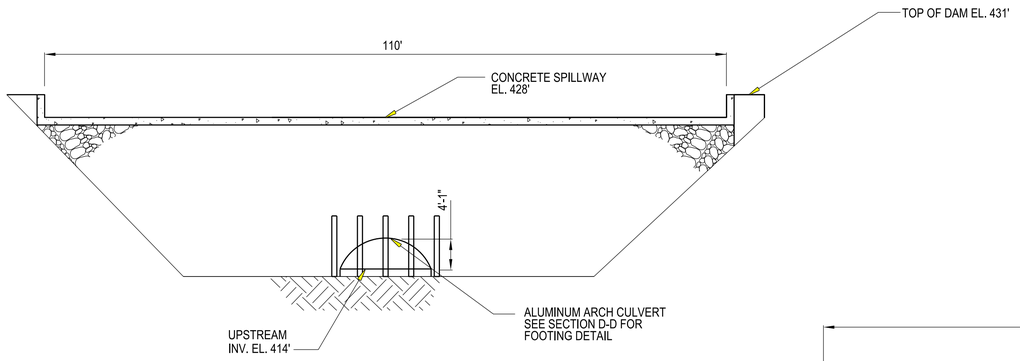
PUKELE DEBRIS AND DETENTION BASIN
SECTION A-A
SCALE: 1"=5'



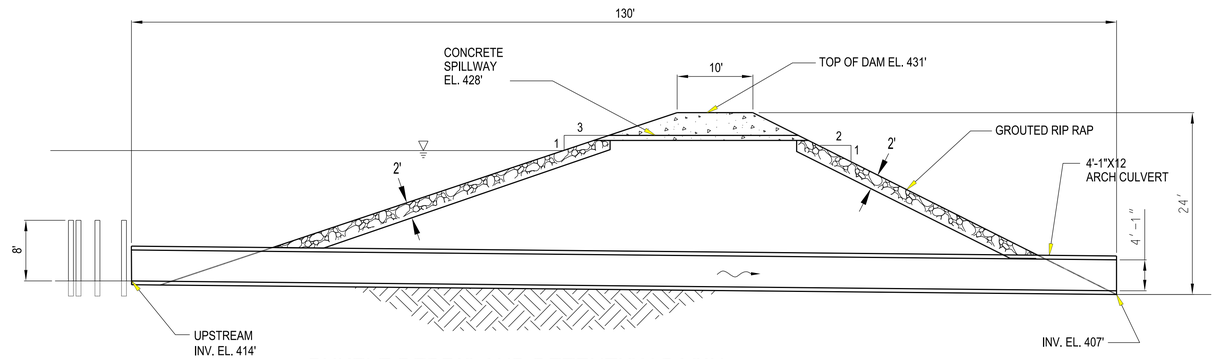
SLOTTED CONCRETE FOOTING
SECTION D-D
SCALE: NTS



PLAN
SCALE: 1"=40'



PUKELE DEBRIS AND DETENTION BASIN
SECTION C-C
SCALE: 1"=5'



PUKELE DEBRIS AND DETENTION BASIN
SECTION B-B
SCALE: 1"=5'

5 2.5' 0 5 10
SCALE: 1" = 5'
Note: All elevations are feet MSL

US Army Corps of Engineers®
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JPH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE: 12/15/2014
FILE NAME: PUKELE DEBRIS & DETENTION BASIN, PLAN & SECTION
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

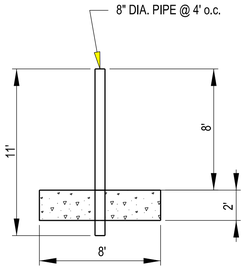
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

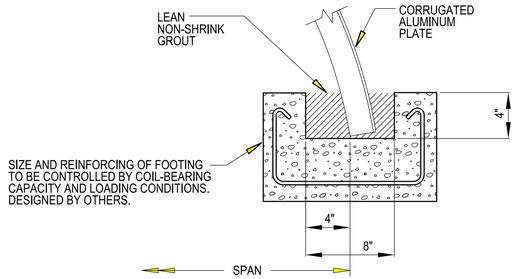
PUKELE DEBRIS AND DETENTION BASIN
PLAN AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-313
SHEET 14 OF 20

FILE: c:\pw-work\poh-1\j3ec9jhh\d0133359\Ala_Wai_C-313xxx.dgn
MODEL NAME: C-313
DATE & TIME: 12/15/2014 5:05:33 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: c:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\pltcfg\printer.pltcfg
PEN TABLE: BW_and_Greyscale_Pen.tbl
PRINTED BY: J3EC9JHH

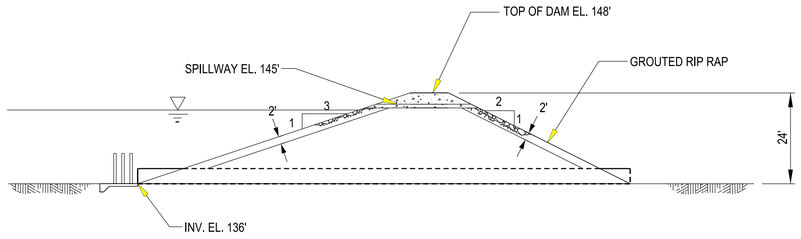


ROOSEVELT DEBRIS AND DETENTION BASIN
SECTION A-A
SCALE: 1"=5'



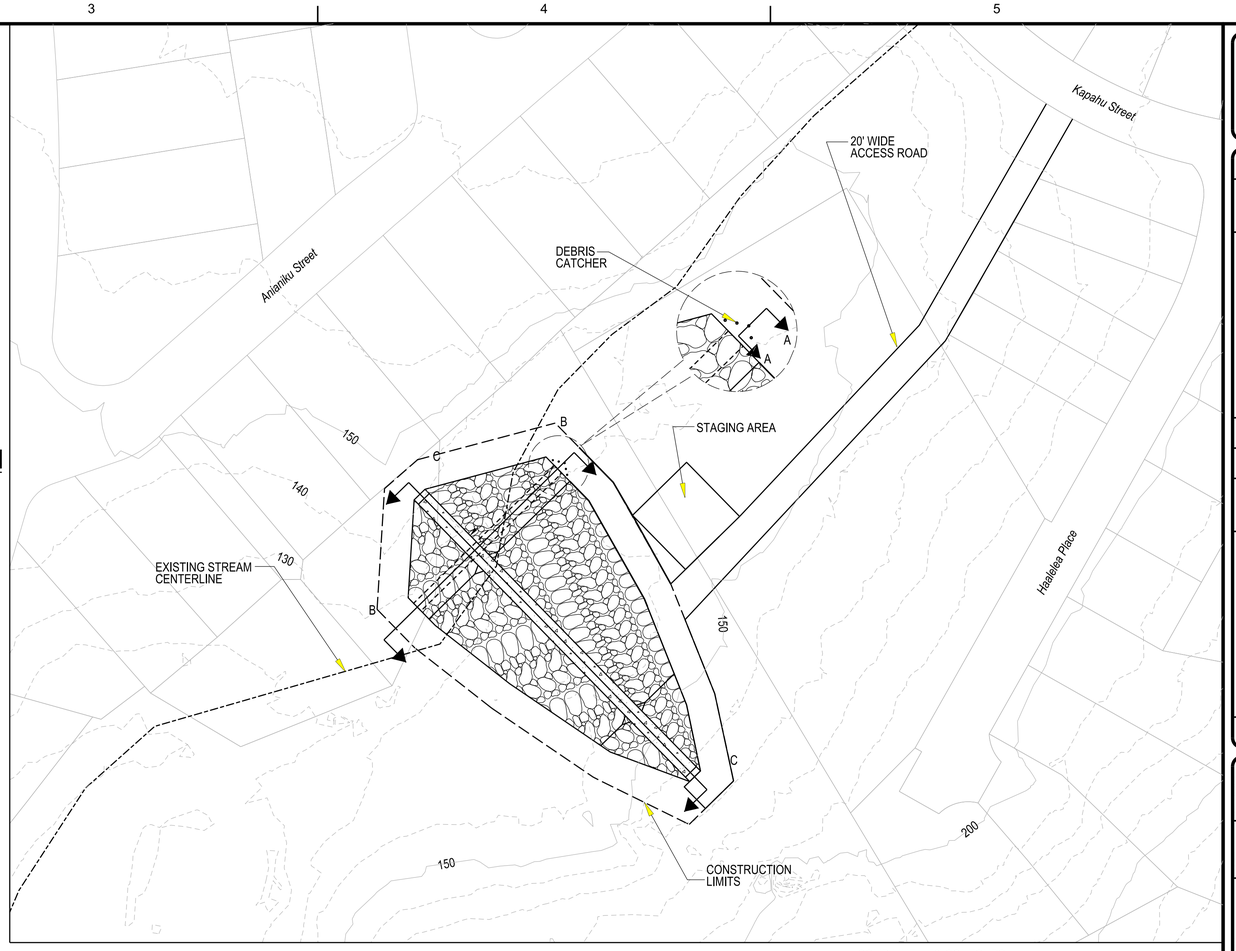
SLOTTED CONCRETE FOOTING

ROOSEVELT DEBRIS AND DETENTION BASIN
SECTION D-D
SCALE: NTS

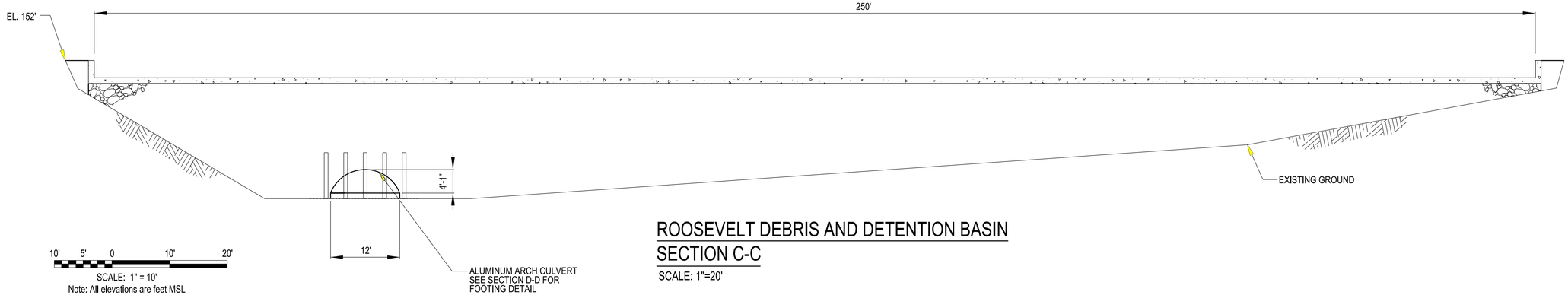


SCALE: 1" = 20'
Note: All elevations are feet MSL

ROOSEVELT DEBRIS AND DETENTION BASIN
SECTION B-B
SCALE: 1"=20'



SOLID LINE = 50' CONTOURS
DOTTED LINE = 10' CONTOURS



SCALE: 1" = 10'
Note: All elevations are feet MSL

ROOSEVELT DEBRIS AND DETENTION BASIN
SECTION C-C
SCALE: 1"=20'

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JPH
DRAWN BY:
SUBMITTED BY:
CHECKED BY:
DATE:
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
PLOT SCALE: AS SHOWN
PLOT DATE:
VERSION 4
SIZE: ANSI D
FILE NAME: ROOSEVELT DEBRIS & DETENTION BASIN, PLAN & SECTIONS

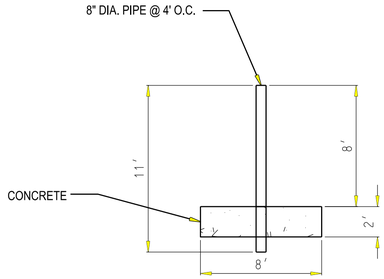
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

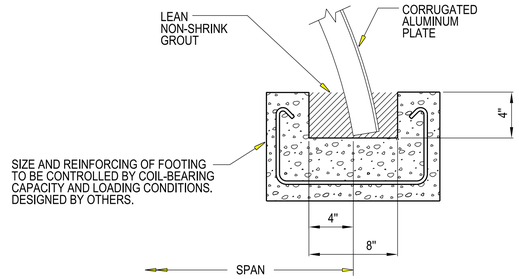
ROOSEVELT DEBRIS AND DETENTION BASIN
PLAN AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-314A
SHEET 15 OF 20

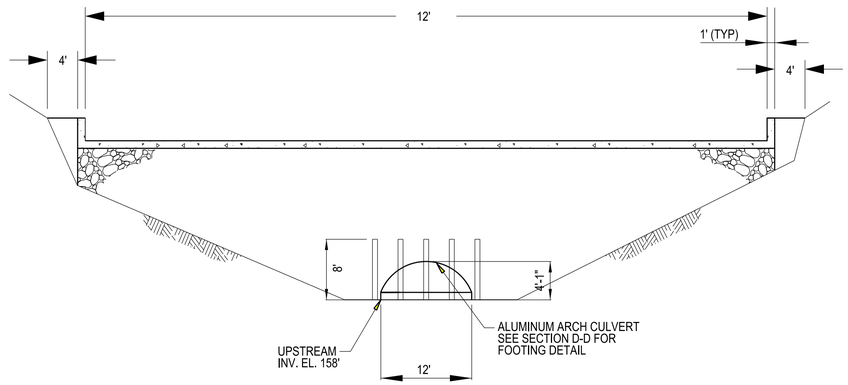
FILE: c:\pw-work\poh-1\j3ec9jhh\d0133359\Ala_Wai_C-314Axx.dgn
MODEL NAME: C-314
DATE & TIME: 12/15/2014 5:08:13 PM
LAST SAVED BY: j3ec9cp9
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotf\gprinter.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



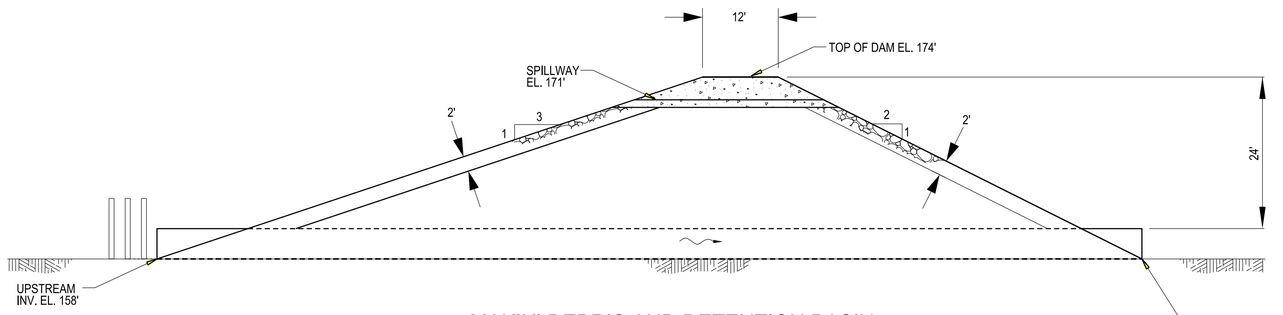
MAKIKI DEBRIS AND DETENTION BASIN
SECTION A-A
SCALE: 1"=5'



SLOTTED CONCRETE FOOTING
MAKIKI DEBRIS AND DETENTION
SECTION D-D
SCALE: NTS



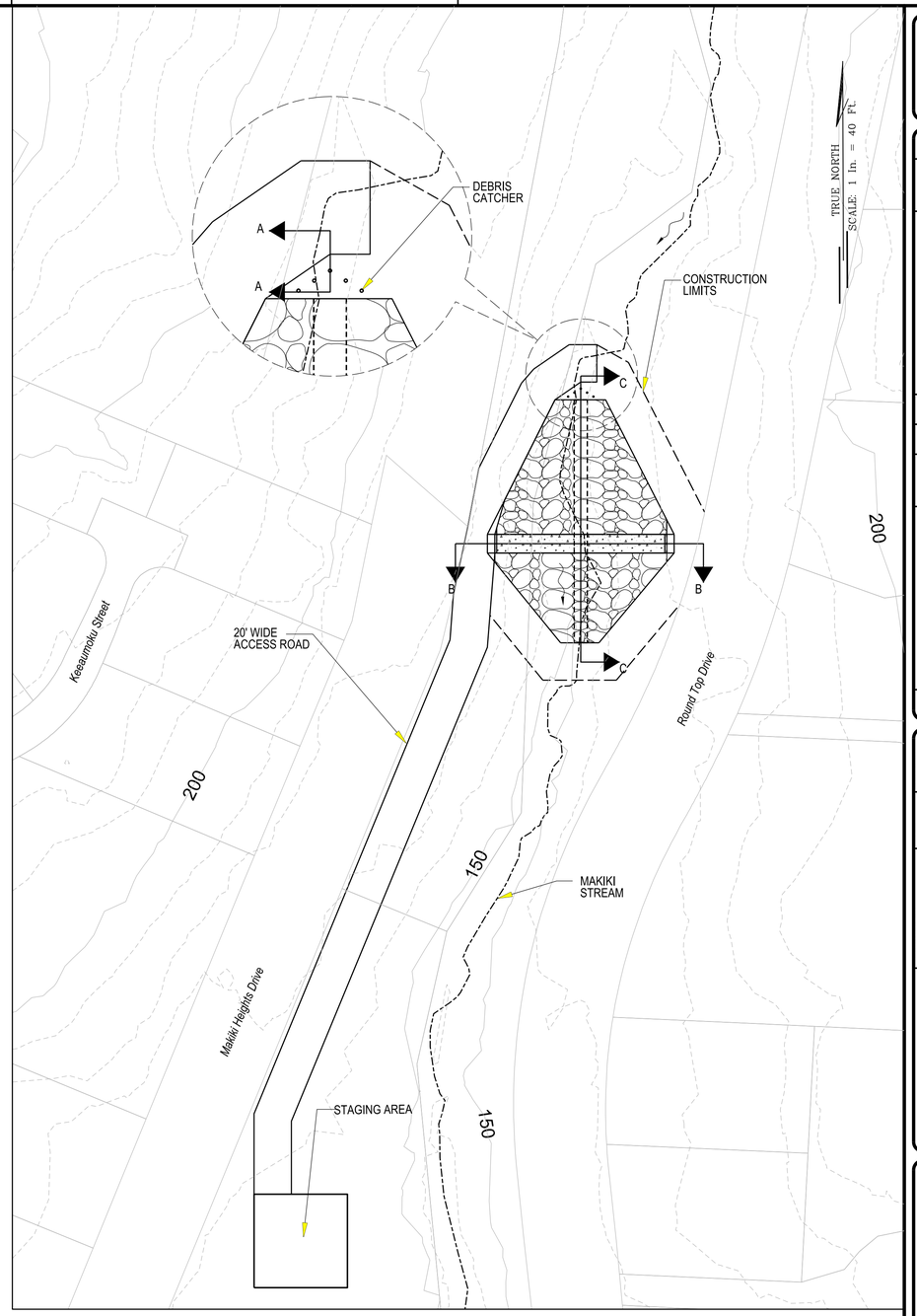
MAKIKI DEBRIS AND DETENTION BASIN
SECTION B-B
SCALE: 1"=10'



MAKIKI DEBRIS AND DETENTION BASIN
SECTION C-C
SCALE: 1"=10'

10' 5' 0 10' 20'
SCALE: 1" = 10'

Note: All elevations are feet MSL



SOLID LINE = 50' CONTOURS
DOTTED LINE = 10' CONTOURS

PLAN
SCALE: 1"=40'

US Army Corps of Engineers®
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
PLOT STYLE: ANSI D
DATE:
CHECKED BY:
PLOT DATE:
VERSION:
FILE NAME: MAKIKI DEBRIS & DETENTION BASIN, PLAN & SECTIONS
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

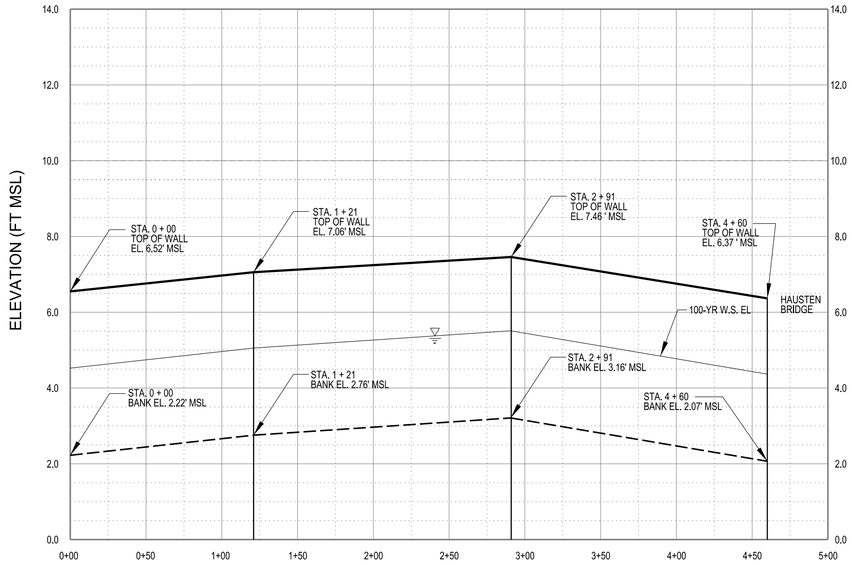
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

MAKIKI DEBRIS AND DETENTION BASIN
PLAN AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-315A
SHEET 16 OF 20

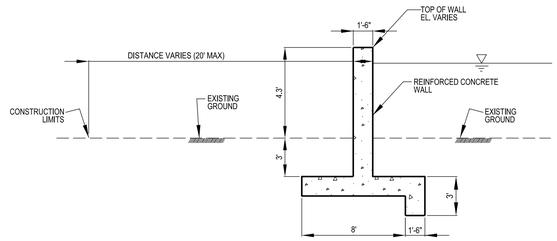
FILE: c:\pwwork\pph-1\j3ec9jhh\d01333599\Ala_Wai_C-315Axx.dgn
MODEL NAME: C-315
DATE & TIME: 12/15/2014 5:10:53 PM
LAST SAVED BY: j3ec9cp9
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotcfg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



PROFILE

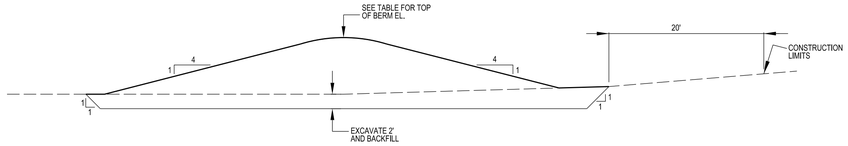
HAUSTEN DITCH RIGHT BANK FLOODWALL

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 2'



A HAUSTEN DITCH TYPICAL REINFORCED CONCRETE FLOODWALL SECTION

NOT TO SCALE



B HAUSTEN DITCH TYPICAL BERM

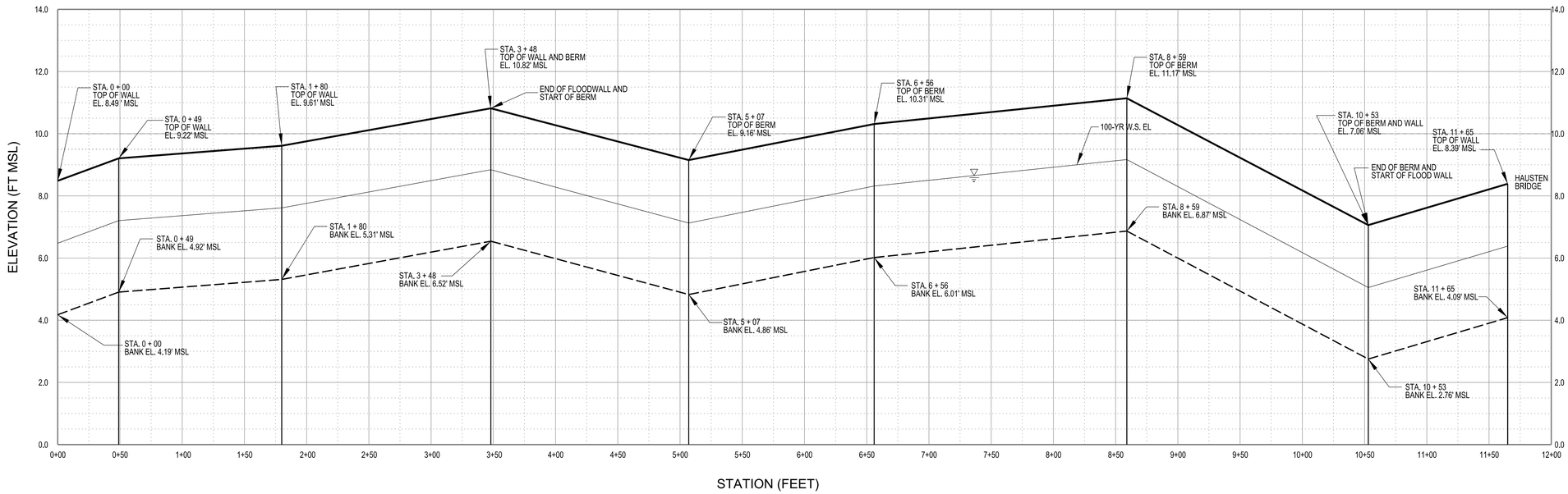
NOT TO SCALE

HAUSTEN DITCH RIGHT BANK FLOODWALL
STA TO 0 + 00 TO 4 + 60

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
0 + 00	4.30	6.52
1 + 21	4.30	7.06
2 + 91	4.30	7.46
4 + 60	4.30	6.37
HAUSTEN BRIDGE		

HAUSTEN DITCH LEFT BANK
FLOODWALL AND BERM
STA 0 0 + 00 TO 11 + 65

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
0 + 00	4.30	8.49
0 + 49	4.30	9.22
1 + 80	4.30	9.61
3 + 48	4.30	10.82
END OF FLOODWALL AND START OF BERM		
3 + 48	4.30	10.82
5 + 07	4.30	9.16
6 + 56	4.30	10.31
8 +59	4.30	11.17
10 + 53	4.30	7.06
END OF BERM AND START OF FLOODWALL		
10 + 53	4.30	7.06
11 + 65	4.30	8.39
HAUSTEN BRIDGE		



PROFILE

HAUSTEN DITCH LEFT BANK FLOODWALL AND BERM

SCALE:
HORIZONTAL: 1" = 50'
VERTICAL: 1" = 2'

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

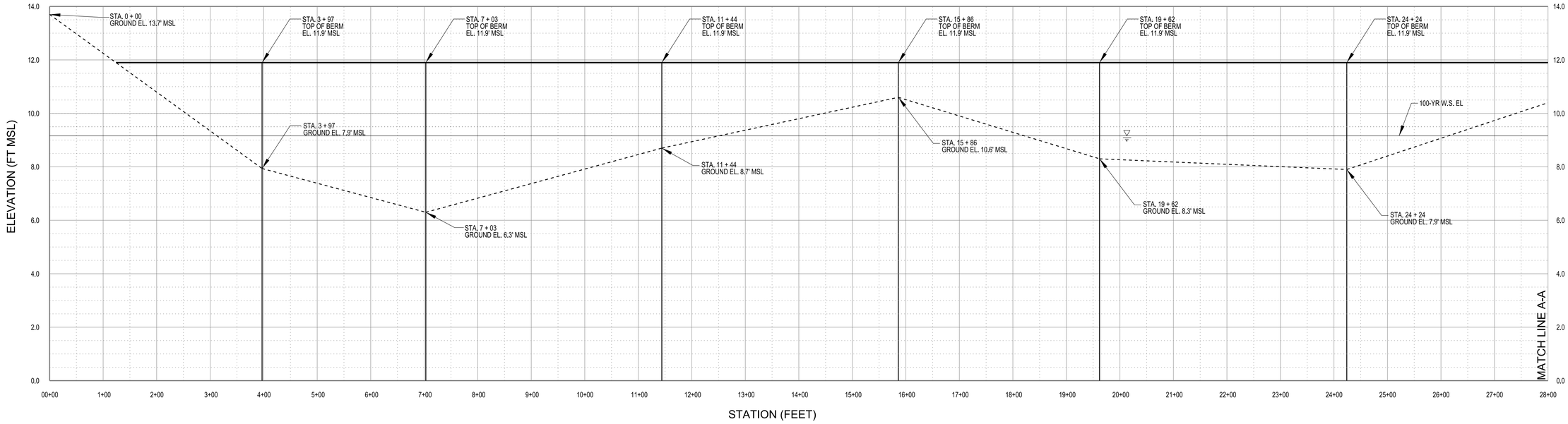
DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: 1=1 SHOWN
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE: 12/15/2014
FILE NAME: HAUSTEN DITCH DETENTION, PROFILE & SECTIONS
REVISION:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

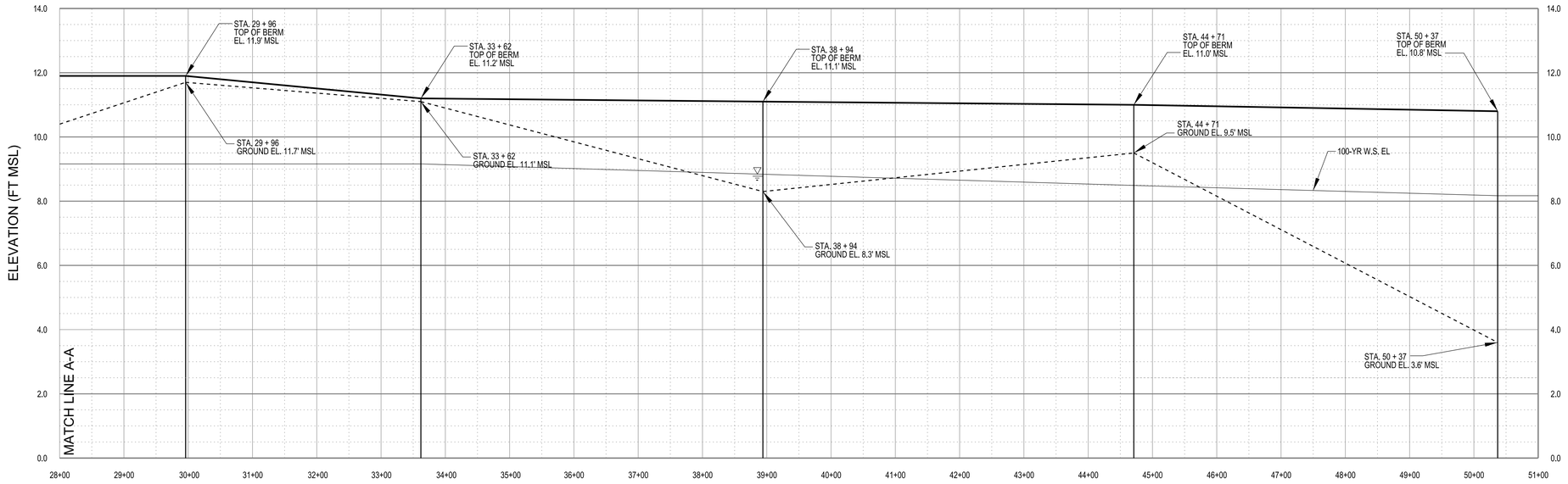
ALA WAI CANAL PROJECT

HAUSTEN DITCH DETENTION FLOODWALLS AND BERM
PROFILE AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-316A
SHEET 17 OF 20

FILE: c:\pw_work\poh-1\j3ec9jhh\d01333599\Ala_Wai_C-316Axx.dgn
MODEL NAME: C-316
DATE & TIME: 12/15/2014 5:12:55 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotcfg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



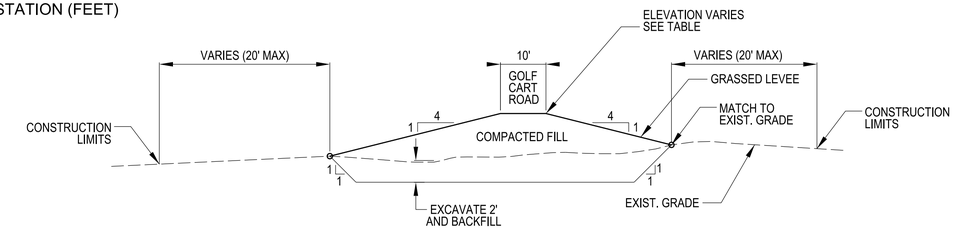


ALA WAI GOLF COURSE LEVEE
STA 0 + 00 TO 50 + 37

STATION	WALL HEIGHT (FT)	FINISHED WALL ELEVATION (FT MSL)
0 + 00	-	-
3 + 97	4.0	11.9
7 + 03	5.6	11.9
11 + 44	3.2	11.9
15 + 86	1.3	11.9
19 + 62	3.6	11.9
24 + 24	4.0	11.9
29 + 96	0.2	11.9
33 + 62	0.1	11.2
38 + 94	2.8	11.1
44 + 71	1.5	11.0
50 + 37	7.2	10.8

ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION LEVEE PROFILE

SCALE:
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 2'



A TYPICAL LEVEE SECTION
NOT TO SCALE

US Army Corps of Engineers
HONOLULU DISTRICT

10% DESIGN

NO.	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
SIZE: ANSI D
PLOT DATE:
FILE NAME: ALA WAI GOLF COURSE MULTI-PURPOSE DETENTION LEVEE.dgn
DATE:
REVISION:
SOLICIT / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

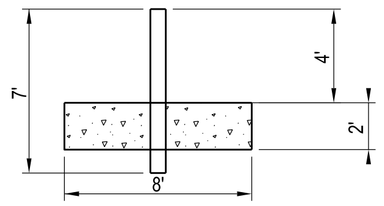
US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

ALA WAI GOLF COURSE LEVEE
PROFILE AND SECTION
ALTERNATIVE 3A

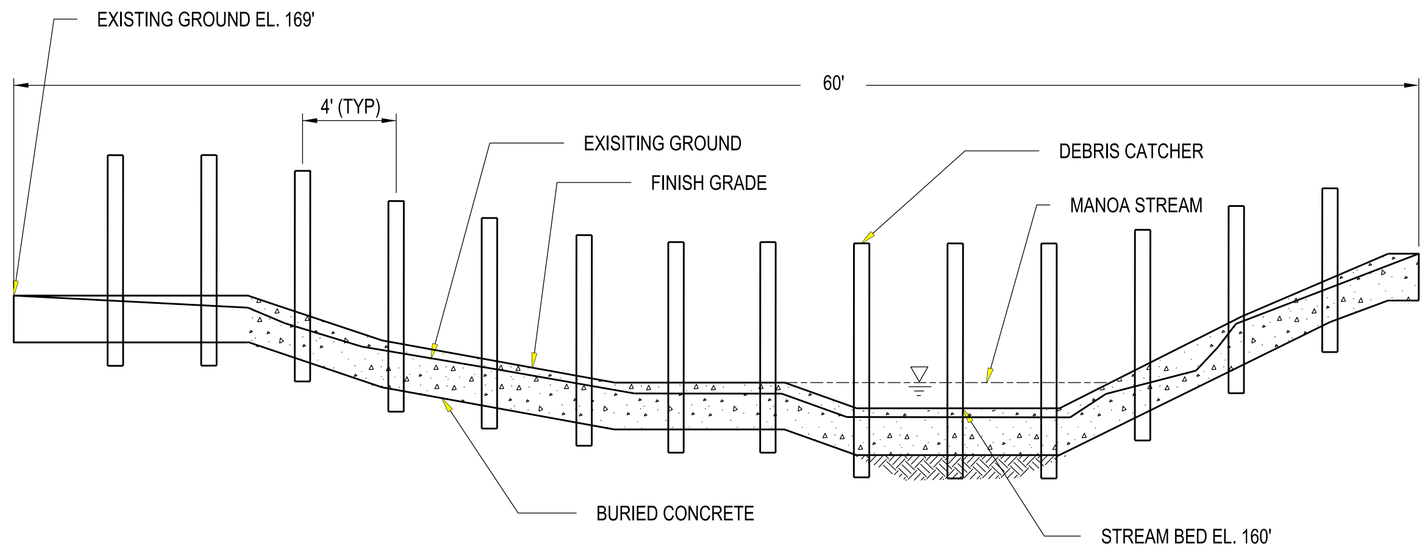
SHEET IDENTIFICATION
C-317A
SHEET 18 OF 20

FILE: c:\pw-workpoh-1\j3ec9jhh\d01333569\Ala_Wai_C-317Axx.dgn
MODEL NAME: C-309
DATE & TIME: 12/15/2014 5:14:52 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotdrg\prhtter.pltcfg
PEN TABLE: BW_and_Greyscale_Pen.tbl
PRINTED BY: J3EC9JHH



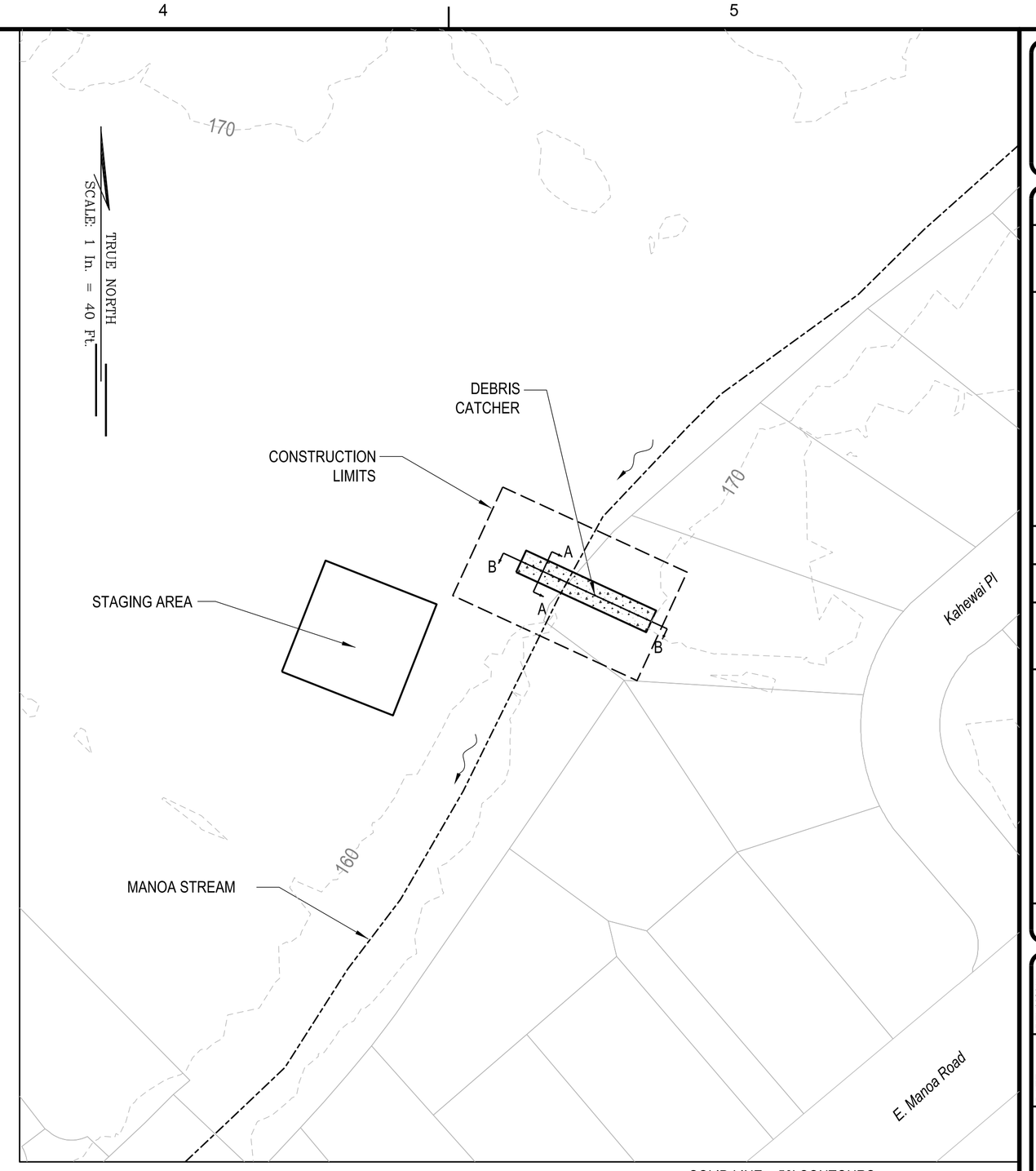
MANOA IN-STREAM DEBRIS CATHMENT
SECTION A-A

SCALE: 1"=5'



MANOA IN-STREAM DEBRIS CATCHMENT
SECTION B-B

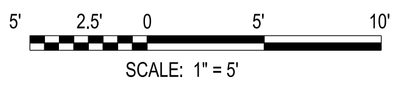
SCALE: 1"=5'



SOLID LINE = 50' CONTOURS
DOTTED LINE = 10' CONTOURS

PLAN

SCALE: 1"=40'



SCALE: 1" = 5'

Note: All elevations are feet MSL

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

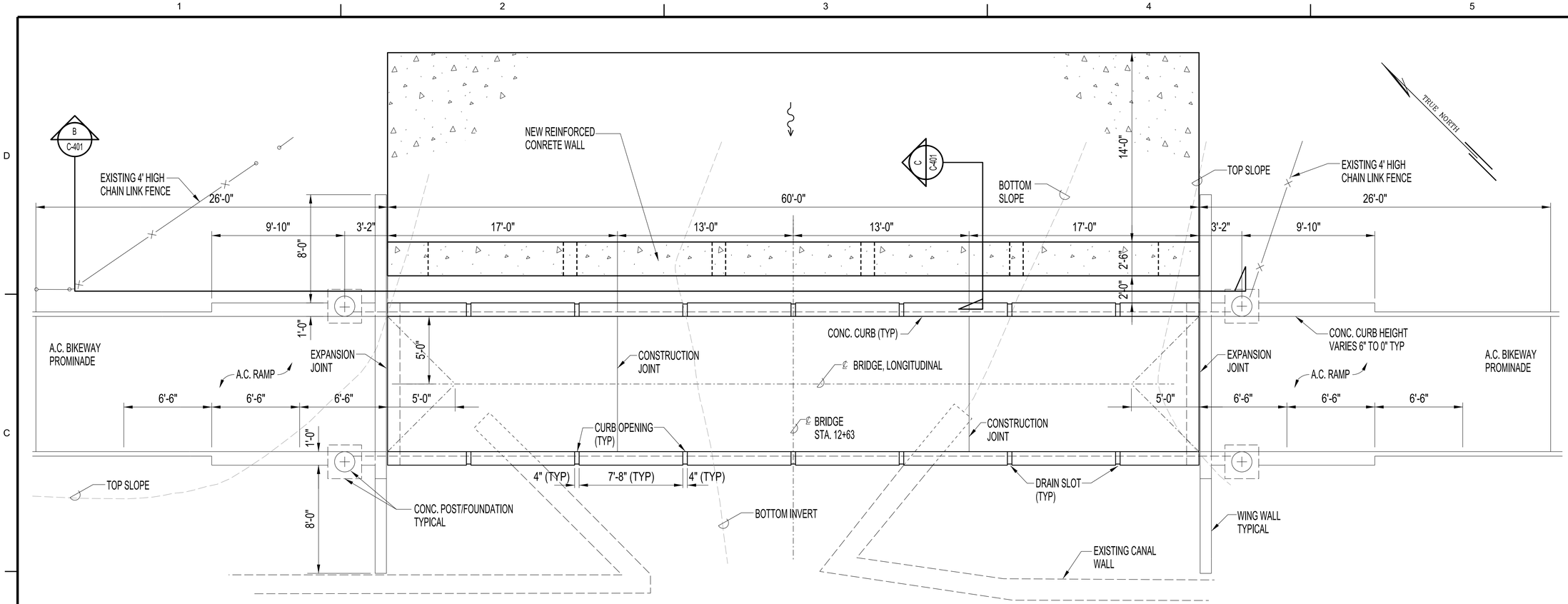
DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
CHECKED BY:
PLOT SCALE: 1:1
PLOT MODE: FULL
SIZE: ANSI D
DATE:
SOLICIT. / CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:
FILE NAME: MANOA IN-STREAM DEBRIS CATCHMENT, PLAN & SECTIONS
REVISION:

ALA WAI CANAL PROJECT

MANOA IN-STREAM DEBRIS CATCHMENT
PLAN AND SECTIONS
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-318
SHEET 19 OF 20

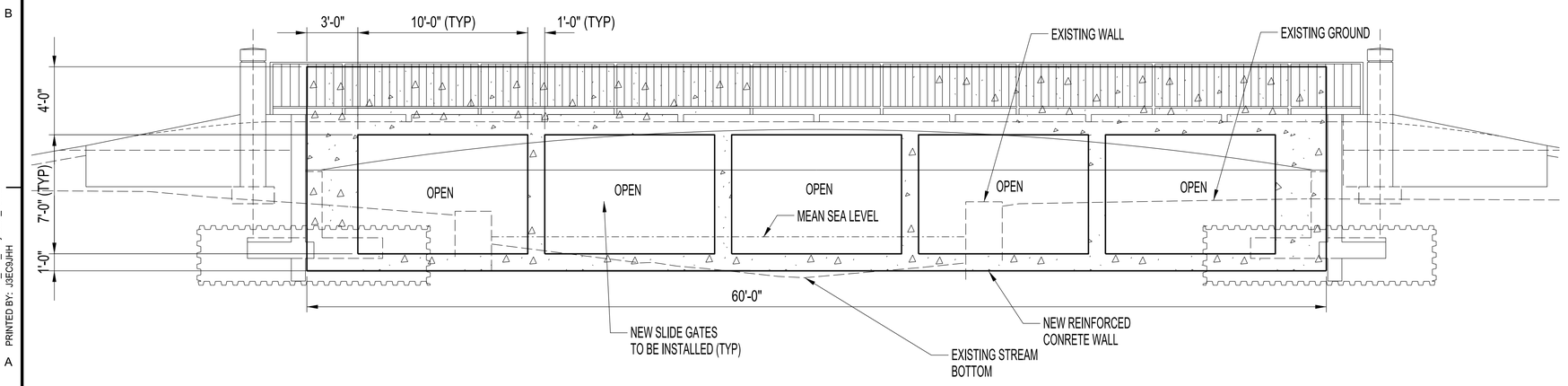
FILE: c:\pw\work\joh-1\j3ec9jhh\d0133359\Ala_Wai_C-318xxx.dgn
MODEL NAME: C-318
DATE & TIME: 12/15/2014 5:16:52 PM
LAST SAVED BY: J3EC9JHH
PLOTDRIVER: C:\ProgramData\Bentley\MicroStation V8i (SELECTseries)\WorkSpace\system\plotcfg\printer.plotcfg
PEN TABLE: BW_and_Grayscale_Pen.tbl
PRINTED BY: J3EC9JHH



ALA WAI CANAL

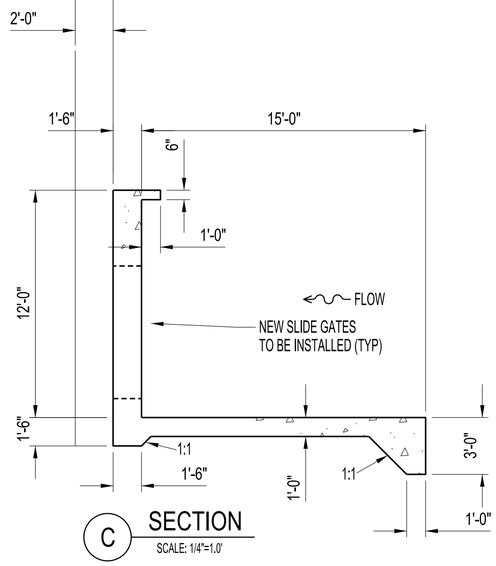
A PLAN

SCALE: 1/4"=1.0'



B ELEVATION

SCALE: 1/4"=1.0'



C SECTION

SCALE: 1/4"=1.0'

US Army Corps of Engineers
Honolulu District

10% DESIGN

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY: JHH
DRAWN BY:
SUBMITTED BY:
PLOT SCALE: AS SHOWN
SIZE: ANSI D
DATE:
CHECKED BY:
PLOT DATE: 1/15/2014
FILE NAME: HAUSTEN BRIDGE PLAN & SECTIONS
REVISION:
SOLICIT./ CONTRACT NO.:
LOCATION CODE
DRAWING NUMBER:

US ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
HONOLULU, HAWAII

ALA WAI CANAL PROJECT

HAUSTEN BRIDGE CONCRETE WALL
PLAN, SECTION AND ELEVATION
ALTERNATIVE 3A

SHEET IDENTIFICATION
C-401A
SHEET 20 OF 20

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Ala Wai Canal Project
Feasibility Study
Honolulu, Hawaii

Hydrologic and Hydraulic Climate Change Scenarios Appendix

Appendix A3

U.S. ARMY CORPS OF ENGINEERS
HONOLULU DISTRICT
FORT SHAFTER, HAWAII

February 2017

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Hydrologic and Hydraulic
Climate Change Scenarios for the 50-year (2075)
Future without Project Conditions
Ala Wai Canal Project, Oahu, Hawaii
Fully Revised, February 2017

1.0 Introduction

The US Army Corps of Engineers' (USACE) planning guidance for civil works projects requires that the planning process incorporate a future without project scenario. The guidance also states that the planning process accounts for such future conditions such as climate variability, sea-level rise, subsidence, seismic influences, geomorphological changes, and changes from development which can place demands on the project systems during their life-cycle. Therefore, this document provides three future without-project scenarios for sea level rise for the year 2075 future conditions for the Ala Wai Watershed which will be used in the modeling, selection, and design of project alternatives.

The future without project condition attempts to describe the Ala Wai Watershed's future if there is no federal action taken to solve the flood risk problem. The future condition is fundamentally uncertain and represents a best guess of conditions in the watershed.

2.0 Purpose and Scope

The purpose of this study is to create a future without project scenario for use in the hydrologic and hydraulic analysis for the Ala Wai Canal Project. This report addresses the components of the planning process with emphasis on sea-level rise and how these components impact the hydrologic and hydraulic model results. The resultant future without project floodplains may be incorporated in the economic analysis.

Climate change impacts for Hawaii have been summarized by Fletcher (2010) and more recently in USACE (2015). These changes are rising surface air temperature, decreasing rainfall and streamflow, increasing rainfall intensity, increasing sea level and sea surface temperature, and ocean acidification. For the purposes of hydrologic and hydraulic modeling, the future without-project scenarios will concentrate on the impacts of sea-level rise, increased rainfall frequency, debris generation and transport, and increased impervious area in the Ala Wai Watershed.

3.0 Study Area

The Ala Wai watershed on the Island of Oahu includes the Makiki, Manoa, and Palolo Stream drainage areas as well as the urban Waikiki area which surrounds the Ala Wai Canal (Figure 1). Total drainage area is about 16 square miles. Mean annual rainfall varies from 20 to 150 inches from the coast to the Koolau Crest. Much of the watershed along the canal is relatively flat and subject to flooding from high intensity rainfall storms while the flooding in the Manoa and Palolo Valleys is limited to those areas along the stream. More background information as well as a discussion of the problems and opportunities in the watershed has been documented in previous studies on the Ala Wai Watershed (Townscape and Dashiell, 2003).

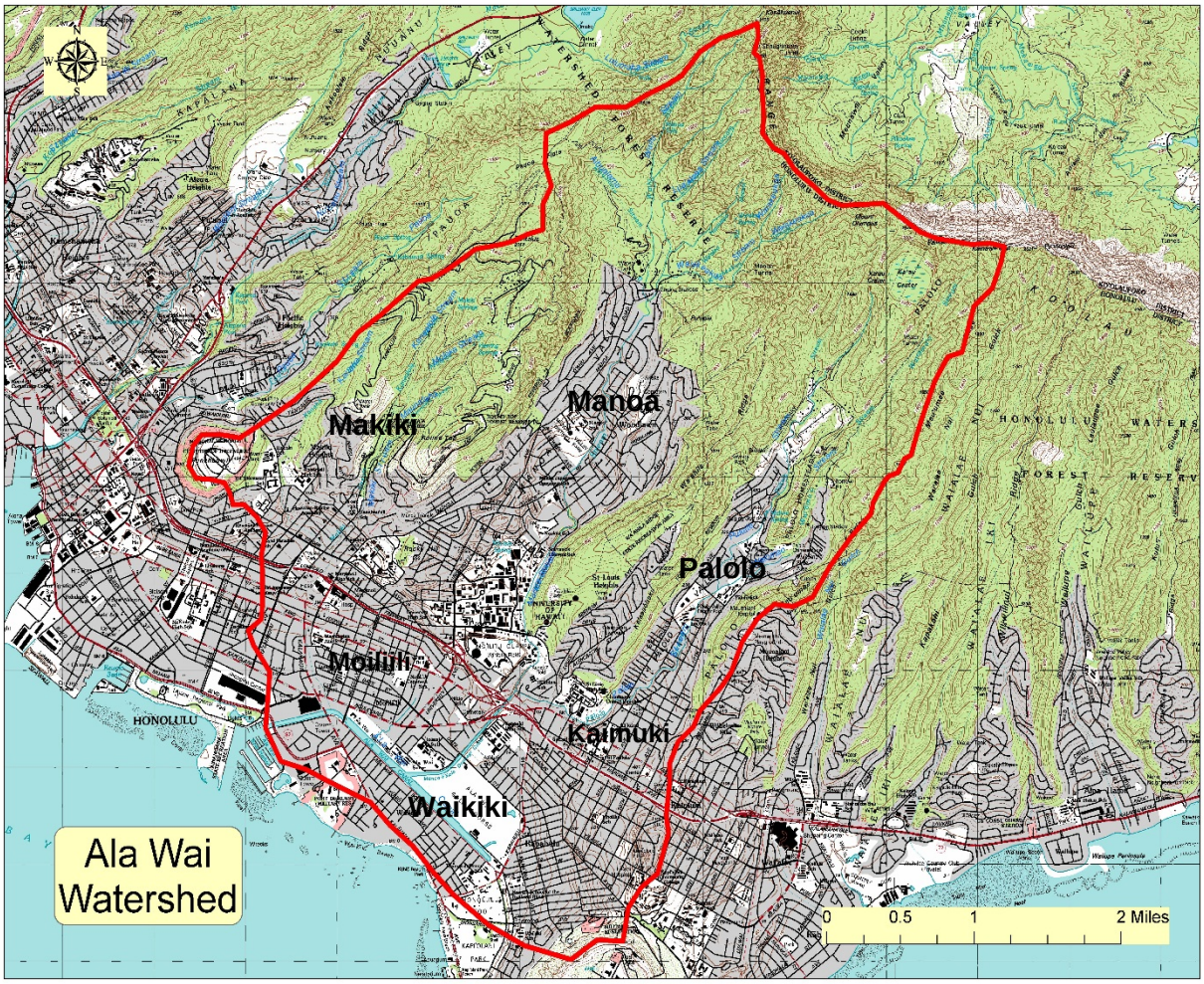

Figure 1. Ala Wai watershed Area

4.0 Methodology and Guidance

The US Army Corps of Engineers' Planning Guidance (Department of the Army, 2000; ER 1105-2-100) for Flood Damage Reduction projects requires a forecast of the future without project condition. This forecast should not exceed beyond 50 years and becomes the basis for evaluation of project alternatives. One of the forecast requirements is to account for future hydrologic changes in the project evaluations. How and what factors to use in the forecast are not discussed in the guidance but left up to the project team to determine.

Sea Level Change (SLC) guidance by USACE has been evolving starting in 2009 with the release of EC 1165-2-211, refined in 2011 as EC 1165-2-212, and finally release as a regulation ER 1100-2-8162 in 2013 (Department of the Army, 2009, 2011, and 2013). These document provide specific guidance to follow in determining sea-level rise in the planning process for projects on the coast or impacted by tidal influences. The computations required for SLC by ER 1100-2-8162 have now been automated by web-based calculator available at http://www.corpsclimate.us/ccaceslcurves.cfm.

For planning purpose, a period of economic analysis also called the period of analysis is chosen. The period of analysis is the time period chosen used to evaluate plan impacts. The period of analysis must be the same for all plans considered in a study as well as the same for all the components of the plan (Yoe and Orth, 1996). Since economic analysis uses a base year for when project benefits start accruing, the forecast period must also start at the same base year. For the Ala Wai watershed project, the base year is 2025. This date is based on a realistic construction start date of 2020 with a 5-year construction time period. Thus, the 50-year forecast period starts at 2025 and ends in 2075.

5.0 Climate Change Impacts and Scenarios:

5.1 Sea-Level Rise

Following SLC guidance, the first steps are to find and determine the applicability of tide station data for the project site. Such data has to be from tide station records longer than 40 years in length. The Honolulu Harbor tide gage, number 1612340, has a long record going back to 1905 and the harbor is located within 2 miles along the coastline to the west of the Ala Wai Canal. There is no dissimilar shoreline, bathymetry or hydrodynamic conditions between the tide station and the canal to disqualify the use of the Honolulu Harbor tide data. Previous tidal data collected in the Ala Wai Canal have shown that the tidal amplitude and phase between the harbor and the canal are nearly identical (Edward K. Noda and Associates, 1992). Thus, this data does adequately represent the local sea-level conditions at the project site.

The guidance recommends the NOAA CO-OPS values for the sea-level trend analysis if such values have been computed for that tide gage. For the Honolulu Harbor tide station, these values have been computed and are available at web site http://www.co-ops.nos.noaa.gov/sltrends. The value for Honolulu Harbor is 1.50 +/- 0.25 mm/year and is based on 100 years of data from 1905-2006. This value is the low or baseline trend rate for the low rise future without-project scenario.

The next step is to calculate a regional mean sea level trend for an identified vertically stable geologic platform in the region to determine if the regional mean sea-level trend is different from the eustatic or global mean sea-level trend of 1.7 +/- 0.5 mm/yr. For the main Hawaiian Island chain, Kauai and Oahu, have been considered relatively stable and this is shown by the very similar tide station trends (Table 1) compared to Maui and Hawaii. Geologic evidence points a slow uplift of Oahu over the last several thousand years resulting from flexural uplift from hotspot loading (Fletcher and Jones, 1996). Rates of uplift have been less than 0.1 mm/yr since the last interglacial period with an estimated mean of 0.06 mm/yr over the last 200,000 years (Fletcher and Jones, 1996; Caccamise, 2003). Given such a low rate of vertical uplift, less than the +/- 0.25 mm/yr uncertainty in the sea-level trend at Honolulu Harbor, the local sea-level trend of 1.50 mm/yr (0.00492 ft/year) was considered to also be the regional mean sea-level trend for Oahu and no vertical land movement was taken into account for determining the future sea-level change.

Table 1. Mean Sea Level Rise Trends in Hawaii

Station Number	Station Location and Island	Period of Record	Years of Record	Computed Trend (mm/yr)
1611400	Nawiliwili, Kauai	1955-2006	52	1.53 +/- 0.59
1612340	Honolulu, Oahu	1905-2006	102	1.50 +/- 0.25
1612480	Mokuoloe, Oahu	1956-2006	51	1.31 +/- 0.72
1615680	Kahului. Maui	1947-2006	60	2.32 +/- 0.53
1617760	Hilo, Hawaii	1927-2006	80	3.27 +/- 0.35

Data from NOAA Tides and Currents website at http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml (last accessed 4 Feb 2010.

The SLC curve calculator (version 2015.46) uses the modified (National Research Council) NRC Curve I to calculate the intermediate rate of sea-level rise and modified NRC Curve III for the high rate of sea-level rise. These calculations as per guidance are done in 5-year increments starting with 1992 (mid-point of current tidal epoch) as the base year; zero SLC. The results of the low, intermediate and high sea-level rise rates for the Ala Wai Canal study are presented in Table 2. The modified NRC curves are based on NRC scenarios for global sea-level rise adjusted to include the historic sea-level change rate of 1.7 mm/yr presented by the Intergovernmental Panel on Climate Change (IPCC) in 2007 (IPCC, 2007; Solomon and others, 2007).

Table 2. Estimated Rates of Sea-Level Rise for the Ala Wai Canal Project, Oahu, Hawaii

Low Rate (1.50 mm/yr or 0.00492 ft/yr)		Intermediate Rate (NRC Curve I)		High Rate (NRC Curve III)	
Year	Feet	Year	Feet	Year	Feet
2025	0.16	2025	0.26	2025	0.57
2030	0.19	2030	0.32	2030	0.72
2035	0.21	2035	0.38	2035	0.90
2040	0.24	2040	0.44	2040	1.09
2045	0.26	2045	0.51	2045	1.30
2050	0.28	2050	0.59	2050	1.53
2055	0.31	2055	0.66	2055	1.78
2060	0.34	2060	0.75	2060	2.05
2065	0.36	2065	0.83	2065	2.34
2070	0.38	2070	0.93	2070	2.64
2075	0.41	2075	1.02	2075	2.96
2080	0.43	2080	1.12	2080	3.30
2085	0.46	2085	1.23	2085	3.66
2090	0.48	2090	1.34	2090	4.04
2095	0.51	2095	1.45	2095	4.44
2100	0.53	2100	1.57	2100	4.86
2105	0.56	2105	1.69	2105	5.29
2110	0.58	2110	1.82	2110	5.74
2115	0.61	2115	1.95	2115	6.21
2120	0.63	2120	2.09	2120	6.70
2125	0.66	2125	2.23	2125	7.21

Results for the three sea-level rise scenarios (Table 2 and Figure 2) show a range of 0.41 to 2.96 feet in 2075. The intermediate and high sea-level rise rates for 2100 are 0.48 and 1.48 meters (1.57 and 4.86 feet), which falls within the global sea-level rise rates of 0.5 to 1.4 meters by 2100 in the updated studies which account for accelerated glacial ice melting (Fletcher, 2009). Fletcher (2009) makes a case for a 1 meter mean global sea-level rise by 2100 which would eliminate the low rate scenario from consideration in the Ala Wai Canal planning process as being really too low and not a realistic forecast. Thus, the low rate of sea-level rise will not be further considered in project design.

The sea-level rise impacts will be incorporated into the starting backwater conditions of the Ala Wai Canal HEC-RAS model which currently assumes a high tide of 1.08 feet (Mean High High Water (MHHW) from Honolulu Harbor tide gage record, Station 1612340, current epoch) for the current or existing without-project condition for all storm frequencies. The MHHW tidal value represents a long term average at the tide gage. There is an inter-annual variability (IAV) in the data in which year to year variations can result in high tide values higher in some year and lower in others. For the Honolulu Harbor tide gage, the inter-annual variability is about 0.4 feet. Thus, to account for future annual high tide values potentially being higher than MHHW, the IAV value was added to the MHHW as part of the starting backwater conditions. The addition of the IAV makes for a slightly conservative approach, but this addition helps account for future resilience in project design. The various sea-level rise scenarios where then added to the MHHW plus IAV values. Therefore starting water surface elevations for the intermediate and high scenarios will be 1.74 and 2.05 feet in 2025 and 2.50 and 4.44 feet in 2075, respectively. These starting backwater conditions will be used in both the with-out project and with-project future scenarios.

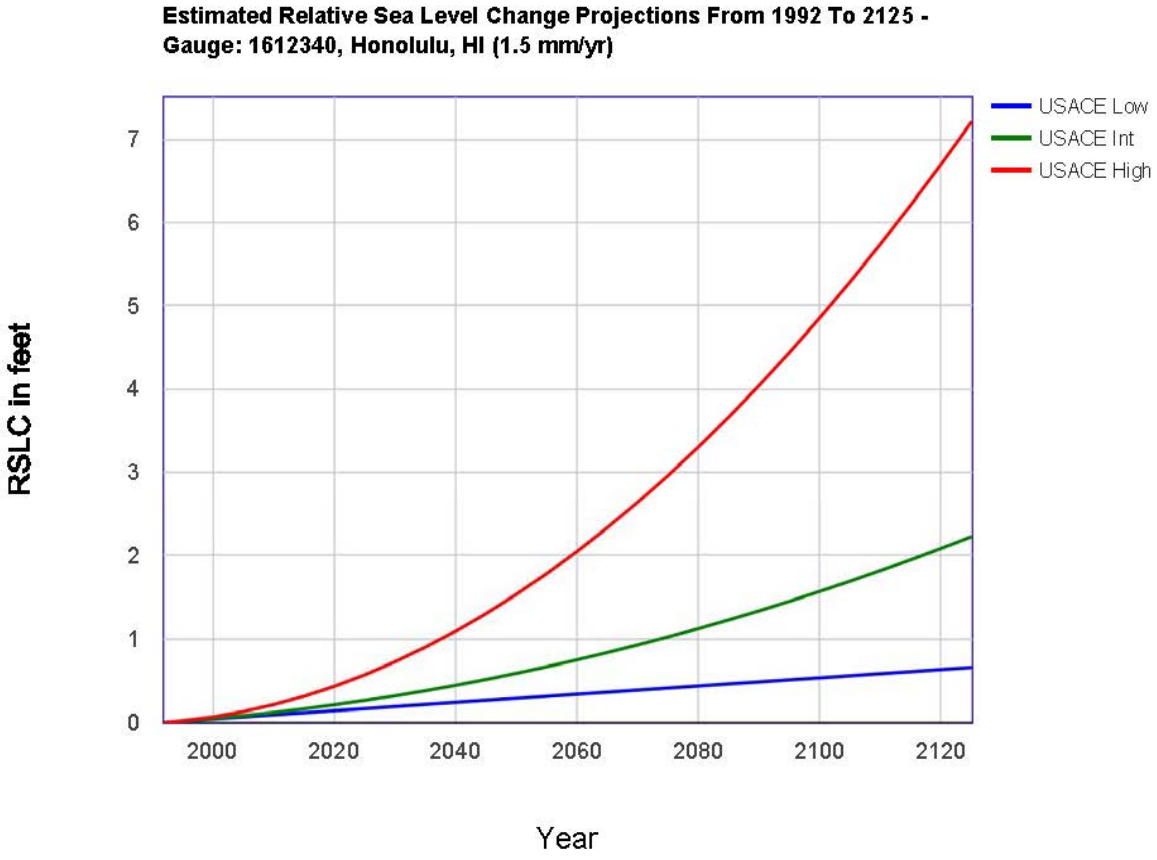

Figure 2. Plot of Relative Sea Level Rise Data in Feet for all Three Scenarios

5.2 Hurricanes

Climate change studies currently indicate that hurricanes would not increase in frequency or movement, but that the intensity of hurricanes that occur could be greater (Christensen and others, 2007; Meehl and others, 2007)). Hurricane strikes to Hawaii and especially Oahu have been rare (Haraguchi, 1984). Because hurricanes are rare in Hawaii, the current hydrological and hydraulic studies for the Ala Wai Watershed project assume no coincidence between hurricanes and the high rainfall intensity flood producing storm systems which are more common. This assumption will also be part of the future without-project condition.

Past hurricane impacts to the Ala Wai Watershed from Hurricanes Iwa in 1982 and Iniki in 1992, have been limited to oceanfront hotel garages below ground being flooded by wave action and road closures of roads fronting these hotels (US Army Corps of Engineers, 1994). Post-hurricane studies have not documented if wave action has had surge impacts to the Ala Wai Canal. Since the mouth of the canal is protected from surge by the Ala Wai Yacht Harbor breakwaters and revetments, surge impacts are assumed minimal. Hurricanes have increased the high tides recorded at tide gages so with sea-level rise, the potential exists that the canal can overtop and cause flooding from hurricanes near Oahu.

Alternatives providing protection from hurricane coastal flooding will not be addressed as part of the Ala Wai Canal project. However, other planning efforts may continue to use the worst-case hurricane condition for southern Oahu until newer studies are conducted (Bretschneider and others, 1985). The worst-case hurricane scenario has inundation limits in Moiliili up to Date Street and in Waikiki into the Ala Wai Golf Course (Bretschneider and others, 1985).

5.3 Rainfall and Runoff

5.3.1 Amount of Rainfall

Regional IPCC results for the North Pacific region (Christensen and others, 2007; page 915) show an estimated decrease of 0 to -5 percent in annual rainfall for Oahu due to estimated temperature increase in the Northern Pacific by 2080-2099. The estimated decrease is -5 to -10 percent for the winter months of December, January, and February (Christensen and others, 2007; page 915). The decadal scale regional climatic feature of El-Nino Southern Oscillation (ENSO) already create drier than normal winter months so the impact on water supply, which is dependent on the tradewind rainfall patterns, will be aggravated when ENSO events occur with the estimated decrease in rainfall. A decrease in rainfall will have an impact to water supply on Oahu, which is highly dependent on ground water wells for drinking water, as rainfall is an important component of ground-water recharge. Sea-level rise will also impact groundwater resources by decreasing the freshwater lens or available amount of freshwater which can be pumped without causing saltwater intrusion. Therefore, water supply planning may look into large and small scale rain catchment or some means to catch storm runoff and store for later non-potable use.

5.3.2 Rainfall Frequency and Intensity

According to the report: Global Climate Change Impacts in the United States (2009, p. 32), from 1958-2007, very heavy precipitation, defined as the heaviest 1 percent of all daily rain events, has increased by 12 percent for the State of Hawaii. The average number of days with heavy precipitation has increased by 8 percent for the State of Hawaii. It is expected that the frequency of heavy rainfall events will increase while the lightest precipitation is projected to decrease. The 5 percent chance (20-year) storm is expected to be between 10 to 25 percent heavier by the end of the 21st century (Global Climate Change Impacts in the United States, 2009, p. 32). It is unknown if decadal events such as ENSO variations can temper the expected increase in heavy precipitation. More recent studies show that this projected increase in heavy rainfall events is not supported by statistical trend analysis or the downscaling of the global circulation models to Hawaii.

Chu and others (2010) looked at extreme rainfall events using statistical trend analysis techniques on daily rainfall data from 2 different time periods, 1950-79 and 1980-2007 at 37 to 65 raingages in Hawaii. Trends of interest for the future without project condition concern the number of wet days, defined as any day with greater than 1 mm of precipitation and the frequency of intense precipitation, defined as the annual total of days with greater than 1 inch of rainfall. For the raingages on the Island of Oahu located in Manoa Valley that were part of their study, there were an insignificant downward trend in the frequency of intense precipitation between the two time periods. Elison Timm and others (2011) investigated trends in the frequency of heavy rainfall events in relation to statistical downscaling of global climate models. This study defined heavy rain events as the 95% quantile in the rainfall distribution during the October to April wet season. Results of the trend analysis indicates that at 9 out of 12 statewide rain gages analyzed in the study there was a downward trend in the frequency of heavy rainfall events. The Honolulu Airport rain gage, was one that did show a downward trend. Other results were that the interannual to interdecadel variability is significantly related to ENSO Southern Oscillation Index (SOI) and that the downscaled results from the global climate models are unable to account for the ENSO variations.

Norton and others (2011) use a nonlinear artificial neural networks statistical model to downscale daily extreme precipitation events on Oahu from global circulation model outputs. Their results show a tendency for increased frequency of heavy rainfall events but a decrease in rainfall intensity during the next 30 years (2011-2040) for the southern shoreline of Oahu. The most recent work on this topic is Elison Timm and others (2013) in which a statistical downscaling method is used to project future shifts in the frequency of heavy rainfall events. In this paper, heavy rain events are defined as days with rainfall amounts exceeding the 90th percentile estimated from all wet season days from 1958-2010. Their statistical downscaling model was able to reproduce the interannual variability in heavy rain events for the period 1978-2010. When applied to global circulation models scenarios, their model predicted a low likelihood of increased heavy rain events in Hawaii over the remainder of this century.

Therefore, based on the results of these studies on changes to heavy rain events in Hawaii, it is assumed for the future without project scenario that there will be no change to the rainfall frequency intensity data from that used in the without project condition.

5.4 Debris Generation

One impact of large intense rainfall storms in Hawaii has been debris generation, both from vegetation and hill slope and channel erosion sources, which can impact the ability of stream channels and stream crossing structures to function as designed. In general, narrow streams rarely transport large floating debris that can block bridges. Large floating debris usually gets trapped or lodged across the channel and rarely moves without being broken into smaller pieces. Small and intermediate size floating debris becomes an issue where bridge piers or other obstructions occur, due to the potential of significant debris pile-ups on piers. Streams in the Ala Wai Watershed have steep channel slopes and exhibit rapid responses to rainfall, “flash floods”, which tend to have a large amount of energy which can move large boulders or rapidly erode sections of stream bank or channel. This type of debris also has the potential to create blockages in the stream channels or reduce the ability of bridges to pass flood flows. One method of account for debris or sediment in runoff is the use of a bulking factor. The bulking factor is just an increase in the Manning’s n-value, which is used to represent channel roughness in the hydraulic model. Normally, the higher the n-value used, the higher the resulting water-surface elevation, thus, the term bulking. Normally a percentage increase, like 10- or 20-percent is used to account for debris in the flood flows.

The ability to predict the amount of debris generated by any future storm event is pure speculation. Although debris volume estimates are made to assist in debris basin sizing, such volume estimates did not account for the sediment or floating debris that passes through the basin or are generated downstream of the basin, so are not as useful as the bulking factor to account for suspended sediment and floating debris. For the future without project scenarios, it is difficult at best to make any guesses that debris amount will be larger or smaller in the future. Assuming the same land-use in 2070 as today, the amount of generated debris should not significantly change from those estimates used in the current without-project conditions models. Assuming such efforts as invasive species removal, feral pig control, stream clean-ups, and restoration of riparian vegetation are to be done in the future as smaller locally based projects, then the amount of debris generated will potentially decrease. Therefore, the future without-project scenario will look at no increase in debris generation.

5.5 Increased impervious Area

The Ala Wai Watershed is already a densely developed urban area. Residential land use dominates in the Makiki, Manoa, and Palolo areas with smaller areas of commercial activities. Waikiki is highly developed with high rise hotels and apartment buildings. Population in the watershed is not expected to increase significantly in the future. In fact a future with a decreasing quality of life may lead to population decrease in Hawaii. Future construction is assumed to continue the current trend which consists of rebuilding on existing lots, possibly with higher density residential units which may add a minimal contribution to runoff. Current observation in the Kaimuki and Palolo areas,

show a slow replacement of smaller single family homes with modern double wall construction 2-story homes having larger footprints. At a specific house lot then, there would be less open space for infiltration and potentially move direct connections from roof to street. The overall impact to runoff is small but potentially cumulative over time. Such redevelopment impacts can be mitigated through low-impact development ideas to be used in new construction or as a requirement for the watershed. Therefore, the future without-project scenario may see a small increase in runoff from urban areas but this increase cannot be quantified.

6.0 Summary

The future without project condition attempts to describe the Ala Wai Watershed's future if there is no federal action taken to solve the flood risk problem. The future condition is fundamentally uncertain and represents a best guess of conditions in the watershed. Planning guidance states that the planning process accounts for such future conditions such as climate variability, sea-level rise, subsidence, seismic influences, geomorphological changes, and changes from development which can place demands on the project systems during their life-cycle. Therefore this document provides a qualitative discussion on the future hydrologic and hydraulic impacts of sea-level rise, increased rainfall frequency, debris generation and transport, and increased impervious area for the 2075 future condition.

The only quantitative analysis will be to incorporate sea level rise in the economic analysis, modeling, selection, and design of project alternatives. Using the intermediate sea level rise rate as the most probable future, the backwater conditions in the HEC-RAS model will be increased to 2.50 feet from 1.08 feet to account for future sea level rise in the future without-project scenario. Both the intermediate and high sea level rise rates will be used in the modeling to analyze project performance in the future with-project analysis for years 2075 and 2125.

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HYDROLOGY REPORT

Ala Wai Canal Modeling Effort

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Introduction

The Ala Wai Canal Flood Risk Management project is located on the island of Oahu in urbanized Honolulu, Hawaii. The project would protect metropolitan Honolulu, the University of Hawaii, and Waikiki, Hawaii's economic center for tourism. The population at risk includes approximately 65,000 residents and an additional 200,000 transient visitors to the watershed daily (tourists, workers, students, etc.). Project features originally included the following eleven individual structural elements and two non-structural components as carried forward from the feasibility study tentatively selected plan include:

- Six debris/detention basins in upper stream reaches
- One stand-alone debris catchment structure
- Three multi-purpose detention basins
- Floodwalls along Ala Wai Canal (including pump stations for interior drainage)
- Flood warning system (non-structural)
- Fish and wildlife mitigation (non-structural)

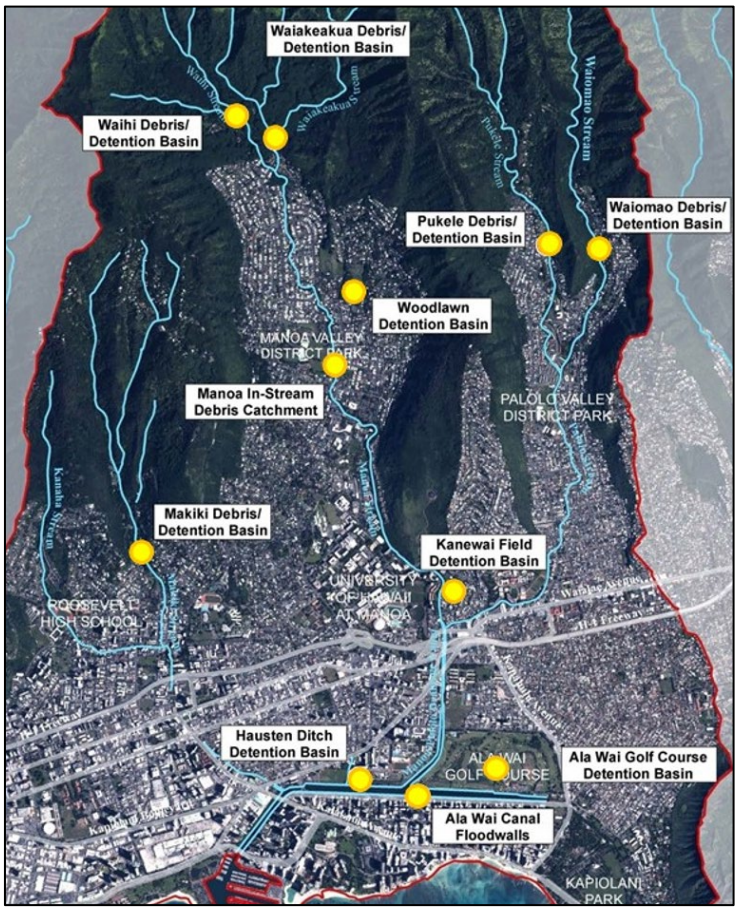


Figure 1: Feasibility Study TSP

At the time of this report project features now include:

- Three multi-purpose detention basins (Kanewai, Golf Course, and Hausten Ditch)
- Two stream diversion features (Woodlawn Bridge and the Makiki Cannel Diversion)
- Floodwalls along Ala Wai Canal (including pump stations for interior drainage)
- Flood warning system (non-structural)
- Fish and wildlife mitigation (non-structural)

Basin Description

The Ala Wai Watershed encompasses approximately 16.2 square miles and includes the drainages of Manoa, Palolo, Makiki, McCully, Moiliili, and Waikiki. The Manoa and Palolo streams join to form the Manoa-Pololo Canal. The Manoa-Pololo Canal, Makiki Stream, and three low lying drainage areas empty into the Ala Wai Canal, a two-mile long, man-made waterway constructed in the 1920s to drain wetlands, allowing the development of the Waikiki area.

The upper reaches of the basin are very steep and rocky and incised into the Ko'olau Volcano. This portion of the watershed ranges from 40 to approximately 2400 feet in elevation. The Makiki and Manoa basins typically receive more than 160 inches of rain annually, while the Pololo valley receives less. See below for the Rainfall Atlas of Hawaii by the University of Hawaii for average annual precipitation.

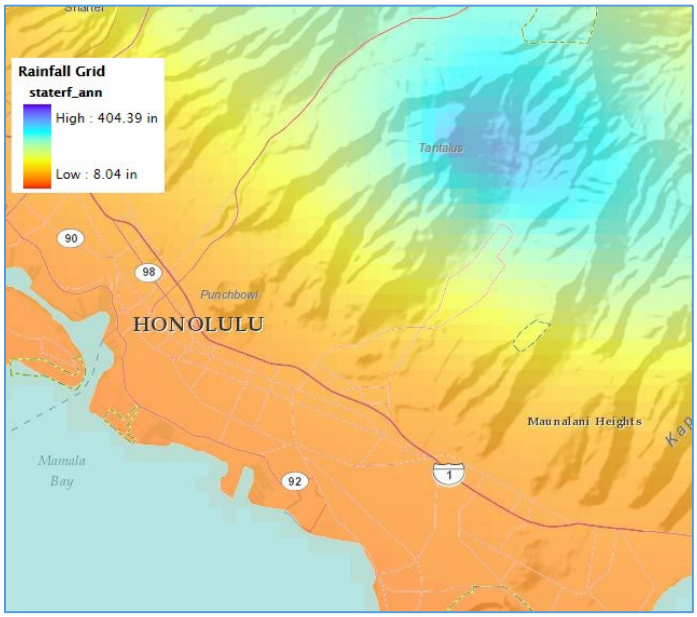


Figure 2: Mean Annual Rainfall-Rainfall Atlas of Hawaii (Giambelluca, 2013)

The lower portion of the basin is much less steep and is extremely urbanized. Significant portions of this are impervious surfaces, with sewer system drainage actively directing most of the runoff in less intense events. The Ala Wai Canal and Waikiki basin receives about 30 inches of annual rainfall. High-Intensity rainfall on steep slopes of the small drainage basin can produce very flashy flood events in the lower basin. Time to peak is usually less than 1 hour and even for large intense storms, the rise and recession of the flood hydrograph usually occurs with 6 hours.

The Ala Wai canal overtopped and previously flooded Waikiki during the November 1965 and December 1967 storms, as well as during the passage of Hurricane Iniki in 1992. In October 2004, a storm flooded Manoa Valley, causing $85M in damages to the University of Hawaii, including the loss of irreplaceable documents in one of the libraries. Additional flooding occurred in the 2006 rain event. Early modeling efforts indicated that a one percent annual flood exceedance event would result in damages to more than 3,000 structures in the watershed, with total damages of over $1.14B, with much of the damage in the downstream area of Waikiki. However, this modeling was done before significant technological modeling advancements in this last decade and this study is an effort to update this work.

Previous Modeling Efforts

A hydrologic model of the watershed was developed in 2008 by Oceanit. Modifications were made to the model and report in March 2016, August 2016, and February 2017. This effort is detailed in the *Ala Wai Canal Flood Risk Management Study O'ahu, Hawai'I Final Feasibility Study Report with integrated Environmental Impact Statement* Appendix A – Hydrology and Engineering.

A list of previous reports with descriptions is included in section 2.2 "previous hydrologic and hydraulic models and studies." These include:

- Federal Emergency Management Agency's National Flood Insurance Program Study (FEMA, 1979)
- Ala Wai Canal Improvement Project, Storm Water Capacity Study (Edward K. Noda and Associates, 1994)
- Ala Wai Flood Study (USACE, 2001)
- Ala Wai Watershed Analysis (Townscape Inc. and Dashiell, 2003)
- Hydrology and Hydraulics Study, Flood of October 30, 2004, Manoa Stream (USACE, 2006)
- Final Hydrology Report, Manoa Watershed Project (Oceanit 2008a)
- Final Hydraulic Analysis Report, Manoa Watershed Project (Oceanit, 2008b)
- Technical Summary Report, Manoa Watershed Project (Oceanit, 2008c)
- Final Hydrology Report, Ala Wai Watershed Project (Oceanit, 2008d)
- Final Drainage Evaluation Report, Ala Wai Canal Watershed Project (Oceanit, 2008e)
- Conceptual Engineering Report, Ala Wai Canal Flushing System & Ala Wai Golf Course Detention System (Mitsunaga & Associates, Inc., 2014)

The 2008 Oceanit study focused on the HEC-HMS model, but utilized five different methods to estimate peak flow discharges throughout the Ala Wai Watershed for various frequency storms. Estimated peak flow discharges were based on the existing conditions of the Ala Wai Watershed. Oceanit modeled storms using both rainfall-runoff and peak flow frequency methods for a range of storm scenarios. The study researched and collected relevant hydrologic data; constructed and calibrated both rainfall-runoff and peak flow frequency hydrologic models; and weighted and compared the results from these models to arrive at estimated peak flow discharges.

Data collected included rainfall and stream gage data, historical storm data, drainage system information, geospatial data for basin characteristics, and field and other local observations. This data

was used to build and calibrate a HEC-HMS model, which simulates rainfall-runoff behaviors for the Ala Wai Basin. This model was used to route Atlas 14 frequency rainfall data (A NOAA dataset that provides rainfall volumes by duration throughout the United States) using losses from SCS numbers, Clark Unit Hydrographs as the transform method in the upper basin, and Kinematic wave in the lower basin.

Alternate flow calculation methods included the USGS (United States Geological Survey-a science based bureau within the Department of the Interior) regression method (peak flow only), City and County of Honolulu drainage standards (peak only), FEMA (Federal Emergency Management Agency) Flood Insurance Study data, and Statistical Analysis of data where available.

This data was weighted to determine a final peak flow discharge at specific locations within the watershed at the 2-, 5-, 10-, 20-, 50-, 100-, 200-, and 500-year events. These are otherwise listed as the 50, 20, 10, 5, 2, 1, 0.5, and 0.2 percent probability events. The 100-year event is the event that has a 1 in a hundred chance happening each year and does not typically occur in a one-hundred-year cycle. Therefore, for the rest of this report the frequency events will be referred to as an Annual Exceedance Probability (AEP) or percent probability event.

Table 1: Equivalent Frequency Terms

1 Year Event	1 AEP	100% Probability	100% AEP
2 Year Event	0.5 AEP	50% Probability	50% AEP
5 Year Event	0.2 AEP	20% Probability	20% AEP
10 Year Event	0.1 AEP	10% Probability	10% AEP
20 Year Event	0.05 AEP	5% Probability	5% AEP
50 Year Event	0.02 AEP	2% Probability	2% AEP
100 Year Event	0.01 AEP	1% Probability	1% AEP
200 Year Event	0.005 AEP	0.5% Probability	0.5% AEP
500 Year Event	0.002 AEP	0.2% Probability	0.2% AEP

Table 2: Feasibility Study Results at Selected Locations for each Frequency Event

HEC-HMS Model Junctions		Location	Peak Flow Discharge (cfs)							
			2	5	10	20	50	100	200	500
			50%	20%	10%	5%	2%	1%	0.50%	0.20%
Manoa Watershed	JM1	Confluence of Waihi and Waiakeakua Streams	1,200	2,000	2,800	3,600	4,600	5,500	6,200	7,400
	JM2	Confluence of Manoa Stream and Woodlawn Ditch	1,700	3,200	4,600	5,700	7,150	8,200	9,000	10,500
	JM3	Lowrey Ave. Bridge	1,900	3,500	4,800	6,000	7,400	8,350	9,300	11,000
	JM4	Woodlawn Dr. Bridge	2,000	3,700	5,000	6,300	7,700	8,800	9,900	11,700
	JM5	Manoa Stream near Noelani Elementary School	2,100	3,800	5,200	6,700	8,200	9,400	10,600	12,400
	JM6	Dole Street Bridge	2,300	4,100	5,700	7,200	9,000	10,200	11,800	13,600
	JM7	Kanewai Field Gage	2,500	4,300	6,000	7,600	9,500	10,700	12,100	14,500

	JM8	Just Upstream of the Confluence of Manoa and Palolo Streams	2,600	4,450	6,150	7,800	9,700	11,200	12,500	15,300
Ala Wai Watershed	JK1	Confluence of Makiki and Kanaha Streams	650	1,300	1,900	2,550	3,400	4,200	4,800	6,400
	JK2	USGS Stream Gage near King Street	700	1,400	2,000	2,700	3,500	4,500	5,600	6,700
	JK3	Confluence of Makiki Stream and the Ala Wai Canal	900	1,700	2,600	3,300	4,500	5,700	6,800	8,000
	JP1	USGS Pukele Gage 16244000	440	820	1,200	1,600	2,100	2,700	3,000	3,900
	JP2	Confluence of Pukele and Waiomao Streams	1,000	2,000	2,900	3,900	5,100	6,100	7,600	9,200
	JP3	USGS Palolo Gage 16247000	1,200	2,200	3,100	4,100	5,500	6,600	8,000	10,000
	JP4	Just Upstream of the Confluence of Manoa and Palolo Streams	1,300	2,600	3,500	4,800	6,300	7,600	9,400	12,000
	JMP1	Confluence of Manoa and Palolo Streams	3,400	6,200	8,400	11,000	14,200	16,700	20,500	22,900
	JMP2	USGS Stream Gage 16247100	3,600	6,400	8,600	11,200	14,500	17,000	20,900	23,200
	JMP3	Confluence of Manoa-Palolo and Ala Wai Canals	4,000	6,700	9,000	11,700	15,000	17,500	21,500	24,000
	Ala Wai	Mouth of Ala Wai Canal	8,000	11,500	13,500	16,000	18,000	19,500	20,500	22,000

Project Scope

In an effort to improve upon and extend previous modeling efforts the following adjustments were scoped for the 2018-2020 initial Ala Wai Hydrology Efforts:

- Update model to the most recent published version (HEC-HMS Version 4.3)
- Sub-basin adjustments and recalibration to better match exact locations of future upstream detention basins and HEC-RAS model inputs.
- Creation of alternative geometries for a peaked and non-peaked routing, including the applications of peaking factors (25%, 33.3%, and 50%) for use in routing the Probable Maximum Precipitation.
- Creation of Probable Maximum Precipitation (PMP) using HMR 39 methodology to include an:
    - Entire Basin PMP
    - Individual PMP for the six upstream detention basins
- Completion of various PMP Sensitivities.
- Routing of final PMF and Frequency Events with alternative geometries.
- Routing uncertainty simulation for upper and lower bounds
- Compiling a final report for inclusion with the hydraulics updates.

As will be detailed in this report, upper basin project features have largely been removed and a single without project geometry was continued for the final frequency, uncertainty, and PMF routings. No

project features are routed in the HEC-HMS model. Therefore, the final scope of this project is listed below.

- Update model to the most recent published version at beginning of study (HEC-HMS Version 4.3)
- Sub-basin adjustments and validation of calibration of the HEC-HMS model to better match HEC-RAS model input locations. These locations need to match as closely as is reasonable to most accurately route flows. Creation of a simplified HEC-HMS model with uncertainty for faster run times in the HEC-WAT Model.
- Routing of feasibility rainfall frequencies for comparison to previous study
- Creation of a HEC-WAT model with a hydraulic sampler, HEC-RAS model, and duration plug-in. The hydraulic sampler shall sample storm events local to the basin and Atlas 14 volumes. The HMS model will be simplified as much as reasonable for runtime speed and linked to the hydrologic sampler. The Duration plug-in will be set to output various duration flows at specified locations for use in the HEC-RAS model.
- Routing of the HEC-WAT model a sufficient number of times to define uncertainty bounds up to the 0.2 Annual Chance Exceedance (500-year event).
- Creation of an HEC-SSP model to distill the HEC-WAT data into hydrographs usable in HEC-RAS modeling for final frequency routings.
- Determination of hydrologic uncertainty parameters for use in HEC-FDA.
- Compiling a final report for inclusion with the hydraulics modeling updates.

Frequency Method and Results Overview

For this effort, final frequency flow data was created for use in the HEC-RAS (hydraulic modeling) and HEC-FDA (economic modeling) models for use in design decisions and cost-benefit analyses. A brief explanation of the process used to create this frequency data is listed below. Additional details of this process are in later chapters of this report.

1. Rainfall Frequency data was populated.
    a. This data was pulled graphically from gridded Atlas 14 precipitation-frequency data and processed using zonal statistics in ArcMap to get a basin average value. This gridded data was collected for the 12-and 24-hour durations. Upper and lower confidence limit data were also collected with the associated estimated record length (ERL). The ERL data was tested for how well it reproduced the uncertainty bands.
    b. Atlas 14 provides a value for point precipitation, so to reduce this to a basin wide value, Table 6-6 in Hydrometeorological Report (HMR) 39 was used (the Probable Maximum Flood guidance document in the state of Hawaii) for Depth Area Reduction.
    c. Five temporal/spatial patterns were developed which include 3 observed storm events (2004, 2006, 1967), an observed temporal pattern from 1958 paired with the Atlas 14 spatial pattern, and a synthetic storm shape developed using HMR39 temporal pattern B., The HEC-WAT (Monte-Carlo Analysis tool) selects one of these storm templates for each iteration and scales it to match the sampled precipitation volume for that iteration.
2. A HEC-HMS model (hydrologic routing model) was updated for use in this study.

   a. The basin was analyzed to determine soil conditions, slopes, land cover and use to determine empirical first guess runoff calculations. This was done as part of the feasibility study.
   b. The rainfall from the three calibration events (2004, 2006, 1967) were imported into the model and run through the empirical equations. This was done as part of the feasibility study. These events were selected as they are the largest events that had reasonable (but still limited) rainfall and stream gage data readily available.
   c. These equations were altered within a band of reasonable values to best match stream data, where available to calibrate to this gage data. This was done as part of the feasibility study.
   d. The feasibility basin configuration was adjusted slightly to meet the needs of the current study's HEC-RAS inflow boundary condition points.
   e. Verification testing was performed to ensure that the minor alterations to the basin configuration did not significantly affect modeled flows.
3. Uncertainty needed to be quantified for the discharge frequency calculations and is required by EM 1110-2-1619, chapter 4. This has also been reinforced by ER 1105-2-101. This uncertainty was added to the rainfall data and HEC-HMS model.
   a. Uncertainty data from rainfall was collected as discussed in item 1a-c.
   b. Uncertainty in the rainfall runoff was estimated though varying the loss rates (loss rates were set to randomly sample between values associated with a range of land uses one band higher and one band lower than the reported field values. (i.e. moderate to highly urbanized, or various levels of plant cover in a forested region)
4. A HEC-WAT (Watershed Analysis Tool) was developed and used to characterize uncertainty.
   a. HEC-WAT is a model linking and sampling tool, it samples the ranges of values specified and runs many times to determine a distribution of values.
   b. The area-reduced basin-averaged precipitation is added to the model with the ERL data. This allows the model to sample precipitation volumes between the uncertainty bands.
   c. The template storms from item 1c are loaded into the WAT interface.
   d. The HMS model is loaded into the WAT and is linked to the precipitation data in 4b and c. The uncertainty data associated with the loss rates is turned on.
   e. A "duration plugin" script was set up to report the output flows at each specified duration. (peak, 1-hour, 2-hour, 4-hour, etc.)
   f. The WAT was then run for 60,000 iterations.
   g. Peak outflows for the HEC-RAS inflow locations are show in the table below.
5. The HEC- SSP (Statistical Software Package) was used to develop balanced hydrographs for use in the HEC-RAS model.
   a. This process takes the HEC-WAT output and turns it into a format HEC-RAS can ingest. For this study HEC-RAS was used for stream flow routing due to backwater effects at the more extreme frequency events.
      WAT flow-frequency-duration outputs were computed for the mean or expected value for all frequencies and the confidence limits for the 0.01 AEP only.
   b. The HEC-WAT 50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% AEP flow values were entered into HEC-SSP for each duration(0.02-, 1-, 2-, 4-, 8-, 10-, and 12-hours) for each HEC-RAS inflow point.
   c. A hydrograph shape derived from the feasibility HMS model was used as a template for each subbasin and was loaded into HEC-SSP as a Flow Data Set.

d. Hypothetical hydrographs were created that "balanced" flow volume, from the HEC-WAT duration plugin, with frequency across multiple durations while preserving the peak runoff timing.
e. This process is needed because, while the HEC-WAT has many storm routings and output data, they are each individually using a temporal pattern from different storm events and need to be simplified to a single neutral pattern. The balanced hydrographs are now ready for ingestion into the HEC-RAS model for final routing with all backwater effects, overland flow, and other more complex flow schema. A sample series of balanced hydrographs is shown below.

Table 3: Peak Flows for 1% Annual Exceedance Probability at HEC-RAS Inflow Points

HEC-RAS Inflow Location	Peak Flow (CFS)	HEC-RAS Inflow Location	Peak Flow (CFS)
A2, W2 Combined	2358	**M13**	947
A3	1587	**M14**	784
A4	1190	**M3**	2631
A6, W3 Combined	981	**M4**	541
A8	511	**M7**	523
JA1	3599	**M8**	125
JP1	3429	**M9**	238
Junction 5	6834	**P2**	3076
K1	1608	**P4**	1502
K2A	712	**P5**	980
K2B	1208	**P6**	2326
K3	417	**P7**	1340
K4	727	**RA1**	2950
K5	782	**W1**	684
K6	2273	**Woodlawn Flow Local (M5)**	1585
M10	767	**M6B- Not diverted**	1000
M11	620	**Woodlawn Sewer System (Part of M6B)**	160
M12	2750	*See Figure 9 for subbasin locations	

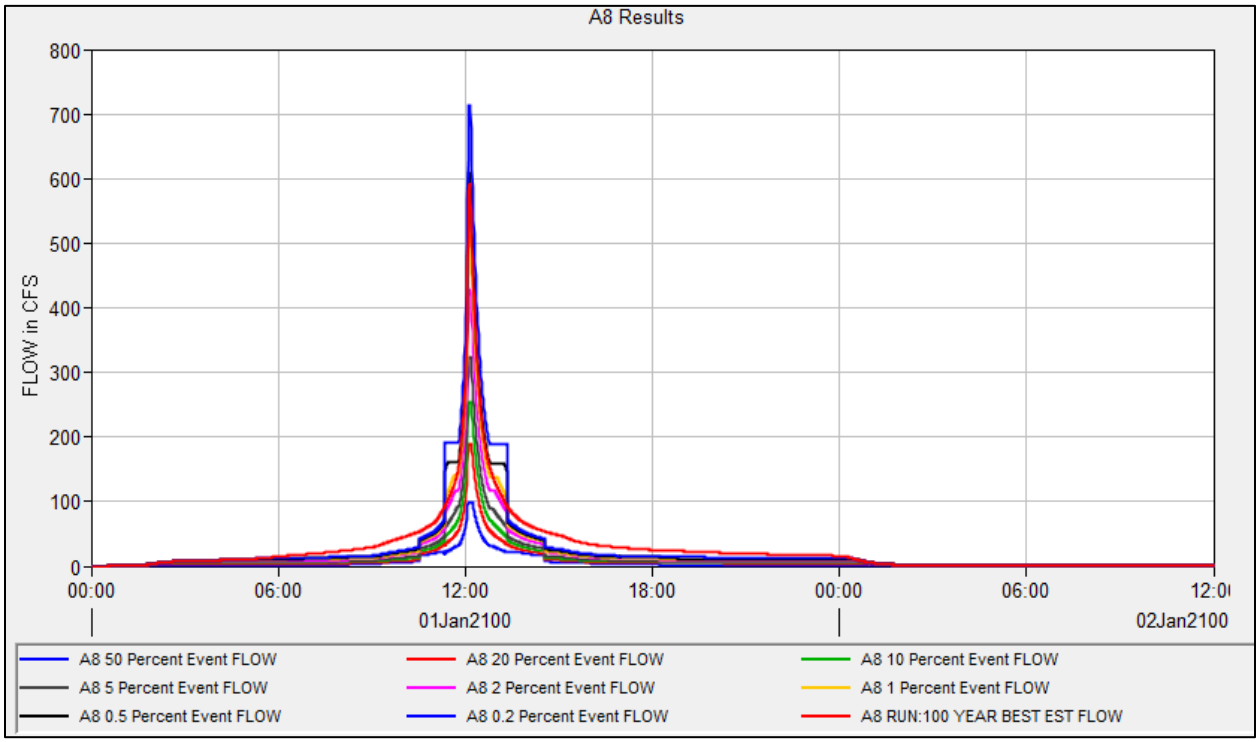


Figure 3: Sample Balanced Hydrograph Results

Guidance Documents

Various guidance documents are referred to within this report. The documents shape the methodology required for this study. These include:

- Engineering Manual 1110-2-1619 Risk Based Analysis for Flood Damage Reduction Studies
- Engineering Regulation 1105-2-101 Risk Analysis for Flood Risk Management
- Engineer Manual 1110-2-1411 Standard Project Flood Determination
- Engineer Regulation 1110-8-2 (FR) Inflow Design Floods for Dams and Reservoirs
- Engineer Manual 1110-2-1417 Flood Runoff Analysis
- Hydrometeorological Report No. 39 (HMR 39) Probably Maximum Precipitation in the Hawaiian Islands
- NOAA Atlas 14 Point Precipitation Frequency Estimates, Precipitation-Frequency Atlas of the United States Volume 4 Version 3
- Technical Paper 40 (TP40) Rainfall Atlas of the United States for Durations from 30 minutes to 24 hours and Return Periods from 1 to 100 years
- HEC-WAT Water Analysis Tool User's Manual
- HEC-WAT Hydraulic Sampler User's Manual
- HEC-SSP Statistical Software Package User's Manual

- HEC-HMS Hydrologic Modeling System User's Manual

Standard Units

Unless otherwise specified all units are as follows:

Precipitation- Inches (In)

Flow – Cubic Feet per Second (CFS)

Runoff Volume – Inches (averaged over the upstream drainage area of a given point)

Area- Square Mile (mi^2)

Elevation- Feet, Local Tidal Datum-mean sea level, Tidal Epoch 1983-2001. Goid 2012A

Projection- NAD 1983 HARN projected to State Plane Hawaii 3 FIPS 5103 feet, Horizontal

Plain Writing Act

The Plain Writing Act of 2010 directs government agencies to use clear and concise language for better public understanding. The writer will attempt to follow the Federal Plain Language Guidelines as much as the subject matter will allow.

Rainfall Frequency (Atlas 14)

Table 4-1 of EM-1110-2-1619 describes the available options for the calculations of discharge probability functions without recorded events. There are not enough gage data to use the direct analytical method described in the regulations at all inflow points to the HEC-RAS model in the basin. Continuous simulation is a significant effort beyond the hypothetical frequency events method and is typically only used in very high-risk situations.

For the very flashy or fast-moving storms that occur in this basin, a rainfall-runoff calculation method that produces hydrographs instead of only peak flow estimates is required. This is because the basin will not reach equilibrium or a steady state at the peak of the storm hydrographs. (The water is moving through the system too rapidly and there is not enough rainfall volume to completely flood all areas associated with equilibrium.) A hydrograph is also required as an input for the updated two-dimensional (2D) hydraulic modeling. Therefore, only the hypothetical frequency events options in the below table is reasonable to use for inputs into the HEC-RAS model. NOAA Atlas 14 is the most widely used rainfall frequency dataset.

Table 4-1
Procedures for Estimating Discharge-Probability Function Without Recorded Events (adapted from USWRC (1981))

Method	Summary of Procedure
Transfer	Discharge-probability function is derived from discharge sample at nearby stream. Each quantile (discharge value for specified probability) is extrapolated or interpolated for the location of interest.
Regional estimation of individual quantiles or of function parameters	Discharge-probability functions are derived from discharge samples at nearby gauged locations. Then the function parameters or individual quantiles are related to measurable catchment, channel, or climatic characteristics via regression analysis. The resulting predictive equations are used to estimate function parameters or quantiles for the location of interest.
Empirical equations	Quantile (flow or stage) is computed from precipitation with a simple empirical equation. Typically, the probability of discharge and precipitation are assumed equal.
Hypothetical frequency events	Unique discharge hydrographs due to storms of specified probabilities and temporal and areal distributions are computed with a rainfall-runoff model. Results are calibrated to observed events or discharge-probability relations at gauged locations so that probability of peak hydrograph equals storm probability.
Continuous simulation	Continuous record of discharge is computed from continuous record of precipitation with rainfall-runoff model, and annual discharge peaks are identified. The function is fitted to series of annual hydrograph peaks, using statistical analysis procedures.

Figure 4: Discharge Probability Options

Rainfall Frequency Data Used

National Oceanic and Atmospheric Administration (NOAA) Atlas 14 are the official precipitation frequency estimates for the United States. This dataset includes the rainfall frequency and intensity with 90 percent confidence intervals for the 1 to 0.001 AEP rainfall events for durations from 5 minutes to 60 days. Documentation can be found at: http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas14_Volume4.pdf, while the actual server is located at: http://hdsc.nws.noaa.gov/hdsc/pfds/hi/hi_pfds.html. This data is used for this study as it provides the means to produce hyetographs for an entire frequency storm event, instead of single peak value. The updated hydraulic (HEC-RAS) modeling requires a time series of data, rather than a static point, so that rainfall can be converted to stream flow, then routed through the basin throughout the storm. This is an improvement to the previous study, which simply assumed that all peak flows occurred at the same time for long enough to create a steady state in the basin.

During the feasibility study, the updated rainfall frequency data for the State of Hawaii was released March 30, 2009 on the Precipitation Frequency Data Server (PFDS) which is part of NOAA Atlas 14, Volume 4, Version 2.0, Hawaiian Islands. This precipitation data was taken from a point at the centroid of the watershed and documented in the feasibility report. Table 4 shows the 2009 best estimate rainfall data below.

Post feasibility study, an update to the Atlas 14 Volume 4 document and the n-minute scaling factors (adjustments to precipitation at less than one hour) was released in 2011. This updated data was analyzed graphically to find subbasin averaged precipitation volume and is what is used for the final frequency analyses in this report. Table 8 shows the final rainfall data for this study below.

It should also be noted that this rainfall frequency was not developed with only recent data, but includes a relatively long period of record, and encompasses notable historic events. In fact, there were quite a few gages in the Ala Wai region by 1905. A reporting of this method and rather large list of precipitation

data is in the Altas-14 documentation at the link above. Due to the methodology used to analyze the gage data, an estimated number of data years of 310 was published in the Atlas 14 document for the Honolulu Area.

Table 4: Feasibility Study: 2009 NOAA Atlas 14 Rainfall Frequencies

Percent Chance Exceedance	Return Period (years)	Depth (inches) for Specified Duration								
		5-min	15-min	30-min	1-hour	2-hours	3-hours	6-hours	12-hours	24-hours
99	1	0.38	0.66	0.97	1.40	1.87	2.12	2.74	3.35	3.92
50	2	0.47	0.80	1.19	1.72	2.33	2.71	3.49	4.29	5.18
20	5	0.61	1.04	1.54	2.22	3.04	3.54	4.58	5.68	6.96
10	10	0.72	1.24	1.83	2.64	3.61	4.21	5.46	6.80	8.39
5	20	0.81	1.49	2.11	3.05	4.15	4.94	6.28	8.00	9.95
4	25	0.89	1.52	2.25	3.24	4.42	5.16	6.69	8.36	10.42
2	50	1.02	1.75	2.59	3.74	5.09	5.94	7.69	9.61	12.05
1	100	1.16	1.99	2.95	4.25	5.78	6.74	8.74	10.92	13.77
0.5	200	1.31	2.25	3.34	4.82	6.53	7.61	9.86	12.30	15.60
0.2	500	1.53	2.62	3.88	5.61	7.57	8.82	11.42	14.23	18.18

Rainfall Intensity Frequency data determined from NOAA Atlas 14 Precipitation Frequency Data Server using watershed centroid of 21.3092 N, 157.8071 W. Values for the 5-percent chance storm are interpolated.

Atlas 14 Volume 4 Data Analyses and Frequency Determination

NOAA uses a detailed process to screen data and produce final best estimate frequency data determinations. The process for Hawaii is dissimilar to Atlas 14 data calculated for the continental United States. A general overview of the process to determine best estimate annual maximum series-based precipitation frequency volumes is as follows:

Precipitation frequency estimates have been computed for a range of frequencies and durations using a regional frequency analysis (which means trading space for time) using statistics on the peak annual rainfall data. This included precipitation measurements recorded at daily, hourly and n-minute time intervals. The data were screened for inaccurate, duplicate, and other suspect measurements. The 1-day and 1-hour data were also analyzed for any potential trends that could affect the results.

Regions with similar annual maximum series precipitation characteristics were grouped together. Adjustments were made to the groups after additional statistical tests and climatology assessments. Multiple probability distribution functions were tested on each region for each duration and the best distribution was then selected with goodness-of-fit tests.

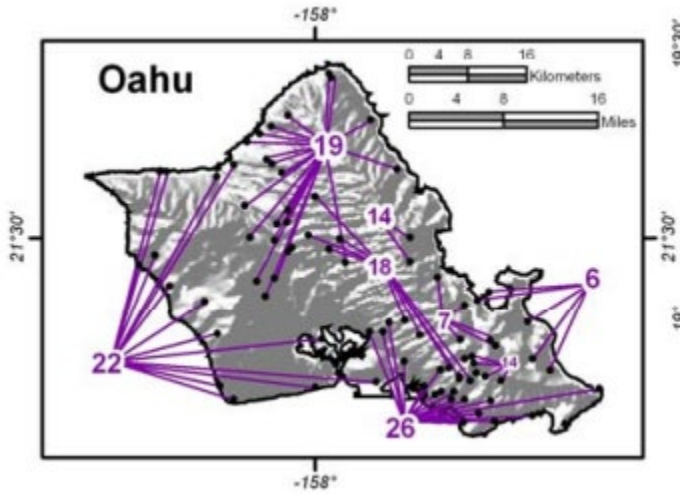


Figure 5: Atlas 14 Station Groupings (Daily)

Frequency estimates for a selected distribution were determined at each station, using a combination of site specific and regional data. A Monte-Carlo simulation (many individual samples between uncertainty bounds) was used to produce the 90% confidence intervals, which are the 5% and 95% confidence limit estimates. A relatively small number of stations have data at less than 1-hour intervals, and therefore both the precipitation frequency and confidence intervals for durations less than 1-hour were computed using scaling ratios between the n-minute and 1-hour frequency estimates.

Table 5: Scaling Factors Applied to 1-hour quantiles to produce N-minute Durations

Duration (minutes)	5	10	15	30
Scaling Factor	0.29	0.43	0.54	0.76

Gridded estimates of the frequency relationships and confidence intervals were determined from mean annual maximum grids and the regional ratios. The mean annual maximum grid for each duration was derived from specific station estimates and PRISM spatial interpolation. The confidence interval data was then derived in an iterative process using the Cascade, Residual Add-Back (CRAB) spatial interpolation procedure. The resulting grids were examined and corrected in cases where inconsistencies occurred between durations and frequencies. Additional descriptions of this process are in the Atlas 14 document.

Point Data versus Grid-based Basin Averaged Data

The Feasibility study estimated the precipitation frequency values using a basin centroid value for the Annual Maximum Series (AMS) at location North 21.3092 Latitude and West 157.8071 Longitude. The updated point values at this location are shown in the table below, pulled at the time of this report. (original values from the feasibility report are shown above.)

However, there were significant orographic effects that suggested that a point value may not accurately capture the basin wide expected rainfall frequencies. The Zonal Statistics tool in ArcGIS software was used to develop an average point precipitation value for the 0.01 AEP 24-hour frequency precipitation depths for each subbasin, which is shown below in Table 6. There is over a 7-inch variation between the far Mauka (near the mountains) and Makai (near the ocean) subbasins. The same method was used to produce 0.01 AEP 12-hour frequency precipitation depths for each subbasin, shown in Table 7. The data in these tables were used as the spatial pattern for the March 1958 and HMR39 hyetographs within the HEC-WAT model.

Table 6: Atlas 14 0.01 AEP 24-Hour Frequency AMS Precipitation for Ala Wai Watershed

Subbasin	Total Rainfall (in)	Subbasin	Total Rainfall (in)
A1	12.18	**M14**	11.97
A2	11.79	**M2**	17.95
A3	11.24	**M3**	16.44
A4	11.28	**M4**	14.70
A5	10.94	**M5**	15.86
A6	11.14	**M6B**	13.90
A7	10.82	**M7**	14.16
A8	12.21	**M8**	13.63
K1	14.50	**M9**	13.98
K2A	13.40	**P1**	17.67
K2B	12.89	**P2**	16.38
K3	13.10	**P3**	15.90
K4	12.89	**P4**	13.86
K5	12.68	**P5**	13.46
K6	12.40	**P6**	11.98
M1	18.26	**P7**	11.29
M10	13.42	**W1**	11.79
M11	12.93	**W2**	11.59
M12	12.67	**W3**	11.17
M13	12.43		

Table 7. Atlas 14 0.01 AEP 12-Hour AMS Frequency Precipitation for Ala Wai Watershed

Subbasin	Total Rainfall (in)	Subbasin	Total Rainfall (in)
A1	9.72	**M14**	9.69
A2	9.39	**M2**	14.30
A3	8.95	**M3**	12.99
A4	8.98	**M4**	11.92
A5	8.70	**M5**	12.57
A6	8.89	**M6B**	11.21
A7	8.61	**M7**	11.31
A8	9.61	**M8**	10.78

K1	11.43	**M9**	10.93
K2A	10.55	**P1**	14.04
K2B	10.14	**P2**	13.26
K3	10.31	**P3**	12.65
K4	10.27	**P4**	11.23
K5	10.02	**P5**	10.74
K6	9.84	**P6**	9.65
M1	14.50	**P7**	9.04
M10	10.70	**W1**	9.33
M11	10.33	**W2**	9.21
M12	10.08	**W3**	8.90
M13	9.89		

For this study, the rainfall data was pulled graphically to account for the significant orographic effects in the upper portion of the basin. The gridded annual maximum series (AMS) frequency rainfall data was downloaded for the Hawaiian Islands and an ArcGIS zonal statistics tool was used to create a basin averaged mean value and basin averaged confidence intervals as shown below. For both tables the best estimate value is bolded, while the confidence intervals are in parentheses. The difference from the data used in the Feasibility Study for the 24-hour, 0.01 AEP frequency volume was approximately 1 additional inch of rainfall.

Table 8: 2011 Point Based AMS Frequency Precipitation for the Ala Wai Basin

AMS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]									
Duration	Annual exceedance probability (1/years)								
	1/2	1/5	1/10	1/25	1/50	1/100	1/200	1/500	1/1000
5-min	**0.408** (0.358-0.466)	**0.579** (0.504-0.663)	**0.706** (0.609-0.812)	**0.880** (0.746-1.02)	**1.02** (0.851-1.19)	**1.17** (0.957-1.37)	**1.33** (1.06-1.57)	**1.56** (1.20-1.86)	**1.75** (1.30-2.11)
10-min	**0.605** (0.531-0.691)	**0.859** (0.747-0.983)	**1.05** (0.903-1.20)	**1.31** (1.11-1.51)	**1.52** (1.26-1.76)	**1.74** (1.42-2.04)	**1.98** (1.58-2.33)	**2.31** (1.78-2.76)	**2.59** (1.93-3.12)
15-min	**0.760** (0.667-0.868)	**1.08** (0.938-1.24)	**1.32** (1.14-1.51)	**1.64** (1.39-1.90)	**1.90** (1.58-2.21)	**2.18** (1.78-2.56)	**2.48** (1.98-2.93)	**2.91** (2.24-3.46)	**3.26** (2.42-3.92)
30-min	**1.07** (0.939-1.22)	**1.52** (1.32-1.74)	**1.85** (1.60-2.13)	**2.31** (1.95-2.67)	**2.68** (2.23-3.12)	**3.07** (2.51-3.60)	**3.49** (2.79-4.12)	**4.09** (3.15-4.88)	**4.58** (3.41-5.52)
60-min	**1.41** (1.24-1.61)	**2.00** (1.74-2.29)	**2.44** (2.10-2.80)	**3.04** (2.57-3.52)	**3.52** (2.93-4.10)	**4.04** (3.30-4.73)	**4.59** (3.67-5.42)	**5.38** (4.14-6.42)	**6.03** (4.49-7.26)
2-hr	**1.91** (1.68-2.18)	**2.73** (2.37-3.13)	**3.33** (2.86-3.83)	**4.14** (3.51-4.80)	**4.80** (4.00-5.59)	**5.50** (4.49-6.44)	**6.23** (4.97-7.36)	**7.27** (5.59-8.68)	**8.13** (6.04-9.80)
3-hr	**2.22** (1.94-2.54)	**3.19** (2.77-3.66)	**3.88** (3.34-4.47)	**4.84** (4.08-5.60)	**5.60** (4.65-6.52)	**6.40** (5.22-7.50)	**7.25** (5.77-8.56)	**8.45** (6.48-10.1)	**9.44** (7.00-11.4)
6-hr	**2.85** (2.49-3.25)	**4.12** (3.58-4.72)	**5.03** (4.33-5.79)	**6.27** (5.30-7.25)	**7.26** (6.03-8.45)	**8.30** (6.76-9.72)	**9.40** (7.48-11.1)	**10.9** (8.40-13.1)	**12.2** (9.06-14.7)
12-hr	**3.49** (3.05-3.99)	**5.10** (4.42-5.85)	**6.26** (5.38-7.21)	**7.83** (6.60-9.07)	**9.06** (7.52-10.6)	**10.4** (8.43-12.1)	**11.7** (9.31-13.9)	**13.6** (10.4-16.3)	**15.2** (11.2-18.3)
24-hr	**4.19** (3.68-4.77)	**6.25** (5.47-7.15)	**7.74** (6.74-8.87)	**9.76** (8.42-11.3)	**11.4** (9.73-13.2)	**13.1** (11.1-15.2)	**14.9** (12.5-17.5)	**17.5** (14.3-20.7)	**19.6** (15.8-23.4)
2-day	**5.19** (4.59-5.89)	**7.66** (6.75-8.72)	**9.39** (8.23-10.7)	**11.7** (10.2-13.5)	**13.5** (11.7-15.6)	**15.4** (13.1-17.9)	**17.4** (14.6-20.3)	**20.1** (16.6-23.8)	**22.3** (18.1-26.6)
3-day	**5.81** (5.16-6.58)	**8.55** (7.55-9.71)	**10.5** (9.19-11.9)	**13.0** (11.3-14.9)	**14.9** (12.9-17.2)	**16.9** (14.5-19.6)	**19.0** (16.1-22.2)	**21.9** (18.1-25.8)	**24.2** (19.7-28.7)
4-day	**6.43** (5.72-7.26)	**9.44** (8.36-10.7)	**11.5** (10.2-13.1)	**14.3** (12.4-16.3)	**16.3** (14.1-18.8)	**18.5** (15.8-21.3)	**20.7** (17.5-24.0)	**23.7** (19.7-27.8)	**26.0** (21.2-30.8)
7-day	**7.36** (6.55-8.32)	**10.7** (9.49-12.2)	**13.0** (11.5-14.8)	**16.0** (14.0-18.3)	**18.3** (15.9-21.0)	**20.7** (17.7-23.9)	**23.1** (19.5-26.8)	**26.4** (21.9-30.9)	**28.9** (23.6-34.2)
10-day	**8.33** (7.41-9.41)	**12.0** (10.7-13.6)	**14.6** (12.8-16.6)	**17.8** (15.6-20.4)	**20.3** (17.6-23.3)	**22.8** (19.5-26.3)	**25.3** (21.4-29.5)	**28.7** (23.9-33.8)	**31.4** (25.6-37.2)
20-day	**10.9** (9.68-12.3)	**15.4** (13.6-17.4)	**18.4** (16.2-20.9)	**22.2** (19.4-25.4)	**25.0** (21.7-28.7)	**27.8** (23.9-32.2)	**30.7** (26.0-35.7)	**34.4** (28.6-40.5)	**37.3** (30.4-44.2)
30-day	**13.2** (11.8-14.9)	**18.4** (16.3-20.9)	**21.9** (19.3-24.8)	**26.1** (22.8-29.9)	**29.3** (25.4-33.6)	**32.4** (27.8-37.4)	**35.5** (30.0-41.2)	**39.5** (32.8-46.4)	**42.5** (34.7-50.3)
45-day	**16.3** (14.5-18.4)	**22.5** (19.9-25.4)	**26.5** (23.3-30.1)	**31.4** (27.4-35.9)	**35.0** (30.3-40.2)	**38.5** (33.0-44.5)	**42.0** (35.5-48.8)	**46.5** (38.6-54.5)	**49.8** (40.6-58.9)
60-day	**19.2** (17.1-21.7)	**26.2** (23.2-29.6)	**30.7** (27.0-34.9)	**36.2** (31.6-41.4)	**40.2** (34.9-46.2)	**44.2** (37.9-51.0)	**48.0** (40.7-55.8)	**52.9** (44.0-62.1)	**56.6** (46.3-67.0)

Table 9: Basin Average Atlas 14 AMS Frequency Precipitation for the Ala Wai Basin

Gridded AMS precipitation frequency estimates with 90% confidence intervals (in inches)			
Return Period	AEP	12-hour duration	24-hour duration
2	0.5	**3.92** (3.46-4.46)	**4.74** (4.2-5.36)
5	0.2	**5.66** (4.95-6.46)	**6.94** (6.14-7.88)
10	0.1	**6.89** (5.97-7.90)	**8.52** (7.49-9.7)
25	0.04	**8.54** (7.28-9.84)	**10.65** (9.28-12.2)
50	0.02	**9.84** (8.25-11.40)	**12.34** (10.66-14.21)
100	0.01	**11.20** (9.21-13.06)	**14.12** (12.07-16.35)
200	0.005	**12.61** (10.14 - 14.82)	**16.0** (13.51-18.65)
500	0.002	**14.60** (11.31-17.35)	**18.64** (15.44-21.96)
1000	0.001	**16.21** (12.14-19.43)	**20.78** (16.93-24.7)

Point versus Basin Totals

Precipitation frequency estimates from the Hawaii Atlas 14 data are estimates for a point location and are not intended for direct use for areas over 10-square miles per page 17 of Atlas 14 Volume 4 Version 3. An additional step is then needed to convert to area-based duration relationships for the Ala Wai Basin, which is 16.2 square miles.

Initial estimates from the feasibility report used the TP 40 Method for depth-area reduction. The Technical Paper 40- Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 hours and Return Periods from 1 to 100 years was published by the Weather Bureau in 1961. This method is internal to the frequency storm methodology produced the current HEC-HMS version. However, this version, while commonly used on projects in the Hawaiian Islands, was not developed for this area. Therefore, the depth-area reduction curves developed as part of the Probable Maximum Storm documents for the Hawaiian Islands (HMR 39- Hydrometeorological Report No. 39 published by the Weather Bureau in 1963) were used. The differences between the two methods are minimal. However, the HMR 39 curve did not adequately provide data to determine sub-hourly precipitation volumes. Therefore, the Atlas 14 scaling factors referenced above were used to create sub-hourly precipitation volumes. The reduction curves for multiple TP 40 time periods and the 24-depth reduction for the HMR 39 method are shown below. Along with the HMR 39 Depth-Area reduction curve are 4 depth-area relationships from storms in the Hawaiian Islands.

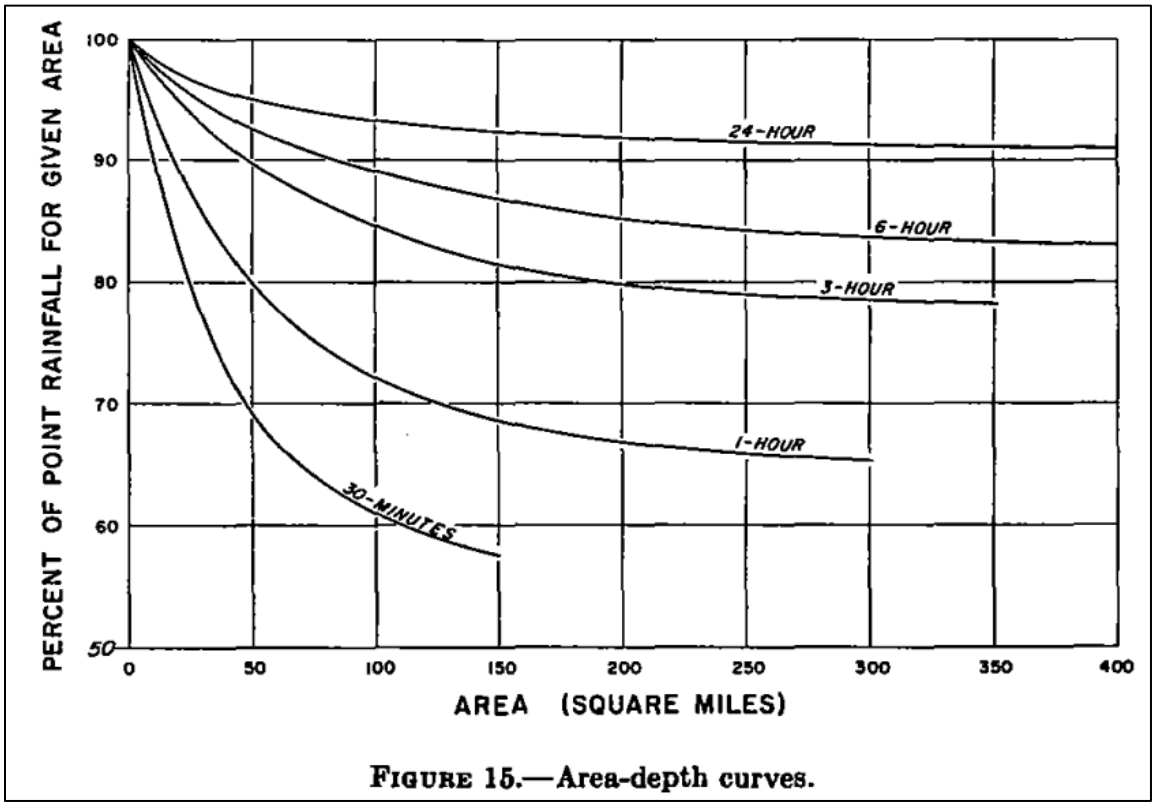


Figure 6: TP 40 Reduction (Hershfield, 1961)

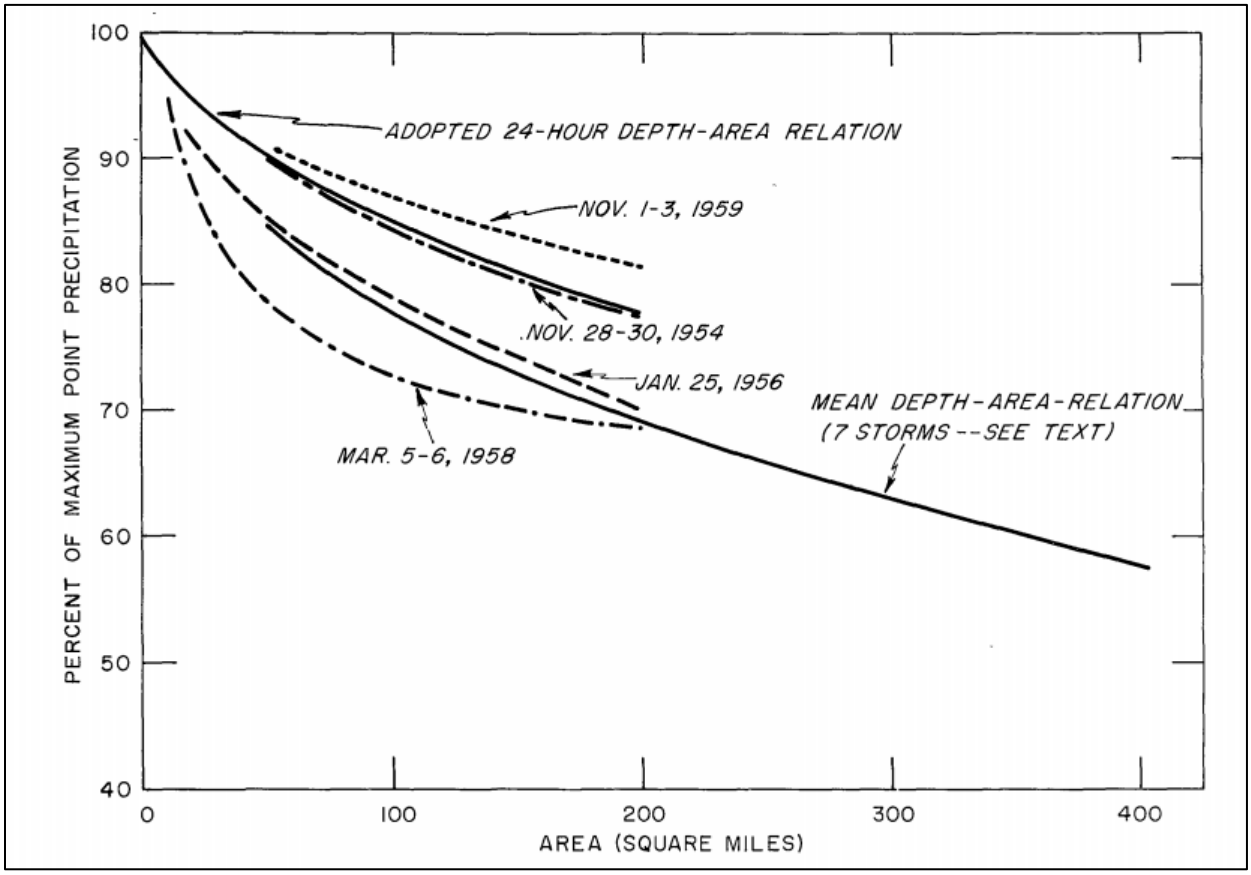


Figure 7: HMR 39 Depth Area Relationship

A significant comment to the frequency estimation process was that largest storms in recent record have been localized and not basin wide, whereas the frequency estimation is basin wide. The decision to have this assumption is slightly conservative for more frequent events but ensures that there is no discrimination among the level of protection at specific areas throughout the basin. This assumption is standard amongst all engineering-based agencies working in the area. We are in the same order of magnitude as the most recent FEMA FIS and the City and County of Honolulu's design standards for flow estimates from the Feasibility Study H&H appendix.

The 1967 event and 1958 events which occurred in the Ala Wai Basin occurred at a basin-wide level. The HMR 39 document described the 1958 event as significant Oahu-wide. "During the March 1958 storm all stations on Oahu reported 2-day totals of at least five inches. The highest officially published amount (Climatological Data) was 24.1 inches at Lunalino Home situated in southeastern Oahu in a valley just west of Koko Crater. However, there were unofficial reports of up to 26 inches. In the 3-day period March 5-7, 1958 the rainfall totals amounted to 50 to 80 percent of the total median annual precipitation along the leeward southern coastal areas of Oahu. In a kona storm like that of March 1958 the orographic effects are diminished because a more nearly uniform level of precipitation is produced from a non-orographic convergence mechanism. This relatively uniform level of precipitation is evident… a nearly 1800-foot difference in elevation does not appear to have any noticeable effect on the magnitude of the rain."

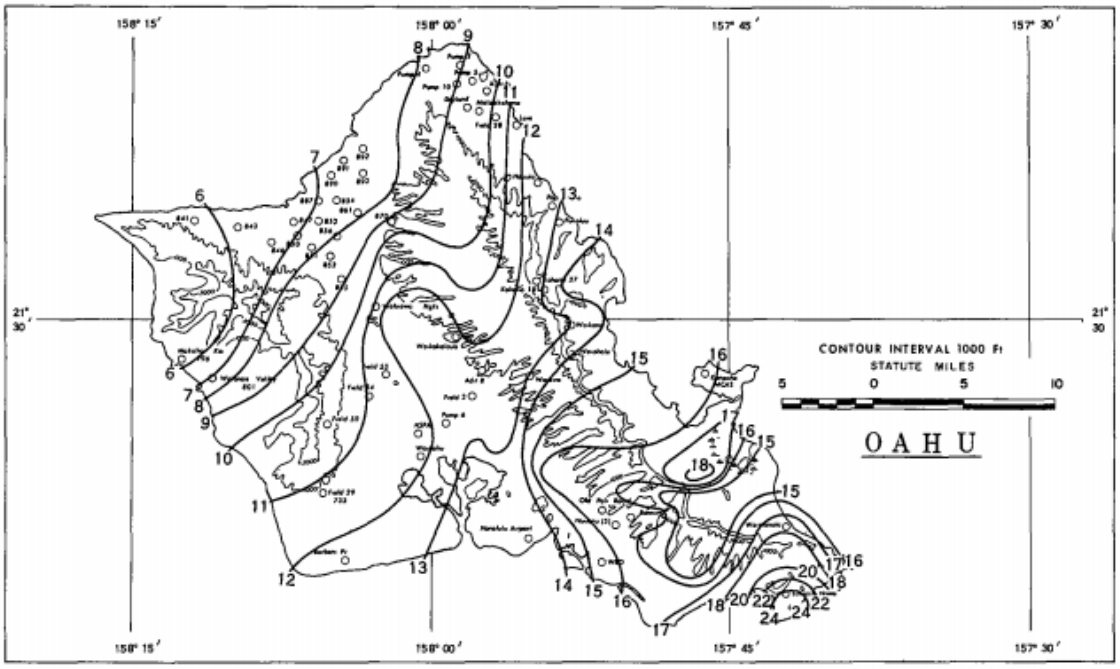


Figure 8: March 5-6, 1958 Storm- Inches of Rainfall (HMR 39)

From historical evidence along all the Hawaiian Islands orographic differences in rainfall decrease with increasing precipitation intensity. Riehl in his article "Some Aspects of Hawaiian Rainfall" emphasized that, "The larger the rainfall the greater becomes the relative homogeneity of storms. As storm intensity increases, the importance of the orography declines." (Riehl, 1949) The final precipitation frequency with a depth area reduction factor of 0.97 applied is shown in the table below. The Atlas 14 precipitation frequency values shown in Table 10 were used to develop the three parameter Generalized Extreme Value (GEV) distribution shape, scale, and location parameters that were input into the HEC-WAT hydraulic sampler.

Table 10: 12-Hour AMS Basin Average Precipitation Frequency with Depth Area Reduction

12-Hour Gridded AMS-Based precipitation frequency estimates with 90% confidence intervals (in inches)			
Return Period	AEP	12-hour	24- hour
2	0.5	**3.81** (3.35-4.33)	**4.60** (4.08-5.20)
5	0.2	**5.49** (4.80-6.26)	**6.73** (5.95-7.64)
10	0.1	**6.68** (5.79-7.66)	**8.26** (7.27-9.41)
25	0.04	**8.28** (7.06-9.55)	**10.33** (9.00-11.83)
50	0.02	**9.54** (8.00-11.06)	**11.97** (10.34-13.78)
100	0.01	**10.86** (8.93-12.66)	**13.70** (11.71-15.86)
200	0.005	**12.2** (9.83 - 14.38)	**15.52** (13.10-18.09)
500	0.002	**14.16** (10.97-16.83)	**18.08** (14.98-21.30)
1000	0.001	**15.72** (11.78-18.85)	**20.16** (16.42-23.96)

Basin Updates and Calibration

At the beginning of this study, a calibrated HEC-HMS model was provided. There have been only three significant events in the observed record with quality data, and these events, the 1967, 2004, and 2006, were used. The details of this effort are discussed in the Flood Risk Management Study O'ahu, Hawai'I Final Feasibility Study Report with integrated Environmental Impact Statement Appendix A- Hydrology and Engineering as well as various Oceanit Reports referenced in the Previous Modeling Efforts section above.

However, geometry and routing adjustments were necessary to better model the upstream dam drainage areas, and to better interface with the hydraulic model. Changes to the base HEC-HMS model geometry include: 1) splitting the K2 Subbasin in order to have an appropriate inflow location at the upstream of Kanaha Stream in HEC-RAS; 2) Redividing and routing the M5 and M6 Subbasins to better match actual location and flow condition for the prospective Woodlawn Dam, and later adding the effects of the local sewer system which would route flows across overland drainage boundaries and into the dam; 3) Redividing and routing the M1 and M3 Subbasins to better match actual location of the prospective Waihi Dam; 4) Splitting the routing for Reach 1 so that the flows upstream and downstream were better matched the locations for the prospective Waiakeakua and Waihi Dams, as well as better aligning the junction of the two streams; 5) Redividing and routing the K1 and K3 Subbasins to better match actual location of the prospective Makiki Dam; 6) Adjusting the RK1 routing reach to better match the handoff location from K1; and7) Routing Subbasin P5 so that it doesn't route though the prospective Waiomao Dam. The final change to the basin geometry was the removal of the reservoir system that represented the routing in the Ala Wai Canal, in order to save model runtime and as no data was found that documented the input values. For the purposes of this study, only HEC-RAS was used to route the two-dimensional behavior of the flow through the channel. A table of final subbasin names and drainage areas is provided below for model verification.

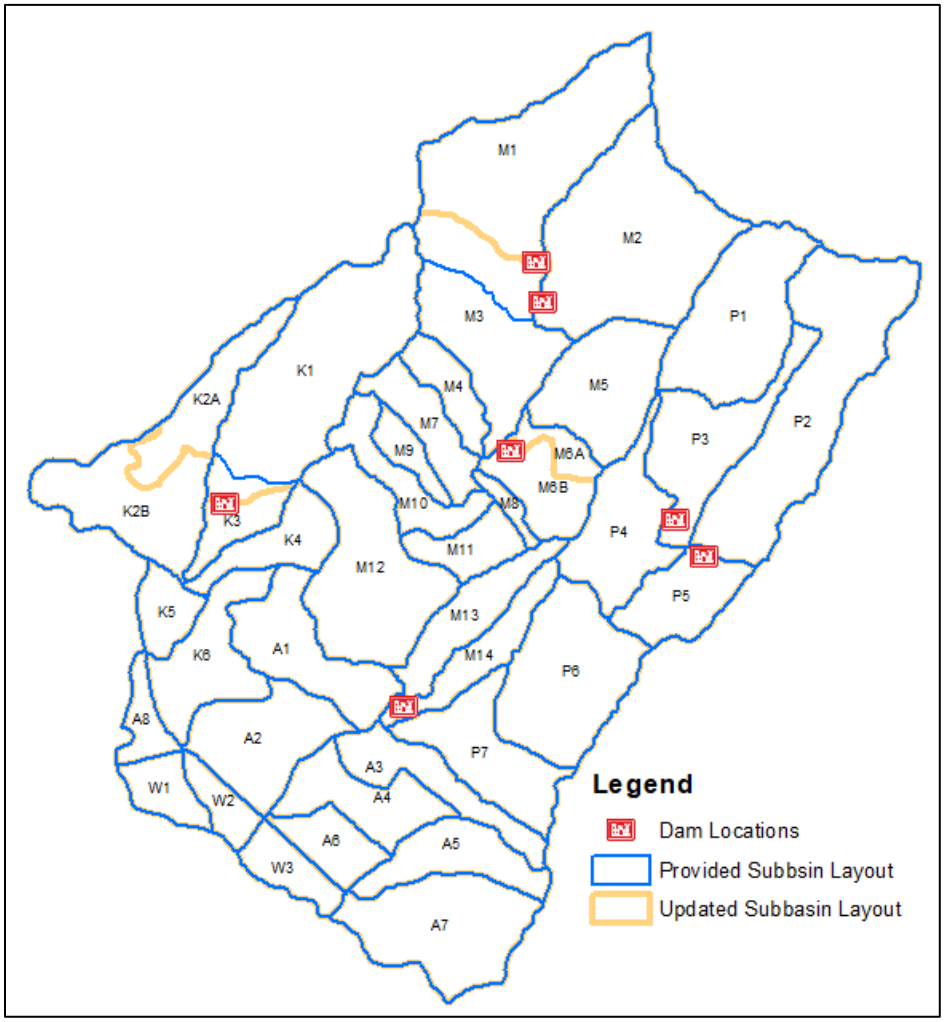


Figure 9: Subbasin Adjustments

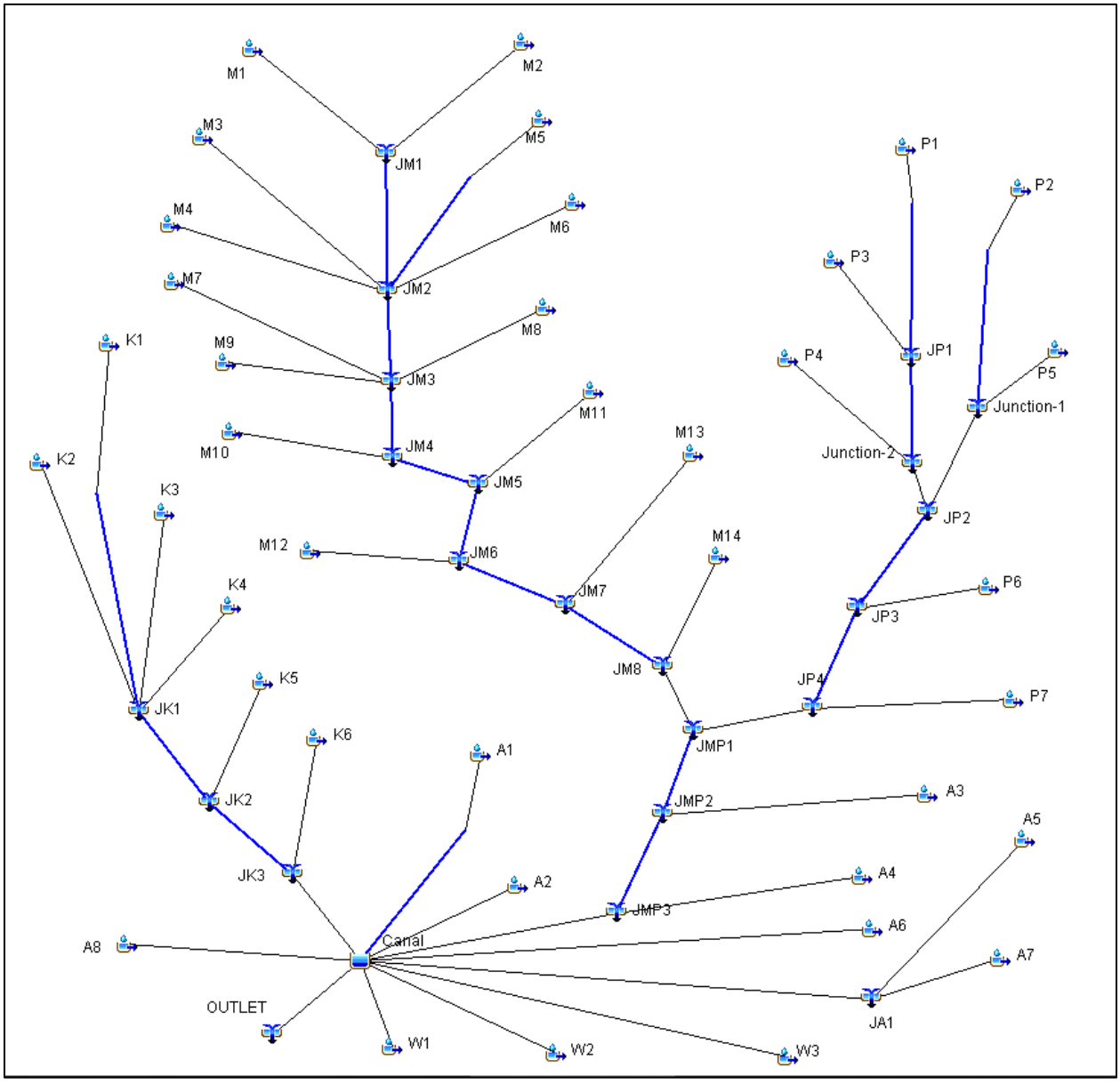


Figure 10: HEC-HMS Schematic as Provided by Honolulu District

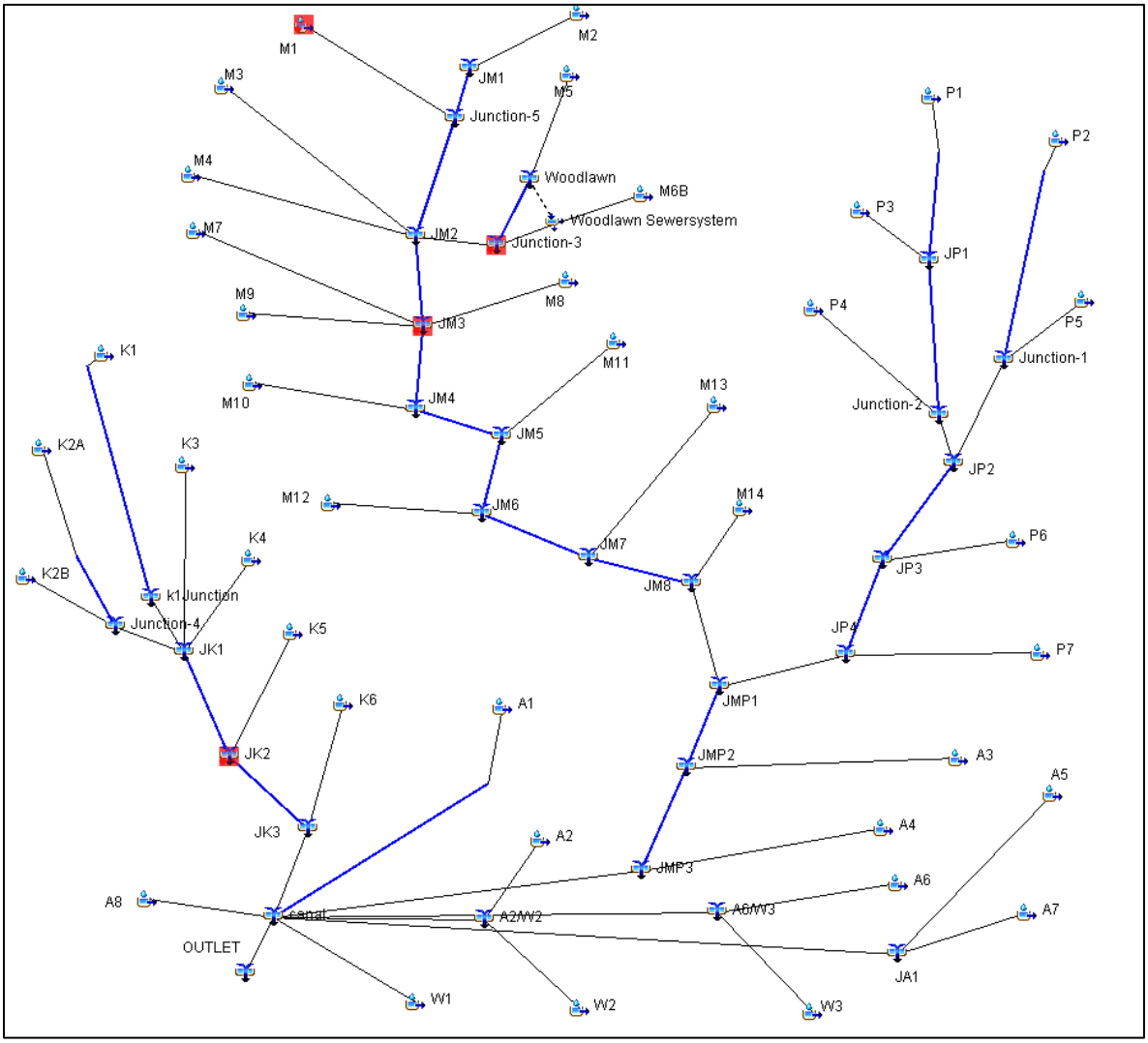


Figure 11: Updated HEC-HMS Schematic

Table 11: Detention Basin Drainage Area Adjustments

Detention Basin	Makiki	Waihi	Waiakeakua	Woodlawn	Pukele	Waiomao
Old Drainage Area (Mi^2)	1.00	1.20	1.07	0.351	1.15	1.34
Updated Drainage Area (mi^2)	1.08	0.942	1.07	0.602	1.15	1.04
% Change	8	-21.5	0	71.51	0	-22.39

Table 12: Listing of Subbasins with Drainage Areas (mi^2)

Subbasin Name	Name/Description	Drainage Area (mi^2)
A1	UHM lower campus and Punahou School	0.453
A2	Mō`ili`ili	0.467
A3	H1 Freeway	0.303
A4	Date Street	0.338
A5	Kaimukī	0.319
A6	Ala Wai Golf Course	0.197
A7	Diamond Head Drainage System	0.620
A8	Hawaii Convention Center	0.124
K1	Upper Makiki Stream	1.075323
K2A	Upper Kanaha Stream	0.328496
K2B	Lower Kanaha Stream	0.522247
K3	Middle Makiki Stream	0.151939
K4	East Manoa Road	0.251
K5	Lower Makiki Stream	0.162
K6	Washington Middle School	0.402
M1	Waihi	0.9415
M10	Woodlawn	0.262
M11	Noelani	0.190
M12	Dole (UHM Campus)	0.749
M13	Kanewai	0.295
M14	Saint Louis Heights	0.254
M2	Waiakeakua	1.073
M3	Pawaina	0.7651
M4	Poelua	0.179
M5	Woodlawn Ditch 1	0.533
M6B	Woodlawn Ditch 2	0.32
M7	Park	0.246
M8	Kahaloa	0.055
M9	Lowrey	0.111
P1	Upper Pukele Stream	0.665
P2	Upper Waiomao Stream	1.036
P3	Middle Pukele Stream	0.481
P4	Lower Pukele Stream	0.450
P5	Lower Waiomao Stream	0.306
P6	Palolo Stream	0.682
P7	Waialae Avenue	0.445
W1	Ala Moana Blvd.	0.162
W2	Kalakaua	0.129
W3	Kuhio	0.175

Updated Hydrologic Model Verification

Split subbasins and other basin modifications were verified against the calibrated feasibility model results at the next downstream computation point that combined all of the geometry changes for a given area. They were matched to either the flows from the provided the 1967, 2004, and 2006 calibration events, or the flows from existing feasibility frequency routing outputs. Only the Manoa-Pololo portion of the basin was available for verification for the 2006 event. Calibration verification methodology depended on when in the study the changes were made, the earliest changes were matched to the calibration and feasibility frequency data, while the later changes were verified by matching the downstream routing results of basin frequency events only (The adjustment of K1/K3, M1/M3, and the second iteration of the Woodlawn Detention inflows). The calibration verification datasets are shown below.

The model time step was also reduced from the five-minute calibration time step to a one-minute time step. Therefore, each of the below new basins were also run on a one-minute time step to ensure that there were no significant deviations from the calibrated results.

Table 13: 1967 Calibration-Subbasin Correction Data

	K2A	K2B	M6A (1st Adjustment)	M6B (1st Adjustment)
Old Area (MI^2)	0.850		0.353	
Corrected Area (MI^2)	0.328	0.522	0.103	0.248
Old TC	0.23		0.22	
Corrected TC	0.15	0.15	0.15	0.15
Old R	0.35		0.30	
Corrected R	0.307	0.29	0.29	0.26
Old CN	62		69	
Corrected CN	62	62	69	69
Added Reach () -Lag (min)	13.8		N/A	
Flow @ Subbasin (CFS)	355.9		441.2	
Flow @ Downstream Junction (CFS)	355.9		441.4	
% Change in Peak Flow	0.00		0.05	
Volume @ Subbasin (IN)	2.02		5.70	
Volume @ Downstream Junction (IN)	2.02		5.70	
Time of Peak @ Subbasin	3:40		00:55	
Time of peak @ Downstream Junction	3:45		00:55	

**TC, R, and CN are HEC-HMS parameters: These are time of concentration and the storage coefficient for routing, and curve number for loss calculations respectively

Table 14: 1967 Calibration Event

Element	Peak Flow (cfs)	Timing (hours)	Volume (inches)
K2 (original)	355.9	3:40	2.02
Junction 4- Outflow of K2A and K2B	355.9	3:45	2.02
Junction 4- 1 Minute Time Step	357.7	3:46	2.02
% Difference	0.51	N/A	0.00
M6 (original)	441.2	00:55	5.70
Junction 3- Outflow of M6A and M6B	441.4	00:55	5.70
Junction 3- 1 Minute Time Step	441.0	00:53	5.7
% Difference in Peak Flow	0.05	N/A	0.00

Table 15: 2004 Calibration Event

Element	Peak Flow (cfs)	Timing (hours)	Volume (inches)
K2	231.7	19:50	0.60
Junction 4- Outflow of K2A and K2B	231.1	19:50	0.60
Junction 4- 1 Minute Time Step	233.1	19:51	0.60
% Difference	0.60	N/A	0.00
M6	429.2	20:05	5.08
Junction 3- Outflow of M6A and M6B	429.9	20:05	5.08
Junction 3- 1 Minute Time Step	432.0	20:07	5.08
% Difference	0.65	N/A	0.00

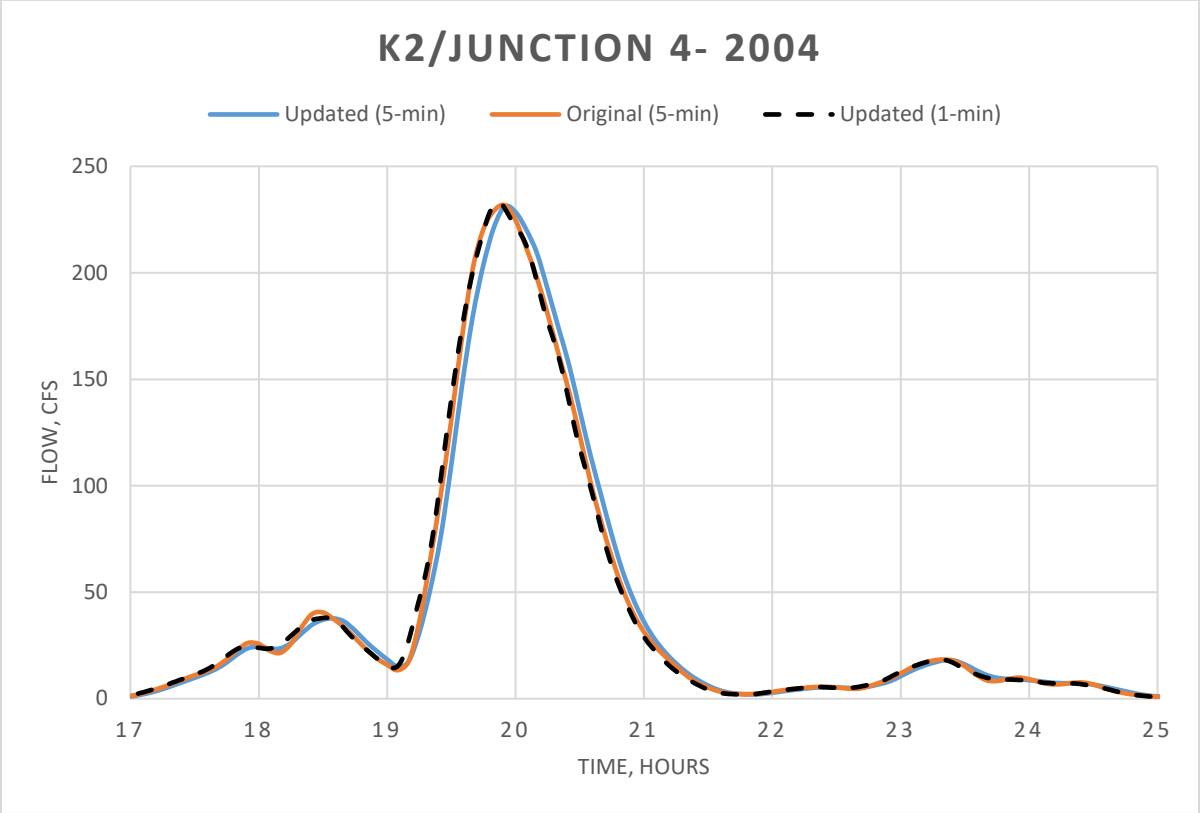


Figure 12: Corrections and Calibration at Subbasin K2

Table 16: 2006 Calibration Event

Element	Peak Flow (cfs)	Timing (hours)	Volume (inches)
K2	--	--	--
Junction 4- Outflow of K2A and K2B	--	--	--
Junction 4- 1 Minute Time Step	--	--	--
% Difference	--	--	--
M6	312.2	12:30	1.57
Junction 3- Outflow of M6A and M6B	312.2	12:30	1.57
Junction 3- 1 Minute Time Step	317.3	12:32	1.57
% Difference	1.63	N/A	0.00

**Makiki Stream was not calibrated for the 2006 event.*

Table 17: Adjusted Routing Parameters- for frequency validation only

	M1	M3	K1	K3	M5 (2nd Adjustment)	M6A (2nd Adjustment)	M6B (2nd Adjustment)
Old Area (MI^2)	1.20	0.51	1.00	0.22	0.499	0.103	0.248
Corrected Area (MI^2)	0.94	0.77	1.08	0.15	0.533	Removed	0.32
Old TC	0.22	0.23	0.18	0.12	0.20	0.15	0.15
Corrected TC	0.22	0.26	0.18	0.12	0.205	N/A	0.25
Old R	0.31	0.42	0.45	0.32	0.46	0.29	0.26
Corrected R	0.26	0.38	0.445	0.32	0.465	N/A	0.48
Old CN	67	74	42	68	65	69	69
Corrected CN	67	72	43.7	68	65.2	N/A	69

For the M1/M3 Adjustment, the Routing reach RM1 was split into the two areas up and downstream of the original junction, into RM1 and Reach 1. This routing reach used the Muskingum-Cunge method and the length was simply split across the two reaches, with all other calculated parameters remaining the same. M5 originally used a routing reach RM8 to route flows using a Muskingum-Cunge method. This method was replaced by a lag of 10 minutes to route water from the bottom of the subbasin to the main stream.

For Table 18 through Table 21 and Figure 13 through Figure 16, all updated values are in the 1-minute increment, while the original values are in the 5-minute increment. The JM2 junction envelops the changes for both the M1/M3 split and the Woodlawn area changes. The JK1 junction envelops changes for both the K1/K3 split and the K2A and K2B split. These nodes were validated in HMS version 4.2.1 and there has been a small separation in results with version upgrades for the K2 and JK1 locations.

Table 18: A0.5 AEP Frequency for Locations with Basin Corrections

Element	Peak Flow (cfs)	Timing (hours)	Volume (inches)
K2	366.5	12:20	1.61
Junction 4- Outflow of K2A and K2B	350.8	12:25	1.63
% Difference	4.28	N/A	1.24
JK1	803.8	12:20	1.38
JK1 Update	778.6	12:23	1.38
% Difference	3.14	N/A	0.00
Junction 3- Outflow of M5 and M6	442.4	12:20	2.17
Junction 3 Update- Outflow of M5 and M6B	439.5	12:26	2.17
% Difference	0.66	N/A	0.00
JM2(downstream of M1/M3 Split)	2169.3	12:25	2.35

JM2 Update	2164.5	12:23	2.36
% Difference	0.22	N/A	0.43

Figure 13: 0.5 AEP Frequency at Subbasin K2

Table 19: 0.05 AEP Frequency for Locations with Basin Corrections

Element	Peak Flow (cfs)	Timing (hours)	Volume (inches)
K2	1162.9	12:20	5.15
Junction 4- Outflow of K2A and K2B	1091.0	12:24	5.15
% Difference	6.18	N/A	0.00
JK1	2653.8	12:20	4.51
JK1 Update	2529.2	12:20	4.50
% Difference	4.70	N/A	0.22
Junction 3- Outflow of M5 and M6	1188.2	12:20	5.99
Junction 3 Update- Outflow of M5 and M6B	1174.4	12:25	5.99
% Difference	1.16	N/A	0.00

JM2(downstream of M1/M3 Split)	5621.2	12:25	6.20
JM2 Update	5655.2	12:21	6.22
% Difference	0.60	N/A	0.32

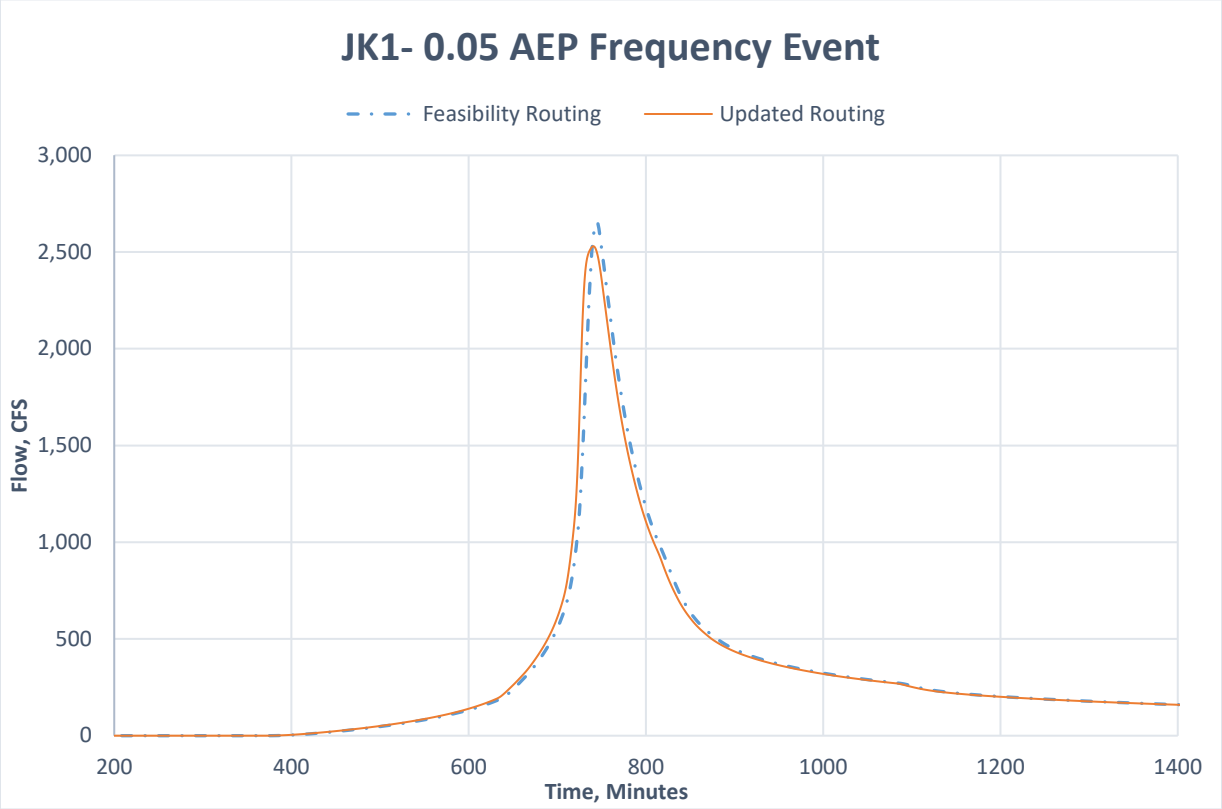


Figure 14: 0.05 AEP Frequency at Junction JK1

Table 20: 0.01 AEP Frequency for Locations with Basin Corrections

Element	Peak Flow (cfs)	Timing (hours)	Volume (inches)
K2	1882.9	12:20	8.39
Junction 4- Outflow of K2A and K2B	1774.9	12:24	8.39
% Difference	5.73	N/A	0.0
JK1	4394.4	12:20	7.48
JK1 Update	4200.5	12:20	7.48
% Difference	4.41	N/A	0.00
Junction 3- Outflow of M5 and M6	1847.2	12:20	9.37
Junction 3 Update- Outflow of M5 and M6B	1823.0	12:25	9.37
% Difference	1.31	N/A	0.00

JM2(downstream of M1/M3 Split)	8633.2	12:25	9.59
JM2 Update	8696.7	12:20	9.61
% Difference	0.74	N/A	0.21

Figure 15: 0.01 AEP Frequency at Junction 3

Table 21: 0.002 AEP Frequency for Locations with Basin Corrections

Element	Peak Flow (cfs)	Timing (hours)	Volume (inches)
K2	2746.8	12:15	12.33
Junction 4- Outflow of K2A and K2B	2586.3	12:23	12.33
% Difference	5.84	N/A	0.00
JK1	6532.2	12:20	11.17
JK1 Update	6255.7	12:19	11.18
% Difference	4.23	N/A	0.09
Junction 3- Outflow of M5 and M6	2622.5	12:20	13.42
Junction 3 Update- Outflow of M5 and M6B	2590.3	12:24	13.42
% Difference	1.23	N/A	0.00

JM2(downstream of M1/M3 Split)	12436.8	12:20	13.66
JM2 Update	12316.4	12:20	13.68
% Difference	0.97	N/A	0.15

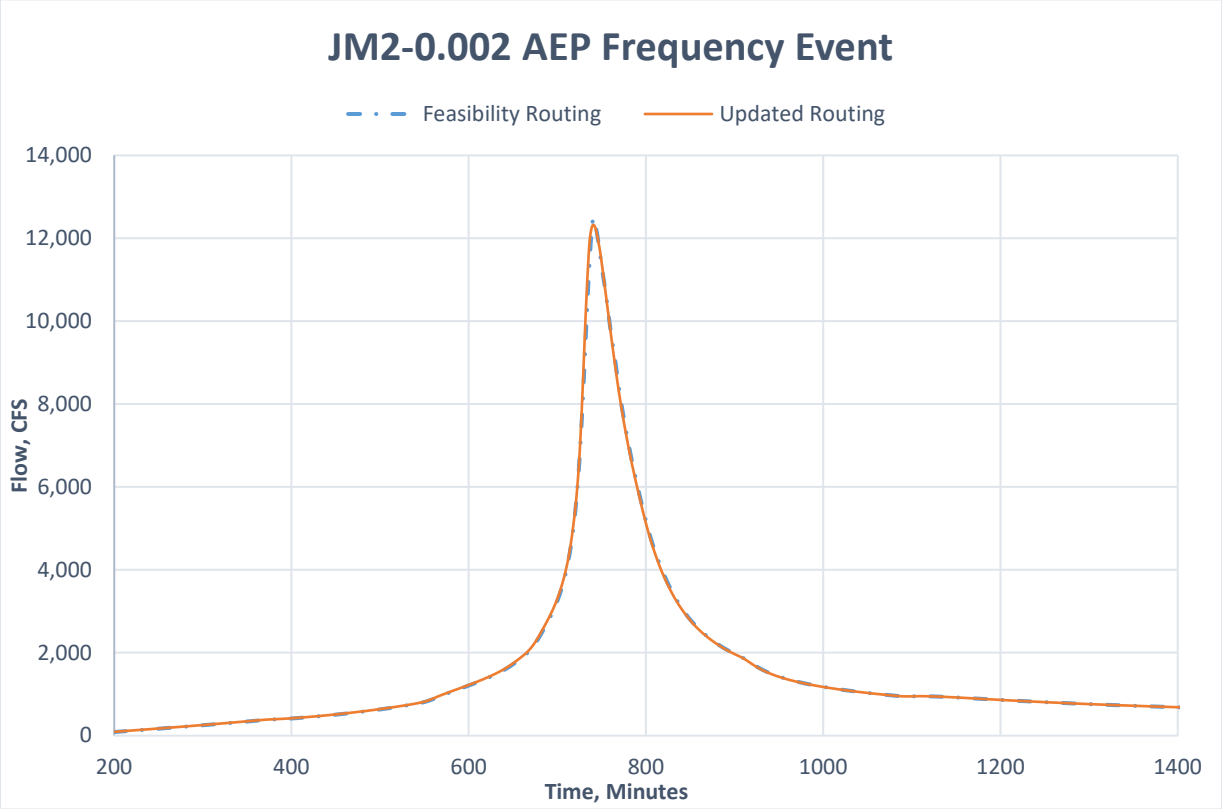


Figure 16: 0.002 AEP Frequency at Junction JM2

As part of the update to HEC-HMS version 4.3 and 4.5 an index method is now required to route Muskingum-Cunge Routing reaches. Per the recommendation of the Hydrologic Engineering Center (HEC), the "celerity" method was used with an index celerity of 5 ft/s. No adjustments to calibration were made at this point, as changes to flow calculation results were minimal.

An additional geometry was created for later use in the HEC-WAT model. This geometry was set to only calculate flows up to the HEC-RAS inflow locations for additional speed in the calculations. This version was also upgraded to HEC-HMS 4.5 due to the rapid model version updates throughout the life of this project, and compatibility with the HEC-WAT model. An image of the geometry is shown in the figure below.

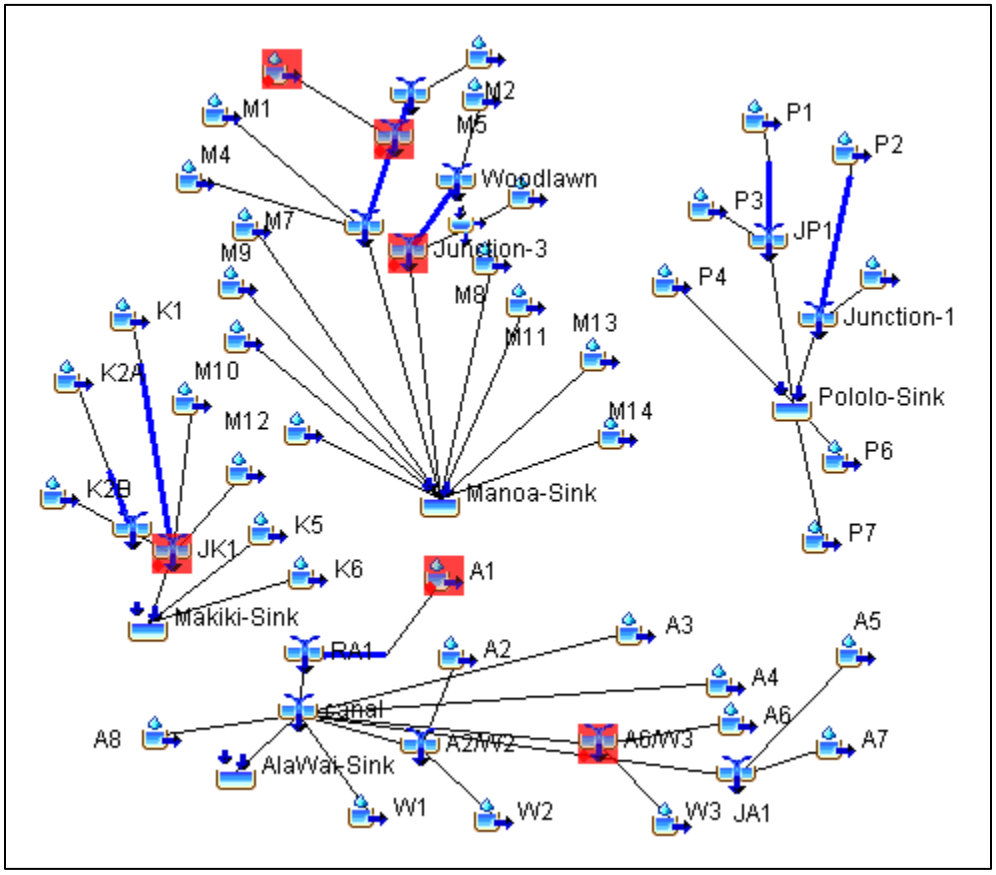


Figure 17: HMS Basin Geometry for use in the HEC-WAT environment

It was also discovered throughout the hydraulic portions of this the study that a significant amount of flow can "back up" behind bridges and in some cases escape into the overbanks. The HEC-HMS model is well calibrated to the 2004, 2006, and 1967 events. However, the ability of the model to represent these effects is questionable beyond the magnitude of these calibration events. **For large events (i.e. the 1% event) it is recommended that the HEC-RAS model be used to report stream routing near and downstream of constrictions, this includes the majority of the routing in the main streams and the Ala Wai Canal.**

Coincident Design Efforts/Detention Basins

Dam Design Information- Iterative Simulations

Two teams, one based in the Seattle District and one based in the New Orleans District were leads in the design process for the dams and pumps, respectively. Multiple variations of the dam culvert, spillway, and storage were modeled in an effort to better understand the system response for each of the upstream dams. Initial excavation, spillway, and dam data for each iteration was provided by the Seattle Design Team. The storage-elevation relationship post-excavation was pulled in the HEC-RAS version 5.05 Mapper and merged with updated LiDAR provided by the Hawaii District. Reasonable culvert elevations and lengths were estimated from this terrain. A reasonable land area over encompassing a given possible pool was analyzed to determine a unique Elevation-Volume curve, as shown below. The same

method with no excavation (LiDAR only) was used to determine a “no excavation” storage curve for each detention basin. Please note that each of these curve calculations assumed a level pool.

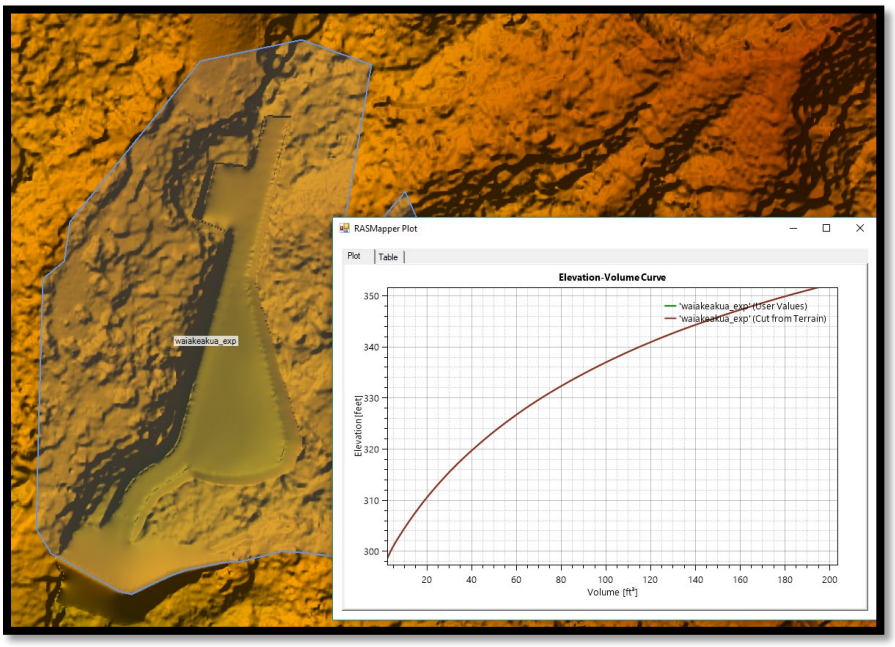


Figure 18: The Third Iteration of Waiakeakua Dam

Makiki, Waihi, Waikeakua, Pukele, and Waiomao detention basins were designed for both debris and detention and were located in the upstream reaches of the system. Each basin was required to pass the design event without debris blocking the intake structure. Woodlawn Dam was designed for only detention and originally had no excavation. Kanewai, Hausten Ditch, the Golf Course diversions, and other lower basin proposed structures were being managed from the Hawaii and New Orleans Districts. These structures are modeled in the Hydraulic Model, HEC-RAS.

After each design iteration the data was incorporated into a series of HEC-HMS simulations (With Project for the 1, 2, 5, 10, 20, 50, 100, 200, and 500 year or 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, and 0.002 AEP NOAA 14 based feasibility study precipitation frequency events) to determine the effect of the iterative changes to the overall basin. Data was reported and compared downstream of each Detention Basin. This data was provided to the HEC-RAS modeler for further analysis.

The structures on Makiki and Pololo portions of the watershed were determined to be ineffective due to the limited storage capacity that could be reasonably excavated and were removed from the study. As is discussed in the Ala Wai Canal Hydraulics Report, significant attenuation behind downstream bridges on the Manoa Portion of the watershed negated the effects of the reduced peak flow. Woodlawn detention also did not have adequate storage capacity. These structures were also removed from the study.

A final detention basin routing for the Waihi and Waikeakua basins was completed each of the 8 frequencies (0.5 to 0.002 AEP) for reporting and inclusion into the HEC-RAS model. This routing was based on the feasibility TSP with a reasonable excavation and updated WAT calculated inflows. These

excavated terrains were provided by the Seattle district. Results from this routing are added to the appendix.

Table 22: Detention Basin Properties

Dam Name	Waihi	Waikeakua
Outlet		
Outlet Length (feet)	185	175
Rise x Span (feet)	6 x 12	6 x 12
Inlet Elevation (feet)	376	294
Outlet Elevation (feet)	366	284
Manning's N	0.015	0.015
Spillway		
Elevation (Length)	400	334
Length (Feet)	100	80
Coefficient (Ft^.5/S)	3	3
Dam Top		
Elevation (Length)	404	338
Length (Feet)	350	300
Coefficient (Ft^.5/S)	3	3

Table 23: Elevation-Storage Relationships

Waihi Storage-Elevation Relationship		Waiakeakua Storage-Elevation Relationship	
Elevation (ft)	Storage (AC-FT)	Elevation (ft)	Storage (AC-FT)
375.752	0.000	293.975	0.000
378.434	0.017	294.650	0.011
379.396	0.046	295.306	0.045
380.262	0.093	296.053	0.109
381.404	0.195	296.672	0.184
382.584	0.338	297.308	0.287
383.062	0.413	297.907	0.409
383.482	0.529	298.512	0.555
383.960	0.716	299.112	0.727
384.484	0.980	299.703	0.920
384.973	1.278	300.302	1.142
385.580	1.704	300.870	1.376
386.316	2.269	301.469	1.649
387.021	2.855	302.526	2.197
387.751	3.509	303.992	3.059
388.513	4.242	304.849	3.600
389.375	5.132	305.724	4.176
390.224	6.072	306.585	4.766
391.044	7.042	307.524	5.436

391.907	8.131	308.358	6.057
392.855	9.407	309.189	6.703
393.840	10.808	309.883	7.265
394.738	12.157	310.590	7.871
395.609	13.538	311.228	8.447
396.354	14.801	311.807	8.999
397.167	16.256	312.593	9.787
397.952	17.736	313.328	10.556
398.739	19.288	313.984	11.274
399.626	21.114	314.644	12.030
400.349	22.670	315.200	12.696
401.123	24.411	315.801	13.453
401.767	25.942	316.817	14.821
402.269	27.184	317.739	16.168
402.871	28.740	318.819	17.859
403.498	30.442	319.841	19.584
404.011	31.901	320.848	21.404
404.656	33.837	321.927	23.475
405.314	35.890	322.830	25.326
405.905	37.805	323.807	27.464
406.654	40.329	324.725	29.591
407.366	42.800	325.666	31.902
408.187	45.737	326.665	34.500
409.676	51.277	327.688	37.308
411.074	56.746	328.523	39.715
412.801	63.782	329.325	42.157
414.040	69.051	330.192	44.955
415.374	74.966	331.084	47.977
		331.937	51.015
		332.822	54.321
		333.667	57.635
		334.673	61.750
		335.643	65.862
		336.630	70.208
		337.605	74.669
		338.450	78.710
		339.258	82.720
		340.089	87.006
		340.913	91.419
		341.728	95.958
		342.477	100.293
		343.196	104.620
		343.994	109.609
388.513	4.242	344.766	114.616
389.375	5.132	345.455	119.245

390.224	6.072	346.318	125.233
391.044	7.042	347.104	130.879
391.907	8.131	347.808	136.096
392.855	9.407	348.607	142.211
393.840	10.808	349.372	148.240

Frequency Routings

The Atlas 14 Rainfall Frequency data is routed through a hydrologic model (HEC-HMS) to translate the rainfall to streamflow. The data was then provided to a hydraulic model (HEC-RAS) to determine the flood extent, as well as any more complex routings due to backwater or overland flow.

The frequency routings were completed in two ways. First, a simple direct input of the feasibility precipitation data into the updated HMS model was created and provided to the HEC-RAS model. This data was used to compare the feasibility study and the results of this effort.

Secondly, a Monte-Carlo water analysis tool, HEC-WAT, was built to sample and iteratively compute frequency discharges with uncertainty. This data was then processed in HEC-SSP for the final project frequency flow hydrographs. The HEC-HMS output locations needed for input into the HEC-RAS model for either method are shown below. The part B column in the below figure is the HMS output location, while the Boundary Condition column indicates the RAS inflow location.

	Boundary Condition	DSS Filename	Part A	Part B	Part C
1	River: Ala Wai Reach: Upper RS: 10082	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		JA1	FLOW
2	River: Kanaha Reach: Ditch RS: 4372	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		K2A	FLOW
3	River: Manoa Reach: Main RS: 16506	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		JUNCTION-5	FLOW
4	River: Pukele Reach: Tributary RS: 5958	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		JP1	FLOW-COMBINE
5	River: Waiomao Reach: Tributary RS: 4900	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		P2	FLOW
6	River: Ala Wai Reach: Upper RS: 9724 to 6370	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		A67W3	FLOW
7	River: Ala Wai Reach: Middle RS: 5687 to 5195	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		A4	FLOW
8	River: Ala Wai Reach: Middle RS: 4676 to 4160	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		RA1	FLOW-COMBINE
9	River: Ala Wai Reach: Middle RS: 5195 to 2513	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		A2	FLOW
10	River: Ala Wai Reach: Lower RS: 812 to 440	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		A8	FLOW
11	River: Ala Wai Reach: Lower RS: 1188 to 79	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		W1	FLOW
12	River: Kanaha Reach: Ditch RS: 4278 to 200	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		K2B	FLOW
13	River: Makiki Reach: Upper RS: 7760 to 7672	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		K3	FLOW
14	River: Makiki Reach: Lower RS: 4716 to 3176	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		K5	FLOW
15	River: Manoa Reach: Main RS: 16458 to 11951	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M3	FLOW
16	River: Manoa Reach: Main RS: 12795 to 11112	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M4	FLOW
17	River: Manoa Reach: Main RS: 10968 to 10871	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		WOODLAWN SEWERSYSTEM	FLOW
18	River: Manoa Reach: Main RS: 11039 to 9501	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M7	FLOW
19	River: Manoa Reach: Main RS: 10429 to 10309	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M8	FLOW
20	River: Manoa Reach: Main RS: 9192 to 9116	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M9	FLOW
21	River: Manoa Reach: Main RS: 8871 to 7734	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M10	FLOW
22	River: Manoa Reach: Main RS: 7653 to 6241	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M11	FLOW
23	River: Manoa Reach: Main RS: 2891 to 2831	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M12	FLOW
24	River: Manoa Reach: Main RS: 1807 to 1765	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M13	FLOW
25	River: Manoa Reach: Main RS: 1230 to 1107	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		M14	FLOW
26	River: Palolo Reach: Main RS: 15440 to 15412.3*	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		P5	FLOW
27	River: Palolo Reach: Main RS: 15134 to 9709	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		P6	FLOW
28	River: Palolo Reach: Main RS: 9520 to 5525	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		P7	FLOW
29	River: Palolo Reach: Lower RS: 4352 to 4233	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		A3	FLOW
30	River: Pukele Reach: Tributary RS: 3514 to 237	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		P4	FLOW
31	SA: Perimeter 7 BCLine: Woodlawn_Inflow	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		WOODLAWN	FLOW-LOCAL
32	SA: Perimeter 7 BCLine: M6B_Diversion	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		WOODLAWN SEWERSYSTEM	FLOW-DIVERSION
33	River: Makiki Reach: Upper RS: 9543	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		K1	FLOW
34	River: Makiki Reach: Lower RS: 6279.67* to 5931	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		K4	FLOW
35	River: Makiki Reach: Lower RS: 3062 to 203	C:\Users\b4edhdmf\Desktop\FWOP_Oct2020\DSS_Flows\Ala_Wai_hydrographs_ver6.dss		K6	FLOW

Figure 19: HEC-RAS Boundary Inflow Locations

Feasibility Comparison (Basin Averaged)

The feasibility study Atlas 14 best-estimate annual maximum series precipitation was incorporated into a series of HEC-HMS simulations to determine the effect of the additional incremental precipitation

volume to the overall basin. The precipitation data was input into the HEC-HMS frequency storm meteorologic model. Please note that within the meteorologic model, the point data was converted to an area value using the TP40 Area Reduction Method. This is inherent to the code within HEC-HMS and is recommended as an acceptable alternative in the Atlas 14 report.

Table 24: HEC-HMS Metrologic Model Input Data (in inches)

Frequency Interval/Model Name	5 Minutes	15 Minutes	1 Hour	2 Hours	3 Hours	6 Hours	12 Hours	24 Hours
1 AEP	0.38	0.66	1.40	1.87	2.12	2.74	3.35	3.92
0.5 AEP	0.47	0.80	1.72	2.33	2.71	3.49	4.29	5.18
0.2 AEP	0.61	1.04	2.22	3.04	3.54	4.58	5.68	6.96
0.1 AEP	0.72	1.24	2.64	3.61	4.21	5.46	6.80	8.39
0.05 AEP	0.81	1.49	3.05	4.15	4.94	6.28	8.00	9.95
0.02 AEP	1.02	1.75	3.74	5.09	5.94	7.69	9.61	12.05
0.01 AEP	1.16	1.99	4.25	5.78	6.74	8.74	10.92	13.77
0.005 AEP	1.31	2.25	4.82	6.53	7.61	9.86	12.30	15.60
0.002 AEP	1.53	2.62	5.61	7.57	8.82	11.42	14.23	18.18

The frequency storm was then routed through the updated basin, which is shown in the graphic in Figure 11: Updated HEC-HMS Schematic. As described earlier, a significant amount of flow can “back up” behind bridges and in some cases escape into the overbanks. The HEC-HMS model is well calibrated to the 2004, 2006, and 1967 events. However, the ability of the model to represent these effects is questionable beyond the magnitude of these calibration events. For large events (i.e. the 1% event) it is recommended that the HEC-RAS model be used to report the two-dimensional effects of stream routing near and downstream of constrictions, as well as though the entirety of the Ala Wai Canal.

The peak discharge values in cfs from these feasibility comparison routings are shown in the tables below. This is the standard method for frequency routing of small basins. However, due to the orthographic impacts and upper basin constrictions that have significant impacts to routing frequency, as well as the high level of risk to this project, alternative precipitation inputs (graphical zonal statistics for precipitation volumes and the HEC-WAT method for routing) were continued for use in risk analyses in this study.

Table 25: Selected Locations on Makiki Stream for Existing Conditions routing Atlas 14 Best Estimate Precipitation -Peak Flow (CFS)

Subbasin	1 AEP	0.5 AEP	0.2 AEP	0.1 AEP	0.05 AEP	0.02 AEP	0.01 AEP	0.005 AEP	0.002 AEP
K1	121	233	437	632	867	1219	1525	1874	2386
K2A	77	141	249	345	455	610	738	879	1080
K2B	134	248	440	610	805	1077	1303	1552	1907
K3	46	82	142	193	251	330	396	467	567
K4	73	129	224	305	396	522	625	738	897
K5	132	222	344	443	545	715	844	986	1191
K6	322	510	811	1055	1315	1718	2025	2357	2849
K7	121	233	437	632	867	1219	1525	1874	2386

Table 26: Selected Locations on Manoa Stream for Existing Conditions routing Atlas 14 Best Estimate Precipitation -Peak Flow (CFS)

Junction	1 AEP	0.5 AEP	0.2 AEP	0.1 AEP	0.05 AEP	0.02 AEP	0.01 AEP	0.005 AEP	0.002 AEP
M1	419	650	1028	1354	1722	2230	2649	3106	3754
M2	332	514	811	1072	1363	1780	2121	2495	3025
M3	331	507	786	1023	1283	1646	1940	2260	2709
M4	81	122	184	236	292	370	433	501	596
M5	171	269	430	571	730	954	1138	1340	1627
M6	113	176	277	364	460	596	706	826	996
M7	79	122	188	245	306	394	464	540	646
M8	24	35	51	64	78	98	113	130	154
M9	38	58	87	112	138	175	205	237	281
M10	145	214	319	406	500	629	732	844	1001

M11	119	175	262	333	411	517	603	696	826
M12	405	591	881	1122	1384	1746	2038	2354	2798
M13	143	218	337	438	550	704	829	966	1158
M14	117	196	307	394	485	609	706	810	956

Table 27: Selected Locations on Pololo Stream for Existing Conditions routing Atlas 14 Best Estimate Precipitation -Peak Flow (CFS)

Junction	1 AEP	0.5 AEP	0.2 AEP	0.1 AEP	0.05 AEP	0.02 AEP	0.01 AEP	0.005 AEP	0.002 AEP
P1	121	265	516	738	992	1344	1635	1953	2404
P2	228	455	833	1163	1535	2055	2483	2951	3612
P3	39	115	266	403	563	786	975	1180	1472
P4	207	337	541	713	903	1164	1375	1605	1930
P5	140	224	357	468	590	758	894	1042	1249
P6	497	735	1079	1353	1647	2044	2361	2704	3185
P7	206	349	536	681	832	1034	1193	1365	1604

Table 28: Selected Locations along the Ala Wai for Existing Conditions routing Atlas 14 Best Estimate Precipitation - Peak Flow (CFS)

Junction	1 AEP	0.5 AEP	0.2 AEP	0.1 AEP	0.05 AEP	0.02 AEP	0.01 AEP	0.005 AEP	0.002 AEP
A1	407	662	1016	1302	1586	2070	2434	2829	3402
A2	372	552	826	1064	1328	1697	1997	2349	2858
A3	329	489	723	912	1102	1438	1689	1963	2360
A4	224	339	522	679	863	1110	1324	1565	1902
A5	346	493	728	925	1125	1457	1708	1981	2395
A6	45	90	171	245	329	457	563	684	857

A7	587	876	1335	1715	2102	2751	3265	3824	4631
A8	119	170	250	320	393	500	592	692	837
W1	161	233	347	443	542	690	815	948	1143
W2	172	247	354	439	523	671	783	904	1081
W3	214	306	8892	560	677	872	1018	1174	1402

HEC-WAT

In order to improve upon the estimated values for the spatially varied simulations and uncertainty ranges, a stochastic approach was recommended by advisors. Hydrologic Engineering Center – Watershed Analysis Tool (HEC-WAT) is a software that uses a stochastic approach compute the meteorologic, hydrologic, hydraulic, consequences, and planning calculations needed in various analyses and design processes. HEC-WAT integrates existing hydraulic and hydrologic software and uses a Flood Risk Analysis (FRA) Compute to run Monte Carlo-style uncertainty sampling to better evaluate an uncertainty range across various parameters throughout the watershed. This is a first-generation software, published in 2017.

"HEC-WAT distinguishes between and separates sampling of natural variability (aleatory uncertainty) from knowledge uncertainty (epistemic uncertainty) using a nested Monte Carlo sampling structure with inner and outer loops. Natural variability is sampled at an event level (inner loop), while knowledge uncertainty is sampled at a realization level (outer loop); where a realization contains enough flood events to fully characterize the natural variability. A realization contains many HEC-WAT "analysis periods" or lifecycles, with an event placed in each year of a lifecycle. At the event level, the Hydrologic Sampler generates each flow or precipitation event using a random instance of natural variability, such as peak flow or total precipitation magnitude and date. The primary knowledge uncertainty captured in the Hydraulic Sampler is in the annual maximum flow or precipitation frequency curves. The uncertainty is defined by an equivalent record length, N and at the realization level, N is randomized by re-estimating each frequency/ curve from an N-year bootstrap. Since each realization is based on one random instance of knowledge uncertainty, many realizations are required to capture the full distribution of possible outcomes." (CEIWR-HEC, 2018)

Simply, the WAT is a tool that links models and samples uncertainty values for each iterative model run. An example would be selecting a precipitation volume between uncertainty bands, a precipitation spatial pattern, and a loss rate in each subbasin making a run and doing it over and over. Then combining all the results into frequency outputs.

For the purposes of this study, spatial and temporal rainfall uncertainty and the SCS loss coefficient were the only uncertainty parameters evaluated, due to the limited data available for other parameter ranges. The HEC-WAT was used to integrate the hydrologic sampler (used to create precipitation patterns) and the HEC-HMS model and make stochastic simulations. A duration analysis plugin developed by Will Lehman was integrated into this modeling effort with the assistance of Evan Heisman. This allowed an output relationship between depth and frequency for each specified parameter. Post processing in Hydrologic Engineering Center – Statistical Software Package (HEC-SSP) created a balanced hydrograph output used for input into HEC-RAS.

Please note that HEC-RAS stochastic simulations are computationally intensive and were not computed in the HEC-WAT environment due to time and computational constraints.

Spatial and temporal precipitation parameters are calculated via the HEC-WAT Hydrologic Sampler. This sampler is a plug-in that creates these parameters for use in the Flood Risk Analysis (FRA) compute for the watershed response. The sampler has three hydrologic sampling methods: two based on frequency curves (flow and precipitation) and one that bootstraps historical and synthetic events. The precipitation

method was used in this study. This method uses historical temporal and spatial patterns (sample rain events) and a total event precipitation frequency curve to create the necessary input by:

1. "randomly samples an annual maximum precipitation depth from an aggregated basin average depth-duration frequency curve
2. Randomly selects a shape set
3. Disaggregates the basin average precipitation depth among the subbasin locations based on subbasin area and shape set depth
4. Scales every hyetograph in the shape set to the subbasin depth, and
5. Places the scaled hyetographs on a peak date randomly sampled from the flood season distribution" (CEIWR-HEC, 2018)

Hydraulic Sampler

To create the basin averaged depth-duration frequency curve, the three parameter Generalized Extreme Value (GEV) distribution was fit to both the published Atlas 14 12- and 24-hour annual maximum series precipitation frequency best estimate curves with an applied HMR 39 depth area reduction factor. The areal reduced Atlas 14 best estimate precipitation frequency estimates can be found in Table 10. Research of the Atlas 14 publication documentation determined that the associated gage record length for daily records was 310 years. A test in the reduction of this value revealed that there were not significantly different output data within a 50-year reduction in period of record. The input data is shown in the figure below. An approximation of the fit was created using a spreadsheet tool, then validated within the HEC-WAT hydraulic sampler. The spreadsheet tool estimated the three parameter GEV distribution based on the NOAA Atlas14 best estimate precipitation depths for 8 quantiles and computed the mean square error for each quantile until the average root mean square error (RMSE) is near zero. For the 12-hour Atlas14 precipitation frequency curve, the computed GEV parameters RMSE was 0.008 and 0.018 for the 24-hour duration. The GEV distribution parameters are Location ϵ = 3.2563, Scale α=1.4044, and Shape κ=-0.0695 for the 12-hour duration, and Location ϵ = 3.9212, Scale α=1.7585, and Shape κ=-0.0797 for the 24-hour duration.

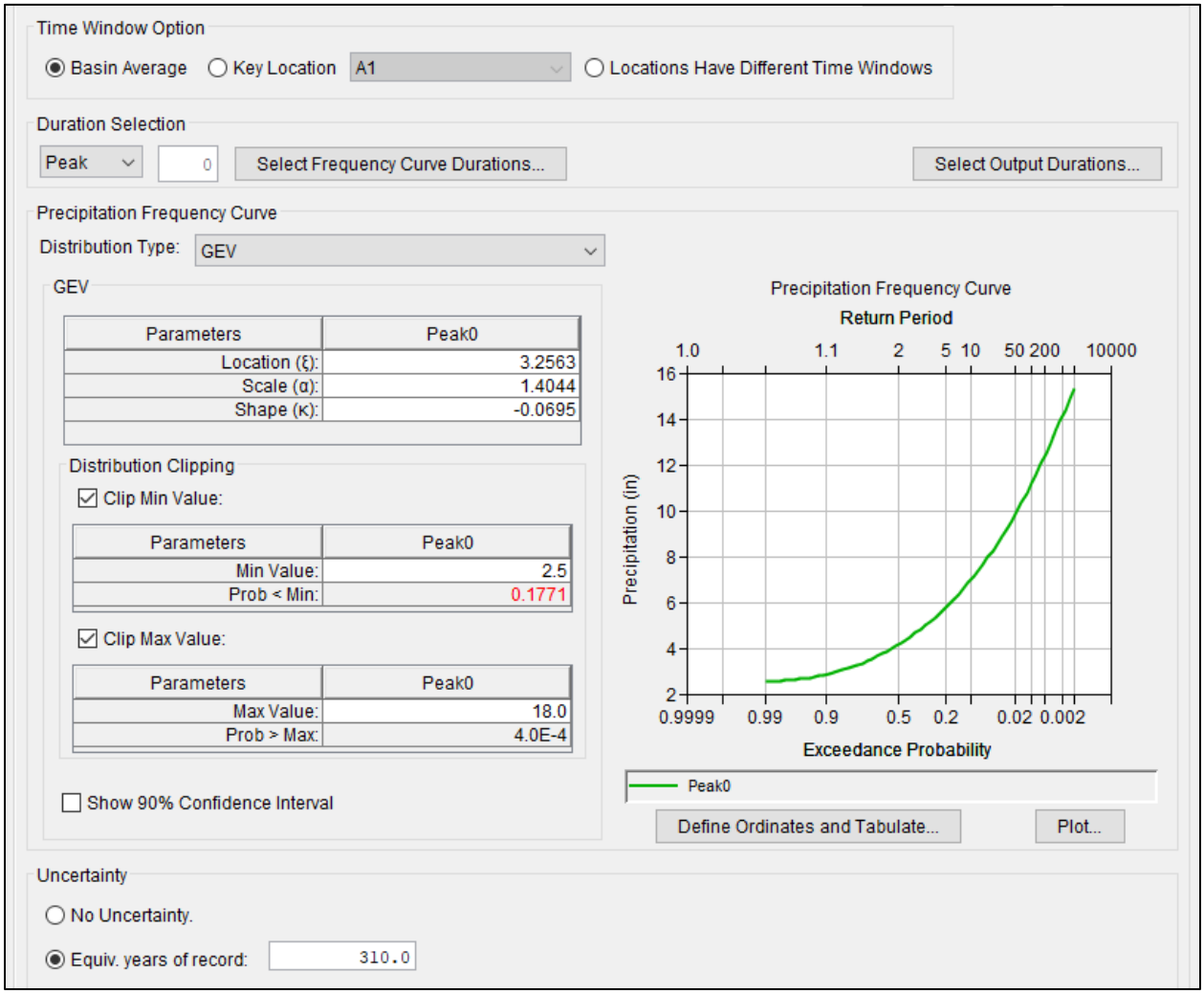


Figure 20: Hydraulic Sampler Basin Averaged Precipitation Inputs for the 12-hour Duration

A shape set refers to data depicting the historic or template storm events at the subbasin level. For this model shape sets were created for the 31 March 2006, 30 October 2004, 16 December 1967, 5-6 March 1958 events, and an HMR 39 synthetic event. The 2004 event was limited to the lower frequencies due to the large precipitation gradient. (A large amount of rain in the upper basin, and almost no rain in the lower basin: scaling is performed by multiplication and the "0" inches of rain at the coastline could not scale up which forced an unreasonably high precipitation volume in the upper basin.) The subbasin hyetographs were pulled from the calibrated events provided in the HEC-HMS by the Hawaii district. The 2006 event data was recreated for the Makiki reach using the gage patterns used in the other calibration events. The remaining data for the 2006, the entire 2004, and entire 1967 precipitation data was taken from the calibrated HEC-HMS reported subbasin precipitation results.

The 1958 shape set was created by taking the published rainfall mass curve found in HMR39 for the March 1958 temporal pattern (Figure 22). The cumulative mass curve was converted to a hyetograph, shown in Figure 23. The temporal pattern was with the spatially varied precipitation pattern from the

gridded 12-hour 0.01 AEP AMS Atlas 14 dataset shown in Table 7. The time step for the output hyetographs was 5-minutes.

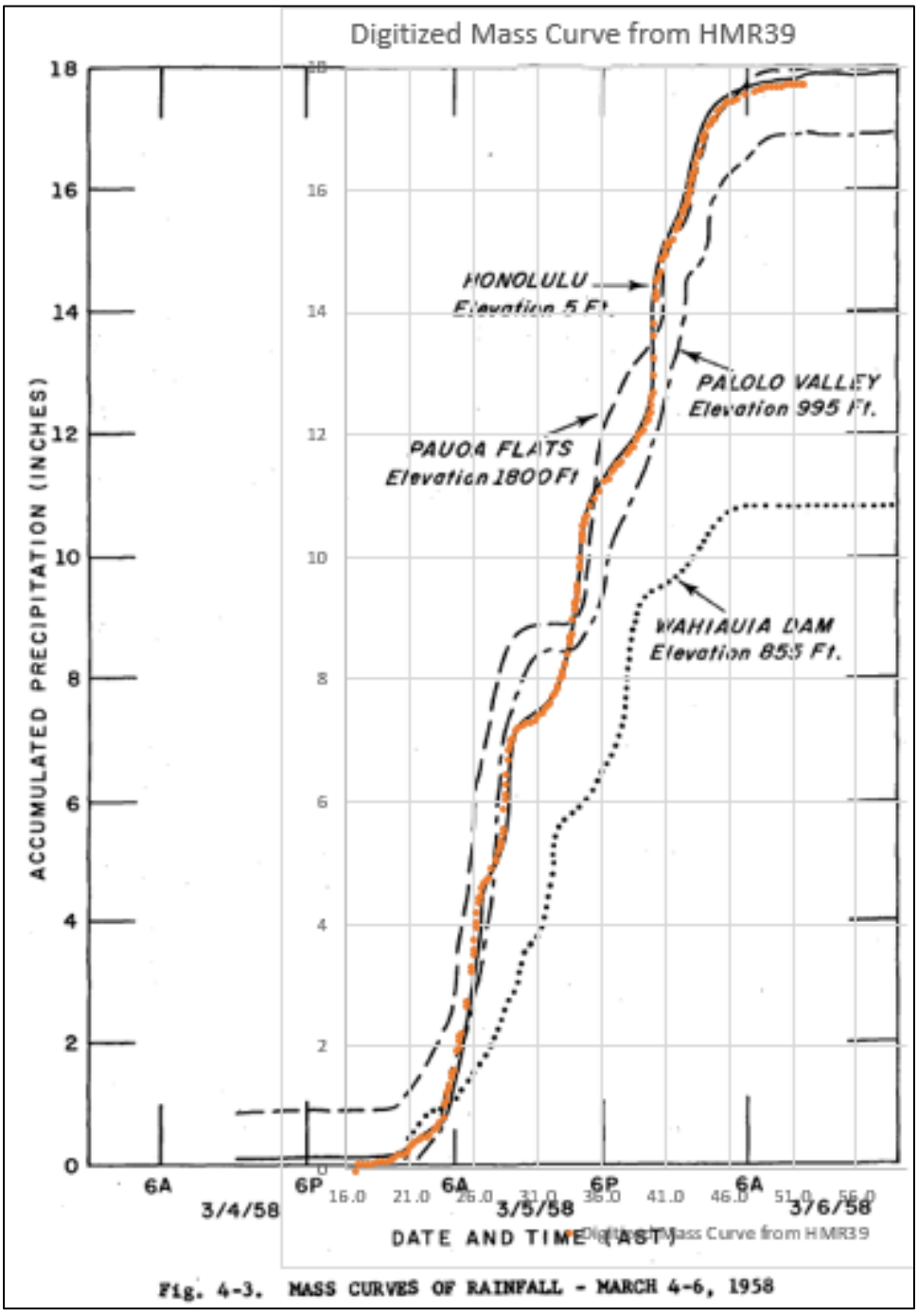


Figure 21. Digitized March 4-6, 1958 Precipitation Mass Curve from HMR39

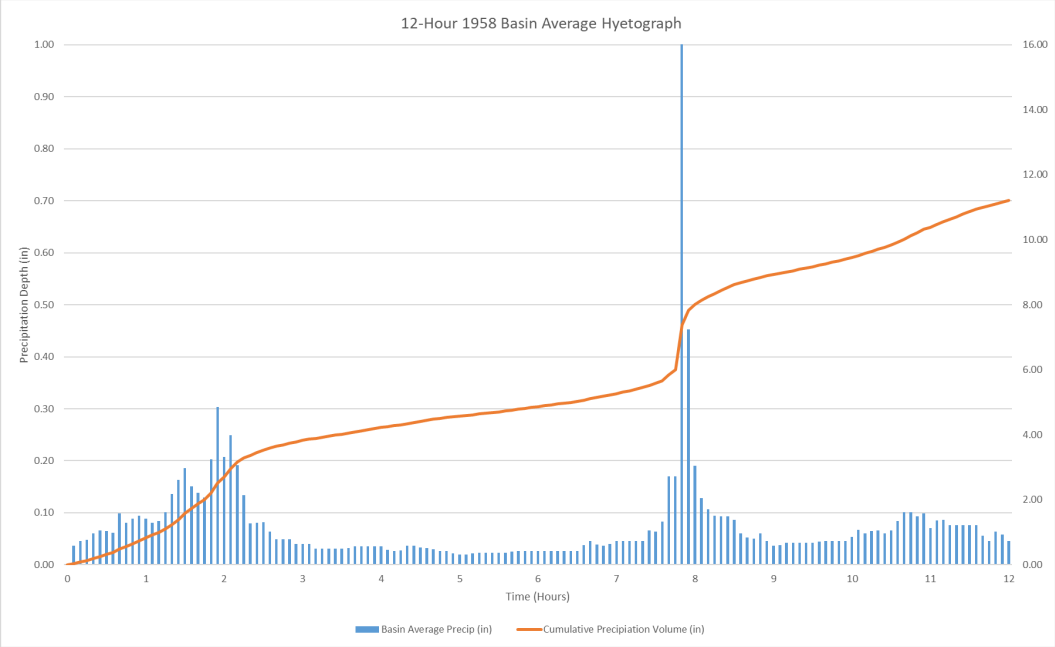


Figure 22. 12-Hour 1958 Basin Average Hyetograph

The HMR 39 shape set was created by applying HMR39 Temporal Pattern B, shown below in Figure 24, to the 12-hour AMS 0.01 AEP spatially varied precipitation pattern shown in Table 7. The time step for the output hyetographs was 5-minutes.

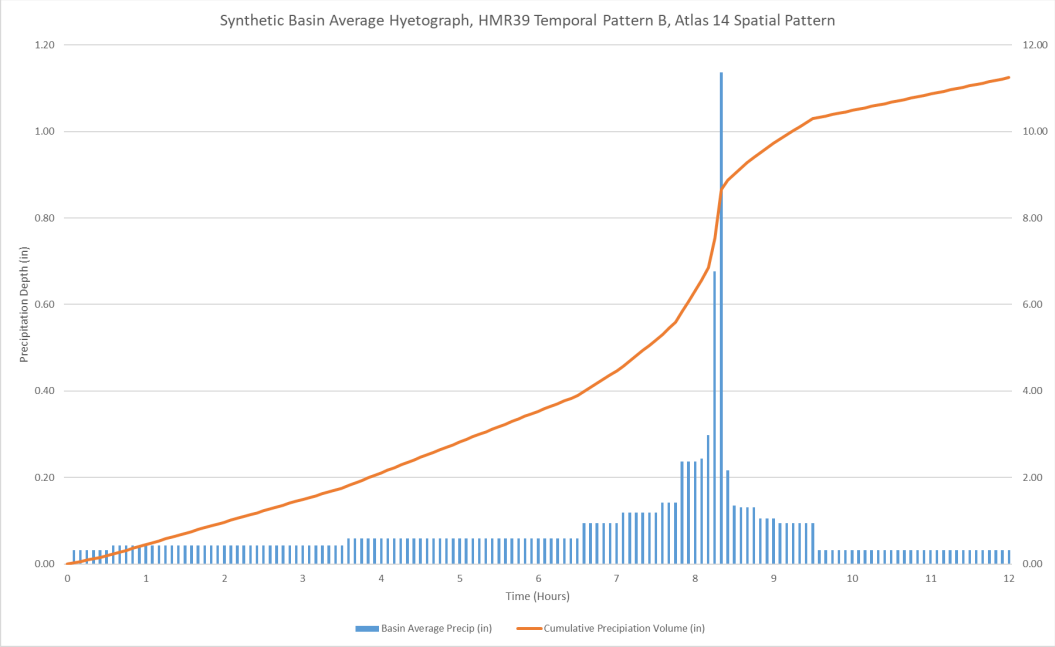


Figure 23. Synthetic Hyetograph Shape: HMR39 Temporal Pattern B, Atlas 14 Spatial Pattern

Tabular data displaying the subbasin hyetographs for all five shape sets are included in the data appendix of this report. A sample image of each of the sample storms sets are shown in Figure 25

through Figure 29. Please note that the precipitation pattern for the 2004, 2006, and 1967 events are based off of multiple gage datasets, and the precipitation patterns will vary somewhat from subbasin to subbasin.

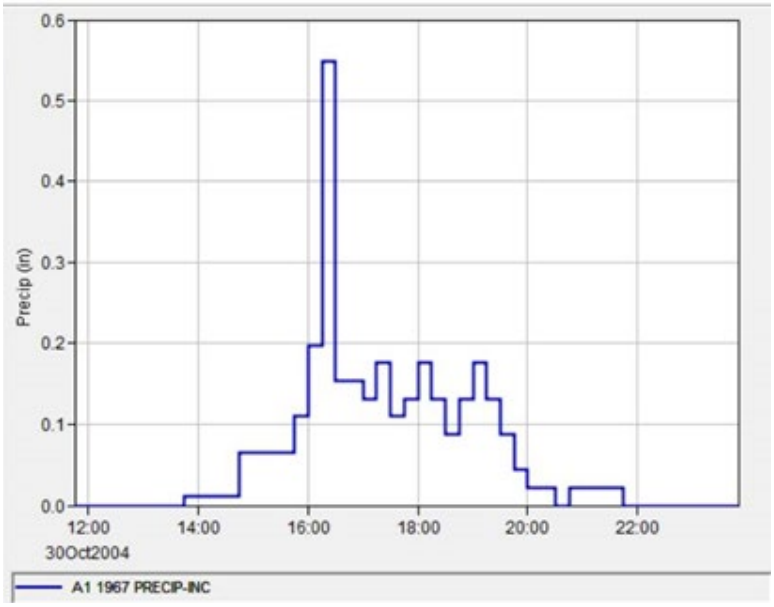


Figure 24. 1967 Storm Pattern Sample Hyetograph for the 12-hour duration for the A1 Subbasin

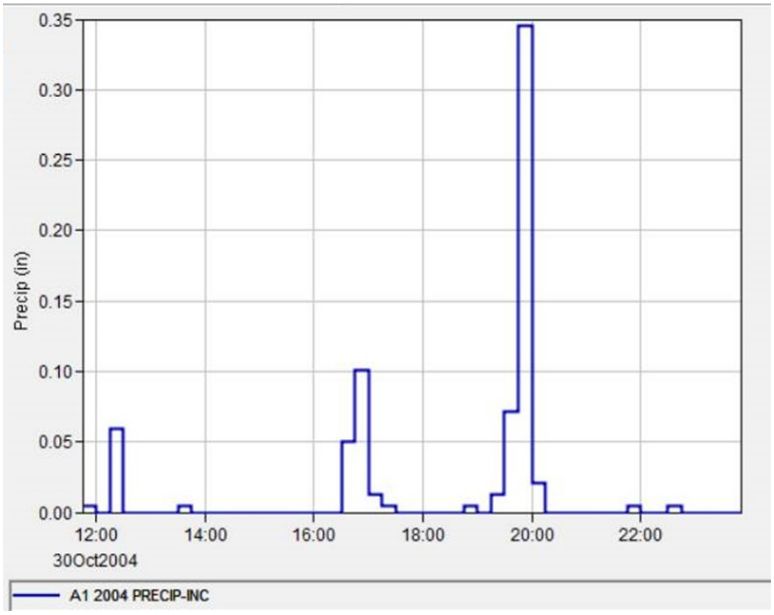


Figure 25. 2004 Storm Pattern Sample Hyetograph for the 12-hour duration for the A1 Subbasin

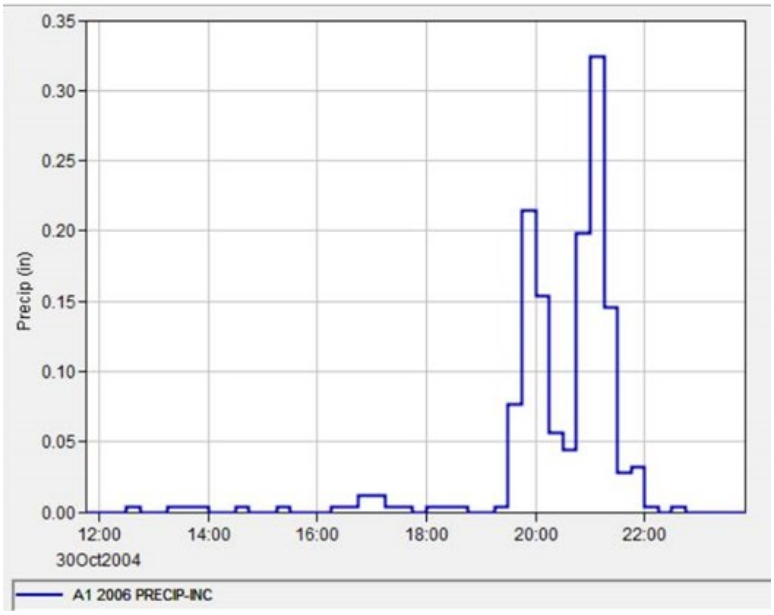


Figure 26. 2006 Storm Pattern Sample Hyetograph for the 12-hour duration for the A1 Subbasin

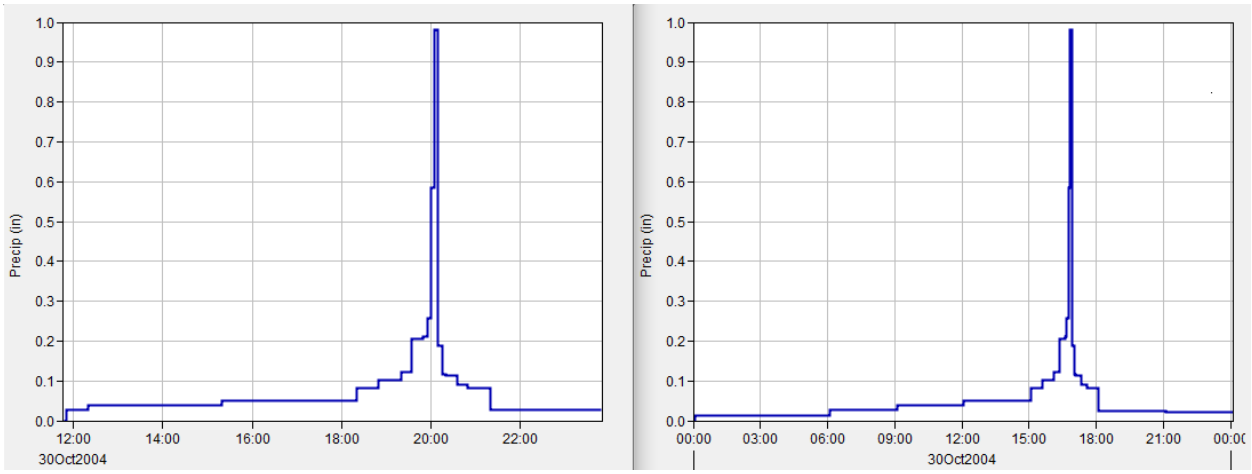


Figure 27: HMR39 Storm Pattern Sample Hyetographs for the 12- and 24-hour duration for the A1 Subbasin

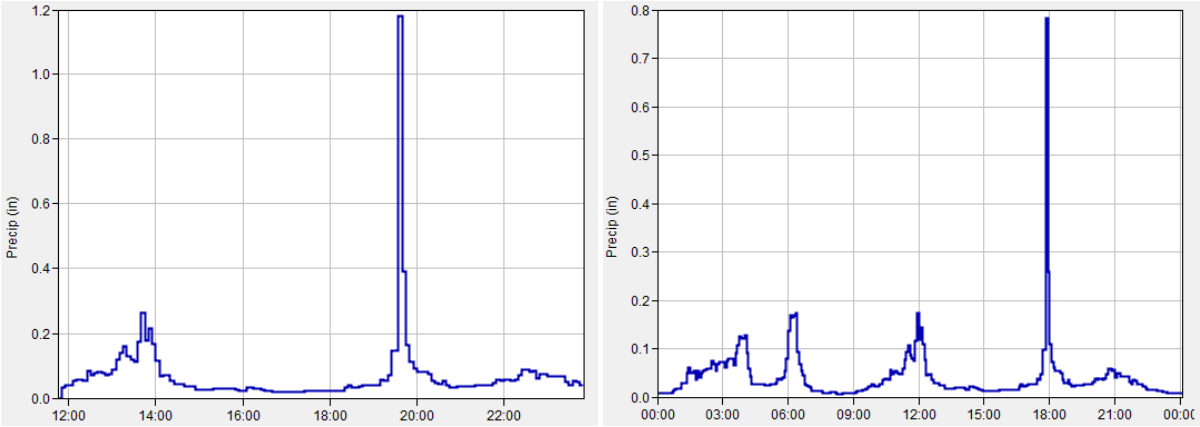


Figure 28: 1958 Sample Hyetographs for the 12- and 24- Hour duration for the 1958 Storm for the A1 Subbasin

For this scenario there are no distinct seasonal response distribution differences and the flood season distribution is set to an even distribution throughout the year. The algorithm then randomly picks a storm pattern from the five events and scales it to a randomly selected volume. This process is then repeated for every model iteration.

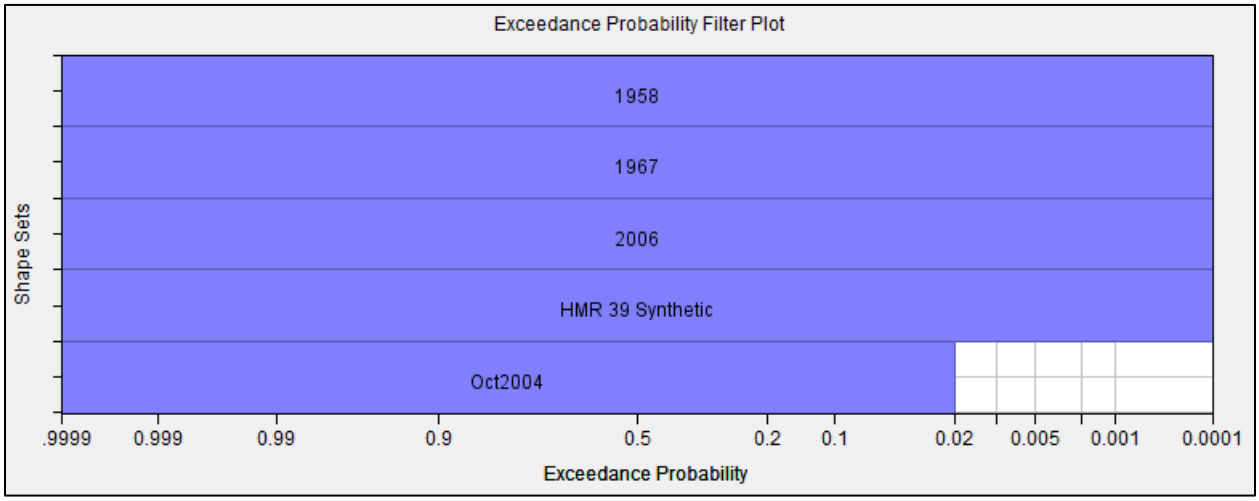


Figure 29: Sample Storm Representation

12-hour vs 24-hour

High-Intensity rainfall on steep slopes of the 16.2 square mile drainage basin can produce very flashy flood events. Time to peak is typically less than 1 hour, and even with large storms, the rise and recession of the flood hydrograph typically occurs within 6 hours. As shown in a sample shape set series for the M12 subbasin precipitation, below, it is also typical for the total event precipitation to fall for a relatively short time period. The figures below show the pattern for the 2006, 1967, and 2004 events from left to right, standardized to the peak 24-hour precipitation dates for the 2004 event. This is currently necessary for the HEC-WAT Hydraulic Sampler to compute. For this example, the significant precipitation totals occur within 3 hours,

8 hours, and 9 hours respectively. These precipitation patterns are replicated for each subbasin within the basin.

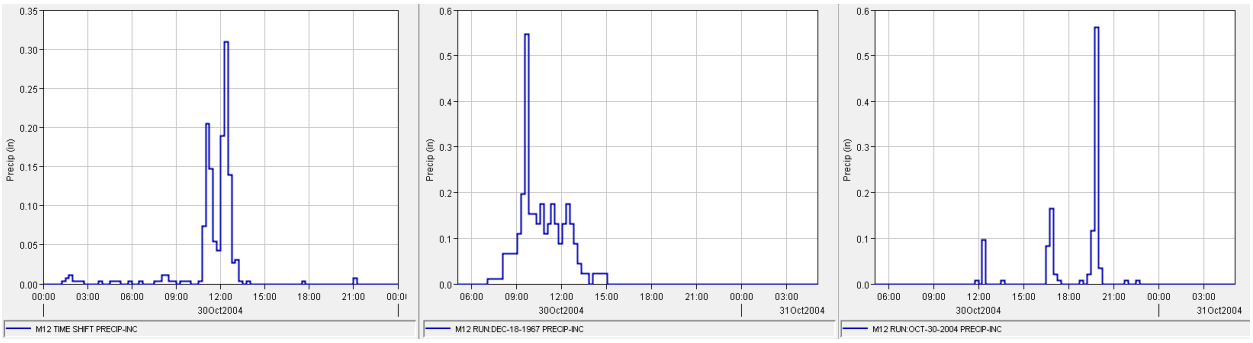


Figure 30: Hyetograph Templates

One drawback to the HEC-WAT methodology as described, is that when required to use the 24-hour volume, the total volume is placed at these patterns shown above. This artificially peaks the 24-hour volumes into the 3-, 8-, and 9-hour bands. To account for critical precipitation and flood response time, a 12-hour storm was produced as the primary frequency dataset, with a 24-hour volume produced as a sensitivity. The 0.01 AEP frequency peak flows for the 12-hour dataset were computed to be roughly equal to the 0.017 to 0.029 AEP 24-hour volume frequency.

HEC-HMS

The HEC-HMS model developed for the Atlas 14 frequency simulations was imported into the HEC-WAT. This was the basin that was stripped of most of the routing reaches to facilitate faster compute times. The HEC-WAT software was upgraded from HEC-HMS 4.3 to 4.5 for WAT versioning compatibility. The HEC-WAT also requires a specified hyetograph meteorologic model to be selected for the base uncertainty analyses in HEC-HMS. However, the hyetographs connected to the HMS uncertainty analyses were not used in the final simulations, as the Hydraulic Sampler will recreate this input for each iterative compute.

Loss Uncertainty

Uncertainty is a required component in the discharge calculations per EM1110-2-1619 and ER 1105-2-101. Uncertainty for the rainfall volume was computed using the estimated record length in the hydrologic sampler. To include uncertainty in the rainfall-runoff routing, a range of loss parameters was calculated.

The WAT currently requires an uncertainty compute method within HEC-HMS. An uncertainty run requires at least one parameter sampling a range of values instead of a single calibrated value. For the HEC-HMS uncertainty compute each individual loss parameter was sampled 20 times per single iterative HEC-WAT run.

To determine the loss value for each subbasin, the table 4-3 “Calculation of Composite Curve Numbers for Ala Wai Watershed” was taken from the feasibility report. This table listed the percentages by area of soil type and land use for each subbasin. These values were assigned a curve number associated to a loss value using the TR55 dataset. Uncertainty in the rainfall runoff was estimated though varying those

loss rates (rates were set to randomly sample between values associated with a range of land uses one band higher and one band lower than the reported field values. (i.e. moderate to highly urbanized, or various levels of plant cover in a forested region). The original, upper and lower loss category values for each soil type and land use in the Ala Wai basin are shown in the tables below.

Table 29: Variation of the SCS Loss Parameter for each Land Use Type

Feasibility Report Category Land Use	Soil Type			TR55 Category for Land Use
	A	B	C	
Original Land Use CN Estimates				
Bare Land	72	82	87	dirt
Evergreen Forest	30	55	70	woods-good condition
Grassland	39	61	74	open space- good cover/good quality forage-grazing
High Intensity Developed	89	92	94	urban districts-commercial and business
Low Intensity Developed	77	85	90	residential- 1/8 acre lots or less
Scrub/Shrub	30	48	65	brush-good
Cultivated Land	77	86	91	fallow bare soil
Water	98	98	98	water
Upper Land Use CN Estimates				
Bare Land	72	82	87	dirt
Evergreen Forest	60	73	79	woods-fair
Grassland	49	69	79	open space-fair condition
High Intensity Developed	89	92	94	urban districts-commercial and business
Low Intensity Developed	81	88	91	industrial
Scrub/Shrub	35	56	70	brush - fair
Cultivated Land	77	86	91	fallow bare soil
Water	98	98	98	water
Lower Land Use CN Estimates				
Bare Land	68	79	86	open space- poor condition (grass cover < 50%)
Evergreen Forest	30	55	70	woods good
Grassland	35	56	70	brush - fair
High Intensity Developed	89	92	94	urban districts-commercial and business
Low Intensity Developed	61	75	83	residential-1/4 acre lots
Scrub/Shrub	30	48	65	brush-good cover
Cultivated Land	74	83	88	crop residue-good
Water	98	98	98	water

Table 30: Overall Subbasin Range for SCS Loss Values

Subbasin	Lower SCS Loss Coefficient	Upper SCS Loss Coefficient	Original SCS Loss Coefficient
M1	56	61	56
M2	62	69	64
M3	62	70	66
M4	62	69	66
M5	61	69	63
M6B	64	73	68
M7	61	68	64
M8	75	83	80
M9	68	75	71
M10	62	71	68
M11	71	78	75
M12	63	74	70
M13	64	72	68
M14	79	87	84
A1	78	86	84
A2	89	91	90
A3	87	90	89
A4	82	87	85
A5	85	89	88
A6	69	77	72
A7	83	87	85
A8	91	92	92
W1	88	91	89
W2	91	93	92
W3	89	90	90
P1	64	69	64
P2	64	70	65
P3	60	67	62
P4	70	76	72
P5	70	77	73
P6	83	87	85
P7	85	89	88
K1	38	45	40
K2	57	66	62
K3	59	72	68
K4	57	73	68
K5	85	89	88
K6	86	88	87

Kinematic routing was used in this HEC-HMS model for the highly urbanized portions of the Ala Wai Basin. The loss parameters were split across two flow planes, with the two flow planes averaging by area to equal the overall subbasin loss rate calculated by soil types and land use. Plane 2 is used to model the very urbanized-impervious areas with a CN of 98. The plane 1 loss values vary from 69 to 86 for the original values. Therefore, only the first plane was varied in the uncertainty calculations. The plane 1 loss values were varied so that the area average of the two planes equal the SCS curve number range described in Table 31.

Table 31: Flow Plane SCS Loss Value Uncertainty Range

Subbasin	Plane 2 Curve Number	Plane 1 Original Curve Number	Plane 1 Lower Curve Number	Plane 1 Upper Curve Number
A1	98	78	69	81
A2	98	86	84	87
A3	98	83	79	84
A4	98	76	72	79
A5	98	81	76	83
A6	98	69	66	75
A7	98	76	73	79
A8	98	86	84	86
K5	98	85	81	86
K6	98	80	77	82
W1	98	83	81	86
W2	98	86	85	87
W3		82	80	82

HEC-WAT Duration Plugin

The HEC-WAT Duration Plugin is a script that reads and outputs volumes for either precipitation or flow at specified calculation points for a specified duration. While the plugin is integrated into the HEC-WAT model, there is no interface and text editing is necessary to produce results. For this effort flow output at the locations that are input into HEC-RAS were calculated to get the appropriate volumes to complete a balanced hydrograph run. This data will be then post-processed by HEC-SSP to create those inputs. A sample of the code to get the data location and pull output is shown below. The Duration Max that is being output is the maximum averaged duration in hours. The peak value is not specified in the code but is automatically output by HEC-WAT at the time step interval. (The peak is a 1-minute maximum calculated value.) Due to the current limitations of the system the time increments between the 1-minute and 1-hour intervals are interpolated.

```
<?xml version="1.0" encoding="UTF-8"?>
<DurationAlternative Name="AlaWaiDurations" Desc="Get volumes over specified  to build a balanced hydrograph for Ala WAi RAS runs">
  <DataLocations>
    <DataLocation Name="JA1" Class="hec2.model.DataLocation" ComputeType="Computed" Model="HMS-(MCA)stochastic" Parameter="FLOW" PrevModelIndex="0">
      <ModelAlternative Name="AlaWaiDurations" />
      <DownStreamLocation>
        <DataLocation Name="JA1" Class="hec2.model.DataLocation" DssPath="//JA1/FLOW//1MIN/C:000000|altName:apName:HMS-(MCA)stochastic/" ComputeType="Computed" Parameter="Flow" PrevModelIndex="0">
          <ModelAlternative Name="(MCA)stochastic" Program="HMS" />
        </DataLocation>
      </DownStreamLocation>
    </DataLocation>
  </DataLocations>
 <OutputVariables>
    <DataLocation Name="JA1" Parameter="FLOW">
      <DurationOutputVariable Duration="1" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
      <DurationOutputVariable Duration="2" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
      <DurationOutputVariable Duration="4" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
      <DurationOutputVariable Duration="8" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
      <DurationOutputVariable Duration="10" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
      <DurationOutputVariable Duration="12" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
      <DurationOutputVariable Duration="16" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
      <DurationOutputVariable Duration="20" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
      <DurationOutputVariable Duration="24" DurationValueRepresentsDays="false" ComputeType="DurationMax" />
    </DataLocation>
  </OutputVariables>
</DurationAlternative>
```

Figure 31: Duration Plugin-Code Sample

Iterative Routings

Once the HEC-HMS basin and simulation data are incorporated into the HEC-WAT, an alternative was created that incorporated the HMS model and Duration Plugin tool. This links the model computes to each other. A program order was set to order the compute starting with the HMS model, then the duration plugin. The Model Linking Editor was then used to link the specific data streams needed to compute the HMS model and duration editor. These connections are shown in the table below. The Output Variable Editor was used to specify the data that the Hydraulic Sampler, HMS model, and Duration Sampler would save to the DSS file. Due to the large amounts of data created with each iterative compute, stored data must be specified to limit total file sizes. This is also the location that is used to specify if an output frequency curve should be computed. The output dataset is shown in the table below. Note that to limit file sizes, only a sample of the Hydraulic Sampler output locations were saved. These were used for data verification.

A time window analysis period is used to set the time period that each realization within the FRA compute uses, and how the data is reset and saved. The length of time specified in the time window needs to be divisible by the realization length but does not specify the number of iterations of the overall compute.

The minimum number of sampled events within each realization should be a minimum of approximately 2-3 times the maximum frequency analyzed. For this effort 500 events were sampled per each 120 realizations. Therefore, the 12-hour output data is considered to have adequate simulations for up to and beyond the 0.002 AEP frequencies. (CEIWR-HEC, 2017)

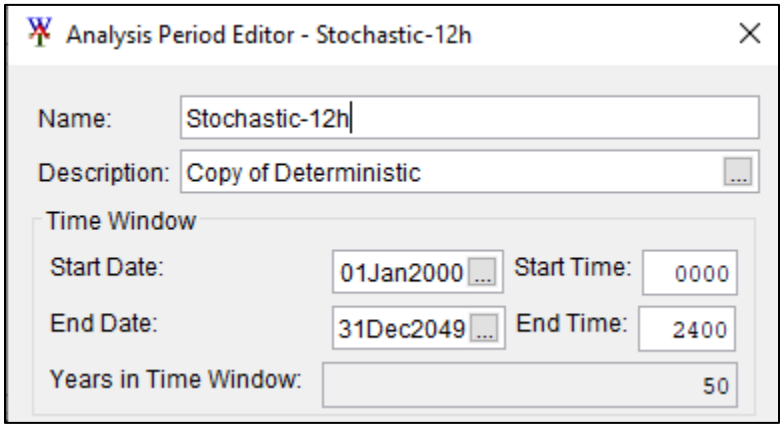


Figure 32: Analysis Period for each Realization

The Simulation Editor was used to link the Model Alternative, Analysis Period, and Program Order. Together this combines all the data sets and linkages discussed above. In the 12-hour simulation, a 500-events is set, and 120 total realizations were computed, which determines at total of 60,000 iterative simulations for each of the three models loaded into the HEC-WAT. (Hydraulic Sampler, HEC-HMS, and the Duration Plugin) In the 24-hour sensitivity simulation, 500 events were computed for 10 iterations for a total of 5,000 iterative runs. Each of the simulations is analyzed for peak flow and all other along with all durations that were specified to be output in the duration plugin. These 60,000 values (or 5,000 for the 24-hour duration sensitivity) for each time period and each location are analyzed as an annual maximum event, in order to determine individual frequency curves for that specific location and duration.

Run FRA Simulation - TEST-Duration

Compute Information for Simulation TEST-Duration

Time Window Information

Start Time: 01Jan2000 0000
End Time: 31Dec2499 2400

Simulation will not stop on errors.
Simulation will save all results.
Simulation will recompute all models.

Realization Information

Lifecycles to Run:[1-8]

Model Sequence	
Model	**Alternative**
HMS	(MCA)stochastic
Duration Plugin	AlaWaiDurations

Time Window Modifiers			
Model	**Alternative**	**Time Window**	**Time Window Mod**
HMS	(MCA)stochastic	Simulation Window	none
Duration Plugin	AlaWaiDurations	Simulation Window	none

Output Variable Time Window		
Model	**Alternative**	**Time Window**
HMS	(MCA)stochastic	Not Set
Duration Plugin	AlaWaiDurations	Not Set

Figure 33: Simulation Information

HEC-WAT Results

After a final compute, reported data was used to validate the results. Output data in the HEC-WAT includes frequency curves with confidence intervals based on peak data values for each compute location, either for flow or precipitation. The module also outputs the basin averaged storm total precipitation as it was recreated. A comparison of the input and output for total event precipitation frequency data is shown below for the 12-hour and 24-hour duration WAT compute.

The HEC-WAT basin-average precipitation results for the 12-hour storm sampled between -0.1 to 0.3 inches different for each frequency with an average of 0.08 inches higher than the WAT input data. Due to WAT input methods the input values were 0.01 to 0.36 higher, with an average of 0.28 inches higher than the graphical AMS Atlas 14 data. The graphical data is between -0.35 to 0.36 inches different, with an average of 0.13 inches different from the original feasibility data. This difference is due to an update to the published dataset and the orographic effects bringing up basin averages. Overall, the final differences in basin-wide precipitation differences range from 0.09 to 0.78 inches from the feasibility study, with an average difference of 0.49 inches. This transition from point to graphical methods of data collection represents the most significant increase in total volume of rainfall in the basin.

The HEC-WAT basin-average precipitation results for the 24-hour storm sampled between -0.04 to 0.4 inches different for each frequency with an average of 0.23 inches higher than the WAT input data. Due to WAT input methods the input values were 0.18 to 0.74 higher, with an average of 0.59 inches higher than the graphical AMS Atlas 14 data. The graphical data is between -0.42 to 0.45 inches different, with an average of 0.17 inches different from the original feasibility data. This difference is due to an update to the published dataset and the orographic effects bringing up basin averages. Overall, the final differences in basin-wide precipitation differences range from 0.56 to 1.4 inches from the feasibility study, with an average difference of 0.98 inches. This transition from point to graphical methods of data collection represents the most significant increase in total volume of rainfall in the basin. An additional increase in scaling of storms for the less frequent events in the HEC-WAT environment.

Table 32: Basin Average Precipitation Totals (inches per 12-hour duration)

Return Period	AEP	Original Feasibility Study Precipitation with DAR	Updated Atlas 14 Frequency Storm Point Data with DAR	Updated Atlas 14 Frequency Storm Graphical Data with DAR	GEV Parameters in Excel	HEC WAT input via GEV Equation	WAT Total Event Precipitation (12 hour)
2	0.5	4.16	3.39	3.81	3.78	4.17	4.25
5	0.2	5.51	4.95	5.49	5.48	5.81	5.73
10	0.1	6.60	6.07	6.68	6.68	7.01	6.89
25	0.04	8.11	7.60	8.28	8.29	8.62	8.57
50	0.02	9.32	8.79	9.54	9.55	9.87	9.90
100	0.01	10.59	10.09	10.86	10.87	11.16	11.37
200	0.005	11.93	11.35	12.24	12.25	12.47	12.71
500	0.002	13.80	13.19	14.16	14.17	14.15	14.49

Table 33:Basin Average Precipitation Totals (inches per 24-hour duration)

Return Period	AEP	Original Feasibility Study Precipitation with DAR	Updated Atlas 14 Frequency Storm Point Data with DAR	Updated Atlas 14 Frequency Storm Graphical Data with DAR	GEV Parameters in Excel	HEC WAT input via GEV Equation	WAT Total Event Precipitation (12 hour)
2	0.5	5.02	4.06	4.60	4.58	5.32	5.58
5	0.2	6.75	6.06	6.73	6.72	7.38	7.42
10	0.1	8.14	7.51	8.26	8.26	8.91	8.99
25	0.04	10.11	9.47	10.33	10.33	11.00	11.15
50	0.02	11.69	11.06	11.97	11.97	12.64	13.08
100	0.01	13.36	12.71	13.70	13.69	14.33	14.76
200	0.005	15.13	14.45	15.52	15.51	16.04	16.3
500	0.002	17.63	16.98	18.08	18.06	18.24	18.4

With the addition of the duration plugin a frequency curve for each requested volume (Peak, 1-, 2-, 4-, 8-, 10-, 12-, 16-, 20-, and 24-hour durations) for each compute point was outputted as well. Each individual hydrograph for each location for each iteration is also saved to the DSS files. However, there is no composite or final output frequency hydrograph for each location created within this early version of HEC-WAT. (See below on post processing in HEC-SSP). A sample peak flow frequency curve for the combined outflow for subbasin A1 is shown below, as well as the basin averaged Atlas 14 peak flow frequencies for both the 12- and 24-hour storms in Table 35 and Table 36. A table is also included to show a peak flow comparison between the inputs from the updated frequency data reproduced as part of this study and the WAT output. Additional WAT output for additional frequencies are in Appendix A. The most significant changes to the peak flow, in addition to the precipitation as previously discussed are the rainfall temporal shapes as informed by the storms on the island, the spatial shapes which better describe orographic effects, and uncertainty in the loss calculations.

The equivalent peak flow for the 0.01 AEP 12-hour frequency event ranged between a 0.017 to 0.029 AEP 24-hour frequency event. This is due to the short nature of the storm patterns in the basin forcing the 24-hour volume into a smaller time patten, and artificially increasing peak values.

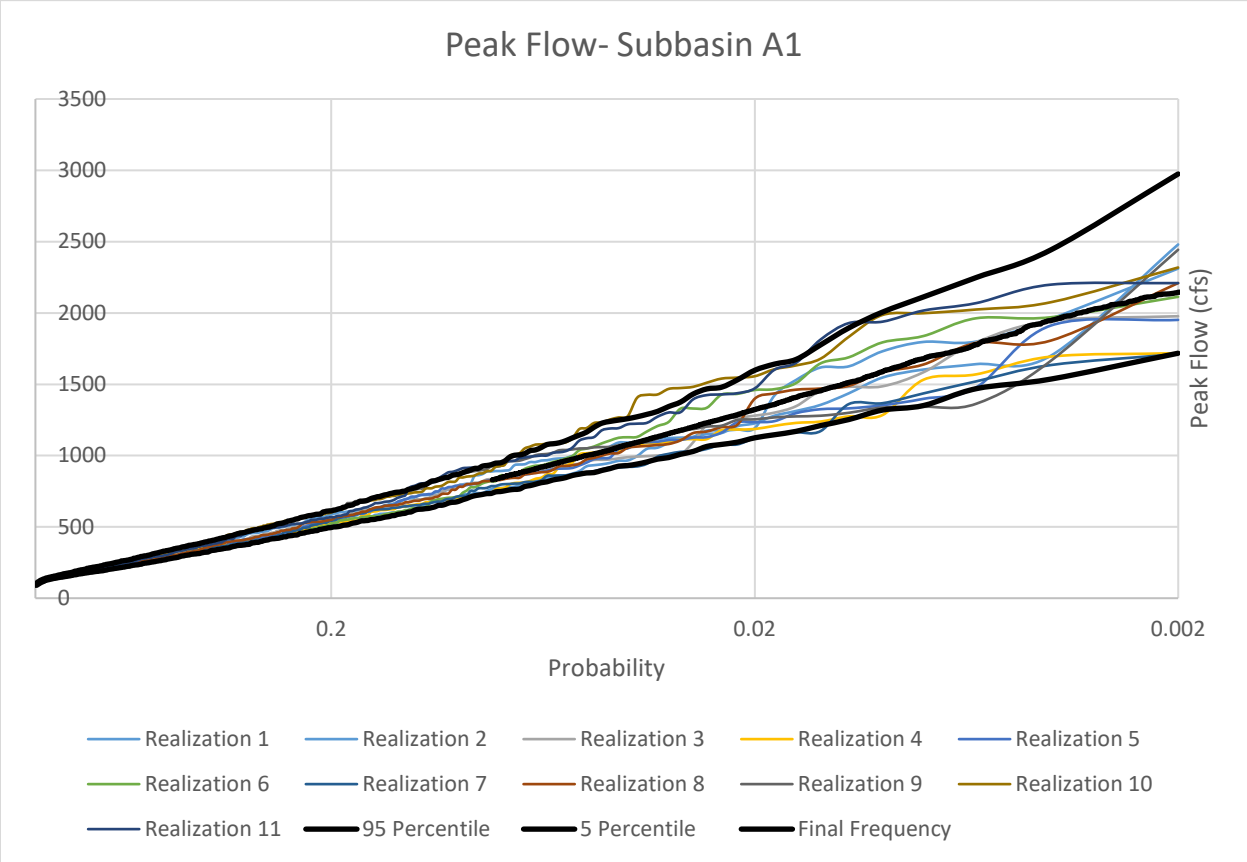


Figure 34: Sample Frequency Plot- Peak flow, cfs (not all realizations are plotted)

Table 34: 24 Hour 0.01 AEP Frequency Flow Volumes by Duration (cfs)

	Frequency	Peak	1-hour	2-hour	4-hour	8- hour	10- hour	12- hour	16- hour	20- hour	24- hour
A2/W2		2857.2	1618	1247	889.4	502.43	405.42	341.81	268.82	220.71	187.4
A3	0.01	1855.6	1072.1	840.8	511.57	277.52	222.98	186.3	141	114.46	96.66
A4	0.01	1429.5	833.8	642.9	451.26	252.37	203.3	171.76	135.58	110.96	94.37
A6/W3	0.01	1166.3	762.4	576	424.23	245.19	201.98	171.57	135.67	111.83	93.33
A8	0.01	578.97	324.35	249.37	152.24	85.54	69.84	59.719	47.229	40.654	34.959
JA1	0.01	4232.2	2142.1	1663.6	1190.7	673.3	542.2	459.6	360.16	298.15	252
JP1	0.01	4286.8	2968.8	2141.6	1589.4	916.9	743.8	637.5	506.14	418.15	352.36
Junction5	0.01	8596	7109	5223.7	3817.4	2341.3	1901.4	1614.3	1254.4	1026	8596
K1	0.01	2272.6	1815.6	1357.2	929.7	531.9	443.33	379.38	298.17	240.67	201.39
K2A	0.01	0.01	645.3	134.59	119.57	96.43	494.35	82.66	69.26	295.26	160.16
K2B	0.01	1473.6	1059.5	801.2	469.42	250.62	210.01	184.99	151.16	130.36	109.39
K3	0.01	523.54	376.16	292.45	184.7	99.29	80.66	69.02	53.038	44.622	37.458
K4	0.01	904	680.4	538.4	349.31	184.52	148	126.59	98.6	81.57	67.97
K5	0.01	887.1	518.79	434.06	241.74	128.93	103.84	88.25	69.81	58.979	49.497
K6	0.01	2774.6	1518.7	1160.2	670.1	359.65	291.36	242.97	187.46	153.85	129.38
M1	0.01	4623.1	3614.3	2506.7	1785.4	1076	876.8	751.2	585.6	474.48	402.05
M10	0.01	974	770.9	552.55	398.38	232.14	187.07	156.1	118.93	974	770.9
M11	0.01	738.2	571.01	442.63	295.47	165.41	133.11	112.31	86.6	71.21	60.262
M12	0.01	3479.4	2591.3	1975.5	1218.6	644.4	525.82	438.94	336.02	273.04	228.28
M13	0.01	1191.3	887.8	679.2	439.29	236.55	190.31	158.59	122.83	100.15	83.51
M14	0.01	964.5	741.1	581.9	406.75	221.81	177.54	149.34	114.82	92.74	77.52
M3	0.01	3333.9	2736.4	2006.6	1425.7	887	723.3	608.32	459.15	381.86	318.22
M4	0.01	691.71	588.74	440.38	320.91	198.04	161.7	136.66	103.49	84.77	70.65
M6B	0.01	1270.1	1050.1	768.3	540.24	330.75	269.75	228.31	172.53	140.68	117.23
M7	0.01	679.9	599.5	478.63	352.73	217.52	178.98	149.81	114.39	94.51	79.11
M8	0.01	150.1	133.86	107.21	82.29	50.154	40.298	34.224	26.201	21.5	17.952

M9	0.01	303.6	273.03	221.72	165.97	102.35	83.18	69.68	53.109	43.269	36.304
P2	0.01	3579.4	2598.5	2017.9	1486.9	840.2	693.1	590	465.6	387.15	323.21
P4	0.01	1826.2	1284.5	954.4	688.4	374.32	301.57	253.99	194.6	158.75	133.32
P5	0.01	1135.5	870.6	689.1	464.93	250.01	202.6	171.05	132.65	109.87	91.7
P6	0.01	2747.8	1990.6	1612	1127.4	600.3	485.23	407.43	313.22	254.92	213.02
P7	0.01	1665.3	1331.1	1047.8	717.8	386.31	312.09	260.22	198.1	161.05	134.2
W1	0.01	775.2	407.79	313.42	215.46	119.39	98.2	84.13	65.1	54.005	45.476
Woodlawn Flow Local (M5)	0.01	1996.1	1696.1	1227.4	897	547.16	446.34	378.54	286.03	233.78	195.09
M6B Flow Not Diverted	0.01	1110.1	890.1	633.7	435.58	264.63	215.68	182.6	138.25	112.63	93.86
Woodlawn Diversion sewer	0.01	160	160	134.6	104.66	66.12	54.07	45.71	34.28	28.05	23.37

Table 35: 12 Hour: 24 Hour 0.01 AEP Frequency Flow Volumes by Duration (cfs)

	Frequency	**Peak**	**1- hour**	**2- hour**	**4- hour**	**8- hour**	**10- hour**	**12- hour**
A2/W2	0.01	2358	1320.9	977.2	674.6	384.11	317.06	267.83
A3	0.01	1587.1	868	657.2	403	217.62	176.67	147.87
A4	0.01	1189.9	686	505.2	342.81	194.98	160.72	135.63
A6/W3	0.01	980.9	618.2	445.6	323.02	186.23	154.86	130.71
A8	0.01	511.1	274.25	201.11	124.86	71.1	60.25	51.504
JA1	0.01	3598.7	1772.6	1294	895.7	508.5	420.68	358
JP1	0.01	3429.2	2337.5	1687.1	1178.2	679.0	564.1	470.64
Junction5	0.01	6834	5539.8	4042.2	2870.2	1765.6	1443.7	1215.8
K1	0.01	1608.3	1298.8	954.4	649.1	371.58	304.48	254.07
K2A	0.01	712	523.2	382.6	236.44	132.33	111.1	93.1
K2B	0.01	831.3	169.94	142.39	604.8	365.81	202.9	1208.4
K3	0.01	301.77	63.71	53.2	228.94	140.4	76.91	417.19

K4	0.01	727	542.7	417.9	262.48	140.76	114.74	95.88
K5	0.01	781.5	427.35	341.84	193.56	105.77	87.5	74.29
K6	0.01	2272.7	1223.3	902.7	527.8	285.93	233.76	198.22
M1	0.01	3645.3	2788.4	1915.2	1350.8	811.2	661.1	557.23
M10	0.01	766.6	589.1	422.8	292.21	169.91	138.4	115.88
M11	0.01	620.4	449.8	342.83	224.34	124.91	102.22	85.74
M12		2749.8	2034	1518.3	940.8	495.5	402.79	337.18
M13	0.01	947	691.9	519.5	331.11	177.87	144.4	121.41
M14	0.01	783.6	596.4	456.4	303.37	164.9	134.24	112.11
M3	0.01	2631.4	2143.8	1550.3	1096.5	668.2	543.9	456.15
M4	0.01	540.61	458.44	339.9	244.29	149	121.2	101.47
M6B	0.01	991.4	809.2	588.3	413.04	247.89	202.05	169.39
M7	0.01	523.4	463.2	365.39	264.73	162.15	132.2	110.61
M8	0.01	125.37	107.85	87.3	63.77	37.577	30.724	25.724
M9	0.01	238.04	212.31	171.87	126.18	77.37	63.03	52.693
P2	0.01	3075.8	2139.2	1601.2	1117.6	633.4	533.1	447.64
P4		1502.1	1021.8	755.9	507.4	280.25	231.82	194.85
P5	0.01	979.8	427.35	341.84	193.56	105.77	87.5	74.29
P6	0.01	2325.8	1625.1	1278.1	842.6	457.32	374.3	314.47
P7	0.01	1339.5	1058.7	818.7	546	291.85	236.51	198.27
W1	0.01	683.8	346.21	253.38	167.74	95.48	79.15	67.4
Woodlawn Flow Local (M5)	0.01	1585.2	1299.8	952	681.3	410.62	335.02	281.99
M6B Flow Not Diverted	0.01	831.4	653.9	469	326.83	194.94	158.66	132.95
Woodlawn Diversion sewer	0.01	160	155.3	119.3	86.21	52.95	43.39	36.44

Table 36: WAT to Feasibility Peak Flow Comparison

HEC-RAS Inflow Location	Feasibility Peak Flow (CFS)	Updated Peak Flow (CFS)	Difference (CFS)	% Difference	HEC-RAS Inflow Location	Feasibility Peak Flow (CFS)	Updated Peak Flow (CFS)	Difference (CFS)	% Difference
A2, W2 Combined	2518.5	2,358	-161	-6.4	**M13**	829.3	947	117.7	14.2
A3	1689.1	1,587	-102	-6.0	**M14**	705.7	784	78.3	11.1
A4	1324.1	1,190	-134	-10.1	**M3**	1939.9	2,631	691.1	35.6
A6, W3 Combined	1298.9	981	-318	-24.5	**M4**	432.6	541	108.4	25.1
A8	591.8	511	-81	-13.7	**M7**	463.5	523	59.5	12.8
JA1	4961.5	3,599	-1,363	-27.5	**M8**	113.4	125	11.6	10.2
JP1	2601.9	3,429	827	31.8	**M9**	204.7	238.	33.3	16.3
Junction 5 (M1 + M2)	4635.5	6,834	2,199	47.4	**P2**	2483.3	3,076	592.7	23.9
K1	1525.2	1,608	83	5.4	**P4**	1375.4	1,502	126.6	9.2
K2A	738.1	712	-26	-3.5	**P5**	894.0	980	86	9.6
K2B	1303.4	1,208	-95	-7.3	**P6**	2361.3	2,326	-35.3	-1.5
K3	395.6	417	21	5.3	**P7**	1192.9	1,340	147.1	12.3
K4	625.4	727	102	16.3	**RA1**	2423.3	2,950	526.7	21.7
K5	844.3	782	-62	-7.3	**W1**	814.5	684	-130.5	-16.0
K6	2024.5	2,273	249	12.3	**Woodlawn Flow Local (M5)**	1138.0	1,585	447	39.3
M10	732.0	767	35	4.8	**M6B- Not diverted**	545.8	1,000	454.2	83.2
M11	602.9	620	17	2.8	**Woodlawn Sewer System (Part of M6B)**	160	160	0	0.0

M12	2037.5	2,750	-713	-35.0	N/A -items are altered from original feasibility configuration and would not offer a direct comparison.	

HEC-SSP Balanced Hydrographs

A balanced hydrograph analysis was performed for each HEC-RAS inflow location. The balanced hydrographs were only computed for the 12-hour duration frequency storm series using the following steps. This process is needed because, while the HEC-WAT has many storm routings and output data, they are each individually using a temporal pattern from different storm events and need to be simplified to a single neutral pattern.

1. A sample hydrograph from the feasibility study Atlas 14 0.01 AEP frequency run was input into the HEC-SSP as a Flow Data Set to ensure that peak inflows occurred at an accurate time for each inflow hydrograph location.
2. The durations were input from the duration plugin specified values (Peak [1 minute], 1-hour, 2-hour, 4-hour, 8-hour, 10-hour and 12-hour for the 12-hour duration event). The 2, 5, 10, 20, 50, 100, 200, and 500-year return intervals or 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, and 0.002 AEP frequencies were specified in this effort.
3. The template hydrograph is “balanced”, so the flow volume and frequency relationships were met for each of the flow volumes reported by the duration plugin, while preserving the peak runoff timing.
4. The data is now ready for ingestion into the HEC-RAS model for final routing with all backwater effects, overland flow, and other more complex flow schema.
5. An additional set of this calculation series was done for this step with the uncertainty limits for the 0.01 AEP event.

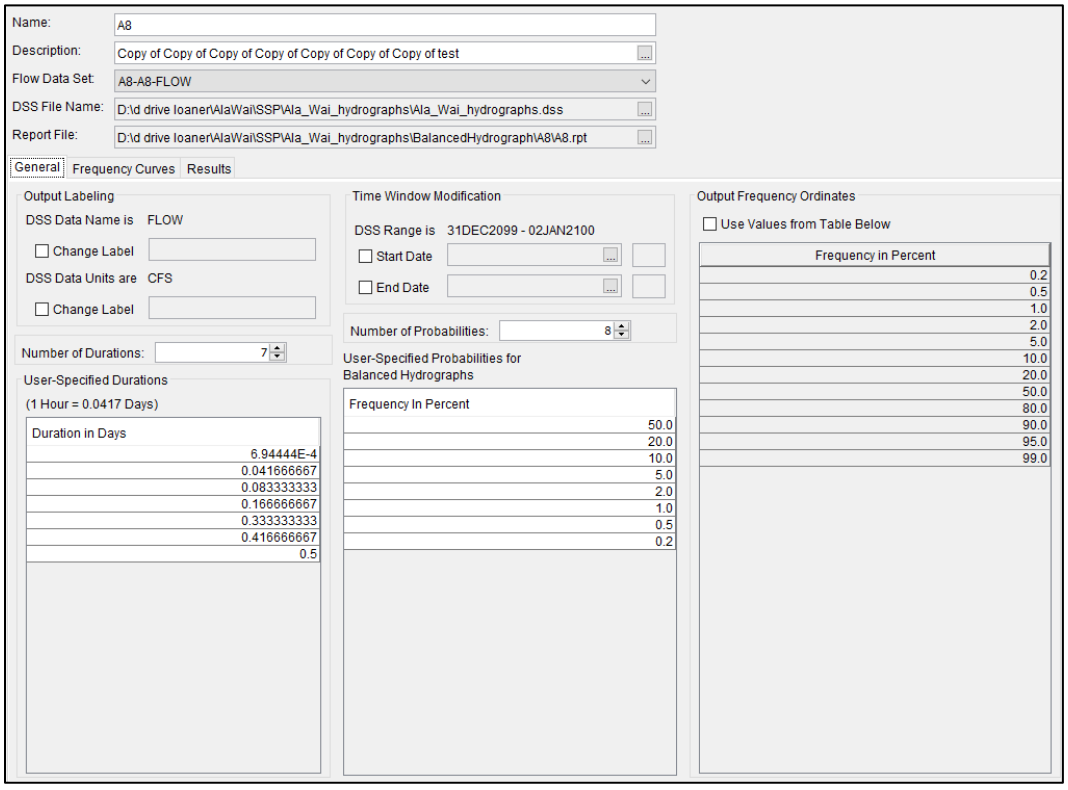
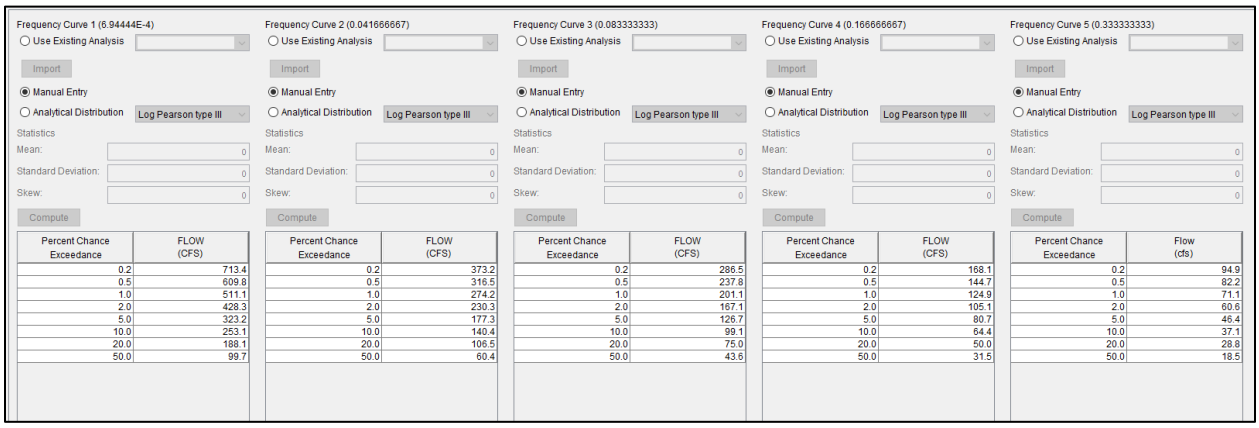


Figure 35: Balanced Hydrograph Editor

The various percent chance exceedance volumes were pulled from the HEC-WAT duration plugin frequency curves for each duration for each HEC-RAS input point. The analysis was then computed. This process creates a volume-balanced hydrograph at each location with peak flow timing based off the 0.01 AEP feasibility hydrographs. This method provides a more appropriate volume distribution throughout the watershed and allows for better model and design on the upper streams, specifically for overflow areas, constrictions, and diversions. A sample result is shown in the figure below and final output from the process is contained in the appendix.

Please note that a key assumption is that peak precipitation falls over the basin at the same time. This is appropriate to storm patterns experienced within the basin and is consistent with Atlas 14 methodology. As discussed in the Atlas 14 section of this report, this is also expected with larger storm events.



Frequency Curve 1 (6.94444E-4)

Use Existing Analysis | Import | Manual Entry | Analytical Distribution: Log Pearson type III

Statistics — Mean: 0 | Standard Deviation: 0 | Skew: 0 | Compute

Percent Chance Exceedance	FLOW (CFS)
0.2	713.4
0.5	609.8
1.0	511.1
2.0	428.3
5.0	323.2
10.0	253.1
20.0	188.1
50.0	99.7

Frequency Curve 2 (0.041666667)

Use Existing Analysis | Import | Manual Entry | Analytical Distribution: Log Pearson type III

Statistics — Mean: 0 | Standard Deviation: 0 | Skew: 0 | Compute

Percent Chance Exceedance	FLOW (CFS)
0.2	373.2
0.5	316.5
1.0	274.2
2.0	230.3
5.0	177.3
10.0	140.4
20.0	106.5
50.0	60.4

Frequency Curve 3 (0.083333333)

Use Existing Analysis | Import | Manual Entry | Analytical Distribution: Log Pearson type III

Statistics — Mean: 0 | Standard Deviation: 0 | Skew: 0 | Compute

Percent Chance Exceedance	FLOW (CFS)
0.2	286.5
0.5	237.8
1.0	201.1
2.0	167.1
5.0	126.7
10.0	99.1
20.0	75.0
50.0	43.6

Frequency Curve 4 (0.166666667)

Use Existing Analysis | Import | Manual Entry | Analytical Distribution: Log Pearson type III

Statistics — Mean: 0 | Standard Deviation: 0 | Skew: 0 | Compute

Percent Chance Exceedance	FLOW (CFS)
0.2	168.1
0.5	144.7
1.0	124.9
2.0	105.1
5.0	80.7
10.0	64.4
20.0	50.0
50.0	31.5

Frequency Curve 5 (0.333333333)

Use Existing Analysis | Import | Manual Entry | Analytical Distribution: Log Pearson type III

Statistics — Mean: 0 | Standard Deviation: 0 | Skew: 0 | Compute

Percent Chance Exceedance	Flow (cfs)
0.2	94.9
0.5	82.2
1.0	71.1
2.0	60.6
5.0	46.4
10.0	37.1
20.0	28.8
50.0	18.5

Figure 36: Sample of Flow Input Data

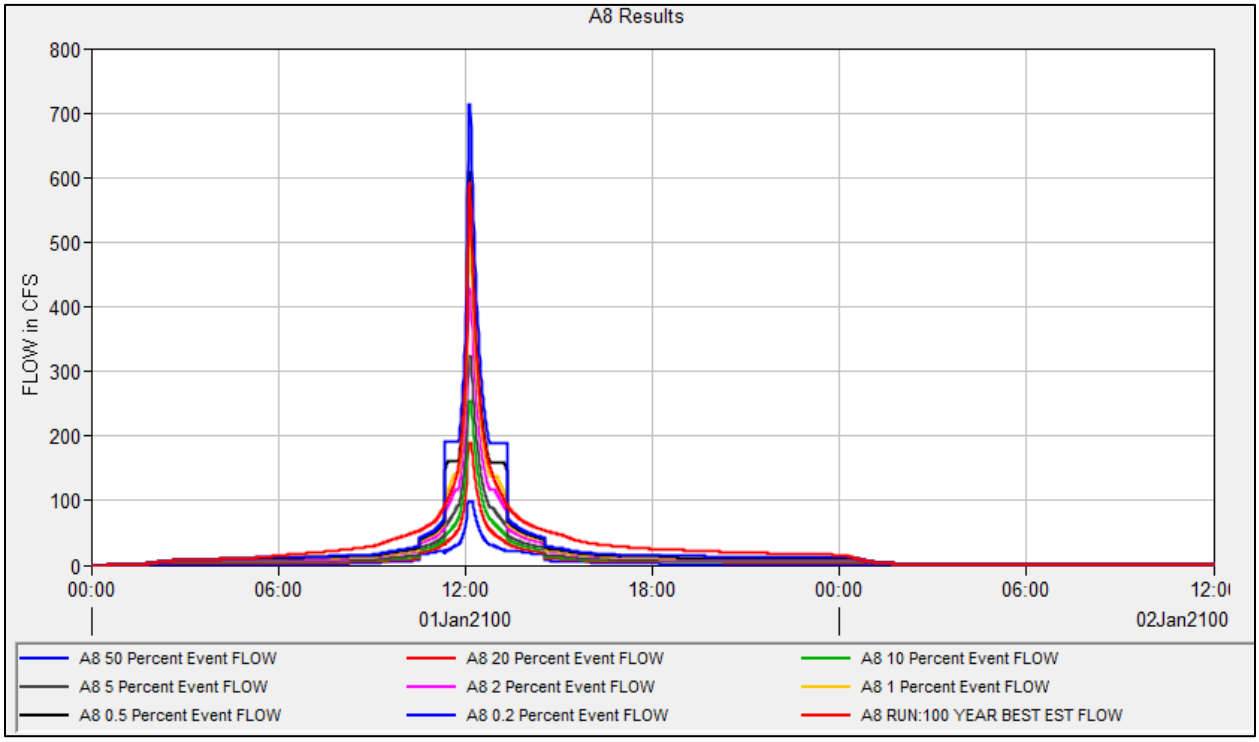


Figure 37: Sample Balanced Hydrograph Results

Uncertainty for Discharge Relationships in FDA

Uncertainty is needed in the discharge frequency calculations and is required by EM 1110-2-1619, chapter 4. This has also been reinforced by ER 1105-2-101. This uncertainty was added to the rainfall data and HEC-HMS model. A final overall frequency determination and uncertainty is needed for use in the HEC-FDA model.

The calibrated HEC-RAS model for this effort was used to develop a routed discharge frequency relationship using the expected HEC-HMS inflows for each frequency interval for each index location used in the HEC-RAS model. The HEC-RAS model was used for the streamflow routing due to the backwater effects and the ability to better match the index locations (not all were near an HMS compute node). HEC-FDA represents discharge uncertainty via a single estimated record length. Therefore, the HEC-RAS model was then used to route the 95% and 5% confidence limit flows (the 90% confidence interval) for the 0.01 AEP event. The 0.01 AEP event was selected as the priority for the current design storm frequency for the project. The 95 and 5% confidence limits were used in lieu of the 2 standard deviations (95% confidence interval) with 2.5% and 97.5% confidence limits because the HEC-WAT model does not currently produce the 95% confidence interval.

Table 37: Index Location Flows

FDA Index Name	**HEC-RAS Index Location**	**Flow-low, CFS**	**Flow-best, CFS**	**Flow High, CFS**
Ala1	1188	12494.54	13094.44	13749.65
Ala2	5687	13719.72	14767.63	16041.13

Ala3	6370	7236.23	8004.69	8915.73
Mak1	2015	1227.66	1245.95	1266.88
Mak2	4703	2048.81	2193.31	2224.93
Mak3	6606	1113.41	1268.32	1453.23
Mak4	8310	1293.27	1604.3	1990.57
Kah1	1249	429.27	458.26	488.66
Kah2	3004	760.59	938.38	1168.37
MPC1	1813	13905.38	14137.57	14384.59
MPC2	4233	19579.02	20581.04	22474.58
Man1	1230	10084	10786	11611
Man2	7734	7388.92	8290.97	9009.8
Man3	8223	7925.92	8745.05	9376.43
Man4	9116	7876.87	8945.4	9925.61
Man5	10309	6918.49	7350.49	7768.46
Man6	13036	7266.04	8670.32	10134.94
Man7	15408	6182.01	7338.11	8550.94
Pal1	6466	8552.9	9523.8	12650.63
Pal2	9055	8053.06	8975.13	12218.45
Pal3	11238	5740.21	6094.72	6801.53
Pal4	14619	6910.82	7714.85	10026.33
Wai1	2127	2483.02	2970.37	3699.9
Puk1	2723	3096.04	3378.48	4428.21

Two equations were used to estimate the standard deviation. These were: $X=\mu + Z\sigma$ and $\sigma=$ (minimum flow – maximum flow)/4. Where X is 95% flow, μ is the mean, Z is the standard Z-variate value relating to 2 standard deviations, and σ is the standard deviation.

The discharge-frequency relationship was entered directly into the HEC-FDA model and an ERL value was iteratively input until a reasonable match was found to the 2 standard deviations confidence interval.

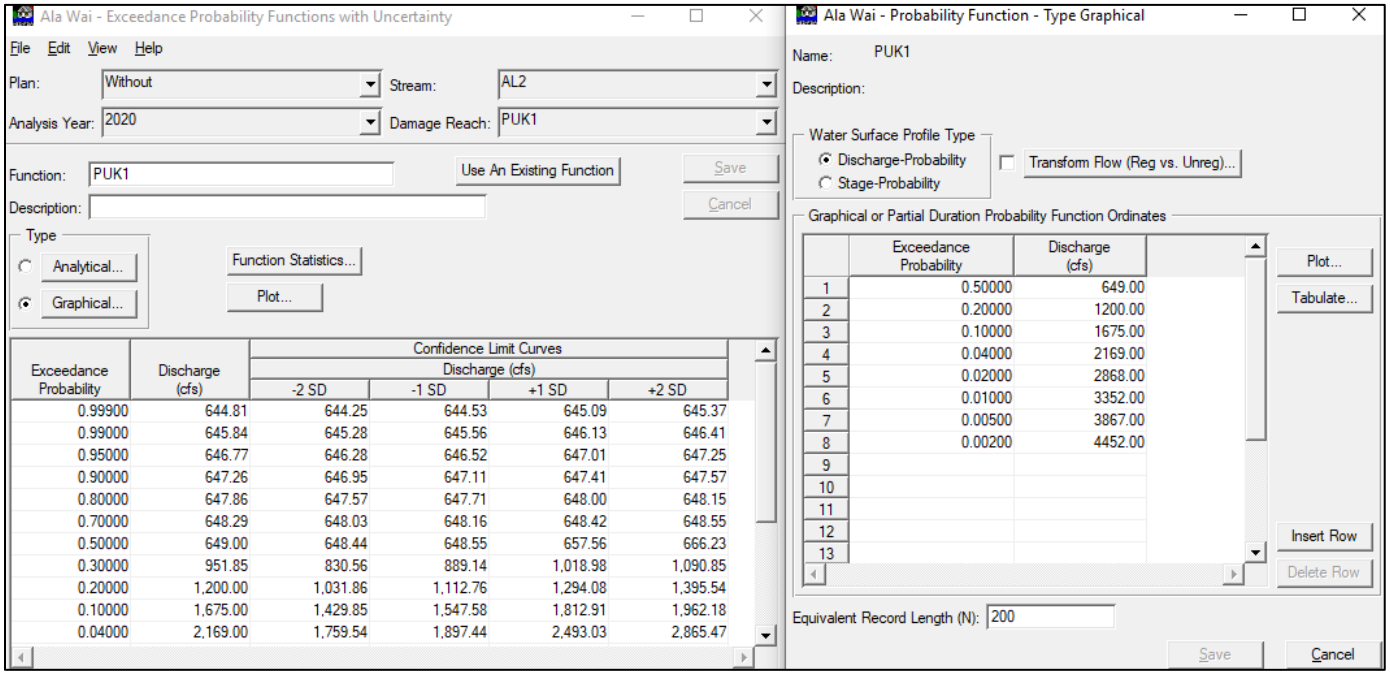


Figure 38: FDA Input for PUK1

This method was created well after publication, and therefore does not match well with any frequency method described by regulations, as shown below. After discussions with advisors, no reduction in ERL was taken, given the higher level of frequency computations.

Table 38: ERL Guidance for EM 1110-2-1619

EM 1110-2-1619

Table 4-5
Equivalent Record Length Guidelines

Method of Frequency Function Estimation	Equivalent Record Length[1]
Analytical distribution fitted with long-period gauged record available at site	Systematic record length
Estimated from analytical distribution fitted for long-period gauge on the same stream, with upstream drainage area within 20% of that of point of interest	90% to 100% of record length of gauged location
Estimated from analytical distribution fitted for long-period gauge within same watershed	50% to 90% of record length
Estimated with regional discharge-probability function parameters	Average length of record used in regional study
Estimated with rainfall-runoff-routing model calibrated to several events recorded at short-interval event gauge in watershed	20 to 30 years
Estimated with rainfall-runoff-routing model with regional model parameters (no rainfall-runoff-routing model calibration)	10 to 30 years
Estimated with rainfall-runoff-routing model with handbook or textbook model parameters	10 to 15 years

[1] Based on judgment to account for the quality of any data used in the analysis, for the degree of confidence in models, and for previous experience with similar studies.

The original feasibility study final equivalent years of record were selected based on the available gage data and the overall confidence in the reliability or accuracy of the peak flow discharge estimates. This

incorporated a significant portion of engineering judgement, and one equivalent year of record was assigned per stream segment. The updated values were assigned due to the ranges in flows calculated.

There is a significant increase in equivalent record length (ERL) between the two studies. This can be attributed to a much higher level of computationally intensive effort to reduce the uncertainty, a 310 year period of record in the Atlas 14 rainfall uncertainty which reduced the range of precipitation values, direct computations at each specific index locations (rather than estimates by reach), and significant backwater effects that at the higher frequency events limits the variability of flows within a stream.

Please note that a few FDA reaches were removed from the study, including UNI1, UNI2, and KAO1. These were removed due to the updating of the HEC-RAS model from one-dimensional to two-dimensional in areas, which removed some of the routing reaches approximating overland flow in the feasibility study.

	Updated ERL	Feasibility Study ERL
Ala1	100	30
Ala2	62	
Ala3	170	
Mak1	200	18
Mak2	200	
Mak3	200	
Mak4	200	
Kah1	200	
Kah2	200	
MPC1	75	30
MPC2	200	
Man1	200	25
Man2	200	
Man3	200	
Man4	200	
Man5	200	
Man6	200	
Man7	200	
Pal1	200	27
Pal2	200	
Pal3	200	
Pal4	200	
Wai1	200	35
Puk1	200	44

Future Considerations/ Conclusion

Frequency routings were completed through a variety of methods. For the final design efforts, it is recommended that the 12-hour HEC-WAT routing be considered as the most accurate and appropriate. Final balanced hydrographs were developed for eight frequencies (50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% AEP) and for the 5% and 95% confidence limits of the 0.01 AEP storm event for each location in the HEC-RAS model. The HEC-WAT effort represents significant technological advances improving from frequency estimates from a single peak flow result of the feasibility study up to the Monte-Carlo style uncertainty analyses which incorporates significant amounts of Hawaii and Ala Wai specific data inputs.

Additional efforts that could be given considerations would be the inclusion of the precipitation patterns from topographically similar locations gathered from the other ongoing studies into the HEC-WAT model. Also, additional calibration to the model is recommended in any additional large storm events occur in the interim. In addition, specific areas will require detailed modeling of the urban drainage systems in later design phases to fully understand the impacts of urbanized runoff at specific project sites.

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Software:

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Pacific Ocean Division

Honolulu District

HYDRAULICS REPORT

Ala Wai Canal Modeling Effort

January 2021

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Introduction

The Ala Wai Canal Flood Risk Management project is located on the island of Oahu in urbanized Honolulu, Hawaii. The project would protect metropolitan Honolulu, the University of Hawaii, and Waikiki, Hawaii's economic center for tourism. The population at risk includes approximately 65,000 residents and an additional 200,000 transient visitors to the watershed daily (tourists, workers, students, etc.).

The canal overtopped and previously flooded Waikiki during the November 1965 and December 1967 storms, as well as during the passage of Hurricane Iniki in 1992. In October 2004, a storm flooded Manoa Valley, causing $85M in damages to the University of Hawaii, including the loss of irreplaceable documents in one of the libraries. Early modeling efforts indicated that a one percent annual flood exceedance event would result in damages to more than 3,000 structures in the watershed, with total damages of over $1.14B, and the majority of the damage in the downstream area of Waikiki.

Basin Description

The Ala Wai Watershed encompasses approximately 16.2 square miles and includes the drainages of Manoa, Palolo, Makiki, McCully, Moiliili, and Waikiki. The Manoa and Palolo streams join to form the Manoa-Palolo Canal. The Manoa-Palolo Canal, Makiki Stream, and three low lying drainage areas empty into the Ala Wai Canal, a two-mile long, man-made waterway constructed in the 1920s to drain wetlands, allowing the development of the Waikiki area.

The upper reaches of the basin are very steep and rocky and incised into the Ko'olau Volcano. This portion of the watershed ranges from 40 to approximately 2400 feet in elevation. The Makiki and Manoa basins typically receive more than 160 inches of rain annually, while the Palolo valley receives less.

The lower portion of the basin is much less steep and is extremely urbanized. Significant portions of this are impervious surfaces, with sewer system drainage actively directing most of the runoff in less intense events. The Ala Wai Canal and Waikiki basin receives about 30 inches of annual rainfall. High-Intensity rainfall on steep slopes of the small drainage basin can produce very flashy flood events. Time to peak is usually less than 1 hour and even for large intense storms, the rise and recession of the flood hydrograph usually occurs within 6 hours.

Study Phases

There were three phases to the Ala Wai Canal project, including the Feasibility phase, the Post-Feasibility Analysis, and the selection of the Proposed Final Features. The Feasibility study was completed in 2017 and is documented in *Ala Wai Canal Flood Risk Management Study O'ahu, Hawai'I Final Feasibility Study Report with integrated Environmental Impact Statement* Appendix A – Hydrology and Engineering (2017). The purpose of the Post-Feasibility study was to upgrade the steady 1D HEC-RAS model from the previous study with 2D areas and a switch to unsteady flow to improve the accuracy of the model. Once the model was updated and calibrated, the features from the tentatively selected plan (TSP) from the feasibility study were input into the model to determine their impacts to the 1% AEP (annual exceedance probability) flows. In addition, modifications to the features were evaluated to produce the most effective and optimal design for the watershed. After running multiple

design considerations, a final proposed design was chosen and modeled. Other frequency events were modeled once all the features in the study were modified and optimized.

Project features from the feasibility study included the following eleven individual structural elements and two non-structural components as carried forward from the feasibility study:

- Six debris/detention basins in upper stream reaches
- One stand-alone debris catchment structure
- Three multi-purpose detention basins
- Floodwalls along Ala Wai Canal (including pump stations for interior drainage)
- Flood warning system (non-structural)
- Fish and wildlife mitigation (non-structural)

The Post-Feasibility analysis analyzed the effectiveness of each of these structures and looked at different modifications to the six debris/detention basins in upper stream reaches, the three multi-purpose detention basins, and the floodwalls/pump stations around the Ala Wai Canal.

The Proposed final feature plan includes the following six structural elements and two non-structural components:

- Three multi-purpose detention basins
- Two stream diversions
- Floodwalls along Ala Wai Canal (including pump stations for interior drainage)
- Flood warning system (non-structural)
- Fish and wildlife mitigation (non-structural)

Previous Modeling Efforts

The original study was developed using the HEC-RAS (Hydrologic Engineering Center - River Analysis System) computer program, version 4.1.0 for hydraulic modeling (*U.S. Army Corps of Engineers, 2010*). This HEC-RAS model was created by joining separate HEC-RAS models of Makiki, Manoa, and Palolo Streams and Manoa-Palolo Drainage and Ala Wai Canals. The HEC-RAS model of Manoa Stream is documented in the Final Hydraulic Report, Manoa Watershed Project (Oceanit, *2008b*) and the separate models for the Makiki and Palolo Streams and the Manoa-Palolo Drainage and Ala Wai Canals were originally created by Oceanit and West Consultants by July 2009 and then corrected and merged together by the U.S. Army Corps of Engineers by November 2009. In 2013 the merged model was then updated again to be more accurate. This model consisted of 8 rivers, 13 reaches, 1,287 cross sections, of which 476 are interpolated, 49 bridges (this includes culverts), 2 inline weirs, and 16 lateral weirs. Modifications were made to the model and report in March 2016, August 2016, and February 2017. This effort is detailed in the *Ala Wai Canal Flood Risk Management Study O'ahu, Hawai'I Final Feasibility Study Report with integrated Environmental Impact Statement* Appendix A – Hydrology and Engineering.

A list of previous reports with descriptions is included in section 2.2 "previous hydrologic and hydraulic models and studies." These include:

- Federal Emergency Management Agency's National Flood Insurance Program Study (FEMA, 1979)
- Ala Wai Canal Improvement Project, Storm Water Capacity Study (Edward K. Noda and Associates, 1994)
- Ala Wai Flood Study (USACE, 2001)
- Ala Wai Watershed Analysis (Townscape Inc. and Dashiell, 2003)
- Hydrology and Hydraulics Study, Flood of October 30, 2004, Manoa Stream (USACE, 2006)
- Final Hydrology Report, Manoa Watershed Project (Oceanit 2008a)
- Final Hydraulic Analysis Report, Manoa Watershed Project (Oceanit, 2008b)
- Technical Summary Report, Manoa Watershed Project (Oceanit, 2008c)
- Final Hydrology Report, Ala Wai Watershed Project (Oceanit, 2008d)
- Final Drainage Evaluation Report, Ala Wai Canal Watershed Project (Oceanit, 2008e)
- Conceptual Engineering Report, Ala Wai Canal Flushing System & Ala Wai Golf Course Detention System (Mitsunaga & Associates, Inc., 2014)

Project Scope

In an effort to improve upon and extend previous modeling efforts the project the following adjustments were made to the 2016 Ala Wai Hydraulic efforts.

- Update model to most recent published version (HEC-RAS Version 5.0.7)
- Modify Geometry to include 2 dimensional (2D) areas for the overbanks where needed
- Review bridges, tunnels, and other existing features in previous model
- Incorporate new terrain data and modify in areas where new features will be added
- Incorporate land cover data for 2D roughness values
- Update model to unsteady flow which is needed for 2D modeling and re-link model to new HEC-HMS flows as discussed in the Hydrology section
- Calibrate and validate updated model to the 2004, 2006, and 1967 events.
- Creation of Alternative geometries for project features.
- Routing of 100-year frequency with different modified geometries.
- Compiling a final report for inclusion with the hydraulics updates.

As will be detailed in this report, upper basin project features have largely been removed and a single without project geometry was brought forward for the final frequency and uncertainty routings.

The table below lists all the HEC-RAS model scenarios as part of this study and includes the associated geometry and flow files for each model scenario. The features included in each scenario will be described in later sections of this report.

Table 1: HEC-RAS Plan, Geometry, and Flow Files

2020 HEC-RAS 1D/2D Model Scenarios			
HEC-RAS Plan Name	**HEC-RAS Geometry Name**	**HEC-RAS Unsteady Flow Name**	**Notes**
2006_Calibration	Existing wo Project_MMC_calibr_NoDebris	2006_Calibration	Calibration Geometry without debris on Woodlawn Dr Bridge since there were no known debris issues on that bridge for the event
1967_Calibration	Existing wo Project_MMC_calibr_NoDebris	1967_Calibration	Calibration Geometry without debris on Woodlawn Dr Bridge since there were no known debris issues on that bridge for the event
2004_Calibration	Existing wo Project_MMC_calibr	2004_Calibration	Includes blocked obstruction above Woodlawn Dr Bridge to simulate debris on the bridge which occurred during the 2004 event.
100-Year_Freq_Projects_Modification_1	TSP_Projects_Modification_1	100 Year_TSP Features_Modification_1	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Freq_Projects_Modification_2	TSP_Projects_Modification_2	100 Year_TSP Features_Modification_2	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Freq_Projects_Modification_3	TSP_Projects_Modification_3	100 Year_TSP Features_Modification_3	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Freq_Projects_Modification_4	TSP_Projects_Modification_4	100 Year_TSP Features_Modification_4	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Freq_Projects_Modification_5	TSP_Projects_Modification_5	100 Year_TSP Features_Modification_5	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Freq_Projects_Modification_6	TSP_Projects_Modification_6	100 Year_All Features_Modification_6_8	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Freq_Projects_Modification_7	TSP_Projects_Modification_7	100 Year_TSP Features_Modification_7	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Freq_Projects_Modification_8	TSP_Projects_Modification_8	100 Year_All Features_Modification_6_8	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Frequency_Modification_9	TSP_Projects_Modification_9	100 Year_2075_Mod_9_10	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Frequency_Modification_10	TSP_Projects_Modification_10	100 Year_2075_Mod_9_10	See table in Modifications to TSP Features section for features included in this scenario

100-Year_Frequency_Modification_11	TSP_Projects_Modification_11	100 Year_2075_Mod_11_12	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Frequency_Modification_12	TSP_Projects_Modification_12	100 Year_2075_Mod_11_12	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Frequency_Modification_13	TSP_Projects_Modification_13	100 Year_2075_Mod_13_14	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Frequency_Modification_14	TSP_Projects_Modification_14	100 Year_2075_Mod_13_14	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Frequency_Modification_15	TSP_Projects_Modification_15	100 Year_2075_Mod_15_16	See table in Modifications to TSP Features section for features included in this scenario
100-Year_Frequency_Modification_16	TSP_Projects_Modification_16	100 Year_2075_Mod_15_16	See table in Modifications to TSP Features section for features included in this scenario
100Year_Freq_Projects_Modification6_calc	TSP_Projects_Modification_6_calc	100 Year_TSP Features_Modification_7	Scenario used to calculate the amount of flow leaving the channel on the left bank at Woodlawn Dr Bridge. This flow was then used in Modification 6 to simulate a simplified diversion of the left bank overflow around the bridge.
100Year_Frequency _Modification_9_10_calc	TSPProjects_Modification_9_10_13_14_calc	100 Year_2075_Mod_9_10_calc	Scenario used to calculate the amount of flow leaving the channel on the left bank at Woodlawn Dr Bridge. This flow was then used in Modifications 9 & 10 to simulate a simplified diversion of the left bank overflow around the bridge.
100Year_Frequency _Modification11_12_calc	TSP_Projects_Modification_11_12_calc	100 Year_2075_Mod_11_12_calc	Scenario used to calculate the amount of flow leaving the channel on the left bank at Woodlawn Dr Bridge. This flow was then used in Modifications 11 & 12 to simulate a simplified diversion of the left bank overflow around the bridge.
100Year_Frequency _Modification13_14_calc	TSPProjects_Modification_9_10_13_14_calc	100 Year_2075_Mod_13_14_calc	Scenario used to calculate the amount of flow leaving the channel on the left bank at Woodlawn Dr Bridge. This flow was then used in Modifications 13 & 14 to simulate a simplified diversion of the left bank overflow around the bridge.
100Year_Frequency _Modification15_16_calc	TSP_Projects_Modification_15_16_calc	100 Year_2075_Mod_51_16_calc	Scenario used to calculate the amount of flow leaving the channel on the left bank at Woodlawn Dr Bridge. This flow was then used in Modifications 15 & 16 to simulate a simplified diversion of the left bank overflow around the bridge.

100-Year_Frequency_FWOP_BasinAvg	Existing Without Project_Future	100 Year_2075_FWOP	This is the future without projects (FWOP). It has the same geometry as calibration but includes improvements to the Woodlawn Dr Bridge that occurred after the calibration events.
100-Year_Frequency_TSP_BasinAvg	TSP Projects_Levee_to_DateSt	100 Year_All Feature	This is the post-feasibility TSP scenario
100-Year_Frequency_FWOP_WAT	Existing Without Project_Future	100 Year_2075_FWOP_WAT	Same as the "100-Year_Frequency_FWOP_BasinAvg" except this scenario uses HEC-WAT derived frequency flows instead of the basin average Atlas 14 flows that all other scenarios are using.
100-Year_Frequency_TSP_WAT	TSP Projects_Levee_to_DateSt	100 Year_WAT_TSP	Same as the "100-Year_Frequency_TSP_BasinAvg" except this scenario uses HEC-WAT derived frequency flows instead of the basin average Atlas 14 flows that all other scenarios are using.
100-Year_Frequency_PostFeasibility_FWP	Proposed_SystemModel_FWP	100 Year_2075_WAT_FWP	This is the future with project (FWP) scenario and includes the proposed final features and uses HEC-WAT derived frequency flows instead of the basin average Atlas 14 flow that all the other scenarios are using.

Standard Units

Unless otherwise specified all units are as follows:

Precipitation- Inches (In)

Flow – Cubic Feet per Second (CFS)

Runoff Volume – Inches (averaged over the upstream drainage area of a given point)

Area- Square Mile (Mi^2)

Storage Volume – Acre feet (acre-ft)

Elevation- Feet, Local Tidal Datum-mean sea level (LMSL), Tidal Epoch 1983-2001. Geoid 2012A

Projection- NAD 1983 HARN projected to State Plane Hawaii 3 FIPS 5103 feet, Horizontal

Hydraulic Model Setup

Overview

The updated hydraulic modeling was developed using the HEC-RAS (Hydrologic Engineering Center - River Analysis System) computer program, version 5.0.7. This version of HEC-RAS has the capability to model one dimensional (1D) and two dimensional (2D) flows. The updated HEC-RAS model utilizes the same 1D channel cross-section data but the overbank areas are modeled with 2D grids rather than having the 1D cross-sections extend into the overbank or in some cases creating false "stream reaches" to model the overbank. The channels were left as 1D cross sections because the current version of HEC-RAS lacks the capability to model bridges and other complex structures in 2D flow areas. The hydraulic modeling was also converted to an unsteady flow analysis from steady flow analysis in the previous study. The unsteady flow model incorporates and routes the variable flows with adjustments for channel roughness, geometry, and constrictions like bridges and debris blockages. The unsteady model's ability to simulate changes to the hydrograph, flow, and water surface elevation over time allow for more accurate representation of hydraulic routing of flow through the watershed. Also, some of the longer culverts were converted to lids to allow more cross-sections over longer lengths which increased stability. Other changes included updating the channel roughness, making specific bridge modifications based on field visit, adding a bridge for Kapiolani Blvd on the lower Makiki Reach, modifying roughness in the overbanks to account for buildings, and switching to uniform lateral inflow to better distribute local inflows when appropriate. The downstream extent of the model was extended into the ocean so that the downstream boundary condition does not unintentionally force potential errors in the canal. Finally, a better-quality terrain was implemented for the study.

Since this project was designed for a 1 percent annual exceedance probability (100-year AEP) event during the feasibility study, this effort primarily focused on the 1% AEP flows for model scenarios and modifications to the feasibility features. Once a decision was made on which features will be included in the final design, the other frequencies were modeled in order to be incorporated into the economic models. Further discussion on the preparation of the hydraulic data for the economic model can be found in the last section of this report titled "Hydraulic Information for Economic Analysis".

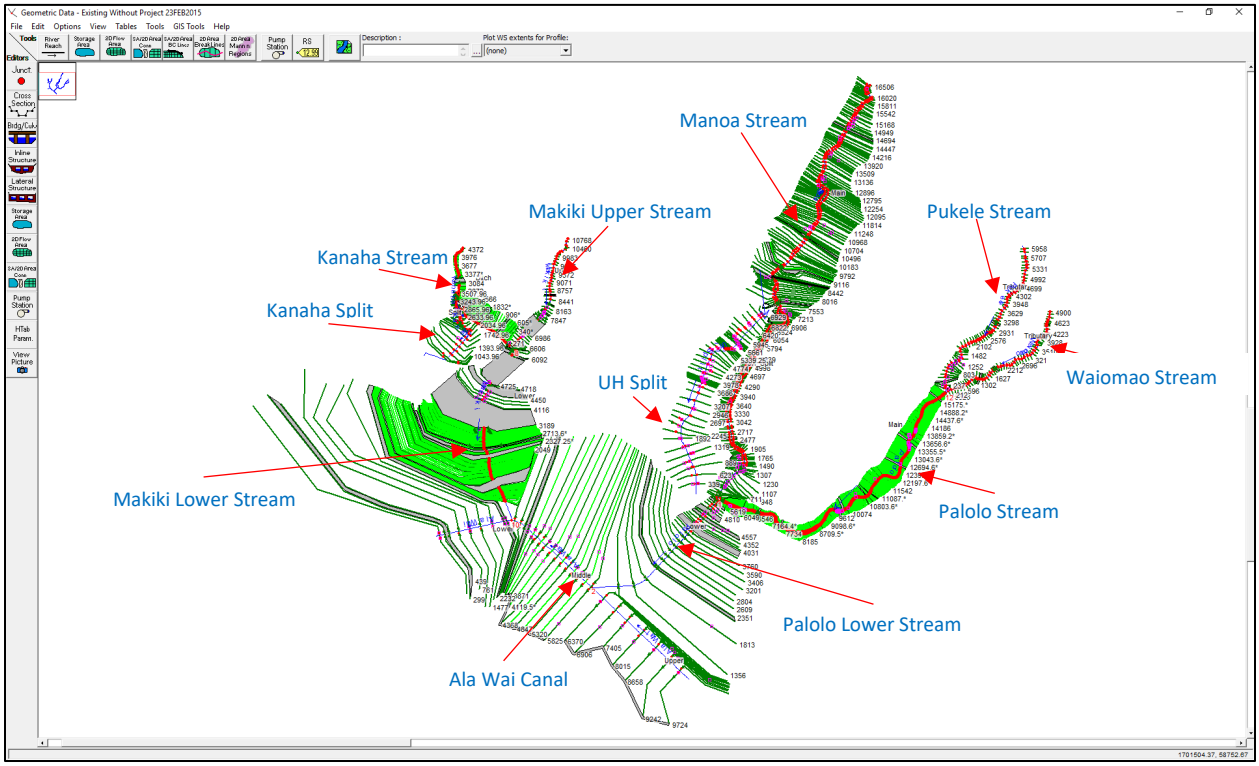

Figure 1: Original HEC-RAS Geometry Schematic

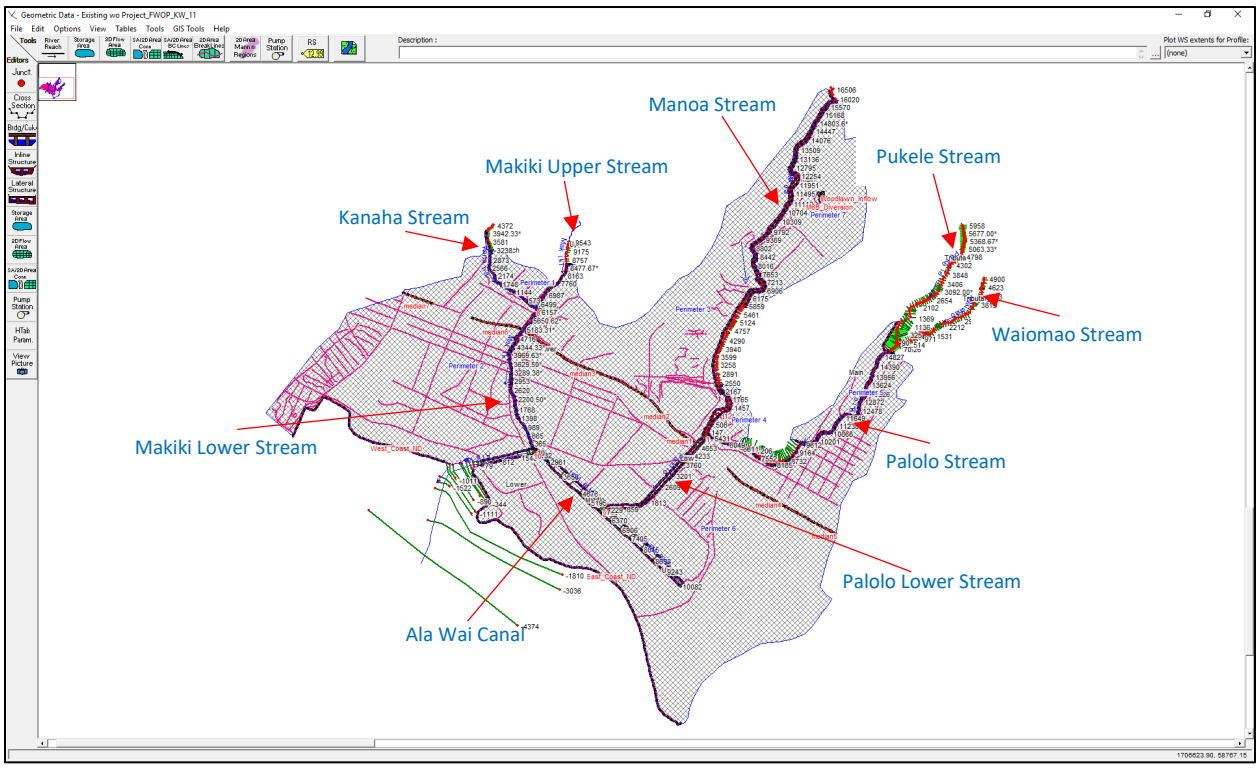

Figure 2: Updated HEC-RAS Geometry Schematic

Study Reaches

The Makiki Stream portion of the HEC-RAS model starts from the confluence with the Ala Wai Canal to a point approximately 2.0 miles upstream and includes the Kanaha Ditch Tributary from its confluence with Makiki Stream to a point approximately 0.8 miles upstream. The Makiki Reach was modified to add the Kapiolani Blvd Bridge near the confluence with the Ala Wai Canal. This bridge was left out in previous studies. This bridge is critical in modeling both the backwater and headwater effects of this constriction, especially since the proposed Ala Wai floodwalls from the tentatively selected plan (TSP) involves tying the floodwalls into the bridge. However, the pedestrian walkway bridges were ignored in the model because they appear sufficiently high to not impact water surface elevations. The stream channels of both Makiki and Kanaha Streams have been highly modified with concrete and confined from the point when they enter the urbanized area and include sections when the stream channel is confined to sections entirely underground.

The Manoa Stream reach extends from the confluence with Manoa-Palolo Drainage Canal upstream about 3.1 miles to the point where the Waihi and Waiakeakua Stream tributaries meet. The Manoa Stream channel is mostly natural with some segments modified by concrete channel or stream bank hardening.

The Palolo Stream Main reach extends upstream approximately 1.9 miles from the confluence with the Manoa-Palolo Drainage Canal. Upstream of Palolo Stream, the Pukele Stream and Waiomao Stream tributaries were modeled, extending 1.1 and 0.9 miles upstream. The Palolo Stream Main reach channel is mostly confined to one large concrete channel with a few segments composed of natural channels.

The Manoa-Palolo Drainage Canal is called the Palolo Stream Lower reach in the model and extends about 0.9 miles from the Ala Wai Canal to the confluence of the Manoa and Palolo Stream. This canal consists of a modified channel with segments of natural bed and banks, but mostly hardened stream banks.

The Ala Wai Canal section is modeled using three reaches from the mouth of the to the Makiki Stream confluence (Lower), from Makiki Stream to the Manoa-Palolo Drainage Canal confluence (Middle), and from the Manoa-Palolo Drainage Canal confluence to the upstream end (Upper). The Ala Wai Canal channel has a natural bottom with hardened banks and has tidal influence. Bathymetric data was collected by Oceanit in 2008 and used to compute the cross-section data for the canal.

Terrain

Topographic data for the hydraulic model is primarily based on airborne light detection and ranging (LIDAR) data. The terrain used for this study was generated from 3 different data sources. The terrain data included SHOALS (Scanning Hydrographic Operational Airborne LiDAR Survey) data for the bathymetric coastal waters, LiDAR that was originally collected prior to February 21, 2007 by Airborne1, and bathymetric survey data for the Ala Wai Canal that was conducted by Oceanit on May 12, 2008. The airborne LiDAR data was collected, processed, and verified by Oceanit and their sub consultants in late 2006 and early 2007. The LiDAR data has an accuracy of 45 cm (1.5 ft) horizontal, 37 cm (1.2 ft) vertical and was processed with 1 ft horizontal point spacing. Datum of data is NAD 1983 HARN projected into Stateplane_Hawaii_3_FIPS_5103_Feet horizontal and mean sea level vertical. The quality of the terrain data used in the HEC-RAS model has been updated compared to the terrain data that was provided for

the original model which was based on a 3 ft horizontal point spacing. The figures below show the difference between the datasets. It's suspected the reduction in the quality of the terrain data was due to conversions that were deemed necessary during the original study. The documentation from the previous study indicates that the terrain data was converted to a TIN (Triangulated Irregular Network) for the application of HEC-GeoRAS which may be the cause of the triangulated areas in the floodplain. The mountainous regions appear to match the LiDAR for the current study and only the flat floodplains areas seem to have been degraded in the previous study. The higher quality terrain was also modified to remove some bridge decks that were not properly removed so that water could move freely in these areas. In addition, the channel data from the existing HEC-RAS cross-sections was used to burn-in channel bathymetry in the terrain to provide improved mapping for the channels. Finally, the terrain for some scenarios was modified to include some of the proposed structures such as Makiki Detention Basin, Pukele Detention Basin, Waiomao Detention Basin, and a deeper sedimentation basin within the golf course. These scenarios included modifications 1 – 8, the TSP plan, and the final proposed features plan. The detention basin terrain was produced by the detention basin designers from the Seattle District. They provided the updated terrain from their CAD software. To incorporate this into the HEC-RAS terrain data, the detention basin terrain was selected as additional terrain data along with the channel terrain data and the LiDAR terrain. The detention basins were set as top priority, followed by the channel terrain and then finally the LiDAR terrain. HEC-RAS created a tiled terrain dataset using all the provided terrain datasets.

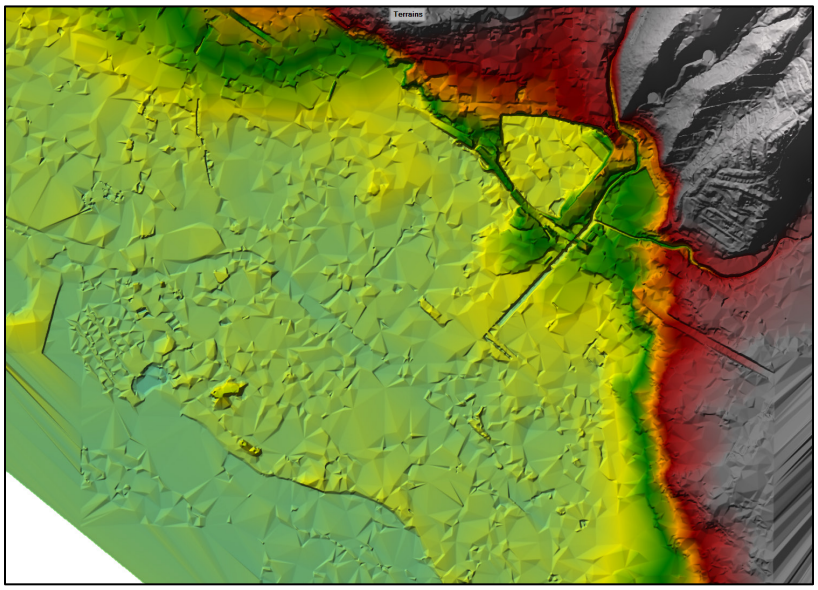

Figure 3: Terrain Data provided with Original Model

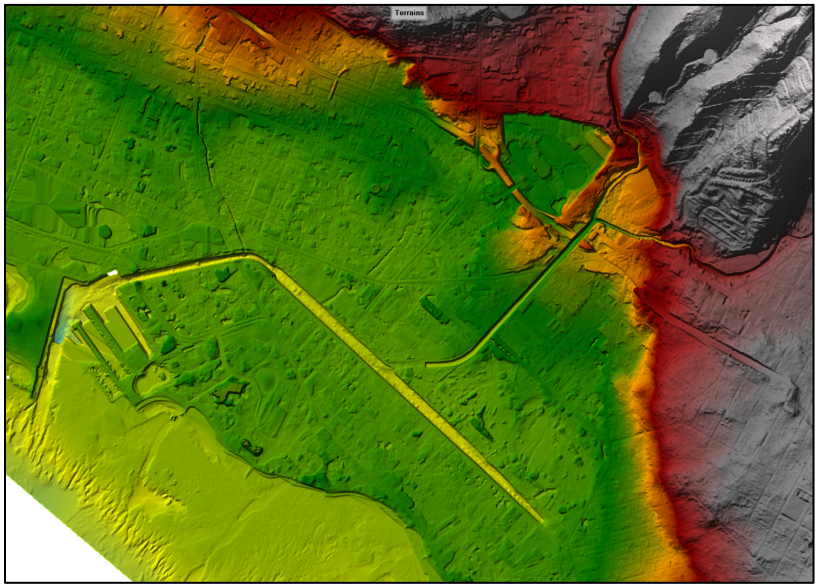

Figure 4: Terrain Data used in the Updated HEC-RAS Model

In addition to the topographic data, additional survey data was collected to improve the modeling. Surveys were collected for the wall along the left bank of the Manoa Stream from Kanewai Field to the confluence with the Palolo Stream. This survey data was input directly into the model as a lateral structure.

Cross-Sections

Overview

The updated hydraulic model uses 1D cross-section for the channel and 2D flow areas for the overbanks except for the Pukele and Waiomao reaches which used the same cross-section data from the previous study. In addition, the upstream portions of Kanaha and Makiki also used the full cross-section extent because these areas are steep, highly gravity driven, have small overbanks, and the dominant flow direction follows the general river flow path which make them appropriate areas to be modeled by 1D geometry.. For areas with 2D flow areas, the original 1D cross-sections were trimmed to the channel area. This included trimming bridge data and other structures data to the reduced cross-sections. The original channel data in the 1D cross-sections was retained for this study. In addition, since the overbanks are now modeled with 2D areas, the “dummy” reaches from the previous study were removed since the 2D would be to model these areas more appropriately. The “dummy” reaches that were removed included the “UH_Split” reach and the “Kanaha Split” reach. These “dummy” reaches were 1D reaches that were added into overbank areas to simulate flow that has left the main channel and flowed along the overbank areas through the University of Hawaii (UH_Split) and south of the Kanaha Stream (Kanaha_Split). There are no real channels that exist in these areas, but the reaches were added to simulate overland flow. Additional cross-sections were added to the model to extend the Ala Wai Lower Reach further into the ocean to prevent forcing a water surface elevation at the end of the study area. The Ala Wai Upper Reach was also extended further upstream near the end of the canal. The previous model started the reach about 300 feet downstream of the east end of the canal near the public library.

Ineffective Flow

Since the cross-sections were reduced to the channel extents for most areas, ineffective areas were not necessary for most of the modeled cross-sections. However, any ineffective areas that were used in the previous model where the full cross-sections were retained (i.e. upper reaches of Kanaha, Makiki, Pukele, and Waiomao), the ineffective areas were preserved. In addition, any ineffective areas that were located around bridges and within the new reduced cross-section footprint, were also preserved.

Manning's "n" Roughness

Manning's n-values were determined based on-site visits conducted by personnel from MMC, HEC, and POH for the different reaches. The site visits were conducted 6-8 November 2018. Due to the lack of calibration data throughout the watershed, the roughness was estimated based on a consensus of several senior hydraulic engineers that participated in the site visits to ensure reasonable values were used for the channels. Since the 1D cross-sections were only used to model the channel portion, a composite 'n' value was used for the entire channel portion which would include the sides of the channels.

The range of Manning's n-values used can be roughly characterized by channel description. A summary of Manning's n-values used in the HEC-RAS model can be found in Table 1. Natural stream channels with minimal vegetation in the channel, steep banks, trees and brush on banks, and bottoms consisting of gravels, cobbles, and few large boulders were given values from 0.04 to 0.08. Natural channel sections that were uniform and contained smooth graveled beds were given a value of 0.028. The Ala Wai Canal was given an n-value of 0.03. Lined or concrete channels were given a value of 0.022 to 0.025. For concrete lined channels on the Palolo, the roughness was estimated to be approximately 0.022 due to the aged concrete, exposed aggregate, and steepness. For Makiki, concrete lined channels were given a value of 0.025 due to the sedimentation, plant growth along the wall, and the rougher side walls that were made with lava stone. The majority of overbank areas in mixed urban areas or overland flow areas were given values of 0.07 to 0.125. The overbank values varied based on the landuse type in the overbank. For example, overbank cross-sections that intersected open park areas had a lower value compared to those that more vegetation or higher density of buildings. Manning's n-values for the study reaches is show in Table 1.

Table 2: Manning's n-values used for 1D cross-sections

Manning's n-values used for 1D Cross-Sections in the Ala Wai Watershed HEC-RAS Model						
Model Stream Names		**Model Cross-Section Range**		**Channel Section**		
River	**Reach**	**From**	**To**	**Left Overbank**	**Main Channel**	**Right Overbank**
Ala Wai	Upper	10082	6095	0.03	0.03	0.03
Ala Wai	Middle	5770	2453	0.03	0.03	0.03
Ala Wai	Lower	2132	79	0.03	0.03	0.03

Ala Wai	Lower	67	-4374	0.04	0.04	0.04
Kanaha	Ditch	4372	3238	0.1 to 0.125	0.055	0.125
Kanaha	Ditch	3083	2	0.025	0.025	0.025
Makiki	Upper	9543	8687	0.125	0.04	0.125
Makiki	Upper	8595	6316	0.025	0.025	0.025
Makiki	Lower	6280	10	0.025	0.025	0.025
Manoa	Main	16506	15475	0.08	0.08	0.08
Manoa	Main	15408	14692	0.05	0.05	0.05
Manoa	Main	14636	12896	0.045	0.045	0.045
Manoa	Main	12795	10566	0.055	0.055	0.055
Manoa	Main	10496	9792	0.045	0.045	0.045
Manoa	Main	9691	8775	0.02	0.02	0.02
Manoa	Main	8699	8646	0.025 to 0.04	0.025 to 0.04	0.025 to 0.04
Manoa	Main	8588	7213	0.045	0.045	0.045
Manoa	Main	7106	6129	0.055	0.055	0.055
Manoa	Main	6054	2550	0.065	0.065	0.065
Manoa	Main	2477	1644	0.06	0.06	0.06
Manoa	Main	1543	1230	0.055	0.055	0.055
Manoa	Main	1107	468	0.04	0.04	0.04
Manoa	Main	417	84	0.045	0.045	0.045
Palolo	Main	15526	15216	0.09 to 0.125	0.025 to 0.022	0.1 to 0.045
Palolo	Main	15134	8951	0.022	0.022	0.022
Palolo	Main	8838	7552	0.08	0.08	0.07
Palolo	Main	7482	7102	0.05	0.05	0.05
Palolo	Main	7000	6611	0.08	0.022	0.08
Palolo	Main	6546	5369	0.022	0.022	0.022

Palolo	Main	5341	5303	0.035	0.035	0.035
Palolo	Lower	5198	4810	0.035	0.035	0.035
Palolo	Lower	4653	229	0.028	0.028	0.028
Pukele	Tributary	5958	2004	0.125	0.06	0.125
Pukele	Tributary	1893	386	0.125	0.022	0.125
Pukele	Tributary	325	50	0.125	0.025	0.125
Waiomao	Tributary	4900	1724	0.125	0.08	0.125
Waiomao	Tributary	1627	514	0.125	0.07	0.125
Waiomao	Tributary	414	70	0.125	0.025	0.125

Bridges and Culverts

Bridge data from the previous model was utilized in the updated model. Site visits were conducted on several bridges to verify dimensions and the model was updated accordingly. In addition, the Kapiolani Blvd Bridge on the downstream of Makiki was added to the model between RS 555 and 425 and the Woodlawn Drive Bridge on Manoa was updated reflect recent improvements to the channel at the bridge and downstream of the bridge between RS 7885 and 7290. For the Kapiolani Blvd Bridge on Makiki, an inspection report dated January 2018 was used to estimate dimensions. For the Woodlawn Drive Bridge improvements, plans were provided by the State of Hawaii Department of Land and Natural Resources (DLNR). The improvements included removing sediment and debris accumulation approximately 40 feet upstream of the bridge, under the bridge and approximately 500 feet downstream of the bridge. In the vicinity of the bridge, the sediment and debris was removed down to the concrete and riprap bottom of the channel. Downstream of the bridge, the channel was graded on a 0.5% slope for approximately 500 feet. Since the Woodlawn Drive improvements were made after the last observed calibration event (i.e. 2006), the improvements were not included in the calibrated geometry but were included in all the other geometries including the "without project" geometry. The improvements at Woodlawn Drive will reduce the water surface elevation (WSEL) around this area and would reduce the amount of flow leaving the channel at the Woodlawn Drive area which should reduce the amount of flooding through the University of Hawaii. Since the primary flooding of the 2004 flood event was at the University of Hawaii and was due to the restricted flow and debris at the Woodlawn, it would not be appropriate to use the improvements for the calibration events. During a November 2018 site visit, this area was still under construction but was eventually finished in time for the improvements to be added to the model. Unfortunately, due to the lack of instrumentation in the areas and lack of observed data since the improvements were complete, the model could not be calibrated with the improvements. Using the 1967 event since it was a high flow event on the Manoa Stream but did not have the debris issue at Woodlawn Drive Bridge like the 2004 event, a sensitivity was performed to determine the potential impact of these improvements. With the improvements, the WSEL above the Woodlawn Bridge dropped a maximum of approximately 3 ft right at the upstream face of the bridge

but increased the WSEL downstream of the bridge between approximately 0.5 to 1.0 ft due to the increase conveyance under the bridge. For the 1967 event, the Woodlawn Drive Bridge improvements allowed an additional approximately 1,000 cfs through the bridge. These impacts were seen on Manoa Stream downstream of the Woodlawn Drive bridge to the confluence with the Palolo Stream.

The updated model also converted the culverts and bridges on the Makiki Reach to cross-sections with lids. This was done to increase stability in the area and to more appropriately model the longer culverts that go underground for several city blocks. Having cross-sections with lids, allows multiple cross-sections along the length of the culvert rather than having cross-sections only on the upstream and downstream ends of the culverts. The use of lids still allows a reduction in conveyance when the conduits flow full because when the water level hits the low chord of the culvert or bridge, the program increases the wetted perimeter to account for the bottom of the lid. Since the culverts were underground, the top of the lids were artificially raised to prevent water from flowing over the top of the lids since most water would flow into the overbank areas if the water surface elevations rise high enough and flow on top of the lids was not deemed to be realistic. In addition, Priessmann slots were used for several of the lids to allow for both open channel and pressurized flow in the conduit. Without this feature turned on, HEC-RAS would not be able to account for the effects of pressure flow in the conduit. According to the HEC-RAS 5.0 Hydraulic Reference Manual, HEC-RAS uses the Priessmann slot theory which suggests that pressure waves can be simulated by equating the wave celerity to the acoustic celerity. When the Priessmann slot is turned on in HEC-RAS, the program inserts a slot of a constant width and infinite height above the top of the conduit with the width of the slot being determined by the equating the celerity wave to the acoustic wave. When the water is high enough (i.e. at the top of the conduit) the wave celerity will be equivalent to the acoustic wave. A sensitivity was performed for some of the shorter bridges that were modeled as lids with the Priessmann slot turned on and off. The analysis showed that the shorter bridges were not sensitive to the Priessmann slot option which was most likely due to the fact of the shorter distance where the wave celerity was equated to the acoustic wave was not of significant length to significantly impact the flow through the bridge. However, for the longer culverts on the Makiki and some on the Kanaha reach would be impacted. As a result, the Priessmann slot was used in the model.

For the calibration and the without project conditions, several bridges were modeled with simulated debris. The 2004 event in particular had additional debris problems on the Woodlawn Drive Bridge and for this particular event, a blocked obstruction was used on the cross-section (RS 7819) just upstream of Woodlawn Drive Bridge to simulate the debris blockage on that bridge during the 2004 event. The dimensions of the debris were carried over from the previous study. The debris was modeled as either a blocked obstruction on the upstream cross-section for bridges or as depth blockage for structures modeled using the culvert feature in HEC-RAS. Table 2 provides a list of bridges in the model and if debris was applied to the bridge.

Table 3: Bridge and Culvert Information

Bridge and Culvert Information

Model Stream Names		Model Cross-Section Location	Name of Crossing	Type of Structure	Bed Material under Crossing	Percent Blockage used for Debris	Model Structure Type
River	Reach						
Ala Wai	Middle	2910	McCully St	Bridge w/ Piers	Natural	----	Bridge/Culvert
Ala Wai	Lower	2066.5	Kalakaua Ave.	Bridge w/ Piers	Natural	----	Bridge/Culvert
Ala Wai	Lower	73	Ala Moana Blvd	Bridge w/ Piers	Natural	----	Bridge/Culvert
Kanaha	Ditch	3168	Nehoa St	Box Culvert	Concrete	25%	Bridge/Culvert
Kanaha	Ditch	2346	Lewalani Dr	Box Culvert	Concrete	----	Bridge/Culvert
Kanaha	Ditch	1713	Liholiho St	Bridge	Concrete	----	Bridge/Culvert
Kanaha	Ditch	1533	Private Drive	Bridge	Concrete	----	Bridge/Culvert
Kanaha	Ditch	1386	Kewalo St	Bridge	Concrete	----	Bridge/Culvert
Kanaha	Ditch	798	Keeamoku St	Bridge	Concrete	----	Bridge/Culvert
Kanaha	Ditch	237	Makiki St	Arch Culvert	Concrete	----	Bridge/Culvert
Kanaha	Ditch	3 to 196	Underground Section U/S of Makiki Confluence	Bridge	Concrete	----	Lid
/Makiki	Upper	8575	Makiki St	Bridge	Concrete	25%	Bridge/Culvert
Makiki	Upper	8290	Oneele Pl	Bridge	Natural	----	Bridge/Culvert
Makiki	Upper	7974	Private Drive	Bridge	Natural	----	Bridge/Culvert
Makiki	Upper	7330	Nehoa St	Box Culvert	Concrete	----	Bridge/Culvert
Makiki	Lower	6231 to 6279	Anapuni St	Box Culvert	Concrete	----	Lid
Makiki	Lower	5960 to 6079	Wilder St	Bridge	Concrete	----	Lid
Makiki	Lower	4716 to 5931	Underground Section D/S of Wilder St	Box Culvert	Concrete	----	Lid
Makiki	Lower	4431 to 4624	Wooden Deck Bridge D/S of Underground Section	Bridge	Natural	----	Lid
Makiki	Lower	3176 to 4083	Underground Section at S. Beretania St	Box Culvert	Concrete	----	Lid

Makiki	Lower	2523 to 2554	Private Drive	Bridge	Natural	----	Lid
Makiki	Lower	2393.5 to 2458	Phillip St	Bridge	Concrete	----	Lid
Makiki	Lower	2131 to 2270	Covered Section D/S of Phillip St	Bridge	Concrete	----	Lid
Makiki	Lower	1120.5 to 1380	Fern St	Bridge	Concrete	----	Lid
Makiki	Lower	425 to 555	Kapiolani Blvd	Bridge	Concrete	----	Lid
Manoa	Main	14636 to 14692	Pawaina St	Bridge	Natural	----	Lid
Manoa	Main	10460 to 10496	Kahaloa Dr	Bridge	Concrete	----	Lid
Manoa	Main	9273	Lowrey Ave	Bridge	Concrete	----	Bridge/Culvert
Manoa	Main	8749	E Manoa Rd	Bridge w/ Piers	Concrete	25%	Bridge/Culvert
Manoa	Main	7756	Woodlawn Dr	Bridge	Natural	45%	Bridge/Culvert
Manoa	Main	2520	Dole St	Bridge w/ Piers	Natural	----	Bridge/Culvert
Palolo	Main	15248	Kiwila St	Box Culvert	Concrete	----	Bridge/Culvert
Palolo	Main	13462 to 13514	Kahlua Rd	Bridge	Concrete	----	Lid
Palolo	Main	12621	Paalea St	Box Culvert	Concrete	----	Bridge/Culvert
Palolo	Main	11042 to 11064	Private Rd	Bridge	Concrete	----	Lid
Palolo	Main	10851 to 10868	Private Rd	Bridge	Concrete	----	Lid
Palolo	Main	9873	Palolo Ave	Arch Culvert	Concrete	----	Bridge/Culvert
Palolo	Main	7515	3rd Ave	Arch Culvert	Concrete	----	Bridge/Culvert
Palolo	Main	6578	St. Louis Dr	Arch Bridge	Concrete	----	Bridge/Culvert
Palolo	Main	6049 to 6069	Footbridge	Bridge	Concrete	----	Lid
Palolo	Main	5341 to 5369	Koali Rd	Bridge	Concrete	----	Lid
Palolo	Lower	5110	Waialaie Ave	Bridge w/ Piers	Natural	----	Bridge/Culvert
Palolo	Lower	4732	H1 Highway	Bridge w/ Piers	Natural	----	Bridge/Culvert

Palolo	Lower	4501	South King St	Bridge w/ Piers	Natural	----	Bridge/Culvert
Palolo	Lower	4031	Kapiolani Blvd	Bridge w/ Piers	Natural	----	Bridge/Culvert
Palolo	Lower	2317	Date St	Bridge w/ Piers	Natural	----	Bridge/Culvert
Pukele	Tributary	3172	Palolo Ave	Box Culvert	Natural	25%	Bridge/Culvert
Pukele	Tributary	355	Ahe St	Box Culvert	Concrete	----	Bridge/Culvert
Waiomao	Tributary	1924	10th Ave Pl	Box Culvert	Concrete	25%	Bridge/Culvert
Waiomao	Tributary	1268	10th Ave	Double Box Culvert	Concrete	10%	Bridge/Culvert

Inline Structures

Several inline structures were used in the model to increase the stability around steep drops in the channel profile. An example is the steep concrete drop off just upstream of Lowrey Ave and the waterfall that is on the downstream end of the Manoa Channel just upstream of the confluence with the Palolo Channel. Table 3 list the inline structures in used in the model.

Table 4: Inline Structure Information

Inline Structure Information			
Model Stream Names		**Model Cross-Section Location**	**Purpose of Structure**
River	**Reach**		
Kanaha	Ditch	4277	Stability for steep slope
Manoa	Main	15474	Stability for steep slope
Manoa	Main	14261	Stability for steep slope
Manoa	Main	9281	Steep Concrete Drop just upstream of Lowrey Ave Bridge
Manoa	Main	4627	Stability for steep slope
Manoa	Main	1643	Stability for steep slope
Manoa	Main	487	Waterfall
Palolo	Main	10073	Stability for steep slope
Palolo	Main	7963	Stability for steep slope
Palolo	Main	7380	Stability for steep slope
Pukele	Tributary	3847	Stability for steep slope
Waiomao	Tributary	4489	Feature from previous model (no documentation of structure)

Lateral Structures

Lateral structures were used to transfer flow between the 1D channel sections to the 2D flow areas. For most of these connections, the "normal 2D equation domain" was used as the overflow computational method since the connection represented overland flow and not a weir type structure. However, some connections were modeled using the weir equation because these areas had walls or other features that may act like weirs such as raised walls along the Makiki Reach and the lateral structure connecting the Manoa Reach to the Kanewai Field since this area has a concrete wall and for the with project condition it will have a weir to allow flow into Kanewai Field. In addition, some lateral structures were manually edited in locations where the terrain data was not properly defining some features. For example, the lateral structures along the Makiki were raised to match the top of bank since this is a concrete lined channel, with known dimensions. The lateral structure on the east bank of the Manoa reach between Kanewai Field and the confluence with Palolo was modified with survey data that was collected to better define a wall along Koali Rd. The lateral structure elevations were also modified on the Makiki reach where lids were used to prevent the flow over the lateral structures since the flow would be underground and could not realistically overtop the lateral structure.

Two-Dimensional Flow Areas

Overview

2D flow areas are used extensively throughout the model for the overbank areas due to the lateral flows and multiple flow paths in the wide and flat floodplains, which are more accurately modeled with 2D versus 1D modeling. In total, seven 2D flow areas are used to represent the overbank areas of the Kanaha, Makiki, Manoa, Palolo, and Ala Wai channels. The average cell size is approximately 80 ft with the largest cell being approximately 200 ft. There are almost 200 breaklines in the model to more accurately model hydraulically significant features with some breaklines having spacing as small as 10 ft cells. There are approximately 31,000 cells across the seven 2D flow areas.

Internal Hydraulic Structures

In addition to breaklines, internal hydraulic structures were used in multiple locations in the 2D flow areas. It was determined that the median barrier along H-1 could impact the flow path, but it was not included in the terrain. Plans were located and the median was found to be approximately 4'8" in height. The height of the median barrier was added to the underlying terrain to represent this barrier. The median barrier was not modeled along H-1 where there were underpasses since the median would not obstruct the flow under the bridges. Features modeled as connections include several project features such as the Golf Course berm, Hausten Ditch berms, Kanewai Field berm, and the Woodlawn Detention Basin berm that will be described in other sections.

Manning's "n" Roughness for 2D

The roughness of the 2D areas were based on the 2011 Coastal Change Analysis Program (C-CAP) Land Cover for Oahu. The land cover data was supplemented with building footprints from a 2009 dataset from the National Geospatial-Intelligence Agency (NGA). Manning's roughness for some land cover fields were estimated using values from *Zhang, K & Yuepeng, L. 2017 "Transition of the Coastal and Estuarine Strom Tide Model to an Operational Model for Forecasting Storm Surges" Florida International*

University. The figure and table below show the values used for the 2D land cover data. For buildings, a high 'n' value was used to reduce conveyance but will also allow for some storage of the water. At first the buildings were set to a roughness of 99.0 but this was found to be too high since water was completely prevented from entering some cells. This number was eventually lowered to a 9.9 based on judgment since there is not clear reference material available to estimate this value. In addition, two Manning's override regions were created to overwrite and better represent the land cover in those areas since the current version of HEC-RAS does not allow for horizontal variation in Manning's n-values on a single cell face. These two particular areas were causing the water to unrealistically pile up in adjacent cells because the entire cell face was using the manning's value for buildings and so the water had nowhere else to go even though some water would be able to flow through the area since part of the cell face would be open to allow water through. Other cells that were using the building Manning's "n" value had other cells for the water to go around and did not artificially cause the water to pile up inside a cell but did allow the water to slow down in this area which was the point of having the building footprints in the Manning's layer. The first override region was placed in the vicinity of the Century Center on the right bank of the Makiki Lower reach near the confluence with the Ala Wai Canal (see Figure 5 below). This building has a partial ground (pg) opening at ground level for parking areas and would allow more flow through this area around the parked cars compared to a solid building and would prevent the WSEL in this area from unrealistically backing up several feet high in the cell to the northwest. The other override region was placed north of the Palolo Main reach around cross-section 10868 (see Figure 6 below). This particular cell face was using the building Manning's "n" value but there are areas of partial ground (pg) that would allow flow through this area and based on the terrain in the area, the flow could easily flow to the north and around the cell face, so the cell was unrealistically causing the WSEL in the cell to the east to pile up multiple feet compared to the adjacent cells. The override region was used to lower the roughness on the cell face and allow water to flow around buildings in that area.

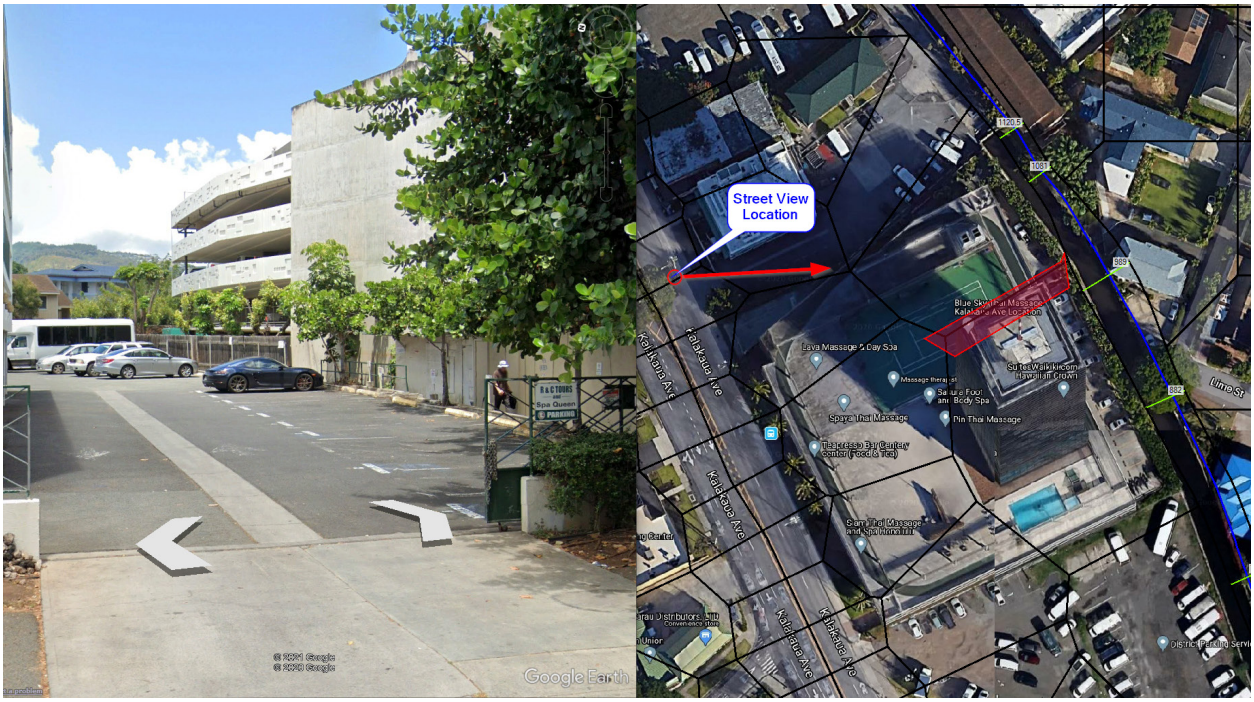

Figure 5: Manning's Override Region along Makiki Stream

Figure 6: Manning's Override Region along Palolo Stream

Table 5: Manning's n-values for 2D Flow Areas

Manning's n-values used for 2D Flow Areas in the Ala Wai Watershed HEC-RAS Model			
Name	**Manning's "n"**	**Override Regions**	
		Pg1 – Near Makiki	**Pg1(1) – Near Palolo**
buildings	9.9	0.1	0.1
open space developed	0.045	----	----
open water	0.02	----	----
palustrine emergent wetland	0.045	----	----
palustrine forested wetland	0.1	----	----
palustrine scrub shrub wetland	0.048	----	----
pasture/hay	0.033	----	----
scrub shrub	0.05	----	----
unclassified	0.035	----	----
unconsolidated shore	0.04	----	----
bare land	0.09	----	----
cultivated land	0.037	----	----
estuarine emergent wetland	0.045	----	----
estuarine forested wetland	0.1	----	----
estuarine scrub shrub wetland	0.048	----	----
evergreen	0.11	----	----
grassland	0.034	----	----
impervious surface	0.02	----	----

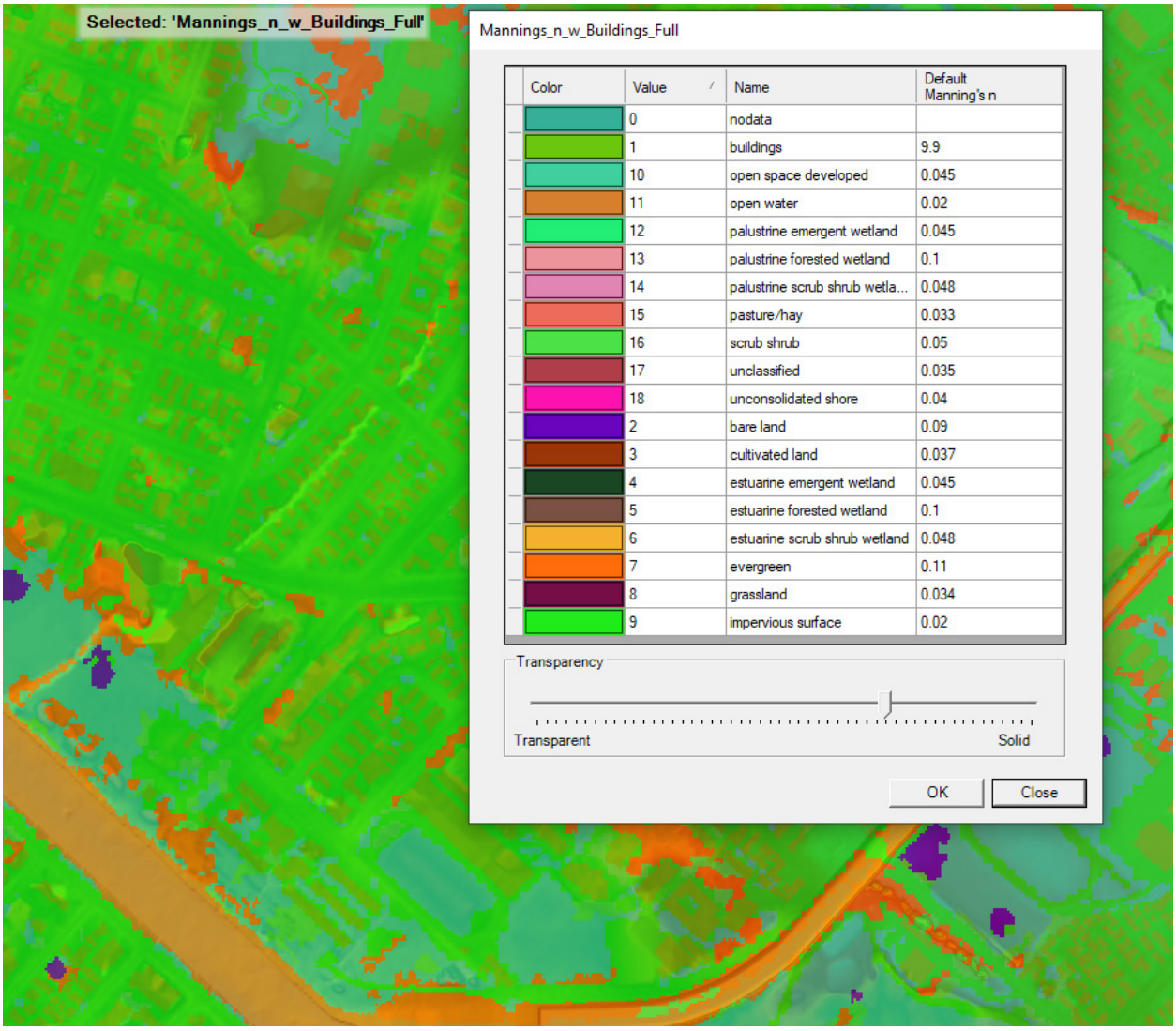

Figure 7: Manning's "n" Layer in RAS Mapper

Boundary Conditions

Since the updated HEC-RAS model is using unsteady flow compared to the steady flow that was used in the previous study, flow hydrographs were needed for the model. Results from the HEC-HMS frequency flows were used throughout the HEC-RAS model. The downstream boundary condition of the Ala Wai Canal was modeled as a stage hydrograph using a stage of 2.05 ft LMSL for the existing conditions and 2.50 ft for the future conditions. The elevation represents a combination of the mean high high water (MHHW) tide at the Honolulu Harbor tide gage coupled with inter-annual variability (IAV) and sea level rise. The MHHW was set to 1.08 ft LMSL and the IAV is 0.4 ft. The 2.05 ft LMSL elevation used for existing conditions represents a high sea level rise base condition predicted for the year 2025. The 2.5 ft LMSL elevation used for future conditions represents an intermediate sea level rise for the year 2075. The years 2025 and 2075 represent the bounds of the estimated 50-year design life. The sea level rise

elevation used for 2025 and 2075 were determined as part of the feasibility study. For this report, all scenarios were based on future year 2075 conditions.

Additional boundary conditions were placed on the 2D flow areas near the coast which included a normal depth boundary condition to allow for the water to exit the system since at this point the water would enter the ocean. The normal depth friction slope was based on an average ground slope around the area of the boundary condition line. The 2D boundary perimeter was located along ground higher than the max tidal elevation used in the model so that 2D flow area would not be inundated or impacted by tides but was located close enough to the ocean to map runoff inundation from interior flooding. The tables below include the boundary conditions used in HEC-RAS for the without project conditions and the Final Proposed Features condition. The boundary conditions that use HEC-HMS flows are indicated by the HEC-HMS feature in the fourth column and the data type in the last column. In addition, the table also includes the other boundary condition types and the associated type of connection. The final proposed features can be found in the Final Proposed Features section of this report.

Table 6: HEC-RAS Boundary Conditions for Without Project Conditions

River / Reach	HEC-RAS River Station/ Location	Boundary Condition Type	HEC-HMS Connection	HEC-HMS Data Type
Ala Wai / Upper	10082	Flow Hydrograph	JA1	FLOW
Kanaha / Ditch	4372	Flow Hydrograph	K2A	FLOW
Manoa / Main	16506	Flow Hydrograph	JUNCTION-5	FLOW
Pukele / Tributary	5958	Flow Hydrograph	JP1	FLOW-COMBINE
Waiomao / Tributary	4900	Flow Hydrograph	P2	FLOW
Ala Wai / Upper	9724 to 6370	Uniform Lateral Inflow	A6/W3	FLOW
Ala Wai / Middle	5687	Lateral Inflow Hydrograph	A4	FLOW
Ala Wai / Middle	4676	Lateral Inflow Hydrograph	RA1	FLOW-COMBINE
Ala Wai / Middle	5195 to 2513	Uniform Lateral Inflow	A2/W2	FLOW
Ala Wai / Lower	812	Lateral Inflow Hydrograph	A8	FLOW
Ala Wai / Lower	1188 to 79	Uniform Lateral Inflow	W1	FLOW
Kanaha / Ditch	4278 to 200	Uniform Lateral Inflow	K2B	FLOW
Makiki / Upper	7760	Lateral Inflow Hydrograph	K3	FLOW
Makiki / Lower	4716 to 3176	Uniform Lateral Inflow	K5	FLOW
Manoa / Main	16458 to 11951	Uniform Lateral Inflow	M3	FLOW
Manoa / Main	12795 to 11112	Uniform Lateral Inflow	M4	FLOW
Manoa / Main	10968	Lateral Inflow Hydrograph	WOODLAWN SEWERSYSTEM	FLOW

Manoa / Main	11039 to 9501	Uniform Lateral Inflow	M7	FLOW
Manoa / Main	10429	Lateral Inflow Hydrograph	M8	FLOW
Manoa / Main	9192	Lateral Inflow Hydrograph	M9	FLOW
Manoa / Main	8871 to 7734	Uniform Lateral Inflow	M10	FLOW
Manoa / Main	7653 to 6241	Uniform Lateral Inflow	M11	FLOW
Manoa / Main	2891	Lateral Inflow Hydrograph	M12	FLOW
Manoa / Main	1807	Lateral Inflow Hydrograph	M13	FLOW
Manoa / Main	1230	Lateral Inflow Hydrograph	M14	FLOW
Palolo / Main	15440	Lateral Inflow Hydrograph	P5	FLOW
Palolo / Main	15134 to 9709	Uniform Lateral Inflow	P6	FLOW
Palolo / Main	9520 to 5525	Uniform Lateral Inflow	P7	FLOW
Palolo / Lower	4352	Lateral Inflow Hydrograph	A3	FLOW
Pukele / Tributary	3514 to 237	Uniform Lateral Inflow	P4	FLOW
SA: Perimeter 7	BC Line: Woodlawn Inflow	Flow Hydrograph	WOODLAWN	FLOW-LOCAL
SA: Perimeter 7	BC Line: M6B_Diversion	Flow Hydrograph	WOODLAWN SEWERSYSTEM	FLOW-DIVERSION
Makiki / Upper	9543	Flow Hydrograph	K1	FLOW
Makiki / Lower	6279.67 to 5931	Uniform Lateral Inflow	K4	FLOW
Makiki / Lower	3062 to 203	Uniform Lateral Inflow	K6	FLOW
River / Reach	**HEC-RAS River Station/ Location**	**Boundary Condition Type**	**Boundary Condition Description**	
Ala Wai / Lower	-4374	Stage Hydrograph	2.05 ft existing condition / 2.5 ft future condition	
SA: Perimeter 2	BC Line: West_Coast_ND	Normal Depth	Friction slope: 0.001	
SA: Perimeter 6	BC Line: East_Coast_ND	Normal Depth	Friction slope: 0.001	

Table 7: HEC-RAS Boundary Conditions for Final Proposed Project Conditions

River / Reach	HEC-RAS River Station/ Location	Boundary Condition Type	HEC-HMS Connection	HEC-HMS Data Type
Ala Wai / Upper	10082	Flow Hydrograph	JA1	FLOW
Kanaha / Ditch	4372	Flow Hydrograph	K2A	FLOW
Manoa / Main	16506	Flow Hydrograph	JUNCTION-5	FLOW
Pukele / Tributary	5958	Flow Hydrograph	JP1	FLOW-COMBINE
Waiomao / Tributary	4900	Flow Hydrograph	P2	FLOW
Ala Wai / Upper	9724 to 6370	Uniform Lateral Inflow	A6/W3	FLOW
Ala Wai / Middle	5687	Lateral Inflow Hydrograph	A4	FLOW
Ala Wai / Middle	4676	Lateral Inflow Hydrograph	RA1	FLOW-COMBINE
Ala Wai / Middle	5195 to 2513	Uniform Lateral Inflow	A2/W2	FLOW
Ala Wai / Middle	812	Lateral Inflow Hydrograph	A8	FLOW
Ala Wai / Middle	1188 to 812	Uniform Lateral Inflow	W1	FLOW
Kanaha / Ditch	4278 to 200	Uniform Lateral Inflow	K2B	FLOW
Makiki / Upper	7760	Lateral Inflow Hydrograph	K3	FLOW
Makiki / Lower	4716 to 3176	Uniform Lateral Inflow	K5	FLOW
Manoa / Main	16458 to 11951	Uniform Lateral Inflow	M3	FLOW
Manoa / Main	12795 to 11112	Uniform Lateral Inflow	M4	FLOW
Manoa / Main	10968	Lateral Inflow Hydrograph	WOODLAWN SEWERSYSTEM	FLOW
Manoa / Main	11039 to 9501	Uniform Lateral Inflow	M7	FLOW
Manoa / Main	10429	Lateral Inflow Hydrograph	M8	FLOW
Manoa / Main	9192	Lateral Inflow Hydrograph	M9	FLOW
Manoa / Main	8871 to 7734	Uniform Lateral Inflow	M10	FLOW
Manoa / Main	7653 to 6241	Uniform Lateral Inflow	M11	FLOW
Manoa / Main	2891	Lateral Inflow Hydrograph	M12	FLOW
Manoa / Main	1807	Lateral Inflow Hydrograph	M13	FLOW
Manoa / Main	1230	Lateral Inflow Hydrograph	M14	FLOW
Palolo / Main	15440	Lateral Inflow Hydrograph	P5	FLOW
Palolo / Main	15134 to 9709	Uniform Lateral Inflow	P6	FLOW
Palolo / Main	9520 to 5525	Uniform Lateral Inflow	P7	FLOW

Palolo / Lower	4352	Lateral Inflow Hydrograph	A3	FLOW
Pukele / Tributary	3514 to 237	Uniform Lateral Inflow	P4	FLOW
SA: Perimeter 7	BC Line: Woodlawn Inflow	Flow Hydrograph	WOODLAWN	FLOW-LOCAL
SA: Perimeter 7	BC Line: M6B_Diversion	Flow Hydrograph	WOODLAWN SEWERSYSTEM	FLOW-DIVERSION
Makiki / Upper	9543	Flow Hydrograph	K1	FLOW
Makiki / Lower	6279.67 to 5931	Uniform Lateral Inflow	K4	FLOW
Makiki / Lower	3062 to 203	Uniform Lateral Inflow	K6	FLOW
River / Reach	**HEC-RAS River Station/ Location**	**Boundary Condition Type**	**Boundary Condition Description**	
Ala Wai / Lower	-4374	Stage Hydrograph	2.05 ft existing condition / 2.5 ft future condition	
SA: Perimeter 2	BC Line: West_Coast_ND	Normal Depth	Friction slope: 0.001	
SA: Perimeter 6	BC Line: East_Coast_ND	Normal Depth	Friction slope: 0.001	
Bypass / Reach 1	1033.5	Flow Hydrograph	Steady 25 cfs	
Bypass / Reach 1	0	Normal Depth	Friction slope: 0.001	
Ala Wai / Upper	6270	Elevation Controlled Gates	Gate Structure at Pump Station	

Since the 1D cross-sections in the version of HEC-RAS that was used for this study cannot be dry, some minimum base flow was needed to maintain stability because the HEC-HMS hydrographs started with zero flow. The base flow was applied only to the upstream of each reach for the Kanaha, Makiki, Manoa, Pukele, Waiomao, and the Bypass reach. Since the Palolo was downstream of Pukele and Waiomao, it did not need an additional base flow. In addition, since the Ala Wai Canal would be filled to some level due to tidal conditions, a base flow was not necessary for the canal. The channel invert of the Ala Wai Canal is less than the tidal boundary of 2.05 ft LMSL for existing conditions and 2.5 ft LMSL for future conditions and so the channel will remained filled to some degree for the entire simulation (see figure below). All base flows were lower than the peak flow of the 2-year annual frequency event with the exception of the Bypass Reach which does not have a 2-year frequency flow. For that reach a base flow of 25 cfs was added so that the model would run and that was flow was developed under trial and error to determine the smallest flow required to prevent instabilities for low flows. The table below describes the base flows that were used in the model and the comparison of the peak flow from the 2-year annual frequency flows at those respective locations. The peak 2-year frequency flow was determined from the post-feasibility HEC-HMS model using the basin average Atlas 14 rainfall.

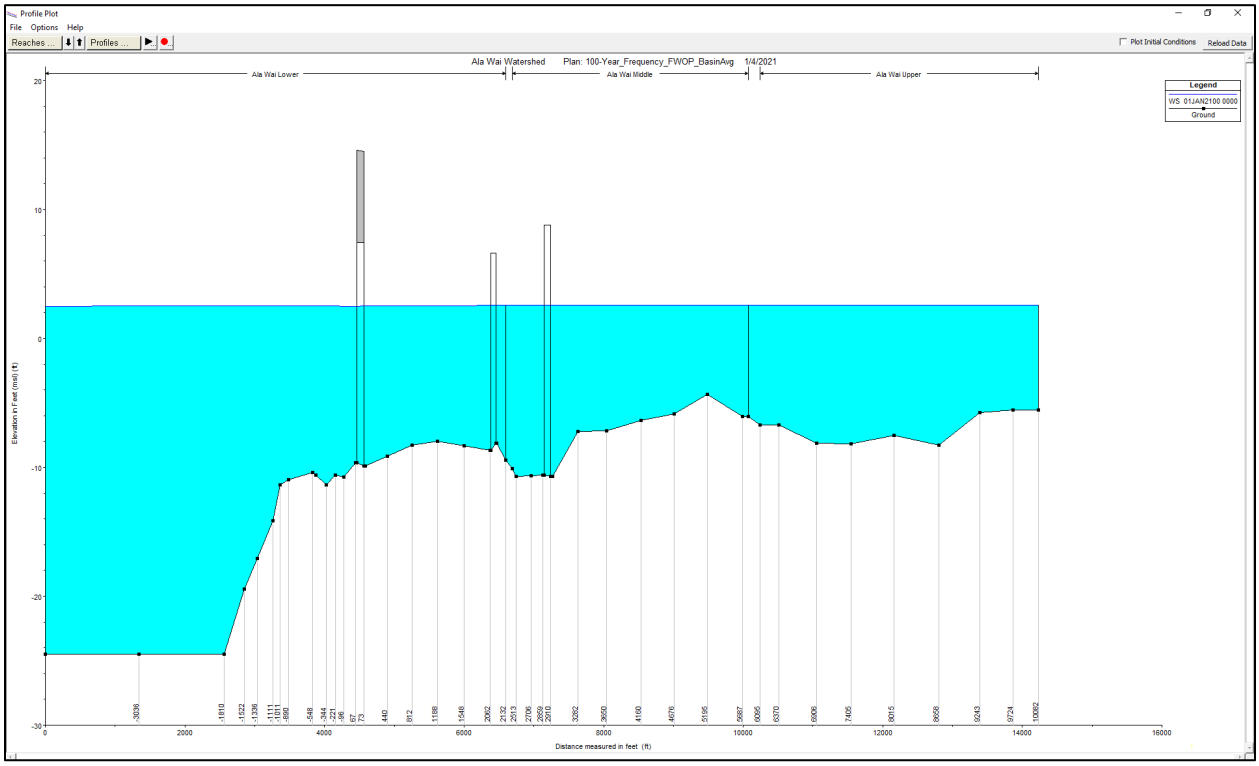

Figure 8: Ala Wai Canal Channel Profile with Tidal Boundary

Table 8: Base Flows used in HEC-RAS

Base Flow Information				
Model Stream Names		Model Cross-Section Location	Base Flow (cfs)	Peak Flow for 2 Year AEP (cfs) from HEC-HMS routed Atlas 14 Rainfall
River	Reach			
Kanaha	Ditch	4372	90	140
Manoa	Main	16506	500	1120
Pukele	Tributary	5958	200	380
Waiomao	Tributary	4900	200	450
Makiki	Upper	9543	200	230

Calibration and Without Project Scenario

Overview - Calibration

Three events were provided for calibration of the model. At the time the original study began, there have been only 3 significant events in the observed record, and these events, the 1967, 2004, and 2006 were used. Observed flows were not available in the detail needed to calibrate an unsteady model, so the HEC-HMS model was used to route the rainfall from those events and provide inflows into the model. It should be noted that only the Manoa-Palolo portion of the basin was available for the 2006 event. See the Hydrologic Report for this study to find out more about the HEC-HMS calibration for these 3 events.

Previous modeling on Manoa Stream (*Oceanit, 2008b*) was calibrated to the 2004 flood event on Manoa Stream. Previous modeling of the Ala Wai Canal (*U.S. Army Corps of Engineers, 2001 and 2005*) was calibrated to the limited data of the 1967 event on Palolo Stream and Manoa-Palolo Drainage Canal. Makiki and Kanaha Streams do not have any calibration or gaged data to aid in calibration or model comparison but are mostly concrete lined channels so the n-values should be stable. Calibrated n-values are assumed to also account for any sediment or debris "bulking" during those storm events.

The Ala Wai Watershed contains several active and inactive USGS Stream Gages, but the data is only reported on a daily interval. Due to the relatively rapid rise and fall of the flood wave (typically the flood wave passes within a few hours) the daily stage and/or discharge data was not adequate for calibration. However, Appendix A2 of the previous feasibility report from March 2017 did provide some comparison data for three of the USGS stream gage stations. This data can be found below in Table 8. There was at least one difficulty with the data which was that the gages are operated using a gage datum that does not correspond to a known datum (e.g. mean sea level) and so for the previous study an approximation of the gage datum had to be made to compare with the HEC-RAS model datum (i.e. LMSL). As stated in the Appendix A2 of the feasibility report, the approximation was made based on information provided by the USGS at their gage locations and the elevation data of the nearest HEC-RAS model cross-section. The Appendix A2 states that it was estimated for the feasibility 1D modeling that the conversion had a 1-foot error and that an additional difference of +/- 0.7 foot would result from model error and USGS rating curve error. The discharge value comparison from Appendix A2 is based on a common discharge values from the station rating curves and the HEC-RAS model results at that location. At USGS station 16242500 Manoa Str at Kanewai Field, Honolulu, Oahu, HI, two water surface elevations were computed for the conversion since the data points for the conversion were more vague than the other two locations. Table 8 includes the information from the feasibility study. The new results from this 2020 study were added to the last column. As can be seen from the comparison, the water surface elevations compare closely with those of the previous study and are within the expected error of +/- 1.7 feet.

Table 9: WSEL Comparisons at Select Locations between USGS Gages and HEC-RAS Model Outputs

USGS Gage Station Number	HEC-RAS Model Reach	HEC-RAS cross-section Location	Comparison Discharge (CFS)	Gage Water Surface Elevation Converted to Model Elevation	HEC-RAS Model Water Surface Elevation – 2017 Original Model	HEC-RAS Model Water Surface Elevation – 2020 New 1D/2D Model
16242500	Manoa Main	1230	4,450	36.4 or 38.8	38.07	38.02
16247000	Palolo Main	9520	1,200	96.2	95.72	95.92
16247100	Palolo Lower	3201	10,910	11.9	12.93	13.02

In addition to this limited data, some qualitative comparisons were made to ensure that model was producing reasonable results. For example, the 2004 event was known for flooding that flowed through the University of Hawaii after the flow left the channel at Woodlawn Drive Bridge due to debris pileup. There was also some shallow flooding observed on the downstream end of the Makiki near the confluence with the Ala Wai Canal. The 2004 modeling agrees with these observations and shows that the flooding for that event is primarily located through the University, as well as some shallow flooding at the lower end of Makiki near the confluence with the Ala Wai Canal. The figures below show the approximated observed inundation through the University of Hawaii from the 2004 event and the 2004 inundation from the new 1D/2D HEC-RAS model for the 2004 event. The modeled inundation matches closely with the provided approximated flood extent. Unfortunately, no images could be found of the flooding along Makiki during the 2004 event but some personnel with the Honolulu District were aware of the flooding locations and were able to validate the inundations that were provided out of the model for the flooding on the lower Makiki Stream during the 2004 event. For the 2006 event it was known that there was some flooding near the Iolani School and around the golf course and the modeling shows that these are primarily the only areas that flooded for the 2006. Unfortunately, no estimated extents were provided and so the exact footprint of the inundation could not be compared. The only image provided for the 1967 flood event is difficult to discern all the flooding but it is clear that the waters exceeded the banks of the Ala Wai Canal and the modeling shows flooding around the canal. There were also reports of street flooding during the 1967 flood in Waikiki and the modeling shows shallow flooding through portions of Waikiki. Unfortunately, no highwater marks were found which would provide more validation towards the model inundation.

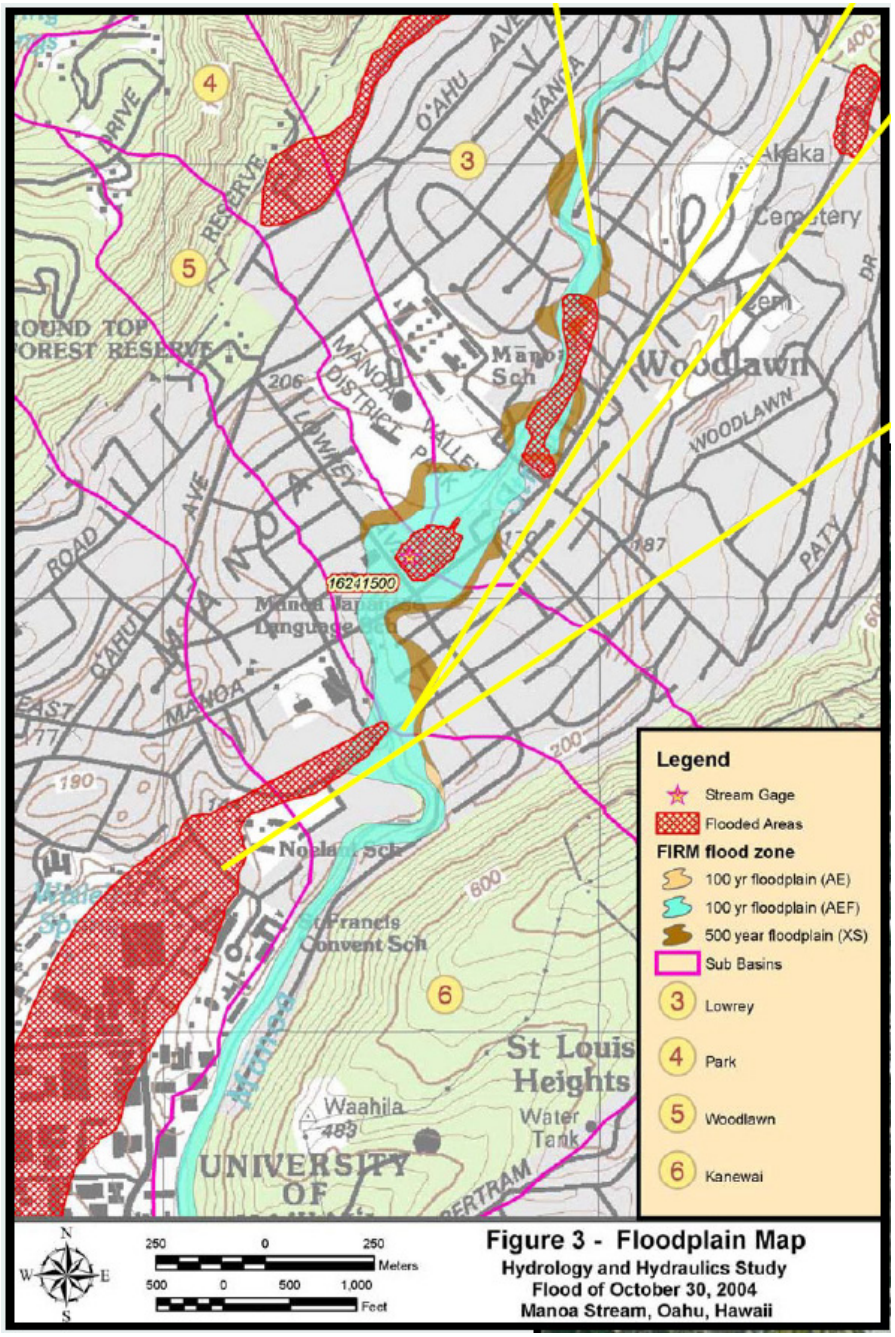

Figure 9: Approximate Flooding Extent from 2004 Event

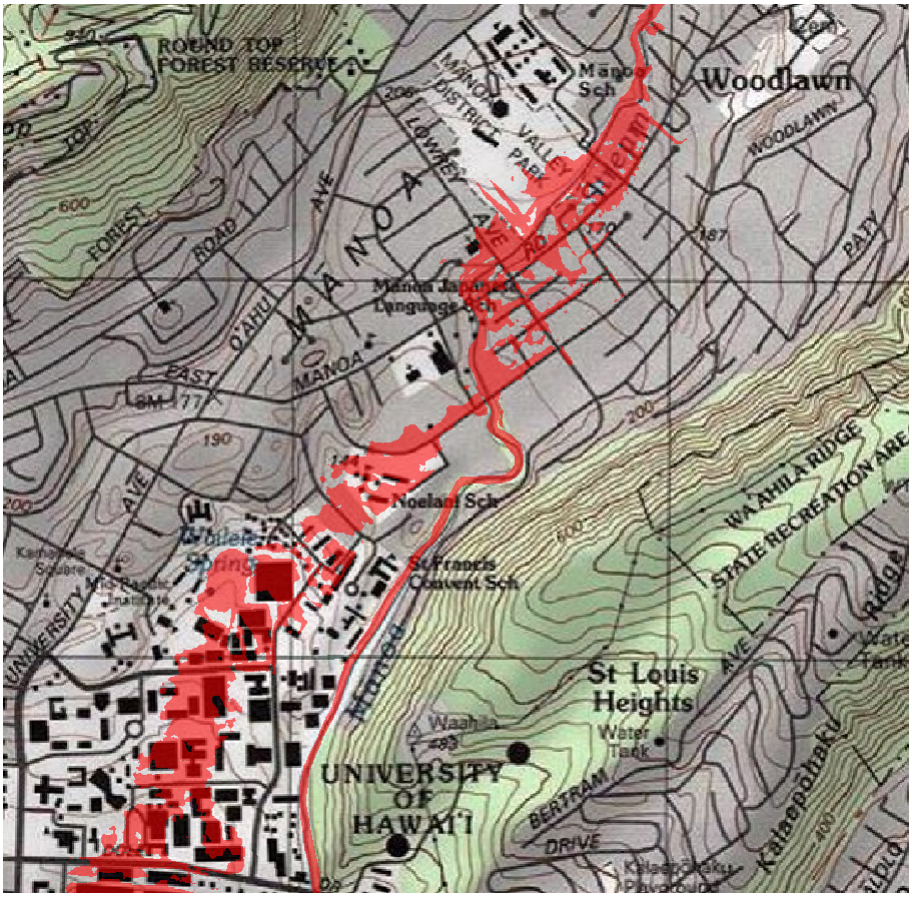

Figure 10: 2004 Flood Inundation with new HEC-RAS 1D/2D model

Figure 11: 2004 Flooding along the Ala Wai Canal during the 1967 flood

Overview – Without Project Scenario

The without project condition uses the same geometry as the calibration scenarios except the bridge at Woodlawn Drive and several cross-section below the bridge have been modified to account for improvements that have been made to the bridge and the excavation of the channel downstream of the bridge. These improvements were made within the last several years and occurred after all the calibration events. The improvements at Woodlawn Drive will reduce the WSEL around this area and would reduce the amount of flow leaving the channel at the Woodlawn Drive area which should reduce the amount of flooding through the University of Hawaii. Since the primary flooding of the 2004 flood event was at the University of Hawaii and was due to the restricted flow and debris at the Woodlawn, it would not be appropriate to use the improvements for the calibration events. During a November 2018 site visit, this area was still under construction but was eventually finished in time for the improvements to be added to the model. Unfortunately, due to the lack of instrumentation in the areas and observed data since the improvements were complete, the model could not be calibrated with the improvements. Using the 1967 event since it was a high flow event on the Manoa Stream but did not have the debris issue at Woodlawn Drive Bridge like the 2004 event, a sensitivity was performed to determine the potential impact of these improvements. With the improvements, the WSEL above the Woodlawn Bridge dropped a maximum of approximately 3 ft right at the upstream face of the bridge but increased the WSEL downstream of the bridge between approximately 0.5 to 1.0 ft due to the increase conveyance under the bridge. For the 1967 event, the Woodlawn Drive Bridge improvements allowed an additional approximately 1,000 cfs through the bridge. These impacts were seen on Manoa Stream downstream of the Woodlawn Drive bridge to the confluence with the Palolo Stream.

The table below shows a comparison of water surface elevations at select locations between the original model and the updated 1D/2D model. The updated model uses 2D areas in the overbanks and therefore does not have the University of Hawaii (UH Split) and south of the Kanaha Stream (Kanaha_Split) reaches. These reaches were 1D reaches that were added into overbank areas to simulate flow that has left the main channel and flowed along the overbank areas through the UH_Split and Kanaha_Split. There are no real channels that exist in these areas, but the reaches were added to simulate overland flow. These areas are being modeled with 2D areas and do not have similar locations to compare. It should also be noted that the inflows between the original model and updated 1D/2D model are different. The original model used steady state flows that were weighted using different methodologies which only produced a single peak flow and therefore could not be used for the 1D/2D model since it is an unsteady flow model. For the new 1D/2D model, HEC-HMS model results which routed Atlas 14 rainfall data were used. Unfortunately, in the table below, flow comparisons cannot be made between the original model and the new updated model due to the stark difference in how the overbank flows were modeled. For the 2D overbanks, it would be difficult to determine flows in the overbanks since the flow paths are not necessarily parallel to the channel.

The last column shows the difference between in the without project plan for the original feasibility 1D HEC-RAS model and the new 2020 1D/2D HEC-RAS model. A positive value indicates that the 2020 1D/2D model plan has a higher WSEL than the original 1D model. A negative indicates a reduction in WSEL with the 1D/2D model as compared to the original 1D model and a zero value indicates no change between the two models.

The comparison is for the 1% AEP event (100 year) using a basin average precipitation from Atlas 14. The final proposed features and without project conditions will be based on frequency flows developed using the Hydrologic Engineering Center's Watershed Assessment Tool (HEC-WAT). Details of the flows used in the post-feasibility study can be found in the Post-Feasibility Hydrology Report.

Table 10: WSEL Comparisons at Select Locations between Feasibility 1D HEC-RAS Model and Updated 1D/2D Model

HEC-RAS Reach Name	Cross-Section ID	Cross-Section ID		1% AEP Event (100 year) - Without-Project		
	Original Modeling	New 1D/2D Model	Location Description	Feasibility WSEL (ft)	20201D/2D Model WSEL (ft)	Difference (ft)
Ala Wai Lower	1477	1188		3.62	4.74	1.12
Ala Wai Middle	4847	4676		7.41	7.34	-0.07
Ala Wai Upper	8015	8015		8.27	7.55	-0.72
Kanahā Ditch	1874	1874		72.54	74.16	1.62
	3005	3004		78.59	79.58	0.99
Kanahā Split	1393.96	N/A		43.01	N/A	N/A
Makiki Lower	1719	1667	Fern	7.35	12.43	5.08
	4325	4301	Beretania	33.87	38.62	4.75
Makiki Upper	6606	6606	Wilder	71.57	69.84	-1.73
	9666	9543	Detention Basin	178.4	173.18	-5.22
Mānoa Stream Main Reach	948	948	Kanewai	38.5	37.33	-1.17
	5461	5461	St. Francis	116.77	118.03	1.26
	8367	8367	Manoa Marketplace	153.24	154.69	1.45
	9032	9032	E. Manoa Rd Bridge	163.52	161.30	-2.22
	10309	10309	Manoa Park	173.34	174.50	1.16
	13136	13136	Poelua St.	211.44	211.05	-0.39
	15753	15753	Pawale Pl.	260.72	261.85	1.13
Pālolo Lower	1813	1813		7.4	9.28	1.88
	3406	3406		13.19	15.90	2.71

Pālolo Main	6376	6376	St. Louis Drive	42.98	39.39	-3.59
	8574	8574	St. Louis HS	89.06	95.47	6.41
	11649	11649	Palolo Hongwanji	138.67	138.38	-0.29
	14619	14619	Palolo District Park	186.99	188.63	1.64
Pūkele	2184	2184		287.58	286.45	-1.13
UH Split	1107	N/A		13.55	N/A	N/A
	4606	N/A		102.12	N/A	N/A
Waiʻōmaʻo	1724	1724		266.67	269.42	2.75

Cross sections correlating to the table above are presented in the figure below.

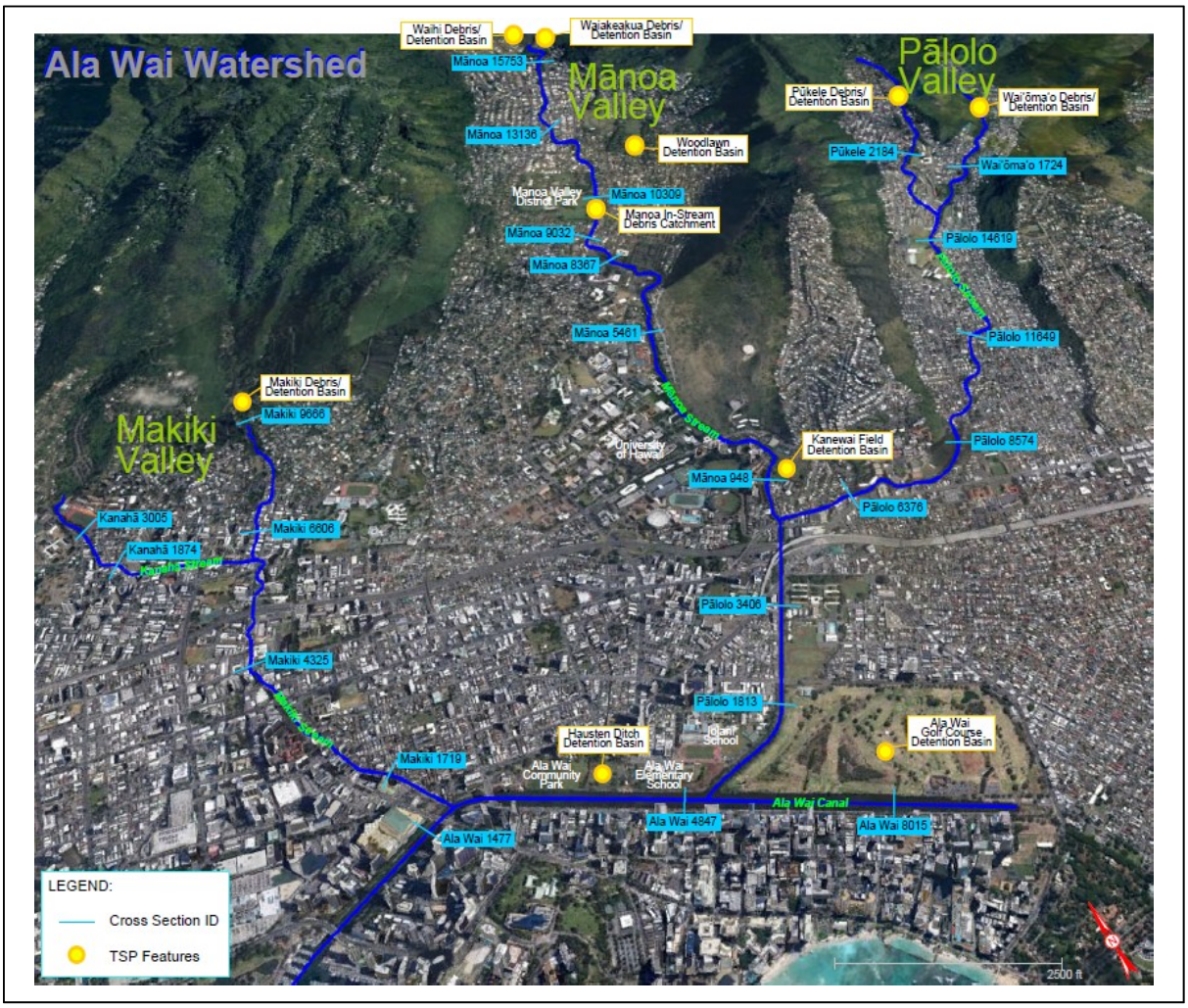

Figure 12: Cross-Section Locations

Sensitivity

To test the sensitivity of the model to the variation in Manning's "n" values, model runs were made for the without project conditions with the "n" values varying on average by +/- 20%.The range of roughness values was estimated at each location to determine a realistic high and low value for the area. The results show an average of 0.4 ft difference across the watershed for the 1% AEP. The average difference in the Ala Wai was approximately +/- 0.2 ft, for Makiki it was +/- 0.3 ft, Kanaha was +/- 0.2 ft, Manoa-Palolo Canal was +/- 0.3 ft, Manoa was +/- 0.5 ft, Palolo was +/- 0.3 ft, Pukele was +/- 0.5 ft, and Waiomao was +/- 0.4 ft. The largest differences were seen in areas with natural channels since these areas typically have a greater variability in estimated roughness depending on a person's judgment; whereas, areas that were concrete lined, the realistic values to use for this surface have less variability in estimates, so the variation in water levels were typically smaller. The figure below shows the difference in the inundation between the best estimate (green), high "n" values (red), and low "n" values (blue). The inundation is not significantly impacted by the change in the values. Most of the increased inundation is very shallow flooding.

Figure 13: Inundation Comparison from Manning's "n" Sensitivity Analysis

Project Phases

There were three phases to the Ala Wai Canal project, including the Feasibility phase, the Post-Feasibility Analysis, and the selection of the Proposed Final Features. The Feasibility study was completed in 2017 and is documented in *Ala Wai Canal Flood Risk Management Study O'ahu, Hawai'I Final Feasibility Study Report with integrated Environmental Impact Statement* Appendix A – Hydrology and Engineering (2017). The purpose of the Post-Feasibility study was to upgrade the steady 1D HEC-RAS model from the previous study with 2D areas and a switch to unsteady flow to improve the accuracy of the model. Once the model was updated and calibrated, the features from the tentatively selected plan (TSP) from the feasibility study were input into the model to determine their impacts to the 1% AEP (annual exceedance probability) flows. In addition, modifications to the features were evaluated to produce the most effective and optimal design for the watershed. After running multiple design considerations, a final proposed design was chosen and modeled. Other frequency events were modeled once all the features in the study were modified and optimized.

Project Features from the Feasibility Study

Overview

The figure below shows the Tentatively Selected Plan (TSP) features from the feasibility study.

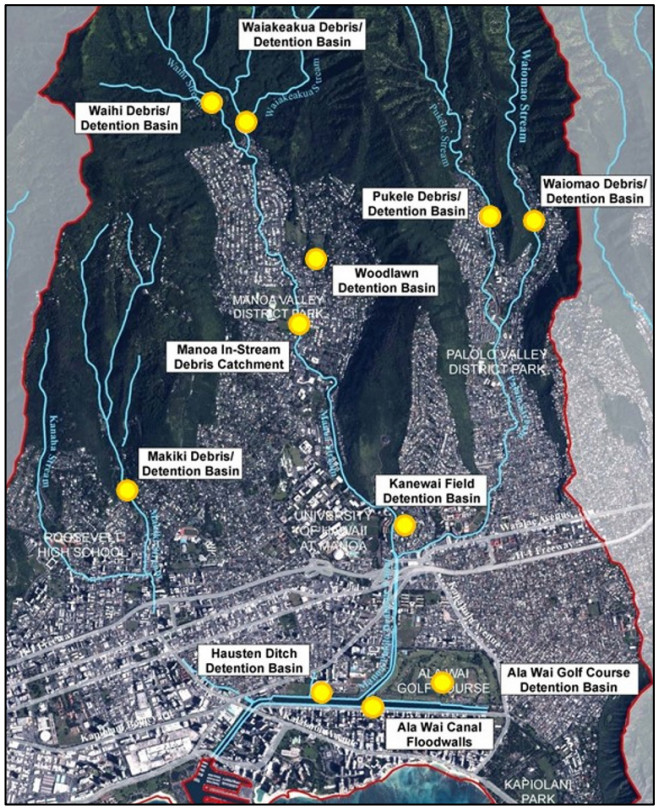

Figure 14: Recommended TSP Features

Project features from the feasibility study included the following eleven individual structural elements and two non-structural components as carried forward from the feasibility study:

- Floodwalls along Ala Wai Canal (including pump stations for interior drainage)
- Three multi-purpose detention basins
    - Ala Wai Canal Golf Course Multi-Purpose Detention
    - Hausten Ditch Detention
    - Kanewai Field Detention
- One stand-alone debris catchment structure
- Six debris/detention basins in upper stream reaches
    - Makiki Debris and Detention Basin
    - Waihi Debris and Detention Basin
    - Waiakeakua Debris and Detention Basin
    - Pukele Debris and Detention Basin
    - Waiomao Debris and Detention

Ala Wai Canal Floodwalls

The Ala Wai Canal Floodwall system was designed to keep the 1-percent AEP (100-year) flow within the existing channel with 90% Assurance. At the upstream end, the floodwall system will connect to the Ala Wai Golf Course Levee and run along the left bank of the Ala Wai Canal. There will be no floodwall on the right bank of the Canal next to the golf course. The floodwall system will continue to run along both banks all the way to the Ala Moana Blvd Bridge. The floodwall will also extend up the Makiki Stream along both banks to the Kapiolani Blvd Bridge. The figure below shows the TSP floodwall alignment.

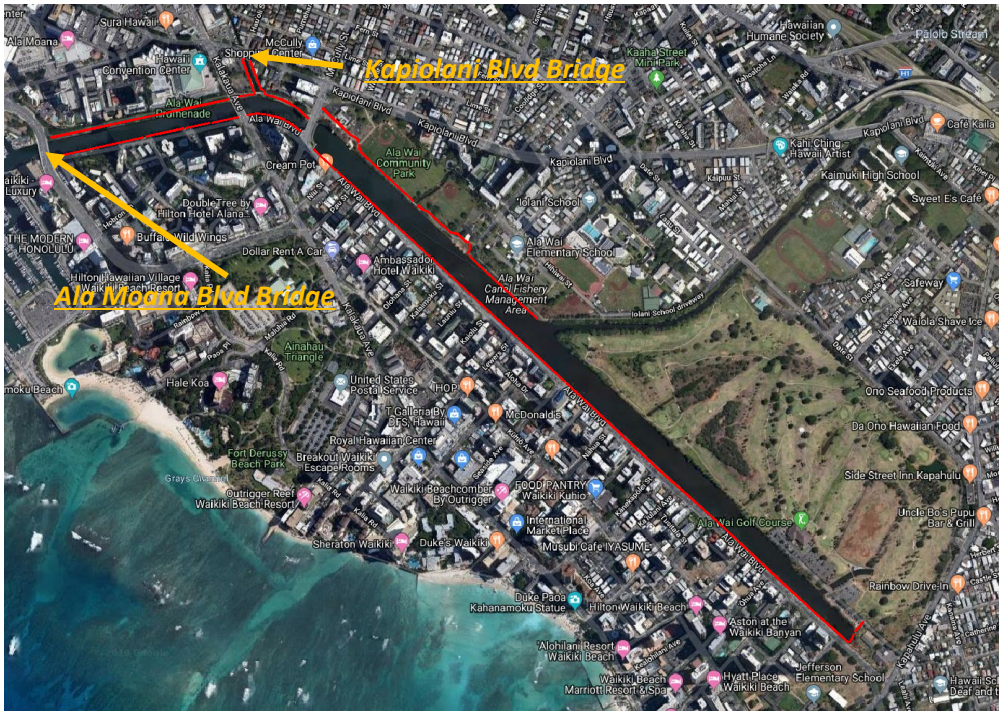

Figure 15: TSP Ala Wai Floodwall Alignment

Ala Wai Golf Course Multi-Purpose Detention

This multi-purpose detention basin was designed to contain water on the golf course and prevent flood waters from leaving. There will be earthen berms constructed on the north and east sides of the golf course, the berms will basically follow the existing golf cart road. The berms have an average height of 3 feet. The height of the berm was set to prevent overtopping from the flooding in the interior of the golf course during the 100-year design storm.

The Ala Wai Golf Course would act as a detention basin allowing flows from the Manoa-Palolo Drainage Canal would be diverted into the basin. Flows would reenter into the Canal at two locations, a new outlet connected to the basin and an existing outlet.

Figure 16: Ala Wai Golf Course TSP Berm Alignment

Hausten Ditch Detention

This basin is designed to temporarily contain water while the slide gates at Hausten Ditch Bridge are up. The slide gates will be down during a flood event to prevent water from Ala Wai Canal flowing back into Hausten Ditch. In addition, the basin is designed to use existing open space (i.e. no residential houses).

Figure 17: Hausten Ditch TSP Berm Alignment

Woodlawn Detention

The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Woodlawn Ditch will eventually flow into Manoa Stream. The design assumes an embankment elevation of 229.0 ft, a 100 ft long concrete-lined emergency spillway at elevation 226.0 ft, and a box culvert 5.25 ft wide by 7.5 ft high. The culvert is 110 ft long with an upstream invert elevation of 200.5 ft and a downstream invert elevation of 199.0 ft. No excavation was assumed, and any storage was based on LiDAR data.

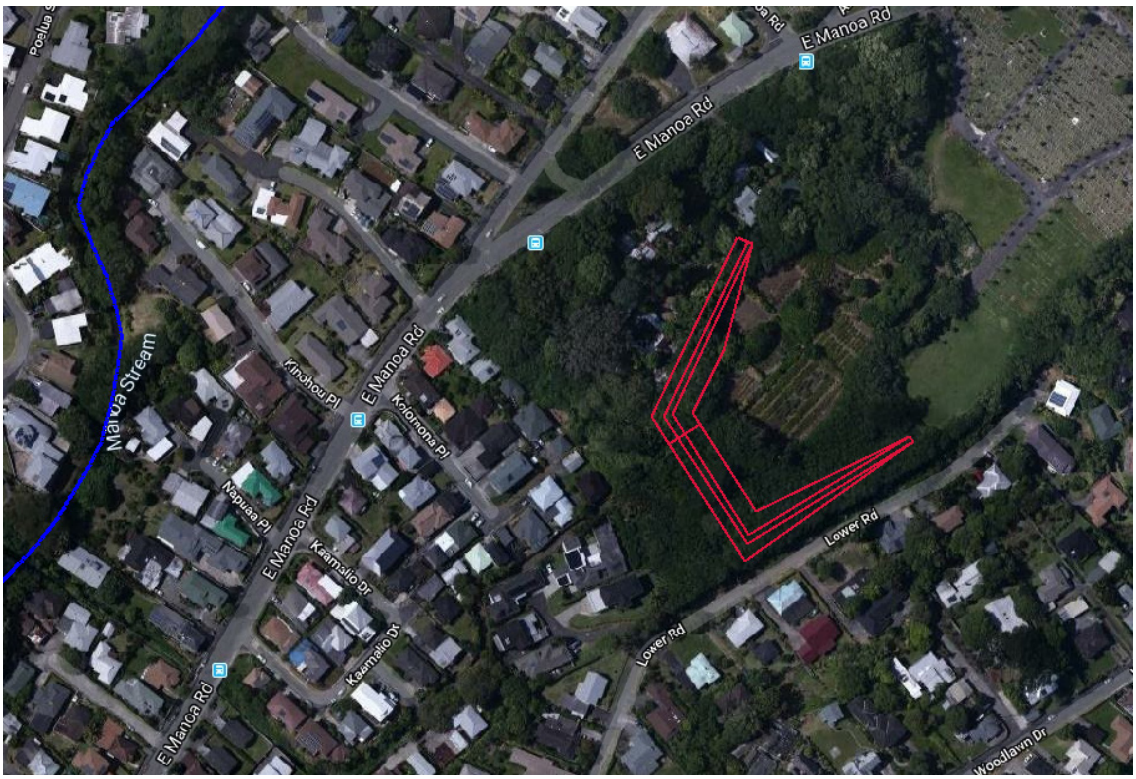

Figure 18: Woodlawn Ditch Detention TSP Dam Alignment

Manoa In-Stream Debris Catchment

This structure was designed to catch large debris. It allows all flood flows to pass through the debris poles. It was assumed that the largest river flow would be below the maximum height of the poles and will span the length of the debris catchment structure. The structure consists of a 2-foot thick concrete pad that spans 60 feet across the stream and the floodplain with a width of 8 feet. Steel posts 8 inches in diameter and between 4 to 7 feet high are evenly spaced at 4 feet along the center of the concrete pad.

Kanewai Field Detention

The basin is designed to use existing open space (park land) to temporarily contain floodwaters. The intake weir into Kanewai Field is intended to handle overflow from the Manoa Stream. The existing 2 ft drainage pipe can drain some of the water. Kanewai Field will be surrounded by a 7-foot-high earthen berm but protecting the existing structures. The berm will be built to an elevation of 43.0 ft. On the northwest end of the basin, adjacent to Manoa Stream, the berm is graded down to a 50 foot spillway that will allow water to flow into the basin when the river level is high and out of the basin once the high flows have passed. The spillway has a crest elevation of 38.0 ft. There is no estimated excavation of the site.

Figure 19: Kanewai Field Detention TSP Berm Alignment

Upstream Detention Basins

Overview

Five basin features, Makiki, Waihi, Waiakeakua, Pukele, and Waiomao, were designed for both debris and detention, and were in the upstream reaches of the system. Each basin was required to pass the 100-year design event without debris blocking the intake structure.

Makiki Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into Makiki Stream. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Makiki Stream. In addition, the basin is designed to use existing open space (i.e. no residential houses). The design assumes an embankment elevation of 185.0 ft, a 60 ft long concrete-lined emergency spillway at elevation 180.8 ft, and an arch culvert 10.0 ft wide by 5 ft high. The culvert is 118 ft long with an upstream invert elevation of 164.0 ft and a downstream invert elevation of 162.0 ft.

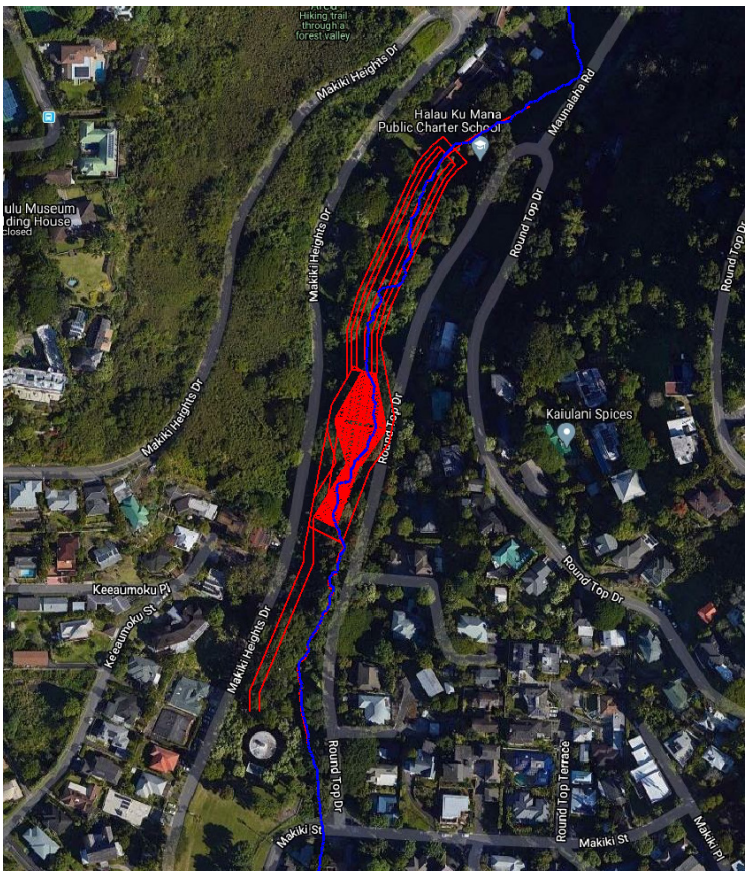

Figure 20: Makiki Detention TSP Berm Alignment

Waihi Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into the Manoa residential area. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Manoa Stream. In addition, the structure is to not interfere with existing farms and houses near the basin site. The design assumes an embankment elevation of 404 ft, a concrete-lined emergency spillway at elevation 400.0 ft, and a box culvert 12.0 ft wide by 6 ft high. The culvert is 167 ft long with an upstream invert elevation of 375.0 ft and a downstream invert elevation of 366.0 ft. The figure below shows the approximate alignment of the Waihi Detention Basin Dam.

Figure 21: Waihi Detention TSP Berm Alignment

Waiakeakua Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into the Manoa residential area. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Manoa Stream. In addition, the structure is to not interfere with existing farms and houses near the basin site. The design assumes an embankment elevation of 338 ft, a concrete-lined emergency spillway at elevation 334.0 ft, and an arch culvert 12.0 ft wide by 6 ft high. The culvert is 240 ft long with an upstream invert elevation of 294.0 ft and a downstream invert elevation of 284.0 ft. The figure below shows the approximate alignment of the Waiakeakua Detention Basin Dam.

Figure 22: Waiakeakua Detention TSP Berm Alignment

Pukele Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into Pukele Stream. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Pukele Stream. The design assumes an embankment elevation of 441.0 ft, a 60 ft long concrete-lined emergency spillway at elevation 436.0 ft, and a box culvert 8.5 ft wide by 8 ft high. The culvert is 155 ft long with an upstream invert elevation of 414.3 ft and a downstream invert elevation of 408.0 ft. The figure below shows the approximate alignment of the Pukele Detention Basin Dam.

Figure 23: Pukele Detention TSP Berm Alignment

Waiomao Debris and Detention Basin

This basin is designed as both a way to temporarily contain water and stop the flow of debris into Waiomao Stream. The basin is not designed to permanently contain water, but to detain large volumes of water to slow the rate into Waiomao Stream. The design assumes an embankment elevation of 402.0 ft, a 100 ft long concrete-lined emergency spillway at elevation 398.0 ft, and a box culvert 8.75 ft wide by 8 ft high. The culvert is 230 ft long with an upstream invert elevation of 369.9 ft and a downstream invert elevation of 361.0 ft. The figure below shows the approximate alignment of the Waiomao Detention Basin Dam.

Figure 24: Waiomao Detention TSP Berm Alignment

Post-Feasibility Analysis

Tentatively Selected Plan (TSP)

The purpose of this study was to upgrade the HEC-RAS model from the previous study with 2D areas to improve the accuracy of the model. Once the model was updated and calibrated, the features from the tentatively selected plan (TSP) from the feasibility study were input into the model to determine their impacts to the 1% AEP flows. Other frequency events will be modeled once all the features in the study have been modified and optimized. The sections below describe the features that were modeled as part of the TSP from the feasibility study.

The figure below shows the Tentatively Selected Plan (TSP) features from the feasibility study.

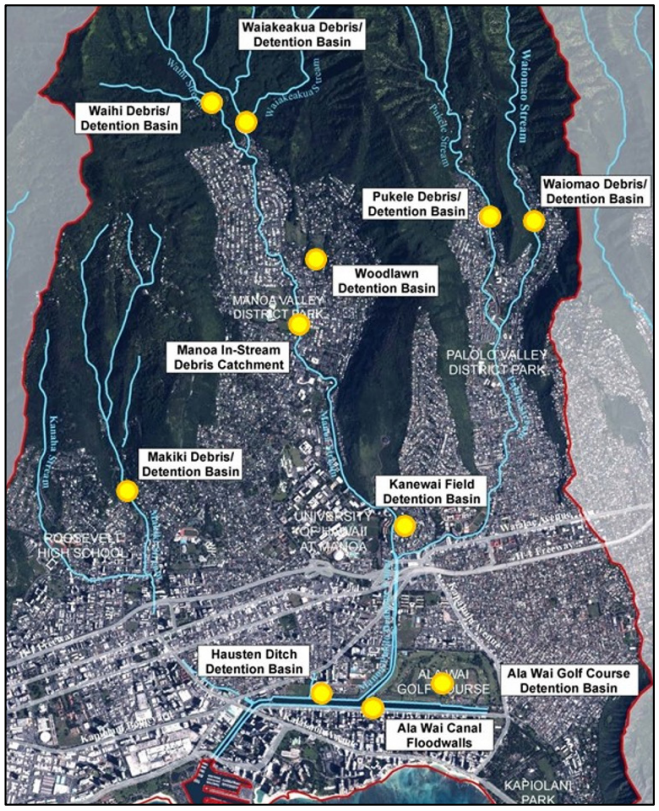

Figure 25: Recommended TSP Features

Project features from the feasibility study included the following eleven individual structural elements and two non-structural components as carried forward from the feasibility study:

- Floodwalls along Ala Wai Canal (including pump stations for interior drainage)
- Three multi-purpose detention basins
    - Ala Wai Canal Golf Course Multi-Purpose Detention
    - Hausten Ditch Detention
    - Kanewai Field Detention
- One stand-alone debris catchment structure
- Six debris/detention basins in upper stream reaches
    - Makiki Debris and Detention Basin
    - Waihi Debris and Detention Basin
    - Waiakeakua Debris and Detention Basin
    - Pukele Debris and Detention Basin
    - Waiomao Debris and Detention

The post-feasibility TSP incorporated all the features from the feasibility study, but some modifications were required to incorporate them into the new modeling and some designs were updated as part of the post-feasibility study. The sections below describe how these features were modeled in the updated 1D/2D HEC-RAS model and any modifications to the design of the structures since the feasibility study.

Ala Wai Canal Floodwalls

Although it was not part of the TSP floodwall plan, the floodwall for this study was extended up the Manoa-Palolo Canal on the right bank near the Kaimuki High School athletic fields. The floodwall extended up to Date St. It was determined quickly that without this floodwall extended up the Manoa-Palolo Canal, the floodwall on the right bank of the Ala Wai Canal that extends from the Manoa-Palolo Canal Confluence to McCully St would be flanked by floodwaters and the floodwall would be of no use.

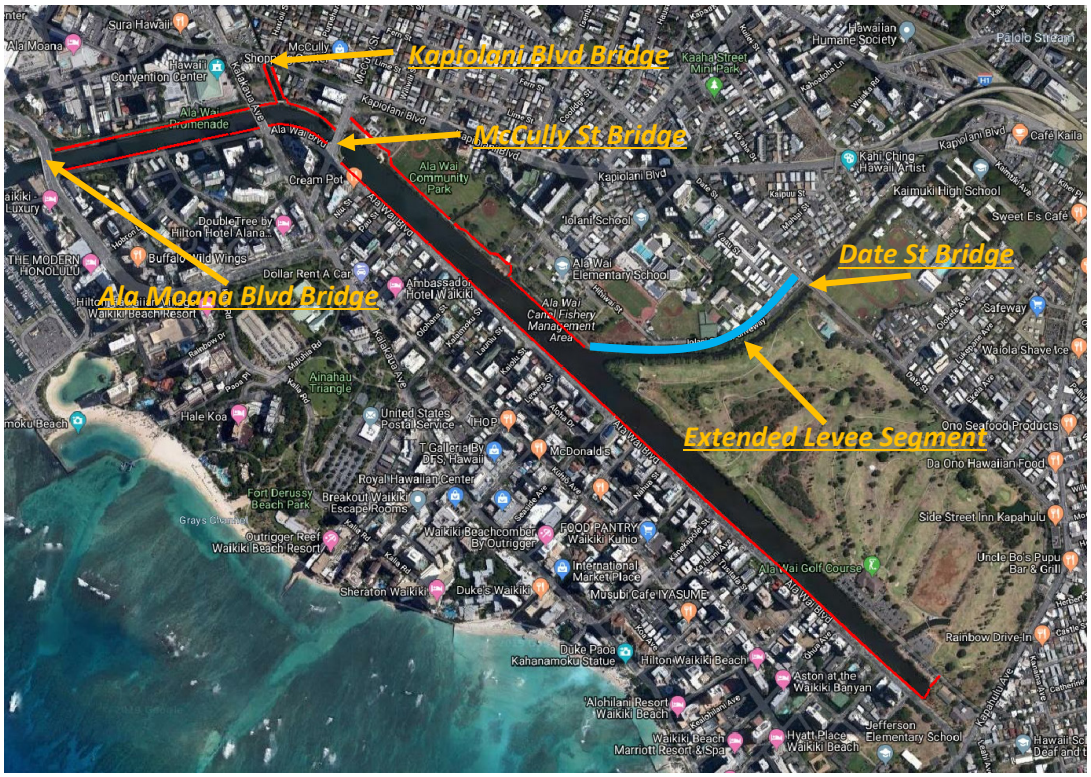

Figure 26: TSP Ala Wai Floodwall Alignment

The floodwalls were input as lateral structures in the model and used the elevations that were determined in the feasibility study. However, knowing that the WSEL would be subject to change due to the updates to the model, the weir coefficients were set to zero on the lateral structures representing the floodwalls. This was done to prevent flow from overtopping the levees if the WSEL was determined to be higher than the feasibility study. The elevations of the floodwalls could have been raised but it was decided to keep the original elevations so that design elevations could be compared with the new WSEL in the canal.

Ala Wai Golf Course Multi-Purpose Detention

The golf course berm design was the same as the feasibility study and was modeled as an internal hydraulic structure in the 2D flow area. The figure below shows the approximate alignment of the berm on the north and east side of the golf course.

Figure 27: Ala Wai Golf Course TSP Berm Alignment

Hausten Ditch Detention

The Hausten Ditch berm was modeled as an internal hydraulic structure in the 2D flow area. No gates were modeled since the gate would be closed during a flood. The figure below shows the approximate alignment of the berms of the Hausten Ditch Detention Basin.

Additionally, removing the floodwall on the canal front the Hausten Ditch area was also evaluated. Further consideration of the flood barrier alignment and effort to increase flood water detention, may be evaluated in future final layout designs of the system. The walls fronting the canal would be replaced with earthen berms along the sides and back perimeter of Hausten Ditch and the Ala Wai Community Park athletic fields to increase canal reservoir capacity. The flood gate originally proposed at the canal wall would be moved to the back perimeter of this detention area spanning Hausten Ditch. The realignment of the floodwall locations may be examined as part of the final design before construction.

Figure 28: Hausten Ditch TSP Berm Alignment

Woodlawn Detention

The structure was modeled as an internal hydraulic structure in the 2D flow area. It has two inflows into the Detention Basin. One inflow is from sub-basin M5 which drains into the detention and the other inflow is a diversion into the detention from an existing storm drain. This diversion flow comes from the sub-basin M6. The inflows were modeled in HEC-HMS. The figure below shows the approximate alignment of the Woodlawn Ditch Detention Dam.

Figure 29: Woodlawn Ditch Detention TSP Dam Alignment

Manoa In-Stream Debris Catchment

The Manoa in-stream debris catchment was modeled using the Bridge/Culvert feature in HEC-RAS. This feature in HEC-RAS allows for the placement of piers and can simulate floating debris. However, the feature does require a high chord and low chord to be input into the model. Since there will not be a bridge deck for this feature, the high chord and low chord were set artificially high so that these features will never have water on them. The bridge modeling approach used energy for both the high and low flow methods.

Since this structure is meant to catch debris during flood events, the floating debris was modeled for each steel post. There are no other structures like this in the area and as such there was no clear information on much debris blockage to assume. However, using judgment from the debris blockage on the Woodlawn Driver Bridge during the 2004 event, which is what this feature is designed to prevent, the debris blockage was assumed to be approximately 4 ft high and will be across the length of the structure. The figure below shows the structure in the model with the floating debris applied.

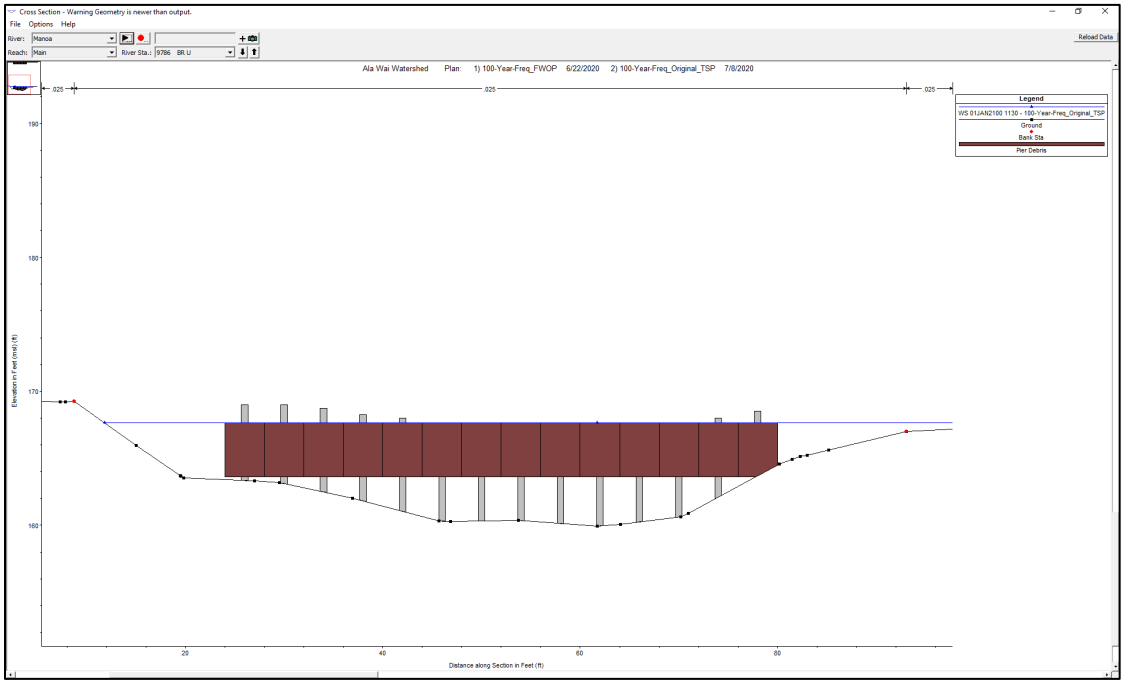

Figure 30: Manoa In-Stream Debris Catchment in HEC-RAS

Kanewai Field Detention

The berm was modeled as an internal hydraulic structure in the 2D flow area and the spillway was modeled as a lateral structure on the left bank of the Manoa Stream. The figure below shows the approximate alignment of the Kanewai Field Berm.

Figure 31: Kanewai Field Detention TSP Berm Alignment

Upstream Detention Basins

Overview

Five basin features, Makiki, Waihi, Waiakeakua, Pukele, and Waiomao, were designed for both debris and detention, and were in the upstream reaches of the system. At the beginning of this effort, it was determined that the excavation and dimensions for these structures were unrealistic due to topography and geology. So new excavation and dimensions were determined for this study to replace the original TSP designs.

Two teams, one based in the Seattle District and one based in the New Orleans District were also in the design process for the dams and pumps, respectively. The latest versions of dam data below were developed by the Seattle District and MMC Teams. The Seattle Design Team also provided updated estimated excavation for the pools of Makiki, Waihi, Waiakeakua, Pukele, and Waiomao.

Multiple variations of dam culvert, spillway, and storage were modeled to better understand the system response for each of the upstream dams. Initial excavation, spillway, and dam data for each iteration was provided by the Seattle Design Team. The excavation for Makiki, Pukele, and Waiomao were pulled into RAS Mapper and merged with updated LiDAR provided by the Hawaii District. Waihi and Waiakeakua were modeled in HEC-HMS rather HEC-RAS. The outflow from these two dams from HEC-HMS was input as an upstream flow hydrograph on the Manoa Reach in the HEC-RAS model. Reasonable culvert elevations and lengths were estimated from this terrain. A reasonable land area encompassing a given possible pool was analyzed to determine a unique Elevation-Volume curve, as shown below.

Makiki Debris and Detention Basin

During the post-feasibility study, it was quickly determined that due to topology and geology, the storage volume that was determined during the feasibility would have required significant excavation to achieve. Due to the topology, geology, and the expense required to achieve this storage volume, new storage volume excavation would need to be determined that would be feasible for this area and not cost prohibited. A reasonable excavation for the area was calculated by the Seattle District and the created terrain was imported into HEC-RAS. The detention basin lies in a narrow section of land between two roads, so the excavation is limited in this area. The new excavation was determined based on the topology and designed such that the slopes would be stable and would not require retaining walls to prevent collapse of the sidewalls. The structure was modeled as an inline structure with a 1D storage area. The maximum storage at the dam crest is approximately 14.0 acre-ft. The figure below shows the approximate alignment of the Makiki Detention Basin Dam.

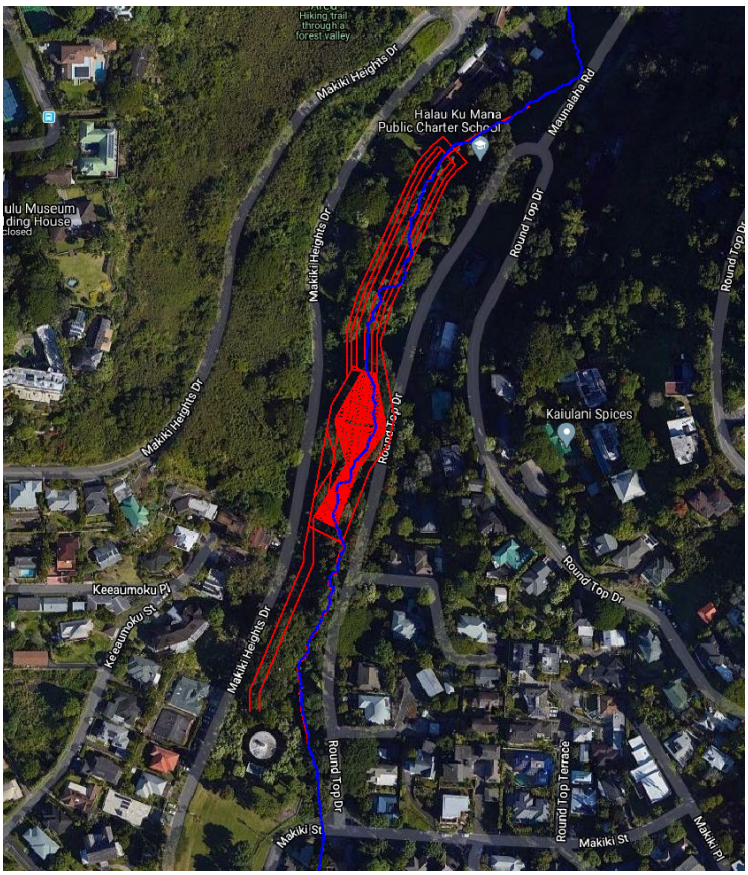

Figure 32: Makiki Detention TSP Berm Alignment

Waihi Debris and Detention Basin

Similar to Makiki Detention, it was determined during the post-feasibility study that due to topology and geology, the storage volume would need to be modified. Based on the topology and geology, a reasonable excavation and alignment was calculated by the Seattle District that would produce a stable detention basin that was not overly cost prohibited. Seattle district created a terrain surface for the new excavation, and this was used to estimate storage volumes. The structure is located above where the HEC-RAS model begins on Manoa Stream, so the HEC-HMS model was used to compute the flows for the structure along with the nearby structure of Waiakeakua. The outflow from these two structures were modeled as a junction since the flows will combine as they enter Manoa Stream just upstream of where the HEC-RAS model begins. The outflow from this junction in HEC-HMS was used as the upstream inflow into the HEC-RAS model. Further information of these structures can be found in the Hydrology Report. The figure below shows the approximate alignment of the Waihi Detention Basin Dam.

Figure 33: Waihi Detention TSP Berm Alignment

Waiakeakua Debris and Detention Basin

Similar to Waihi Detention, it was determined during the post-feasibility study that due to topology and geology, the storage volume would need to be modified. Based on the topology and geology, a reasonable excavation and alignment was calculated by the Seattle District that would produce a stable detention basin that was not overly cost prohibited. Seattle district created a terrain surface for the new excavation, and this was used to estimate storage volumes. The structure is located above where the HEC-RAS model begins on Manoa Stream, so the HEC-HMS model was used to compute the flows for the structure along with the nearby structure of Waihi. The outflow from these two structures were modeled as a junction since the flows will combine as they enter Manoa Stream just upstream of where the HEC-RAS model begins. The outflow from this junction in HEC-HMS was used as the upstream inflow into the HEC-RAS model. Further information of these structures can be found in the Hydrology Report. The figure below shows the approximate alignment of the Waiakeakua Detention Basin Dam.

Figure 34: Waiakeakua Detention TSP Berm Alignment

Pukele Debris and Detention Basin

Similar to the Makiki and Manoa Stream detention basins, it was determined during the post-feasibility study that due to topology and geology, the storage volume would need to be modified. A reasonable excavation was calculated by the Seattle District and the created terrain was imported into HEC-RAS. The detention basin lies in a narrow section of land and is limited by residential areas, so the excavation is limited in this area. The structure was modeled as an inline structure with cross-sections used to model reservoir. The cross-sections were extracted from the new terrain created by the Seattle District. The maximum storage at the dam crest is approximately 15.0 acre-ft. The figure below shows the approximate alignment of the Pukele Detention Basin Dam.

Figure 35: Pukele Detention TSP Berm Alignment

Waiomao Debris and Detention Basin

Similar to the other 5 detention basins it was determined during the post-feasibility study that due to topology and geology, the storage volume would need to be modified. A reasonable excavation was calculated by the Seattle District and the created terrain was imported into HEC-RAS. The structure was modeled as an inline structure with cross-sections used to model reservoir. The cross-sections were extracted from the new terrain created by the Seattle District. The maximum storage at the dam crest is approximately 35.0 acre-ft. The figure below shows the approximate alignment of the Waiomao Detention Basin Dam.

Figure 36: Waiomao Detention TSP Berm Alignment

Results of Post-Feasibility TSP and Without Project Comparison

The table below shows a comparison of water surface elevations at select locations between the without project conditions and the TSP features from the feasibility study which includes Post-Feasibility modifications to represent more realistic dimensions and storage. The last column shows the difference between the post-feasibility TSP plan and the without project plan. A positive value indicates that the TSP plan has a higher WSEL than the without project conditions. The Ala Wai Canal and the areas of the other streams near the confluence with the Ala Wai Canal are higher in the TSP plan compared to the without project plan because the floodwalls are containing the floodwaters that would have otherwise been in the overbanks. A negative indicates a reduction in WSEL with the TSP in place as compared to the without project conditions and a zero value indicates no change between the with and without project features.

The comparison is for the 1% AEP event (100 year) using a basin average precipitation from Atlas 14. The final proposed features and without project conditions will be based on frequency flows developed using the Hydrologic Engineering Center's Watershed Assessment Tool (HEC-WAT). Details of the flows used in the post-feasibility study can be found in the Post-Feasibility Hydrology Report.

Table 11: WSEL Comparisons at Select Locations between Without Project Conditions and the TSP Features

Reach Name (per HEC-RAS Model)	Cross-Section ID		1% AEP Event (100 year)		Difference (TSP – W/out) (ft)
	New 1D/2D Model	Location Description	Without Projects WSEL (ft)	With TSP Features WSEL (ft)	
Ala Wai Lower	1188		4.74	5.65	0.98
Ala Wai Middle	4676		7.34	9.43	2.04
Ala Wai Upper	8015		7.55	9.84	2.13
Kanahā Ditch	1874		74.16	74.16	0
	3004		79.58	79.58	0
Makiki Lower	1667	Fern	12.43	12.3	-0.13
	4301	Beretania	38.62	38.68	0.06
Makiki Upper	6606	Wilder	69.84	70.02	0.18
	9543	Detention Basin	173.18	183.69 (pool)	10.51*
Mānoa Stream Main Reach	948	Kanewai	37.33	37.41	1.41
	5461	St. Francis	118.03	117.22	2.45
	8367	Manoa Marketplace	154.69	153.76	-0.94
	9032	E. Manoa Rd Bridge	161.30	159.46	-1.79
	10309	Manoa Park	174.50	173.96	-0.53
	13136	Poelua St.	211.05	209.78	-1.25
	15753	Pawale Pl.	261.85	260.59	-1.28
Pālolo Lower	1813		9.28	9.91	0.71
	3406		15.90	15.60	0.25
Pālolo Main	6376	St. Louis Drive	39.39	39.02	-0.62
	8574	St. Louis HS	95.47	94.76	-0.75
	11649	Palolo Hongwanji	138.38	138.06	-0.32

	14619	Palolo District Park	188.63	188.22	-0.41
Pūkele	2184		286.45	286.34	-0.11
Waiʻōmaʻo	1724		269.42	269.23	-0.19

*Difference is due to the cross-section being in the Makiki Detention Basin pool for the TSP plan.

Below is a figure illustrating the differences in the inundation between the without project conditions (red) and with TSP project conditions (blue).

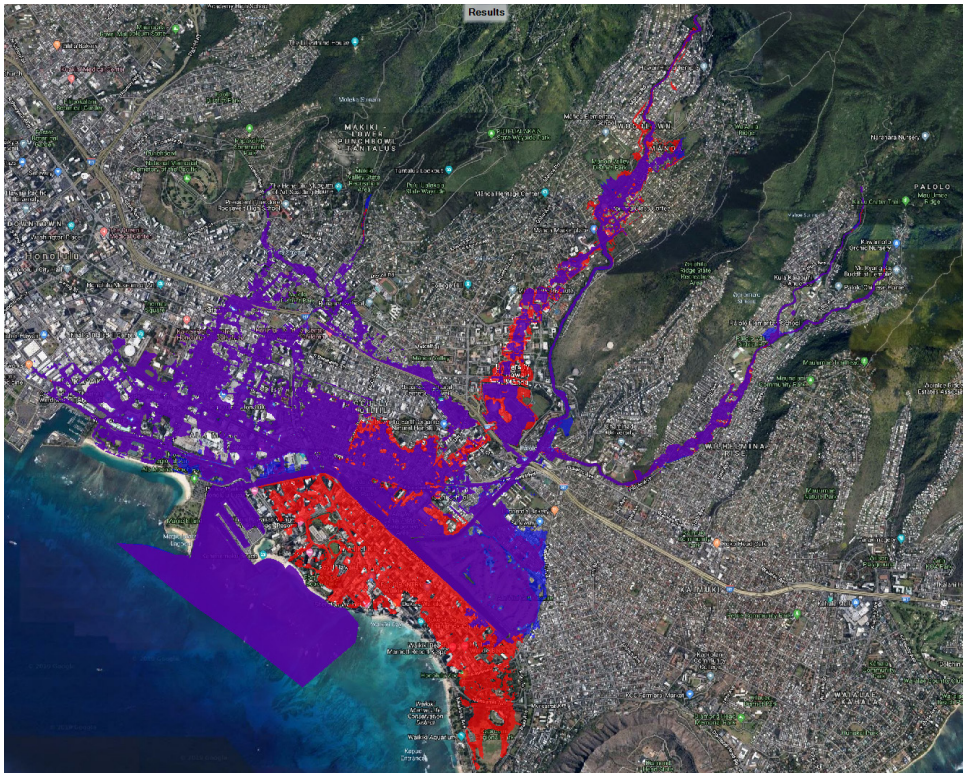

Figure 37: Inundation of Without Project (red) and With TSP Projects (blue)

Ala Wai Canal

The results from the table above show that the Ala Wai Canal increased up to 2 ft in places, but this is expected. The placement of floodwalls in the area are preventing the water from storing in the overbanks and that volume is expected to go down the Ala Wai Canal which increases the WSEL along the canal. The figure of the inundation shows that the inundation has been greatly reduced in the Waikiki area and to the north of the Canal. However, it also shows that the TSP is inducing flooding north and northeast of the Ala Wai Golf course. This is due to the new berm placed on the north end of the golf course. The berm is preventing flow from traveling south into the golf course and so it is flooding more areas north of the golf course as the flow pushes east instead of south. There is also some induced flooding along the right embankment of the Ala Wai Canal below the confluence with Makiki Stream. This flooding is due to the higher water levels in the Canal that are backing up the Makiki Stream. In addition, the floodwall on the right bank below the confluence is preventing the excess flows

from flowing back into the canal. In sections below, additional modifications were tested to prevent this induced flooding.

Makiki

The results from the table above show that the Makiki Detention Basin provided little to no protection. The structure on Makiki was determined to be ineffective due to the limited storage capacity that could be reasonably excavated. There was no way to realistically excavate the original storage volume from the feasibility study without an exorbitant cost due to the narrow valley, the detention basin would have to have a significant depth to achieve the storage volume. This would have required extremely tall vertical walls on either side of the valley and would have to be shored up and reinforced to prevent the roads on either side from collapsing into the detention basin. As a result of the reduction in storage volume, the post-feasibility TSP design only reduces the 1% AEP flow by approximately 5 cfs. In addition, it was found that significant attenuation behind downstream bridges of the watershed negated the effects of the reduced peak flow. In sections below, additional modifications were tested for this reach. This feature was ultimately removed from the Proposed Final Feature design.

Manoa

The results from the table above show that Waihi and Waiakeakua reduced the water levels downstream of the structures by approximately 1 ft but this is in an area that is mostly contained in the channel on the upstream end of the Manoa Watershed, so it provides little benefit. By the time the floodwaters reach Manoa Park, the reduction in water level is only about 0.5 ft. It was found that significant attenuation behind downstream bridges of the watershed negated the effects of the reduced peak flow. The Woodlawn Detention was found to have little effect on the water levels due to the limited storage capacity and the relatively small sub-basin catchment area compared to the rest of the Manoa Watershed. The results do show a significant reduction in water levels near East Manoa Bridge and near the Manoa Marketplace. However, these reductions are believed to be heavily influenced by the Manoa In-Stream Debris Catchment upstream of East Manoa Bridge because the simulated floating debris is acting as a dam and reducing the flow downstream while increasing the water levels upstream and inducing additional flooding. In addition, the post-feasibility TSP scenario does not include debris on the Woodlawn Drive bridge due to the Manoa In-Stream Debris Catchment upstream of the bridge which was designed to catch the debris before it reaches the bridge so the bridge openings will not be clogged with debris. has increased the capacity of flow through the Woodlawn Drive Bridge and this most likely caused most of the reduction to the flooding through the University of Hawaii when compared to the effects of Waihi, Waiakeakua, and Woodlawn Detention. This also explains the higher water levels below Woodlawn Drive at St. Francis and Kanewai. Woodlawn Drive Bridge can now pass more flow and so the flow and water levels are increased downstream. In sections below, additional modifications were tested for this reach. Waihi, Waiakeakua and Woodlawn Detention basins were ultimately removed from the Proposed Final Feature design.

Palolo

The results from the table above show that both the Pukele Detention Basin and Waiomao Detention Basin provided little protection. The structures were determined to be ineffective due to the limited storage capacity that could be reasonably excavated. The Pukele Detention Basin only reduced water levels just downstream of the structure by 0.1 ft and Waiomao Detention Basin only reduced water

levels by 0.2 ft just downstream of the structure. In addition, it was found that significant attenuation behind downstream bridges of the watershed negated the effects of the reduced peak flow. In sections below, additional modifications were tested to prevent this induced flooding. Pukele and Waiomao detention basins were ultimately removed from the Proposed Final Feature design.

Modifications to TSP Features

Overview

Due to changes in structure dimensions, storage excavations, and the additional insight that significant attenuation behind downstream bridges of the watershed negated the effects of the reduced peak flow from some structures, it was decided that additional modifications to the TSP plan should be evaluated. In total, 16 different scenarios were setup in the HEC-RAS model with different combinations of features and modifications. Since some features will be independent of other features, multiple modifications were included in some scenarios. For example, modifications on the Makiki Stream will not impact modifications on Manoa Stream or the Palolo Stream. So, 1 scenario could have different modifications in each stream. The table below shows the different features that were used for each scenario and the sections below describe any modifications that were made to the post-feasibility design or any new features that were added

Table 12: Modification Plan Features

Scenario Number	Makiki Debris and Detention Basin	Waihi Debris and Detention Basin	Waiakeakua Debris and Detention Basin	Manoa In-stream Debris Catchment	Manoa District Park Detention Basin	Woodlawn Ditch Detention	Woodlawn Bridge By-Pass	Kanewai Field Detention Basin	Pukele Debris and Detention Basin	Waiomao Debris and Detention Basin	Ala Wai Flood Walls	Golf Course Berm
1	Left Bank Dam	Post-Feasibility TSP Design	Post-Feasibility TSP Design							402' Crest w/ Gate		
2	Right Bank Dam	Automated Gates	Automated Gates									
3	Left & Right Bank Dams									580' Crest (upper basin location) w/ Gate		
4	No Detention	Post-Feasibility TSP Design	Post-Feasibility TSP Design									
5		Automated Gates	Automated Gates									
6	Left & Right Bank Dams	Post-Feasibility TSP Design	Post-Feasibility TSP Design							580' Crest (upper basin location) w/ Gate		
7	Left & Right Bank Dams											
8	Left & Right Bank Dams											
9		Post-Feasibility TSP Design	Post-Feasibility TSP Design									
10												
11												
12												
13												
14												
15												
16												

	No Feature
	HEC-RAS Modeling
	HEC-HMS only, or HEC-HMS and HEC-RAS Modeling

Makiki Modifications

Since the TSP Makiki Detention Basin only reduces the water level by a maximum of approximately 0.2 ft just downstream of the structure and only reduces the peak discharge by 5 cfs, other modifications to the Makiki Detention were evaluated. As seen table 11 above, 3 modifications were evaluated. The modifications included replacing and relocating the planned single basin with two detention basins upslope in Kaneolole (right bank) and Moleka (left bank) headwater streams. Out of the options considered, the most viable and effective alternative in reducing WSE was the construction of two detention basins upslope in the headwater streams but it would come at a significantly increased cost. Modification 1 includes only the left bank detention, Modification 2 includes just the right bank detention, and modification 3 includes both detentions. Since these structures were above the HEC-RAS model extent, the different detention basins were modeled in HEC-HMS and outflows from these structures were imported into the HEC-RAS model. Additional information on these features can be found in the Hydrology Report. The table below shows the results of these runs compared with the option of not building a detention basin (i.e. Modification 4).

Table 13: WSEL Comparisons at Select Locations for Makiki Detention Basin Modifications

Reach Name (per HEC-RAS Model)	Cross-Section ID		1% AEP Event (100 year)				
	New 1D/2D Model	Location Description	Post-Feasibility TSP	Modification 1 – Left Bank Detention	Modification 2 – Right Bank Detention	Modification 3 – Both Banks Detention	Modification 4 – No Detention
			WSEL (ft)	WSEL (ft)	WSEL (ft)	WSEL (ft)	WSEL (ft)
Makiki Lower	1667	Fern	12.3	12.31	12.31	12.3	12.31
	4301	Beretania	38.68	38.83	38.76	38.62	38.91
Makiki Upper	6606	Wilder	70.02	69.82	69.54	69.31	70.2
	9271	Just Downstream of Detention Basin	159.57	159.4	159.2	159.04	159.6

Based on the results, the new modifications did provide some additional benefit when compared to the TSP, but the benefits were marginally better. Having both detention basins on the left and right bank reduced the water levels by up to 0.7 ft but as seen in the image below, the inundation is only marginally better and due to the cost of the structure and these small benefits, any project on Makiki was deemed to not be feasible.

Figure 38: Inundation of Without Projects (red) and with Both Left and Right Bank Detention Basins (blue)

Manoa Modifications

To reduce the inundation along the Manoa Stream, especially on the upstream portion of the basin, several modifications were evaluated across several structures. This included modifications to the Waihi and Waiakeakua, including a detention basin in the Manoa Park and a bypass inlet/culvert around Woodlawn Drive Bridge.

Waihi and Waiakeakua Modifications

An option to include automated gates on both Waihi and Waiakeakua was evaluated to see if a gated structure could more efficiently reduce the flows. A separate simplified 1D HEC-RAS model was created just for the structure and included just enough cross-sections downstream to compute an outflow.

Waihi Detention Basin was slightly modified from the TSP design. The design assumes the same embankment elevation of 404 ft, a concrete-lined emergency spillway 100 ft wide but the spillway elevation was raised to 402.0 ft from the original design of 400 ft, and the box culvert was replaced with a 13 ft wide by 8 ft high gate with an invert set to elevation 376.0 ft. The operation was set to release a max of 1,610 cfs.

Waiakeakua Detention Basin was slightly modified from the TSP design. The design assumes the same embankment elevation of 338 ft, a concrete-lined emergency spillway 80 ft wide but the elevation was raised to 338.0 ft, and the box culvert was replaced with a 7 ft wide by 7 ft high gate with an invert set to elevation 294.0 ft. The operation was set to release a max of 900 cfs.

The outflow hydrographs were combined and input into the upstream end of the HEC-RAS model for Manoa Stream. The peak outflow with the gates was approximately 2,500 cfs compared with the TSP which had a peak flow of approximately 3,500 cfs. The without project has a peak flow of approximately 4,600 cfs. The table below shows a comparison of water levels on the upper Manoa watershed. Modification 1 includes the TSP operation, Modification 3 includes the automatic gates, and without projects assumes no structures. All three of these scenarios do not include any other features along the Manoa Stream except for the Manoa In-Stream Debris Catchment and the removal of debris on Woodlawn Dr Bridge is included in the Modification 1 and 3 scenarios. The Woodlawn Detention basin was removed from both scenarios.

Table 14: WSEL Comparisons at Select Locations for Waihi & Waiakeakua Detention Basin Modifications

Reach Name (per HEC-RAS Model)	Cross-Section ID		1% AEP Event (100 year)		
	New 1D/2D Model	Location Description	Modification 1 – TSP	Modification 3 – Automated Gates	Without Projects
			WSEL (ft)	WSEL (ft)	WSEL (ft)
Manoa Main	948	Kanewai	38.8	38.82	N/A
	5461	St. Francis	116.93	116.67	N/A
	8367	Manoa Marketplace	154.03	153.72	N/A
	9032	E. Manoa Rd Bridge	159.79	158.88	N/A
	10309	Manoa Park	174.01	173.77	174.50
	13136	Poelua St.	209.78	208.8	211.05
	15753	Pawale Pl.	260.59	259.38	261.85

The results show that although there is a reasonable drop in the WSEL just below the dams (approximately 2.5 ft) using automated gates when compared to the without project features, the difference reduces to approximately 0.7 ft at Manoa Park. It has been found that the bridges along the stream have contributed to the attenuation of the flood waters. Below Manoa Park on Modifications 1 and 3 include the Manoa In-Stream Debris Catchment which acts as a small dam with the floating debris applied and the debris has been removed at the Woodlawn Drive Bridge, so it is difficult to make a direct comparison with the without project conditions below Manoa Park. However, when comparing the difference between the TSP and the automated gates for the detention basins, the differences start to converge as you move downstream. In addition, as can be seen in the figure below there is little difference in the inundation when compared between the TSP and the automated gates. Also, due to the complex nature of the gates, the additional expense, the maintenance, and the potential for the system not working when needed, the automated gates were removed from consideration, especially given limited gains from using these gates.

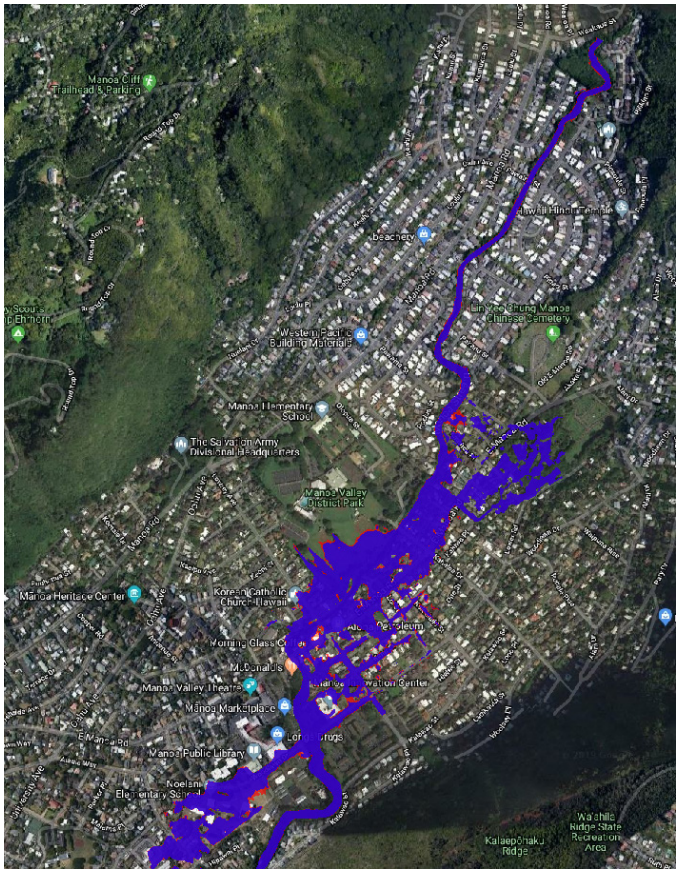

Figure 39: Inundation of TSP (red) and Automated Gates (blue) for Waihi and Waiakeakua Detention Basins

Manoa District Park Detention Basin

Since Waihi and Waiakeakua appear to provide limited benefits in reduction of flooding both in the Upper Manoa Basin and through the University of Hawaii due to attenuation of the flood waters on some of the downstream bridges, the Manoa Park Detention was evaluated. This detention basin was originally studied in the feasibility study but was not selected as part of the TSP. However, since the modeling has been updated to include 2D and unsteady flow, it was decided to re-evaluate the detention basin since it will be located downstream of some of the bridges.

The design of the Manoa Park Detention Basin includes a berm at elevation 180 ft that extends on the south and east sides of the park. The figure below shows the approximate alignment. Water enters the detention by a 20 ft wide by 10 ft high culvert that is placed upstream on the Manoa Stream approximately 300 ft upstream of Kahaloa Dr Bridge. The culvert is approximately 775 ft long. In addition, 2 culverts are placed in the berm to allow for drainage back into Manoa Stream. One culvert is a 2 ft diameter culvert located on the east side of the berm and ties into an existing ditch between the baseball fields. There is also a 4 ft by 4 ft box culvert located on the southeast corner of the berm and drains into a ditch on the southern part of the park. The berm is modeled as an internal hydraulic structure within the 2D area and includes the two drainage culverts. The inlet culvert is connected to the right bank lateral structure on the Manoa Main reach and connects via GIS coordinates to a cell in the 2D area.

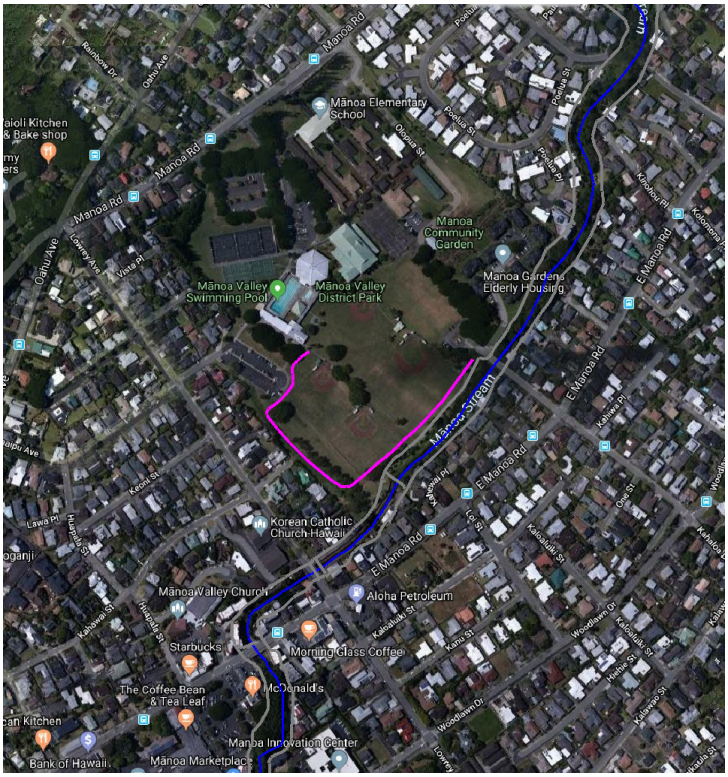

Figure 40: Manoa Park Detention TSP Berm Alignment

For comparison of the effectiveness of the structure, modification 12 was run with the Waihi and Waiakeakua TSP structures in place upstream and modification 16 includes no upstream structures. Both modifications include the Woodlawn Bypass which is located near the Woodlawn Dr Bridge. The table below shows the results for the Manoa Park Detention. For a comparison of the effectiveness between Waihi and Waiakeakua versus Manoa Park, modification 10 was included in the table because it represents Waihi and Waiakeakua with their TSP design but no Manoa Park.

Table 15: WSEL Comparisons at Select Locations for the Manoa Park Detention Basin Modifications

Reach Name (per HEC-RAS Model)	Cross-Section ID		1% AEP Event (100 year)		
			Manoa Park Detention		No Manoa Park
	New 1D/2D Model	Location Description	Modification 12 – Waihi & Waiakeakua TSP Design Upstream	Modification 16 – No Waihi or Waiakeakua Detention Upstream	Modification 10 - Waihi & Waiakeakua TSP Design
			WSEL (ft)	WSEL (ft)	WSEL (ft)
Manoa Main	948	Kanewai	38.69	39.45	39.6
	5461	St. Francis	116.7	117.56	117.9
	8367	Manoa Marketplace	153.19	153.74	154.13
	9032	E. Manoa Rd Bridge	157.93	158.7	160.26
	10309	Manoa Park	173.95	174.42	174.19
	13136	Poelua St.	210.2	211.07	210.19
	15753	Pawale Pl.	260.72	261.87	260.72

Based on the comparisons above, having both Waihi and Waiakeakua Detention and the Manoa Park (i.e. Modification 12) reduces the water surface on average approximately 0.5 ft between Manoa Park and Kanewai when compared to just Manoa Park only (i.e. Modification 16). Due to the expense of the structures, it would not be feasible to build all 3 structures for an average of 0.5 ft reduction. However, if you compare the Manoa Park only option (i.e. Modification 16) and Waihi & Waiakeakua only option (i.e. Modification 10), the Manoa Park appears to provide a greater reduction in water level when compared to Waihi & Waiakeakua detention. The Manoa Park Detention reduces the water level around the E. Manoa Rd Bridge by an addition 1.5 ft but due to the attenuation of the downstream bridges, this reduction is quickly reduced to only 0.4 within about 700 ft downstream. However, if you look at the figure below comparing the inundation between the Manoa Park Detention only versus the Waihi and Waiakeakua Detention only, the Manoa Park Detention causes more flooding. Some of the additional flooding is within the park which is part of the design but there is some additional flooding on the right bank above Manoa Park since the Manoa Park Detention will have more flow upstream of the detention basin. In addition, the berm is being flanked on the western edge for the 1% AEP which also leads to some additional flooding on the right bank downstream of the Manoa Park Detention.

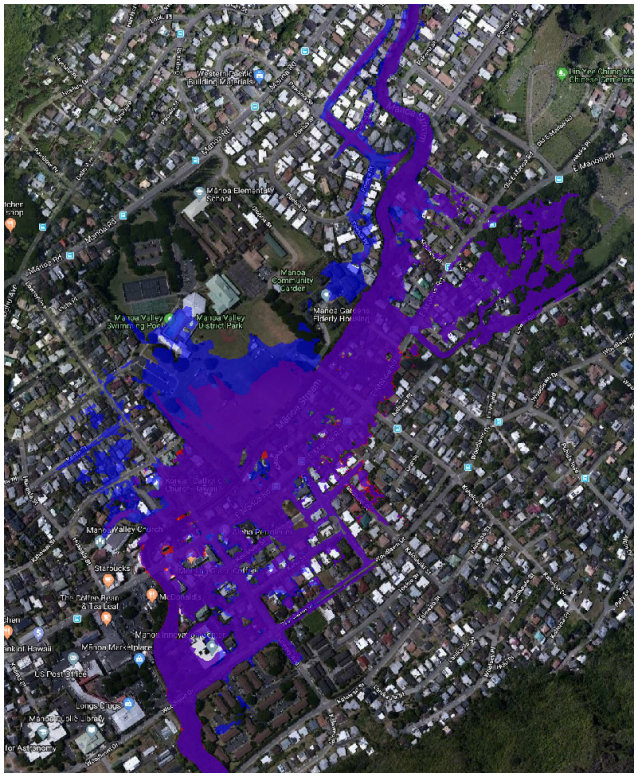

Figure 41: Manoa Park Detention only (blue) versus Waihi/Waiakeakua TSP Detention (red)

Woodlawn Detention

Although no modifications were made to the Woodlawn Detention Basin, two scenarios were run comparing the effectiveness of the structure. Modification 2 includes the Woodlawn Detention Basin and Modification 3 is the same as Modification 2 except the Woodlawn Detention Basin has been removed. The table below shows the results of those two scenarios.

Table 16: WSEL Comparisons at Select Locations for with and without the Woodlawn Detention Basin

Reach Name (per HEC-RAS Model)	Cross-Section ID		1% AEP Event (100 year)	
	New 1D/2D Model	Location Description	Modification 2 – with Woodlawn Detention Basin	Modification 3 – No Woodlawn Detention Basin
			WSEL (ft)	WSEL (ft)
Manoa Main	948	Kanewai	38.7	38.82
	5461	St. Francis	116.51	116.67
	8367	Manoa Marketplace	153.58	153.72
	9032	E. Manoa Rd Bridge	158.65	158.88
	10309	Manoa Park	173.7	173.77
	13136	Poelua St.	208.8	208.8
	15753	Pawale Pl.	259.38	259.38

Based on the results above the Woodlawn Detention reduced the water levels in Manoa by a maximum of approximately 0.2 ft.

Woodlawn Drive Bypass

Since all features that have been tested in the upper Manoa Watershed did not completely reduce the flood waters from leaving the channel on the upstream face of Woodlawn Drive Bridge and traveling through the University of Hawaii, a bypass around the bridge was evaluated. The initial analysis of this option assumed whatever flow that was leaving the right bank at Woodlawn Drive Bridge near Manoa Marketplace would be captured through an inlet on Woodlawn Drive and redirected through a culvert that would run underground and along the driveway for the University's greenhouses and back into Manoa Stream. The intent is to build the system to capture the expected overflow based on whatever features are constructed upstream. This option was modeled by making an initial run to calculate the amount of flow leaving the right bank lateral structure based on the features included upstream. Then another run was made that uses an outlet time series for the lateral structure that which uses the flow hydrograph that was pulled from the first run. This will remove the flow from the system. An identical flow hydrograph was added downstream of the Woodlawn Drive Bridge.

This feature will prevent the flooding through the university except for the university ball fields just north of H1 because these areas are flooded by water leaving the channel on the Manoa-Palolo Canal. However, by redirecting this flow away from the University of Hawaii, the flow in the Manoa Stream will

increase downstream of the Woodlawn Drive Bridge. It's possible that the Kanewai Field Detention may be able to absorb some of this excess flow. Since this feature will be designed to redirect all the flow leaving the channel at the Woodlawn Bridge regardless of the other features designed upstream, the redirected flow will vary per scenario. However, to illustrate the increase in flow on the Manoa Stream, the table below shows Modification 8 which includes the bypass and Modification 7 which is the same as 8 but does not include the bypass.

Table 17: WSEL Comparisons at Select Locations for with and without the Woodlawn Drive Bypass

Reach Name (per HEC-RAS Model)	Cross-Section ID		1% AEP Event (100 year)	
	New 1D/2D Model	Location Description	Modification 7 – without Woodlawn Bypass	Modification 8 – With Woodlawn Bypass
			WSEL (ft)	WSEL (ft)
Manoa Main	948	Kanewai	38.74	39.12
	5461	St. Francis	116.93	117.5
	8367	Manoa Marketplace	154.03	154.05
	9032	E. Manoa Rd Bridge	159.79	159.8
	10309	Manoa Park	174.01	174.01
	13136	Poelua St.	209.78	209.78
	15753	Pawale Pl.	260.59	260.59

The results above show a slight increase in the water level below Manoa Marketplace which is a result of redirecting the flow that would have flowed through the University of Hawaii back into the Manoa Stream. For this particular case the water surface only increases 0.6 ft at St. Francis and about 0.4 ft near Kanewai. For these scenarios, the Kanewai Field Detention Basin was not included in the analysis.

Kanewai Field

Although no modifications were necessarily made to Kanewai Field Detention, several scenarios were made to show the benefits of with and without the detention basin. The effectiveness and the design of the inlet weir will be dependent on the features that will be constructed upstream. The table below shows an example of a comparison between with Kanewai Field Detention (i.e. Modification 13) and without Kanewai Field Detention (i.e. Modification 14).

Table 18: WSEL Comparisons at Select Locations for with and without the Kanewai Field Detention

Reach Name (per HEC-RAS Model)	Cross-Section ID		1% AEP Event (100 year)	
	New 1D/2D Model	Location Description	Modification 13 – with Kanewai Field Detention	Modification 14 – without Kanewai Field Detention
			WSEL (ft)	WSEL (ft)
Palolo Lower	1813		9.94	9.97
	3406		15.84	15.9
Manoa Main	948	Kanewai	40.08	40.4
	5461	St. Francis	118.71	118.71
	8367	Manoa Marketplace	154.58	154.58

Based on the results above, the Kanewai Field Detention reduced the water levels by 0.3 ft at Kanewai, but those reductions were practically eliminated farther downstream on the Manoa-Palolo Canal. However, as seen in the figure below the inundation is impacted some with Kanewai Field Detention in place (blue) versus the detention basin being removed (red). As mentioned above, the effectiveness of the detention basin may be dependent on the upstream structures. Once the upper Manoa Watershed features are designed, the Kanewai Field can be analyzed for its effectiveness to reduce the water levels and/or prevent induced flooding if the Woodlawn Bypass feature is built.

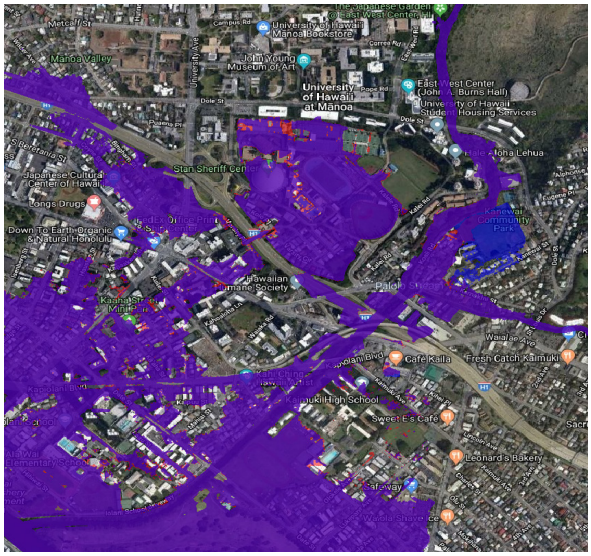

Figure 42: Kanewai Field Detention (blue) versus Without Kanewai Field Detention (red)

After evaluating several modifications and optimizations, it was determined that detention basin(s) located in the upper watershed of Manoa Valley will not achieve the required risk reduction, particularly when considered that the most effective plan (modification 11) which includes Waihi, Waiakeakua, Manoa Park Detention, and the Woodlawn Bypass estimated cost is approximately $70M. Alternatively the least expensive alternative which only incudes the Woodlawn Bypass Culvert, a small floodwall near the Innovation Center, and channel excavation from E. Manoa Rd Bridge to approximately 1,000 ft downstream of Woodlawn Drive Bridge was estimated at a cost of approximately $25M. A comparison of the lateral extent and depth of inundation show that inundation is very similar between Modification 11 and the Woodlawn Bypass Culvert, small floodwall, and excavation only option (considered as a final proposed feature). The figure below shows the difference in the extent between Modification 11 (blue) and the proposed system modification (red). Therefore, the Waihi, Waiakeakua, Woodlawn and Manoa Park detention basins in Manoa Valley has been removed from the flood risk management system. The Woodlawn Bypass Culvert and Kanewai Detention Basin are the only features that will move to the final proposed design.

Figure 43: Inundation Comparison of Modification 11 (blue) and the Proposed System Option (red)

Palolo Modifications

Pukele Modifications

Since the TSP Pukele Detention Basin only reduces the water level by a maximum of approximately 0.1 ft, a modification to the structure was evaluated. The only modification evaluated was to include an in-stream debris catchment similar to the one proposed for Manoa Stream. This option was evaluated in modifications 2, 3, 6, 7, and 8 using the same methodology as the Manoa In-Stream Debris Catchment. However, after making these modifications, during a meeting in August of 2018 in Honolulu, city and county personnel informed the team that the Pukele, Waiomao, and Makiki have not had a history of debris issues. Only Manoa has a history of debris issues with the 2004 event being an example of debris issues. Due to several restrictions in the watershed, a new location or modified dimensions of the Pukele Detention Basin was not feasible. Since the Pukele Detention was not found to be effective, the feature was removed for subsequent (i.e. Modifications 9-16) model runs.

Waiomao Modifications

Since the TSP Waiomao Detention Basin only reduces the water level by a maximum of approximately 0.2 ft, modifications to the structure were evaluated. Two modifications were considered on top of the TSP design. Both plans assumed an automated gate. An option to include an automated gate at the TSP site was first considered and then an option was considered for the detention basin to be moved upstream and for it to also include an automated gate. A separate HEC-RAS model was created just for the structure and included just enough cross-sections downstream to compute an outflow.

For the first modification, the Waiomao Detention Basin was slightly modified from the TSP design. The design assumes the same embankment elevation of 402 ft, a concrete-lined emergency spillway 75 ft wide but the elevation was raised to 400.0 ft, and the box culvert was replaced with a 12 ft wide by 7 ft high gate with an invert set to elevation 370.5 ft. The operation was set to release a max of 1,750 cfs which compares to the approximately 2,350 cfs release from the TSP and the approximately 2,480 cfs without project.

The second modification moved the detention basin further upstream. The design assumes an embankment elevation of 580 ft, an emergency spillway 50 ft wide with an elevation of 578 ft, and a 14 ft wide by 8 ft high gate with an invert set to elevation 529.4 ft. The operation was set to release a max of 1,120 cfs which compares to the approximately 1,750 cfs for the first modification, 2,350 cfs release from the TSP and the approximately 2,480 cfs without a project.

The table below shows a comparison of water levels for the different modifications of the Waiomao Detention Basin. Modification 5 includes the TSP operation, Modification 2 includes the automatic gates at the TSP location, and Modification 3 includes the upper basin location with automatic gates.

Table 19: WSEL Comparisons at Select Locations for Makiki Detention Basin Modifications

Reach Name (per HEC-RAS Model)	Cross-Section ID		1% AEP Event (100 year)			
	New 1D/2D Model	Location Description	Modification 2 – TSP w/ Gate & Pukele Debris only	Modification 3 – Upper Detention w/ Gate & Pukele Debris only	Modification 4 – TSP Waiomao & TSP Pukele	Without Project
			WSEL (ft)	WSEL (ft)	WSEL (ft)	WSEL (ft)
Waiomao Tributary	1724		268.36	267.19	269.23	269.42
Palolo Main	11649	Palolo Hongwanji	138.05	137.92	138.08	138.38
	14619	Palolo District Park	188.01	187.59	188.21	188.63

Based on the results, the TSP design with a gate does provide almost 1.0 ft reduction on Waiomao when compared to the without project features but this reduction is quickly diminished as you progress downstream due to the attenuation of the downstream bridge restrictions. The upper basin detention with a gate reduces the water levels by a little over 2.2 ft on Waiomao but once again this difference is diminished as you progress downstream. However, as pointed out on the automatic gates for Waihi and Waiakeakua due to the complex nature of the gates, the additional expense, the maintenance, and the potential for the system not working when needed, the automated gates were removed from consideration, especially given limited gains from using these gates. In addition, Since the Waiomao TSP Detention was not very effective, the feature was removed for subsequent (i.e. Modifications 9-16) model runs.

The features developed in the feasibility phase and numerous modifications evaluated during the post-feasibility phase do not significantly reduce localized flooding or WSEL at the confluence with Manoa Stream. Therefore, the detention basins in Palolo Valley will be removed from the risk management system when considered collectively with the limited, relatively shallow inundation, an estimated $37M of construction costs, land acquisition requirements, and the unwanted impacts to the environment and community.

Proposed Final Features

Overview

Due to the results of this analysis, the structures on Makiki and Palolo portions of the watershed were determined to be ineffective due to the limited storage capacity that could be reasonably excavated and were removed from the study. As previously shown, significant attenuation behind downstream bridges on the Manoa Portion of the watershed negated most of the effects of the reduced peak flow and the limited benefits of most of the structures were not considered economically justifiable. As a result, the

Waihi, Waiakeakua, Woodlawn Detention, and Manoa Park structures were also removed from the study. The features that will be carried forward in the Proposed Final design include the following six structural elements:

- Two stream diversions
  - Makiki Stream Diversion
  - Woodlawn Drive Bridge Diversion
- Three multi-purpose detention basins
  - Ala Wai Golf Course Detention
  - Hausten Ditch Detention
  - Kanewai Field Detention
- Floodwalls along Ala Wai Canal (including pump stations for interior drainage)

The hydrology for the proposed final features model scenario was updated to use a 12-hour duration 100-year frequency flow developed using HEC-WAT. Plots and tables of the hydrographs used for the 100-year frequency event can be found in the appendix of this report. Details of the flows used in the post-feasibility study can be found in the Post-Feasibility Hydrology Report. In addition, the without project condition model scenario was also updated to run the HEC-WAT derived frequency flows in order to provide a comparison of the results. Finally, the post-feasibility TSP design was run using the HEC-WAT flows so that the economic analysis could be conducted on this scenario and compared to the proposed final feature scenario. As stated in the post-feasibility section of this report, all other scenarios used a basin average 100-year 24-hour duration Atlas 14 frequency flow since the HEC-WAT derived flows were not available at the time the other scenarios were modeled.

Makiki Watershed

Findings from the hydrologic and hydraulic analysis in Makiki Valley necessitated a conceptual shift from maximizing flood water detention to enhanced conveyance to manage flood risk.

The use of extended floodwalls along Makiki channel upstream of Kapiolani Blvd Bridge was also explored. Modeling results indicate the floodwalls would need to extend a significant distance to reach a topographic elevation high enough to overcome the WSEL and commensurate hydraulic head at the confluence with the Ala Wai Canal. Additionally, the floodwalls would need to be constructed for long distances on the top of existing historic walls on the Makiki Stream or in narrow channels through densely urbanized businesses and residences. The existing walls often butt directly against the tops of this narrow, vertical-walled storm water channel, further complicating construction and significantly increasing cost.

A diversion culvert was examined rather than pursue extending floodwalls due to logistical and cost challenges. A culvert with approximate dimensions of 1,500 feet long by 20 feet wide by 10 feet deep to supplement the conveyance of floodwater was considered. After a series of models, including supplemental small pumps, it was determined that a culvert beginning at the Makiki channel running parallel to the canal to a discharge point just upstream of Ala Moana Blvd Bridge would significantly reduce backwater conditions and prevent overtopping of the channel in the McCully and Moiliili area. This design concept requires further evaluation for performance optimization, environmental impacts, and cost effectiveness as part of the final design.

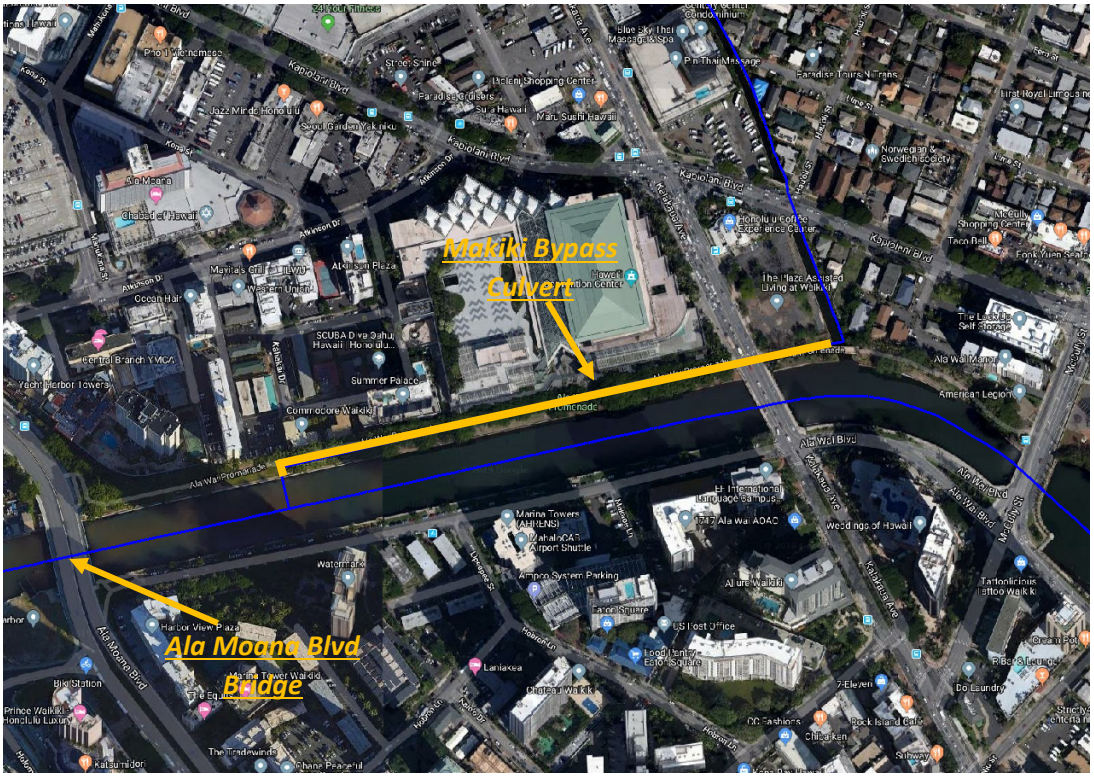

Figure 44: Conceptual footprint of Makiki Diversion

Manoa Watershed

The proposed path forward for the system model is to perform excavation from E. Manoa Rd Bridge to approximately 1,000 ft downstream of Woodlawn Dr Bridge, constructing a small levee on the left bank between E. Manoa Rd Bridge and Woodlawn Drive Bridge, and constructing a box culvert 15 ft wide by 10 ft high redirects water around Woodlawn Dr Bridge. The figure below shows the approximate alignment of the box culvert.

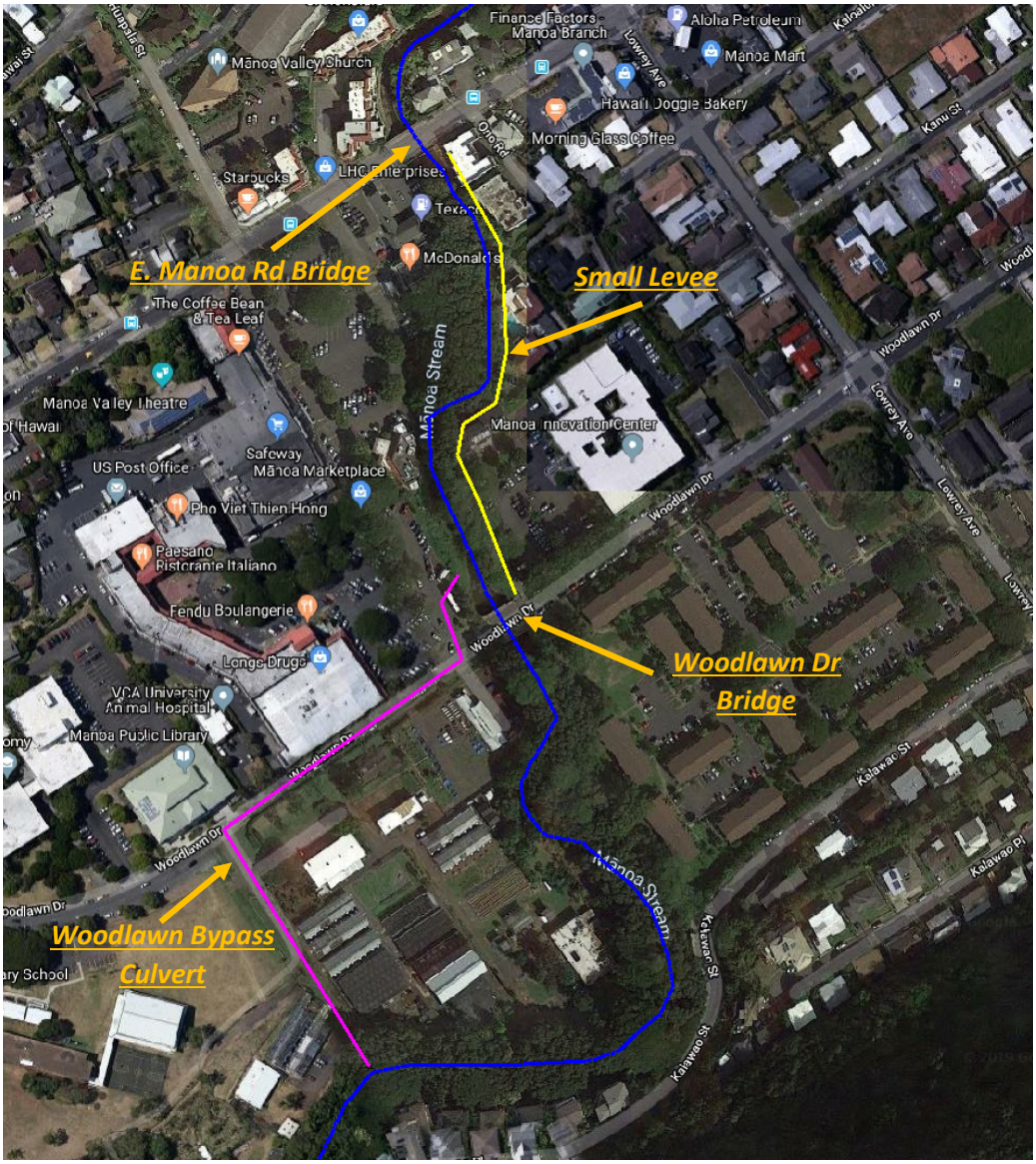

Figure 45: Conceptual footprint of Woodlawn Bypass Culvert

Palolo Watershed

The features developed in the feasibility phase and numerous modifications evaluated during the post-feasibility phase do not significantly reduce localized flooding or WSEL at its confluence with Manoa Stream. Therefore, no features were included in the Palolo Watershed.

Lower Watershed

Golf Course

Results of the modeling indicate the planned berm alignment at the northern and eastern perimeter of the golf course prevent overland flow from uplands north from reaching the Ala Wai Canal and consequently induced flooding. Hydraulic modeling shows the sheet flow was pushed eastward, flanking the berm and increased inundation along a major north/south thoroughfare, Kapahulu Avenue.

A new design was developed which includes 2 berms running north to south across the golf course, in conjunction with a pump placed on the Ala Wai Canal just upstream of its confluence with the Manoa-Palolo Canal. The figure below shows the conceptual footprint of the golf course berms. In addition to the berms, a sedimentation basin would be placed in the terrain on the west side of the golf course.

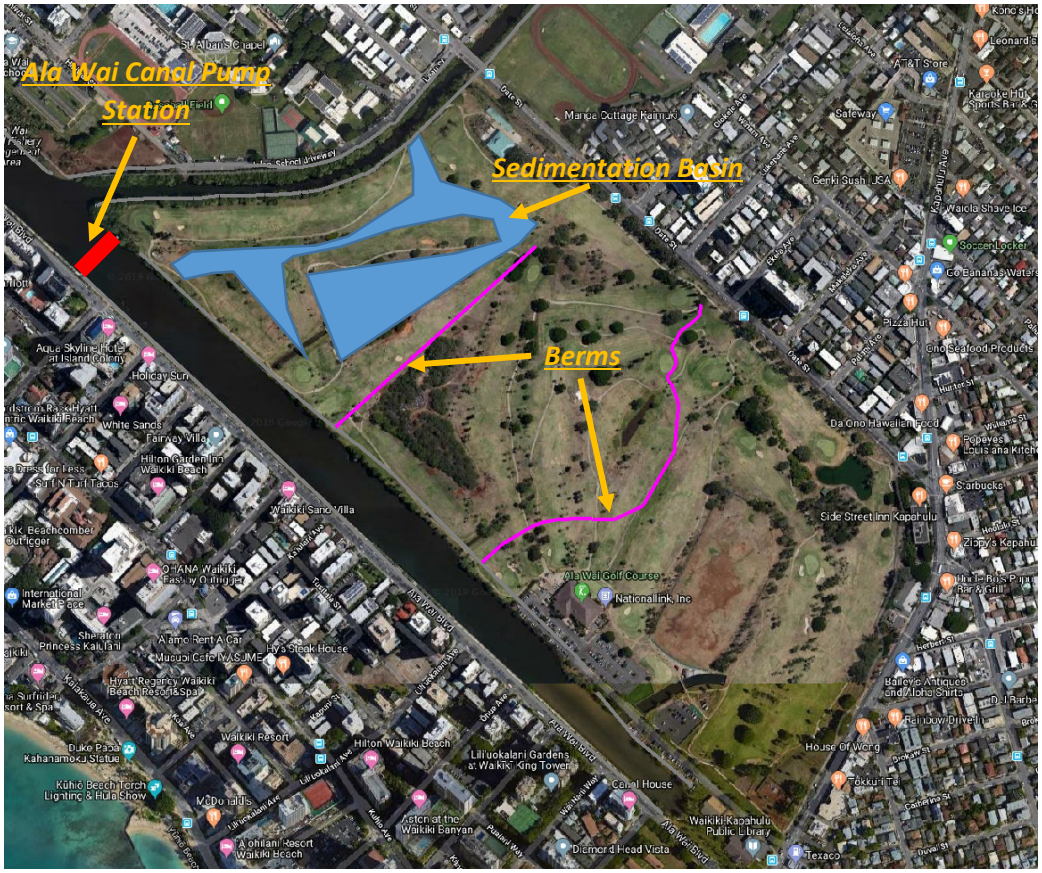

Figure 46: Conceptual footprint of Golf Course Berms

Floodwalls and Pump

For the final proposed design, the floodwalls on the Ala Wai Canal and the floodwall on the right bank of the Manoa-Palolo Canal from the confluence with the Ala Wai Canal up to Date street remain unchanged from the post-feasibility analysis with the exception of removing the segment of the floodwall on the upper portion of the canal. The segment that was removed was the on the left bank of the upper Ala Wai Canal across from the Ala Wai Golf Course. The upstream section of the left bank floodwall now begins at the proposed location of the pump station instead of the upstream end of the canal near the library. The figure below shows the proposed alignment of the floodwalls. If the Makiki Diversion is accepted, the floodwall will block the current Makiki outlet and extend down to the new Makiki Outlet.

The original study considered two pump stations but after several iterations by the New Orleans district, The recommended plan consolidates two pump stations into a single 4,000 cfs pump and relocates the pump on the Ala Wai canal to just upstream of the confluence with the Manoa-Palolo Canal.

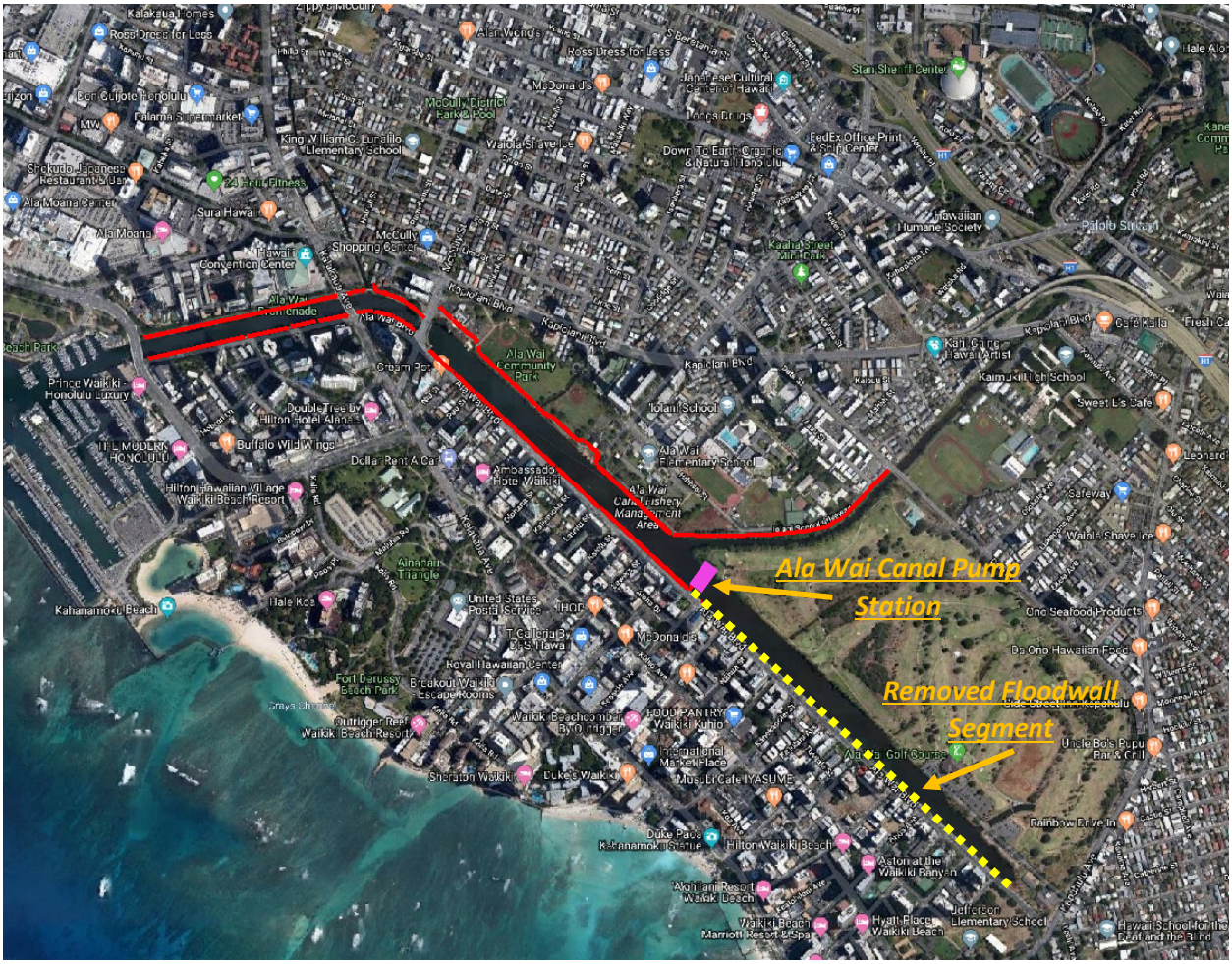

Figure 47: Proposed Final Floodwall Alignment

Kanewai Field

Kanewai Field currently remains in the future proposed features as designed in the post-feasibility TSP analysis but will need to be evaluated based on its effectiveness once the upper Manoa Valley features are fully designed and accepted.

Results

The table below shows the results of the proposed system model versus the without project conditions. The last column shows the difference between the proposed final features plan and the without project plan. A positive value indicates that the proposed final feature plan has a higher WSEL than the without project conditions. The Ala Wai Canal and the areas of the other streams near the confluence with the Ala Wai Canal are higher in the proposed final feature plan compared to the without project plan because the floodwalls are containing the floodwaters that would have otherwise been in the overbanks. A negative indicates a reduction in WSEL with the proposed final features in place as compared to the without project conditions and a zero value indicates no change between the with and

without project features. The comparison uses the 12 hr duration event (100 year) that was from the HEC-WAT derived frequency flows.

The proposed final features reduce the flooding through the University of Hawaii and reduce the severity of flooding in the lower watershed around Waikiki, Iolani, McCully, and the Moiliili areas.

Table 20: WSEL Comparisons at Select Locations between Without Project Conditions and Proposed System Model

	Cross-Section ID	Cross-Section ID		1% AEP Event (100 year) - HEC-WAT Flow Computation		
Reach Name (per HEC-RAS Model)	Original Modeling	New 1D/2D Model	Location Description	Without Projects WSEL (ft)	Proposed Final Features WSEL (ft)	Difference (ft)
Ala Wai Lower	1477	1188		5.32	5.83	0.51
Ala Wai Middle	4847	4676		7.70	9.35	1.65
Ala Wai Upper	8015	8015		7.9	8.45	0.55
Kanahā Ditch	1874	1874		74.01	74.01	0
	3005	3004		79.25	79.25	0
Makiki Lower	1719	1667	Fern	12.63	12.63	0
	4325	4301	Beretania	38.90	38.90	0
Makiki Upper	6606	6606	Wilder	70.28	70.28	0
	9666	9543	Detention Basin	173.30	173.30	0
Mānoa Stream Main Reach	948	948	Kanewai	37.73	40.36	2.63
	5461	5461	St. Francis	119.62	120.58	0.96
	8367	8367	Manoa Marketplace	155.75	154.11	-1.64
	9032	9032	E. Manoa Rd Bridge	162.59	162.41	-0.18
	10309	10309	Manoa Park	175.19	175.15	-0.04
	13136	13136	Poelua St.	212.54	212.54	0
	15753	15753	Pawale Pl.	263.51	263.51	0
Pālolo Lower	1813	1813		9.44	10.72	1.28
	3406	3406		16.3	16.41	0.11
Pālolo Main	6376	6376	St. Louis Drive	39.89	39.87	-0.02

	8574	8574	St. Louis HS	95.62	95.62	0
	11649	11649	Palolo Hongwanji	138.47	138.47	0
	14619	14619	Palolo District Park	188.96	188.96	0
Pūkele	2184	2184		286.97	286.97	0
Waiʻōmaʻo	1724	1724		270.04	270.04	0

The figure below shows the difference in the inundation between the without project conditions (red) and the with the proposed final features (blue/purple).

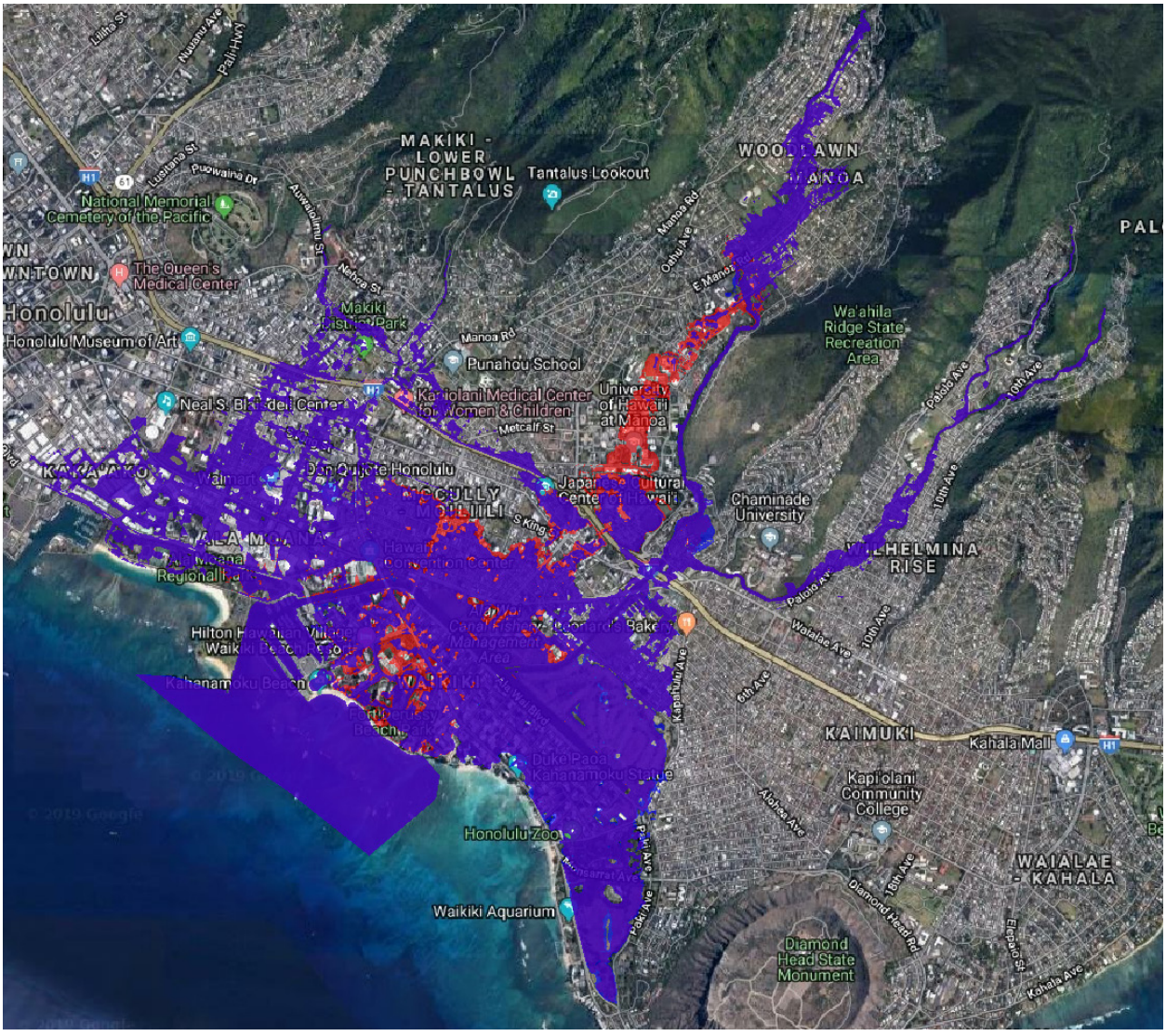

Figure 48: Inundation Comparison of without projects (red) and with proposed final features (blue/purple)

Summary and Conclusions

In summary, while the project objective remains the same as the plan advanced through the planning, engineering, and design phases, the approach evolved based on better data and better hydraulic modeling. Results of the HEC-RAS 1D/2D unsteady state modeling and accompanying engineering analysis support a shift from flow detention in the upper watersheds to improved conveyance for greater control and risk management throughout the downstream system.

Key findings summarized below:

Upper Watershed - Makiki Valley, Manoa, and Palolo Valleys

- Extent of inundation was not as severe as estimated with HEC-RAS 1D modeling in Makiki and Palolo Valleys, therefore the requirements and benefits of detention basins in the upper watersheds were reduced
- Significant flooding was observed throughout Manoa Valley in HEC-RAS 1D steady and HEC-RAS 1D/2D unsteady state modeling, particularly in the Manoa Marketplace stream reach
- Overtopping at the Woodlawn Drive Bridge occurs without the presence of the bridge due to stream channel constraints, which are amplified by the presence of the bridge substructure and historic debris blockages
- HEC-RAS 1D/2D modeling showed storage capacity of detention basins could not be cost effectively expanded in the upper valleys to reduce flows enough to prevent overtopping at numerous constrictions along the routing
- Recommend replacing the Makiki detention basin planned in upper Makiki Valley with a culvert diversion at the confluence with the Ala Wai canal pending further engineering investigation
- Recommend removing Waihi, Waiakeakua, and Woodlawn Ditch detention basins and improve conveyance at the Manoa Marketplace stream reach with stream deepening, floodwalls, and a culvert bypass at the Woodlawn Drive Bridge to keep storm flow within the stream channel and prevent downstream flooding of neighborhoods and University of Hawaii campus
- Recommend replacing Waiomao and Pukele detention basins with floodwalls extended northward from the Ala Wai canal to the Date Street Bridge to maintain storm flow within the stream channel and prevent flooding of the neighborhood, ‘Iolani and Ala Wai Elementary schools

Lower Watershed – Ala Wai Canal, Golf Course, Hausten Ditch

- Widespread flooding will occur across the base of the Ala Wai watershed, north and south of the Ala Wai canal in a 1% annual exceedance probability event
- Consolidation of two large capacity pump stations into a single 4,000 cubic feet per second pump station at the confluence of the Manoa-Palolo channel and the Ala Wai canal
- Pump station(s) placement at the eastern end of the Ala Wai canal enhances efficacy of existing interior storm water drainage in the Kapahulu and Diamond Head neighborhoods

The figure below graphically summarizes the recommended modifications to the flood risk management features planned during the feasibility phase.

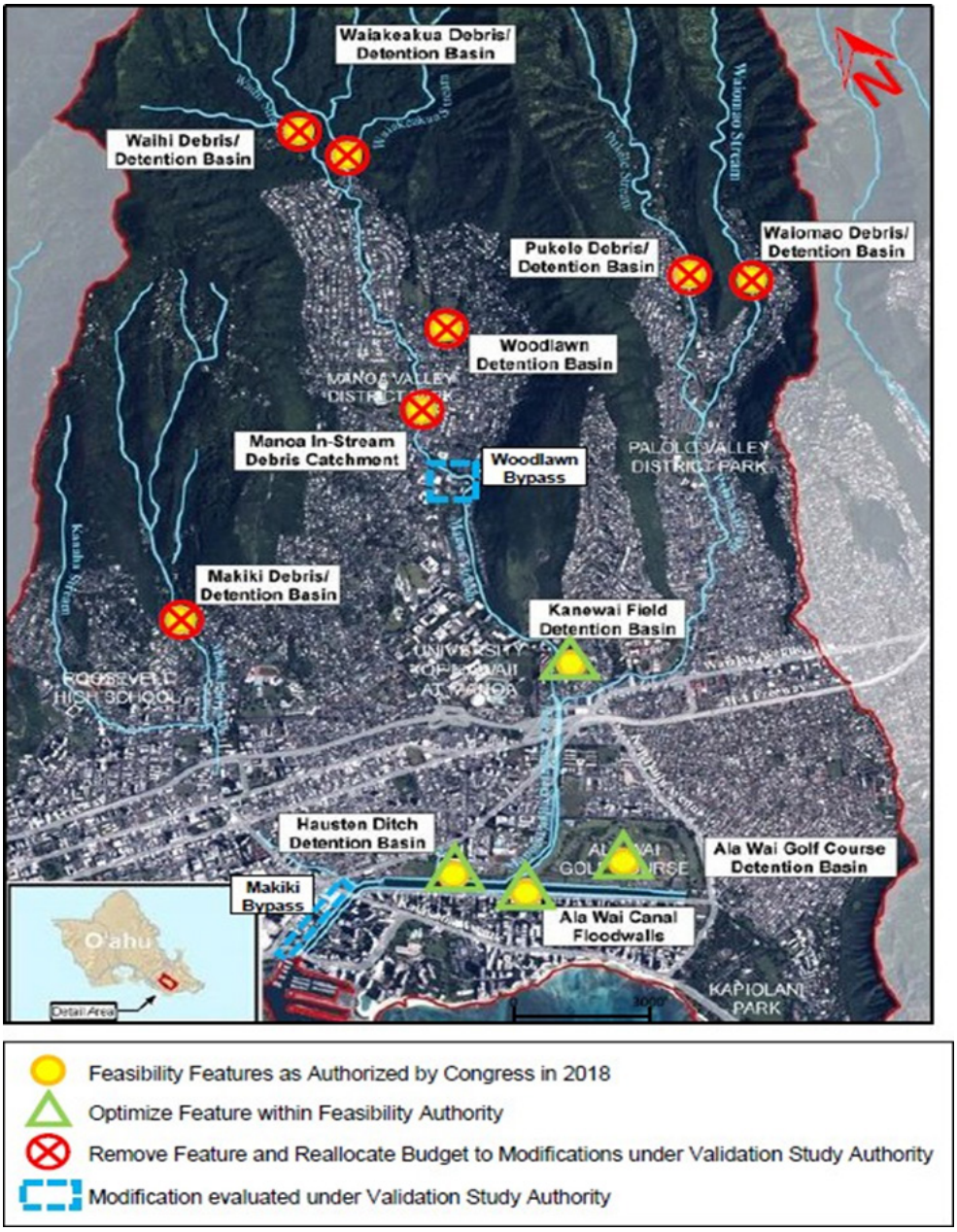

Figure 49: Recommended Modifications to the authorized FFEIS Project

Future Considerations

Currently, all scenarios in this report are based on a basin average Atlas 14 rainfall (i.e. the same precipitation was used for all sub basins), since this was the same methodology used for the Atlas 14 routings in the feasibility studies. However, for the hydrology effort, the frequency routings were completed through a variety of methods. These included an Atlas 14 method for both averaged and confidence interval precipitation, spatially varied Atlas 14 for both averaged and confidence interval precipitation, and HEC-WAT routings for a 12- and 24-hour events. Confidence interval data is available for HEC-WAT routings but was not post processed in HEC-SSP or routed though HEC-WAT. Only the 12-

hour duration frequency events were post-processed in HEC-SSP. For the final design efforts, it is recommended that the 12-hour HEC-WAT routing be considered as the most accurate and appropriate.

Additionally, the probable maximum precipitation (PMP) should be estimated and routed through the HEC-HMS model to produce the probable maximum flood (PMF). Currently, the only basin remaining in the recommended plan is the Kanewai Field Detention which may require a PMF scenario for design.

Finally, as described above, the availability of data to calibrate the HEC-RAS model was highly limited due to the number of gages available during the calibration events and the frequency in which the data was recorded. However, additional gages have been added in the watershed by USGS (including one on Makiki) and the data is currently collected at 5-minute increments. As a result, additional calibration events would be beneficial to use to better calibrate the model. The use of more calibration events was outside the scope of this effort.

Hydraulic Information for Economic Analysis

As part of this effort, an economic analysis was performed using the Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA) software. This analysis requires multiple inputs from the hydraulic analysis which includes cross-section range and index location for each damage reach, bank elevations, channel inverts, water surface profiles for the 8 exceedance probability flood events, stage-discharge standard deviation, and input on re-delineation of damage reaches. Below is a list of the plans that were analyzed as part of the economic analysis.

- Future without-project condition– indexed to future without project conditions of 2075 and based on an intermediate scenario pertaining to sea level rise. Uses HEC-WAT derived frequency flows.
- Future with- post-feasibility TSP project condition – used for analysis of the post feasibility tentatively selected plan features indexed to year 2075. Uses HEC-WAT derived frequency flows.
- Future with-proposed final features project condition – used for analysis of the new proposed final features indexed to the year 2075. Uses HEC-WAT derived frequency flows.

Damage Reaches

The economic analysis was based on the same methodology as the original feasibility study but due to updates to the HEC-RAS 1D/2D model, some edits to the damage reaches have been made. Damage reaches in HEC-FDA are geographical areas that are used to aggregate structure data and other damage information within a floodplain. The changes to the feasibility study damage reaches include expanding some damage reaches to encompass the new inundation extents. The new HEC-RAS 1D/2D provides more detailed modeling in the overbanks areas and as a result, there are some differences in the overbank inundation compared to the feasibility study. Additional edits to the damage reaches included merging some of the reaches since the stream reaches for the University Split reach and the Kanaha Split reach no longer exist in the updated HEC-RAS model. These reaches were replaced with 2D flow areas and so the stream reach and cross-sections do not exist. The University Split reach that modeled the flows through the University of Hawaii was merged with adjacent reaches on the Manoa Stream. The UNI1 damage reach was merged with MAN1 damage reach and the UNI2 was merged with MAN2

damage reach. For the Kanaha Split reach that was used to model overbank flows to the south of Kanaha Stream, the damage reach KAO1 from the Kanaha Split stream reach was merged with the KAH1 damage reach. Below are figures showing the damage reaches from the feasibility study and the new post-feasibility damage reaches. The figure also shows the without project inundation for the 100-year flood event. The basis for the delineation of the original damage reaches can be found in Appendix B of the feasibility study, as well as other pertinent data and assumptions made for the HEC-FDA model.

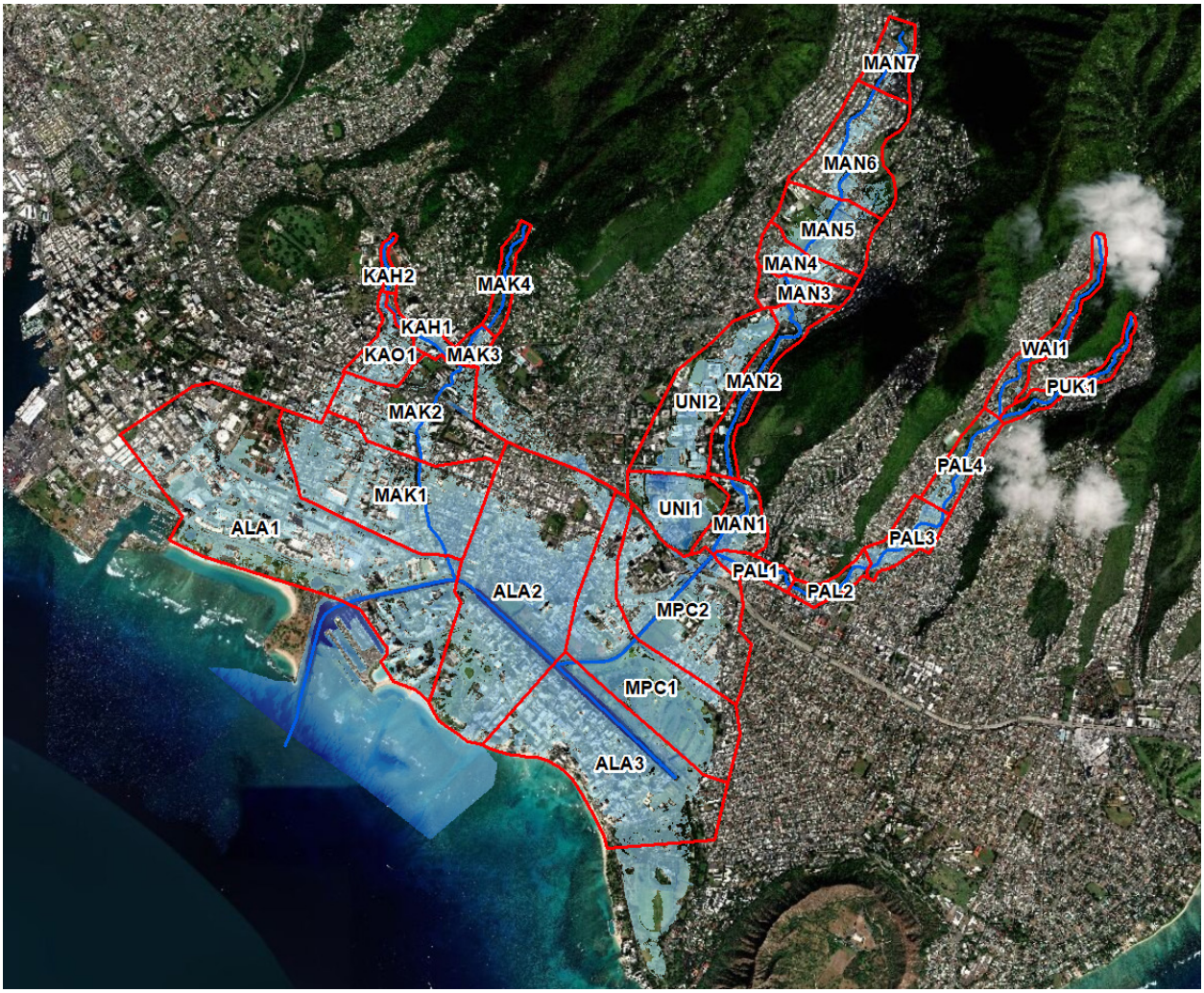

Figure 50: Damage Reach Layout from Feasibility Study

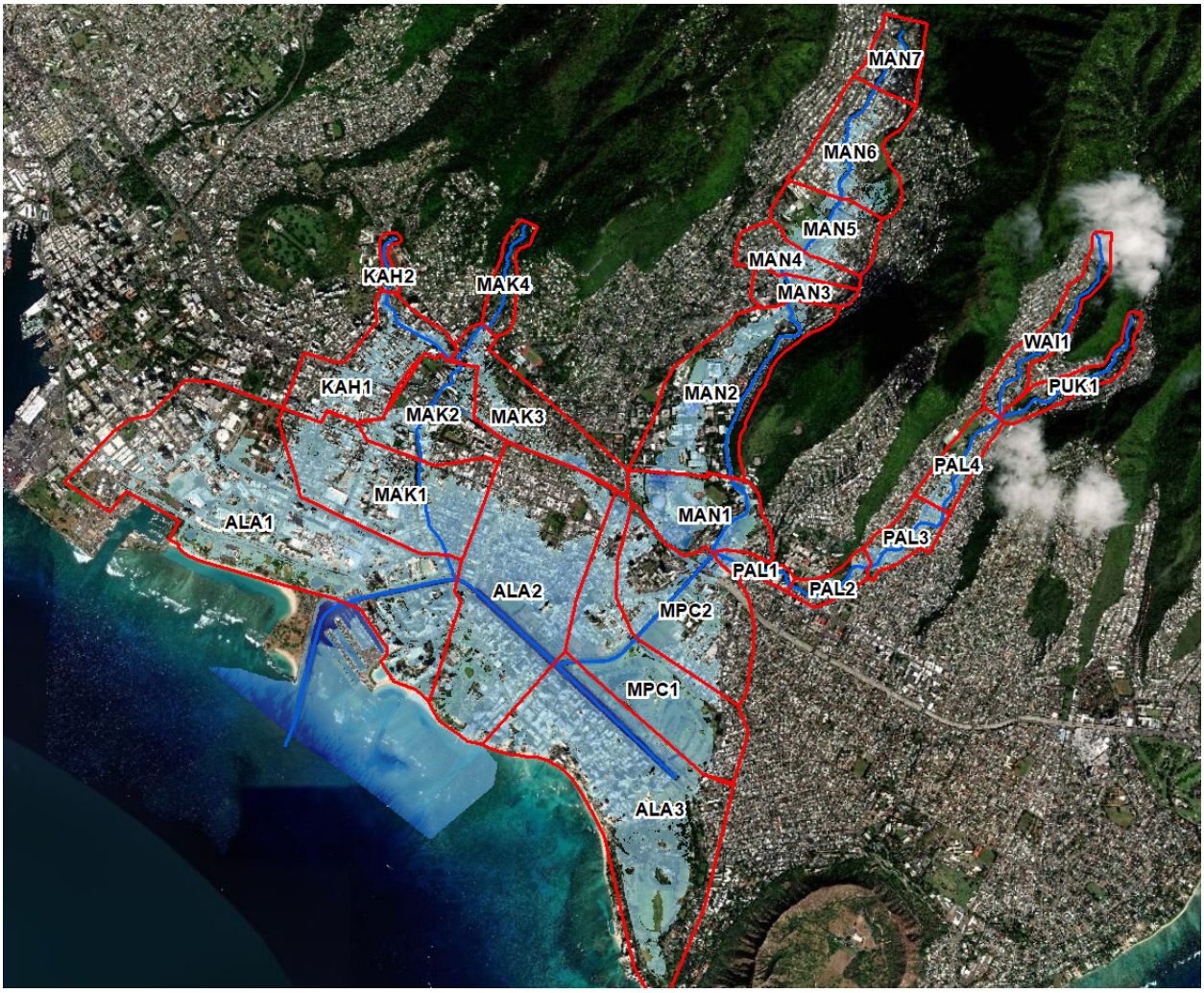

Figure 51: Updated Damage Reach Layout for Post-Feasibility Study

Damage reaches in HEC-FDA also require additional information such as the upstream and downstream river stations from HEC-RAS, an index location, channel invert of index location, and bank elevations at the index location. The index location is a location between the upstream and downstream station for the reach and is selected to specify the stage-discharge, the discharge probability, and stage damage functions with uncertainty for the damage reach. The index location was selected based on location that would represent the reach and would provide reliable data. The index location for some damage reaches were changed for some plans due to the structures and the reliability of the data. For example, the ALA3 index location was changed for the post-feasibility proposed final features plan due to the pump station that was added to that reach. The index location was moved closer to the confluence of the Manoa-Palolo canal and downstream of the pump station since this area would be more representative of the water surface in the canal instead of upstream of the pump station which will be lowered by the pump station. Other examples included locations that may have been impacted by project features and which may have caused a loop effect on the rating curves for the area. There were a few areas such as the Ala Wai upper canal that saw a continuous increase in WSEL over the 8

frequencies, but the flow may have reduced for the lower frequency events due to an increase in backwater effects. Below are tables of the downstream stations, upstream stations, index locations, channel invert, and bank elevations used for the different plans.

Table 21: HEC-FDA Damage Reach Information for Future Without Project Conditions

Damage Reach	Stream	Downstream Cross Section	Upstream Cross Section	Index	Channel Invert at Index Location	Bank	Right Bank Elevation (ft)	Left Bank Elevation (ft)
Ala1	Ala Wai	-221	2132	1188	-7.97	Both	4.76	4.71
Ala2	Ala Wai	2453	5770	5687	-6.05	Both	2.4	4.7
Ala3	Ala Wai	6095	10082	6370	-6.74	Both	3.5	4.4
Mak1	Makiki	595	3062	2015	2.47	Both	8.9	8.9
Mak2	Makiki	3176	6280	4703	24.8	Both	38.5	42.6
Mak3	Makiki	6316	7672	6606	63.38	Both	75.9	70.2
Mak4	Makiki	7760	9543	8310	119.81	Both	129.81	130.4
Kah1	Kanaha Ditch	3	2774	1249	61.5	Both	67.5	67.5
Kah2	Kanaha Ditch	2873	4372	3004	70.68	Both	75.1	72.7
MPC1	Manoa-Palolo Canal	229	2282	1813	-1.25	Both	7	7.6
MPC2	Manoa-Palolo Canal	2351	5198	4233	6.21	Both	20.2	22.4
Man1	Manoa	84	2441	1230	28.56	Both	48.1	38.3
Man2	Manoa	2477	7885	7734	134	Both	148.5	147.1
Man3	Manoa	7953	8699	8223	141.65	Both	156	149.85
Man4	Manoa	8775	9501	9116	150.1	Both	157.5	158.5
Man5	Manoa	9639	11248	10309	164.12	Both	172.53	171.5

Man6	Manoa	11302	14636	13036	198.62	Both	208.3	212.3
Man7	Manoa	14692	16506	15408	241.73	Both	256.68	253.2
Pal1	Palolo	5303	7482	6466	30.77	Both	39.6	47.2
Pal2	Palolo	7552	9824	9055	87.61	Both	97.11	96.8
Pal3	Palolo	9922	12593	11238	121.94	Both	128.3	131.5
Pal4	Palolo	12653	15526	14619	178.43	Both	194.6	187.2
Wai1	Waiomao	70	4900	2127	275.83	Both	281.2	281.33
Puk1	Pukele	50	5958	2723	303.9	Both	317.04	314.32

Table 22: HEC-FDA Damage Reach Information for Future with Post-Feasibility TSP Features

Damage Reach	Stream	Downstream Cross Section	Upstream Cross Section	Index	Channel Invert at Index Location	Bank	Right Bank Elevation (ft)	Left Bank Elevation (ft)
Ala1	Ala Wai	-221	2132	1188	-7.97	Both	6.45	6.45
Ala2	Ala Wai	2453	5770	3282	-7.2	Both	10.4	10.4
Ala3	Ala Wai	6095	10082	6370	-6.74	Both	3.5	10.45
Mak1	Makiki	595	3062	2015	2.47	Both	8.9	8.9
Mak2	Makiki	3176	6280	4703	24.8	Both	38.5	42.6
Mak3	Makiki	6316	7672	6606	63.38	Both	75.9	70.2
Mak4	Makiki	7760	9543	8310	119.81	Both	129.81	130.4
Kah1	Kanaha Ditch	3	2774	1249	61.5	Both	67.5	67.5
Kah2	Kanaha Ditch	2873	4372	3004	70.68	Both	75.1	72.7
MPC1	Manoa-Palolo Canal	229	2282	1813	-1.25	Both	11.1	9.7

MPC2	Manoa-Palolo Canal	2351	5198	4233	6.21	Both	20.2	22.4
Man1	Manoa	84	2441	1230	28.56	Both	48.1	38.3
Man2	Manoa	2477	7885	7653	133.5	Both	148.3	148
Man3	Manoa	7953	8699	8306	143.04	Both	156.8	156
Man4	Manoa	8775	9501	9116	150.1	Both	157.5	158.5
Man5	Manoa	9639	11248	10183	163.74	Both	171	171.5
Man6	Manoa	11302	14636	13036	198.62	Both	208.3	212.3
Man7	Manoa	14692	16506	15408	241.73	Both	256.68	253.2
Pal1	Palolo	5303	7482	6466	30.77	Both	39.6	47.2
Pal2	Palolo	7552	9824	9055	87.61	Both	97.11	96.8
Pal3	Palolo	9922	12593	11335	123.04	Both	129.5	129.8
Pal4	Palolo	12653	15526	13835	165.9	Both	176.5	173.4
Wai1	Waiomao	70	4900	2127	275.83	Both	281.2	281.33
Puk1	Pukele	50	5958	2723	303.9	Both	317.04	314.32

Table 23: HEC-FDA Damage Reach Information for Future with Proposed Final Features

Damage Reach	Stream	Downstream Cross Section	Upstream Cross Section	Index	Channel Invert at Index Location	Bank	Right Bank Elevation (ft)	Left Bank Elevation (ft)
Ala1	Ala Wai	-221	2132	1188	-7.97	Both	6.3	6.3
Ala2	Ala Wai	2453	5770	3282	-7.2	Both	9.8	9.8
Ala3	Ala Wai	6095	10082	6095	-6.74	Both	10.45	10.45
Mak1	Makiki	595	3062	2015	2.47	Both	8.9	8.9
Mak2	Makiki	3176	6280	4703	24.8	Both	38.5	42.6
Mak3	Makiki	6316	7672	6606	63.38	Both	75.9	70.2

Mak4	Makiki	7760	9543	8310	119.81	Both	129.81	130.4
Kah1	Kanaha Ditch	3	2774	1249	61.5	Both	67.5	67.5
Kah2	Kanaha Ditch	2873	4372	3004	70.68	Both	75.1	72.7
MPC1	Manoa-Palolo Canal	229	2282	1813	-1.25	Both	7	9.7
MPC2	Manoa-Palolo Canal	2351	5198	4233	6.21	Both	20.2	22.4
Man1	Manoa	84	2441	851	25.42	Both	32.65	40.2
Man2	Manoa	2477	7885	7734	131.86	Both	148.5	147.1
Man3	Manoa	7953	8699	8223	138.66	Both	156	152
Man4	Manoa	8775	9501	9116	150.1	Both	157.5	158.5
Man5	Manoa	9639	11248	10309	164.12	Both	172.53	171.5
Man6	Manoa	11302	14636	13036	198.62	Both	208.3	212.3
Man7	Manoa	14692	16506	15408	241.73	Both	256.68	253.2
Pal1	Palolo	5303	7482	6466	30.77	Both	39.6	47.2
Pal2	Palolo	7552	9824	9055	87.61	Both	97.11	96.8
Pal3	Palolo	9922	12593	11335	123.04	Both	129.5	129.8
Pal4	Palolo	12653	15526	13835	165.9	Both	176.5	173.4
Wai1	Waiomao	70	4900	2127	275.83	Both	281.2	281.33
Puk1	Pukele	50	5958	2723	303.9	Both	317.04	314.32

Water Surface Profiles

In addition to the parameters listed in the previous section, HEC-FDA also requires water surface profiles from the HEC-RAS model. The water surface profiles can be extracted from the HEC-FDA table in the summary output tables in HEC-RAS. These tables can also be exported from HEC-RAS as .wsp file that can be imported directly into HEC-FDA. The water surface profile information includes the max WSEL, max flow, and min channel elevation at a cross-section for each of the probability exceedance events. To

produce this information, all 8 frequency events were run for each project configuration (i.e. without project, post-feasibility TSP features, and proposed final features). The table below shows the stage-discharge relationship for the index location in each of the damage reaches for the different frequency events.

Table 24: Water Surface Profiles from HEC-RAS for the Three Project Configurations

			Without Project		Post-Feasibility TSP		Proposed Final Features	
Reach	**Probability**	**Return Period**	**Flow (cfs)**	**WSEL (ft)**	**Flow (cfs)**	**WSEL (ft)**	**Flow (cfs)**	**WSEL (ft)**
Ala1	0.5	2	5938.59	2.92	5847.5	2.91	7056.5	3.14
	0.2	5	8818.07	3.46	9155.06	3.54	11128.66	4.16
	0.1	10	10096.52	3.78	11151	4.09	12592.5	4.65
	0.04	25	11207.17	4.16	12975.4	4.65	13575.89	5.04
	0.02	50	12473.34	4.75	15764.99	5.65	15297.52	5.68
	0.01	100	12800.29	5.33	17421.45	6.35	16050.74	6.29
	0.005	200	12898.87	5.96	17924.82	6.59	16230.99	6.58
	0.002	500	13103.83	6.68	18076.08	6.67	16258.56	6.74
Ala2	0.5	2	4966.81	4.28	5208.54	3.82	7039.13	4.45
	0.2	5	7426.06	5.75	8243.28	5.35	11051.84	6.56
	0.1	10	8990.47	6.42	10245.14	6.42	12484	7.41
	0.04	25	11165.61	7.03	12064.7	7.45	13428.78	8.03
	0.02	50	12684.82	7.69	15032.1	9.15	15154.82	9.07
	0.01	100	13457.16	8.15	16851.3	10.3	15522.37	9.76
	0.005	200	13498.09	8.59	17612.68	10.65	15812.66	10.06
	0.002	500	13790.57	9.18	18164.31	10.77	16085.05	10.18
Ala3	0.5	2	832.53	4.29	739.52	4.26	1286.92	5.06
	0.2	5	2567.02	5.74	2447.39	5.98	1290	7.28

	0.1	10	3858.05	6.4	3864.63	7.1	1295	8.13
	0.04	25	5660.41	6.99	4480.27	8.14	1300	8.74
	0.02	50	6741.54	7.63	5374.92	9.82	37750	9.75
	0.01	100	7431.21	8.08	5429.17	10.94	3776.58	10.44
	0.005	200	7432	8.52	5659.91	11.3	3794.47	10.74
	0.002	500	7496.48	9.1	6277.97	11.43	3820.37	10.88
Mak1	0.5	2	748.66	9.62	748.3	9.62	747.69	9.64
	0.2	5	1105.53	10.95	1040.47	10.91	1104.65	10.95
	0.1	10	1166.5	11.46	1153.35	11.44	1165.86	11.47
	0.04	25	1199.84	11.81	1194.83	11.81	1199.4	11.81
	0.02	50	1228.18	12.23	1224.85	12.23	1227.96	12.23
	0.01	100	1245.95	12.53	1241.48	12.52	1245.71	12.53
	0.005	200	1261.9	12.83	1257.14	12.83	1261.56	12.83
	0.002	500	1271.5	13.18	1270.43	13.18	1270.6	13.18
Mak2	0.5	2	630.91	30.45	619.62	30.37	630.91	30.45
	0.2	5	1144.19	36.3	1096.5	35.29	1144.18	36.3
	0.1	10	1353.92	38.85	1310.97	38.35	1353.83	38.85
	0.04	25	1624.89	40.72	1456.96	39.96	1625	40.72
	0.02	50	2074.55	44.06	2036.09	43.58	2074.78	44.06
	0.01	100	2176.48	45.02	2235.03	45.11	2176.45	45.02
	0.005	200	2188.4	45.53	2242.23	45.63	2188.34	45.53
	0.002	500	2188.56	45.98	2250	46.19	2188.58	45.98
Mak3	0.5	2	294.19	65.56	282.38	65.5	294.19	65.56
	0.2	5	583.13	66.94	551.41	66.8	583.14	66.94
	0.1	10	681.72	67.36	654.53	67.25	681.7	67.36
	0.04	25	865.39	68.11	809.6	67.89	865.4	68.11

	0.02	50	1141	69.16	1124.64	69.09	1141.01	69.16
	0.01	100	1268.32	70.28	1261.29	70.13	1268.34	70.28
	0.005	200	1393.74	70.75	1385.52	70.73	1394.38	70.75
	0.002	500	1604.16	71.24	1583.43	71.2	1604.24	71.24
Mak4	0.5	2	237.54	122.04	228.14	121.98	237.54	122.04
	0.2	5	484.04	123.28	453.87	123.14	484.04	123.28
	0.1	10	703.94	124.2	628.53	123.9	703.94	124.2
	0.04	25	959.03	125.17	896.46	124.93	959.04	125.17
	0.02	50	1337.35	126.56	1312.47	126.46	1337.35	126.56
	0.01	100	1604.3	127.9	1593.19	127.84	1604.3	127.9
	0.005	200	1876.69	130.44	1860	130.28	1876.67	130.44
	0.002	500	2129.7	133.47	2130.43	133.47	2132.5	133.47
Kah1	0.5	2	196.36	66.08	196.17	66.12	196.36	66.08
	0.2	5	350.36	68.22	345.89	68.3	347.93	68.23
	0.1	10	380.32	68.61	379.33	68.6	379.22	68.63
	0.04	25	395.12	69	397.71	68.98	382.82	69.13
	0.02	50	421.88	69.6	421.05	69.6	421.88	69.6
	0.01	100	432.81	70.22	437.49	70.17	432.93	70.22
	0.005	200	452.17	70.74	454.14	70.7	452.18	70.74
	0.002	500	486.74	71.24	487	71.21	486.88	71.24
Kah2	0.5	2	142.48	72.59	142.48	72.59	142.48	72.59
	0.2	5	290.44	74.51	290.23	74.51	290.38	74.51
	0.1	10	409.73	75.71	408.92	75.7	408.26	75.71
	0.04	25	548.07	76.79	548.12	76.79	548.06	76.79
	0.02	50	764.95	78.22	764.92	78.22	764.97	78.22
	0.01	100	938.28	79.25	938.3	79.25	938.28	79.25

	0.005	200	1104.03	80.17	1104.03	80.17	1104.03	80.17
	0.002	500	1264.78	81.02	1264.77	81.02	1264.78	81.02
MPC1	0.5	2	5549.4	6.39	5202.95	6.28	5541.82	7.19
	0.2	5	9592.27	7.84	9181.98	7.77	9461.48	9.68
	0.1	10	11760.09	8.63	11332.63	8.55	11270.51	10.12
	0.04	25	13130.56	9.04	13098.3	9.26	13180.71	10.36
	0.02	50	13706.38	9.37	13139.06	9.96	13851.13	10.63
	0.01	100	13832.79	9.57	13200.38	10.9	14296.35	10.75
	0.005	200	14110.32	9.73	13838.47	11.25	14448.77	10.84
	0.002	500	14398.84	9.87	14366.67	11.4	14672.76	10.92
MPC2	0.5	2	5483.44	14.29	5211.26	13.66	5592.96	13.99
	0.2	5	9626.38	17.57	9211.54	16.85	9819.95	17.29
	0.1	10	12934.37	22.11	12009.76	21.52	12100.59	21.51
	0.04	25	16757.26	23.85	14991.12	22.99	16367.85	23.73
	0.02	50	19500.33	24.64	18382.7	24.61	19047.39	24.87
	0.01	100	21660.85	25.16	19958.85	25.21	21160.24	25.67
	0.005	200	23322.38	25.52	21214.41	25.7	22395.3	26.12
	0.002	500	24673.09	25.83	22447.17	26.17	23532.83	26.54
Man1	0.5	2	3497.77	37.05	3279.54	36.83	3603.93	33.8
	0.2	5	6418.96	39.19	5828.34	39.02	6488.27	36.37
	0.1	10	7967.95	39.81	7547.63	39.92	7982.66	37.35
	0.04	25	9048.16	40.19	9047.41	40.57	10684.86	38.7
	0.02	50	10194.84	40.6	11436.89	41.5	12856.75	39.53
	0.01	100	10794.02	40.84	13020.17	42.06	14681.4	39.97
	0.005	200	11440.97	41.09	14687	42.59	15676.4	40.17
	0.002	500	11860.88	41.44	16700.47	43.22	17112.6	40.45

Man2	0.5	2	2949.83	145.54	2789.63	144.74	2857.4	139.09
	0.2	5	5234.47	147.92	4903.62	146.77	5140.7	142.1
	0.1	10	6189.63	149.01	6325.8	147.86	6379.12	143.47
	0.04	25	6695.75	149.94	7509.27	148.59	7672.31	144.82
	0.02	50	7594.12	150.89	9158.46	149.52	9526.97	146.48
	0.01	100	8276.16	151.43	10240.92	150.11	10407.58	147.82
	0.005	200	8805.1	151.78	11067.47	150.51	10982.59	148.39
	0.002	500	9287.65	152.15	11935.53	150.94	11558.46	148.95
Man3	0.5	2	2894.52	149.7	2726.21	150.11	2929.99	145.14
	0.2	5	4653.59	151.26	4789.77	151.69	5656.6	147.92
	0.1	10	5944.14	152.27	6013.62	152.31	7111.2	149.1
	0.04	25	6975.52	152.81	7244.18	152.95	8666.23	150.39
	0.02	50	8122.26	153.44	9097.72	153.82	10175.31	151.86
	0.01	100	8745.05	153.81	10224.39	154.31	10634.88	152.75
	0.005	200	9197.74	154.06	10990.28	154.65	10916.59	153.24
	0.002	500	9635.88	154.3	11755.31	154.99	11299.74	153.69
Man4	0.5	2	2831.63	156.54	2638.4	155.34	2847.91	155.12
	0.2	5	4802.73	158.68	4440.52	158.5	4990.6	159.41
	0.1	10	5980.14	160.14	5237.53	158.93	5827.81	159.74
	0.04	25	6887.4	161.39	6121.45	160.2	7037.41	160.49
	0.02	50	8128.14	162.25	7189.29	161.57	7877.57	162.06
	0.01	100	8945.4	162.75	8117.1	162.21	8674.89	162.57
	0.005	200	9623.93	163.07	8775.5	162.62	9350.07	162.94
	0.002	500	10354.11	163.38	9604.01	163.04	10100.64	163.28
Man5	0.5	2	2748.26	171.65	2613.66	170.92	2746.67	171.69
	0.2	5	4762.59	173.43	4355.48	172.22	4732.19	173.45

	0.1	10	5771.9	174.06	5097.53	172.67	5683.03	174.05
	0.04	25	6511.93	174.5	5803.52	173.07	6289.27	174.48
	0.02	50	7014.27	174.93	6779.62	173.59	6628.46	174.89
	0.01	100	7350.49	175.19	7407.18	173.91	6912.26	175.15
	0.005	200	7633.44	175.39	7877.23	174.15	7271.57	175.36
	0.002	500	7928.28	175.59	8429.44	174.42	7714.55	175.57
Man6	0.5	2	1898.43	204.91	1761.1	204.68	1898.43	204.91
	0.2	5	3517.4	207.24	3047.56	206.64	3517.4	207.24
	0.1	10	4723.55	208.51	3831.64	207.62	4723.55	208.51
	0.04	25	5945.55	209.49	4823.77	208.61	5945.54	209.49
	0.02	50	7534.42	210.45	6379.81	209.77	7534.39	210.45
	0.01	100	8670.32	211.03	7732.27	210.56	8670.25	211.03
	0.005	200	9535.96	211.43	8746.43	211.06	9535.96	211.43
	0.002	500	10485.26	211.83	9962.41	211.61	10485.25	211.83
Man7	0.5	2	1615.9	247.06	1493.42	246.91	1615.9	247.06
	0.2	5	2961.31	248.56	2556.88	248.16	2961.31	248.56
	0.1	10	3977.09	249.51	3181.34	248.78	3977.09	249.51
	0.04	25	5024.72	250.39	3970.66	249.51	5024.73	250.39
	0.02	50	6422.82	251.45	5454.06	250.73	6422.85	251.45
	0.01	100	7338.11	252.09	6685.23	251.64	7338.13	252.09
	0.005	200	8055.42	252.56	7516.39	252.21	8055.37	252.56
	0.002	500	8813.09	253	8474.99	252.82	8813.08	253
Pal1	0.5	2	2031.18	35.22	1933.67	35.1	2031.19	35.22
	0.2	5	3361.11	36.63	3204.48	36.47	3361.14	36.63
	0.1	10	4424.53	37.56	4110.18	37.3	4424.53	37.56
	0.04	25	6297.14	38.97	5492.85	38.38	6294.8	38.96

	0.02	50	7994.52	40.19	7304.27	39.68	8008.27	40.15
	0.01	100	9523.8	41.26	9078.12	40.88	9509.92	41.25
	0.005	200	11181.22	42.27	10935.83	42.07	11175.59	42.28
	0.002	500	13079.15	43.26	12969.67	43.2	13091.17	43.27
Pal2	0.5	2	1925.16	92.85	1823.76	92.65	1925.23	92.85
	0.2	5	3133.43	95.02	2980.89	94.78	3133.38	95.02
	0.1	10	4104.01	96.45	3796.94	96.01	4103.99	96.45
	0.04	25	5899.73	98.63	5074.42	97.7	5897.6	98.63
	0.02	50	7485.95	100	6785.84	99.49	7486.44	100
	0.01	100	8975.13	100.93	9098.56	100.89	8977.08	100.93
	0.005	200	10690.94	101.99	10413.74	101.79	10696.62	101.99
	0.002	500	12664.01	103.08	12492.86	102.98	12707.97	103.1
Pal3	0.5	2	1826.8	125.4	1701.56	127.25	1819.68	127.41
	0.2	5	3141.15	126.93	2910.72	128.76	3127.86	129.01
	0.1	10	3968.72	127.83	3383.57	129.57	3400.01	129.81
	0.04	25	4631.74	128.52	3589.06	130.07	3806.47	130.42
	0.02	50	5513.84	129.27	4140.04	130.93	4355.89	131.21
	0.01	100	6094.72	129.72	4603.59	131.53	4754.72	131.7
	0.005	200	6582.57	130.12	5023.3	132.05	5076.37	132.11
	0.002	500	6857.81	130.57	5328.11	132.43	5353.08	132.46
Pal4	0.5	2	1602.49	182.31	1532.05	170.05	1659.84	170.26
	0.2	5	2897.33	184.15	2681.31	171.77	3000.91	172.21
	0.1	10	3948.32	185.48	3496.15	172.85	4086.64	173.58
	0.04	25	5019.69	186.74	4315.44	173.86	5154.94	174.75
	0.02	50	6481.88	188.11	5760.04	175.35	6340.14	175.81
	0.01	100	7714.85	188.96	6640.05	176.35	6887.36	176.55

	0.005	200	9034.23	189.71	7294.09	176.96	7385.73	177.06
	0.002	500	10393.11	190.43	7826.96	177.53	7881.28	177.58
Wai1	0.5	2	629.11	281.14	589.72	280.95	629.15	281.14
	0.2	5	1104.9	282.96	1006.25	282.6	1104.85	282.96
	0.1	10	1490.23	284.25	1299.96	283.58	1490.18	284.25
	0.04	25	1918.1	285.54	1601.31	284.47	1918.18	285.54
	0.02	50	2494.29	287.02	2313.32	286.21	2494.1	287.02
	0.01	100	2978.88	287.7	2872.02	287.18	2978.99	287.7
	0.005	200	3544.36	288.34	3500.71	288.2	3544.11	288.34
	0.002	500	4149.01	289.3	4102.08	289.27	4148.38	289.3
Puk1	0.5	2	649.18	316.2	586.36	310.37	655	310.59
	0.2	5	1200.18	317.37	1013.76	311.65	1210.01	312.16
	0.1	10	1675.32	318.18	1286.8	312.33	1687.87	313.17
	0.04	25	2169.33	318.92	1570.27	312.94	2183.63	314.03
	0.02	50	2867.66	319.73	2534.14	314.47	2889.53	314.91
	0.01	100	3352.32	320.19	3129.45	315.17	3378.02	315.41
	0.005	200	3866.5	320.64	3662.54	315.7	3893.32	315.93
	0.002	500	4451.83	321.11	4436.12	316.4	4487.69	316.44

Stage-Discharge Function with Uncertainty

In HEC-FDA, the stage-discharge information is imported from the water surface profile information from HEC-RAS model that is detailed in the section above. For this study, a normal distribution was used to represent uncertainty for this data and that option required a standard deviation for each damage reach. The standard deviation was determined by running a sensitivity on the manning's "n" values in the HEC-RAS model. To test the sensitivity, model runs were made with the "n" values varying on average by +/- 20% for the without project plan, post-feasibility TSP plan, and the proposed final features plan. The range of roughness values was estimated at each location to determine a realistic high and low value for the area. The difference in stage between the high estimate and low estimate was calculated for each cross-section. For each damage reach, an average stage difference was determined for the cross-sections contained within the damage reach. To estimate the standard deviation relative to the mean stage for the 95% confidence interval for a normal distribution, the

difference in stage between the high and low was divided by 4 (+/- 2 standard deviations). The calculated standard deviations for each damage reach for the different project configurations can be found in the table below.

Table 25: Stage-Discharge Standard Deviations

Reach	Stream	Without Project	Post-Feasibility TSP	Proposed Final Features	Adopted Standard Deviation*
		Stage/Discharge Standard Deviation (ft)	Stage/Discharge Standard Deviation (ft)	Stage/Discharge Standard Deviation (ft)	Stage/Discharge Standard Deviation (ft)
Ala1	Ala Wai	0.05	0.05	0.04	0.7
Ala2	Ala Wai	0.08	0.20	0.11	0.7
Ala3	Ala Wai	0.11	0.21	0.25	0.7
Mak1	Makiki	0.03	0.04	0.03	0.7
Mak2	Makiki	0.11	0.18	0.11	0.7
Mak3	Makiki	0.20	0.25	0.19	0.7
Mak4	Makiki	0.16	0.15	0.16	0.7
Kah1	Kanaha Ditch	0.10	0.13	0.10	0.7
Kah2	Kanaha Ditch	0.13	0.13	0.13	0.7
MPC1	Manoa-Palolo Canal	0.09	0.20	0.08	0.7
MPC2	Manoa-Palolo Canal	0.09	0.06	0.13	0.7
Man1	Manoa	0.14	0.13	0.25	0.7
Man2	Manoa	0.23	0.17	0.46	0.7
Man3	Manoa	0.27	0.26	0.39	0.7
Man4	Manoa	0.19	0.14	0.18	0.7

Man5	Manoa	0.21	0.10	0.20	0.7
Man6	Manoa	0.33	0.31	0.33	0.7
Man7	Manoa	0.43	0.41	0.43	0.7
Pal1	Palolo	0.13	0.10	0.12	0.7
Pal2	Palolo	0.12	0.21	0.12	0.7
Pal3	Palolo	0.10	0.06	0.10	0.7
Pal4	Palolo	0.09	0.08	0.09	0.7
Wai1	Waiomao	0.20	0.18	0.20	0.7
Puk1	Pukele	0.26	0.24	0.26	0.7

*MINIMUM STANDARD DEVIATION AS SPECIFIED IN EM 1110-2-1619

Table 26: Minimum Standard Deviations of Error in Stage (Table 5-2 from EM 1110-2-1619)

Manning's n Value Reliability[1]	Standard Deviation (in feet)	
	Cross Section Based on Field Survey or Aerial Spot Elevation	Cross-section based on Topographic Map with 2-5' Contours
Good	0.3	0.6
Fair	0.7	0.9
Poor	1.3	1.5

[1]Where good reliability of Manning's *n* value equations relate to excellent to very good model adjustment/validation to a stream gauge, a set of high-water marks in the project effective size range, and other data. Fair reliability relates to fair to good model adjustment/validation for which some, but limited, high-water mark data are available. Poor reliability equates to poor model adjustment/validation or essentially no data for model adjustment/validation

The Engineer Manual (EM) 1110-2-1619, *Risk Based Analysis for Flood Damage Reduction Study,* provides guidance on determining standard deviations. Table 5-2 from EM 1110-2-1619 describes the minimum standard deviation of error in stage that can be used for a flood damage reduction study. The table is reproduced above. As stated in the Terrain section of this report, the LiDAR data has an accuracy of 45 cm (1.5 ft) horizontal, 37 cm (1.2 ft) vertical and was processed with 1 ft horizontal point spacing and survey data was provided for some channel data. The manning's "n" values were considered "Fair" due to the limited calibration data and coupled with the use of LiDAR and survey data, the minimum standard deviation of error in stage was determined to be 0.7 ft. Since the calculated standard deviations for every reach was lower than the minimum standard from EM 1110-2-1619, a 0.7 ft standard deviation was adopted for all reaches across the 3 project configurations.

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1996. Risk-Based Analysis for Flood Damage Reduction Studies, Engineering Manual (EM 1110-2-1619), USACE.

Appendix

Adopted HEC-WAT derived 12-hour 100-year frequency flows used in the without project conditions.

Table 27: HEC-RAS Boundary Conditions for Without Project Conditions and Peak 12-hr 100-year HEC-WAT Flows

River / Reach	HEC-RAS River Station/ Location	Boundary Condition Type	HEC-HMS Connection	HEC-HMS Data Type	Peak Flow (CFS) – Without Project – HEC-WAT 12-hr - 100 year
Ala Wai / Upper	10082	Flow Hydrograph	JA1	FLOW	3,599
Kanaha / Ditch	4372	Flow Hydrograph	K2A	FLOW	712
Manoa / Main	16506	Flow Hydrograph	JUNCTION-5	FLOW	6,834
Pukele / Tributary	5958	Flow Hydrograph	JP1	FLOW-COMBINE	3,429
Waiomao / Tributary	4900	Flow Hydrograph	P2	FLOW	3,076
Ala Wai / Upper	9724 to 6370	Uniform Lateral Inflow	A6/W3	FLOW	981
Ala Wai / Middle	5687	Lateral Inflow Hydrograph	A4	FLOW	1,190
Ala Wai / Middle	4676	Lateral Inflow Hydrograph	RA1	FLOW-COMBINE	2,950
Ala Wai / Middle	5195 to 2513	Uniform Lateral Inflow	A2	FLOW	2,358
Ala Wai / Lower	812	Lateral Inflow Hydrograph	A8	FLOW	511
Ala Wai / Lower	1188 to 79	Uniform Lateral Inflow	W1	FLOW	684
Kanaha / Ditch	4278 to 200	Uniform Lateral Inflow	K2B	FLOW	1,208
Makiki / Upper	7760	Lateral Inflow Hydrograph	K3	FLOW	417
Makiki / Lower	4716 to 3176	Uniform Lateral Inflow	K5	FLOW	782
Manoa / Main	16458 to 11951	Uniform Lateral Inflow	M3	FLOW	2.631
Manoa / Main	12795 to 11112	Uniform Lateral Inflow	M4	FLOW	541
Manoa / Main	10968	Lateral Inflow Hydrograph	WOODLAWN SEWERSYSTEM	FLOW	991
Manoa / Main	11039 to 9501	Uniform Lateral Inflow	M7	FLOW	523
Manoa / Main	10429	Lateral Inflow Hydrograph	M8	FLOW	125
Manoa / Main	9192	Lateral Inflow Hydrograph	M9	FLOW	238
Manoa / Main	8871 to 7734	Uniform Lateral Inflow	M10	FLOW	767
Manoa / Main	7653 to 6241	Uniform Lateral Inflow	M11	FLOW	620
Manoa / Main	2891	Lateral Inflow Hydrograph	M12	FLOW	2,750
Manoa / Main	1807	Lateral Inflow Hydrograph	M13	FLOW	947

Manoa / Main	1230	Lateral Inflow Hydrograph	M14	FLOW	784
Palolo / Main	15440	Lateral Inflow Hydrograph	P5	FLOW	980
Palolo / Main	15134 to 9709	Uniform Lateral Inflow	P6	FLOW	2,326
Palolo / Main	9520 to 5525	Uniform Lateral Inflow	P7	FLOW	1,340
Palolo / Lower	4352	Lateral Inflow Hydrograph	A3	FLOW	1,587
Pukele / Tributary	3514 to 237	Uniform Lateral Inflow	P4	FLOW	1,502
SA: Perimeter 7	BC Line: Woodlawn Inflow	Flow Hydrograph	WOODLAWN	FLOW-LOCAL	1585
SA: Perimeter 7	BC Line: M6B_Diversion	Flow Hydrograph	WOODLAWN SEWERSYSTEM	FLOW-DIVERSION	160
Makiki / Upper	9543	Flow Hydrograph	K1	FLOW	1608
Makiki / Lower	6279.67 to 5931	Uniform Lateral Inflow	K4	FLOW	727
Makiki / Lower	3062 to 203	Uniform Lateral Inflow	K6	FLOW	2273

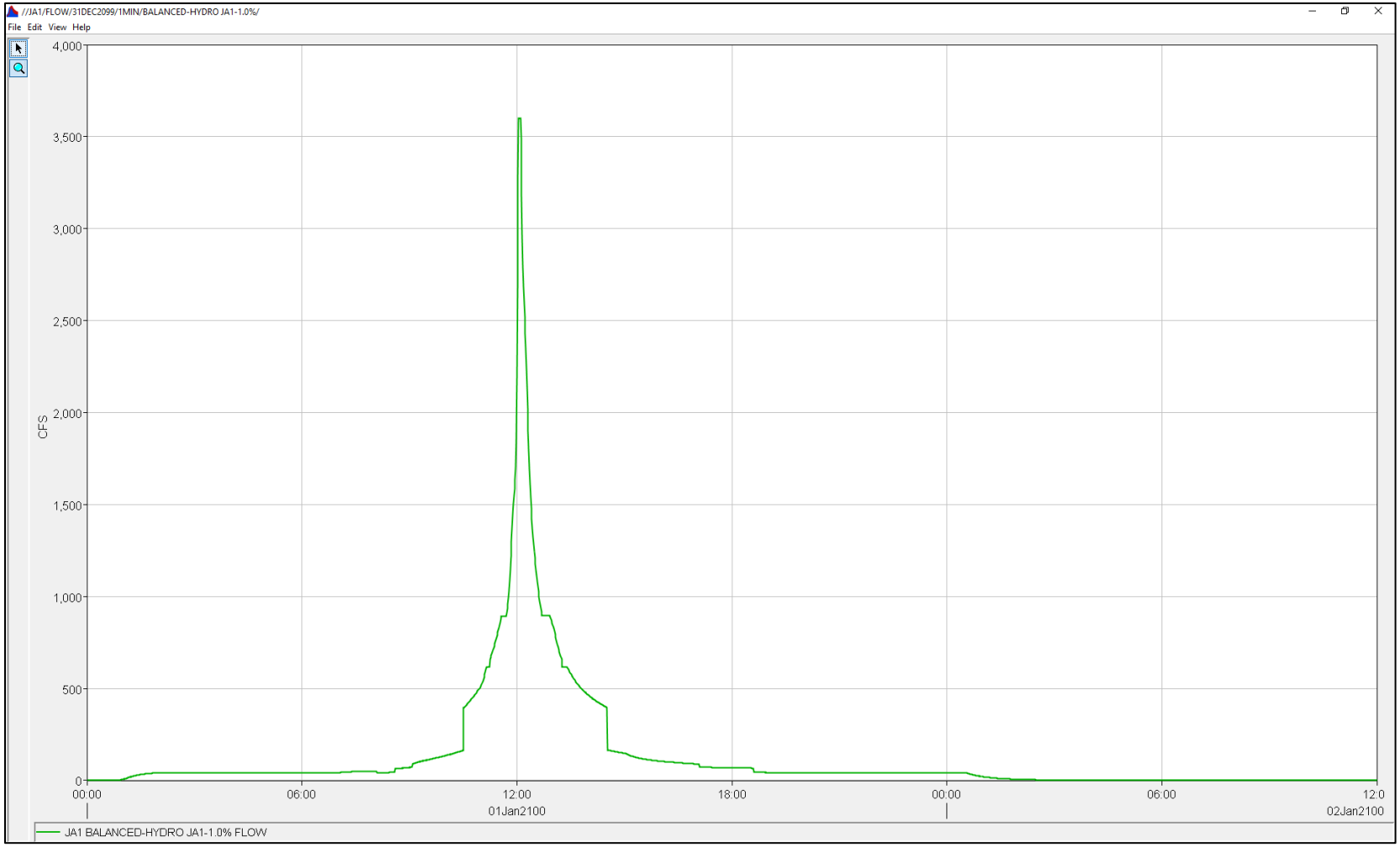

Figure 52: Ala Wai Upper RS 10082 (JA1 – FLOW)

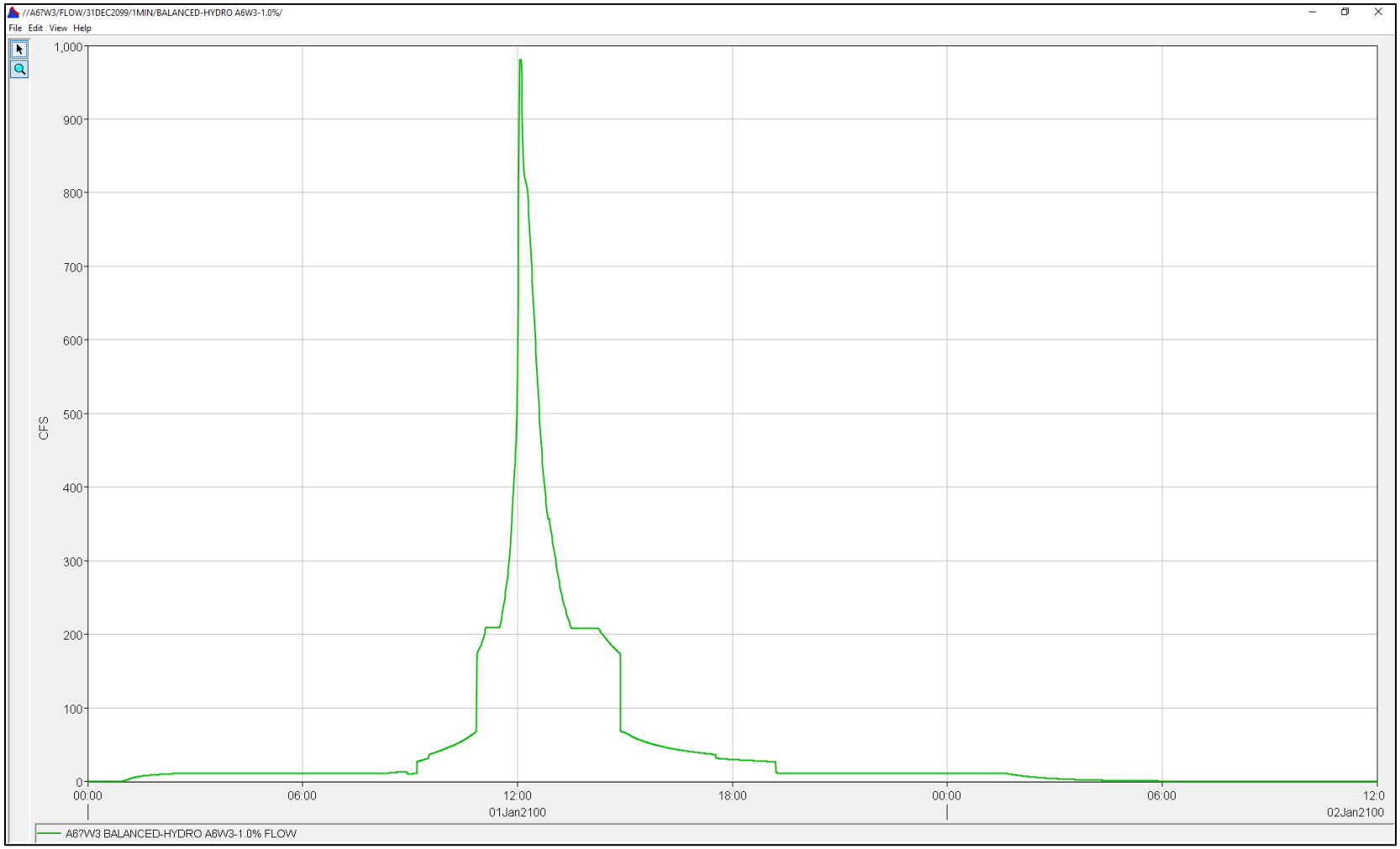

Figure 53: Ala Wai Upper RS 9274 - 6370 (A6?W3 – FLOW)

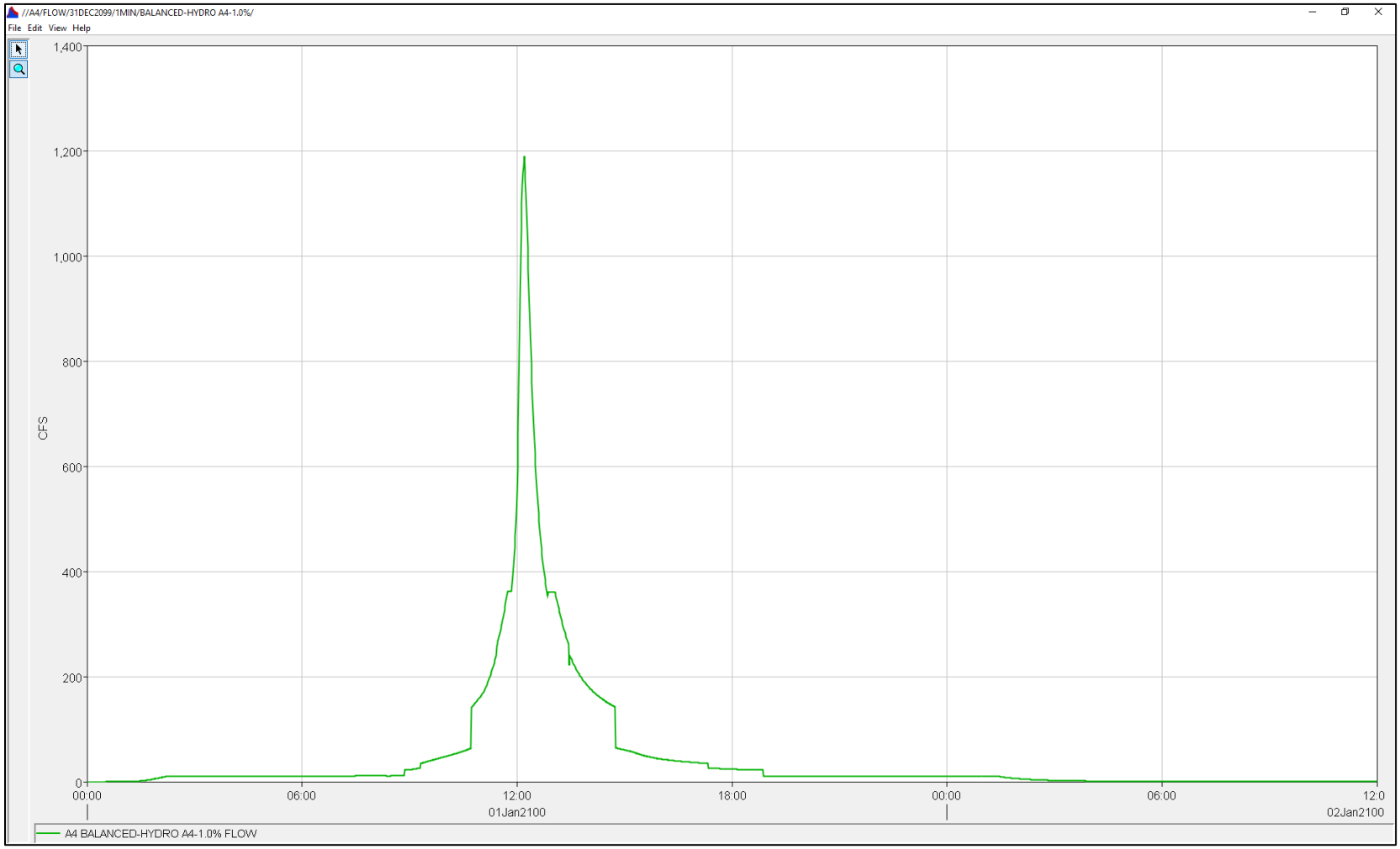

Figure 54: Ala Wai Middle RS 5687 (A4 – FLOW)

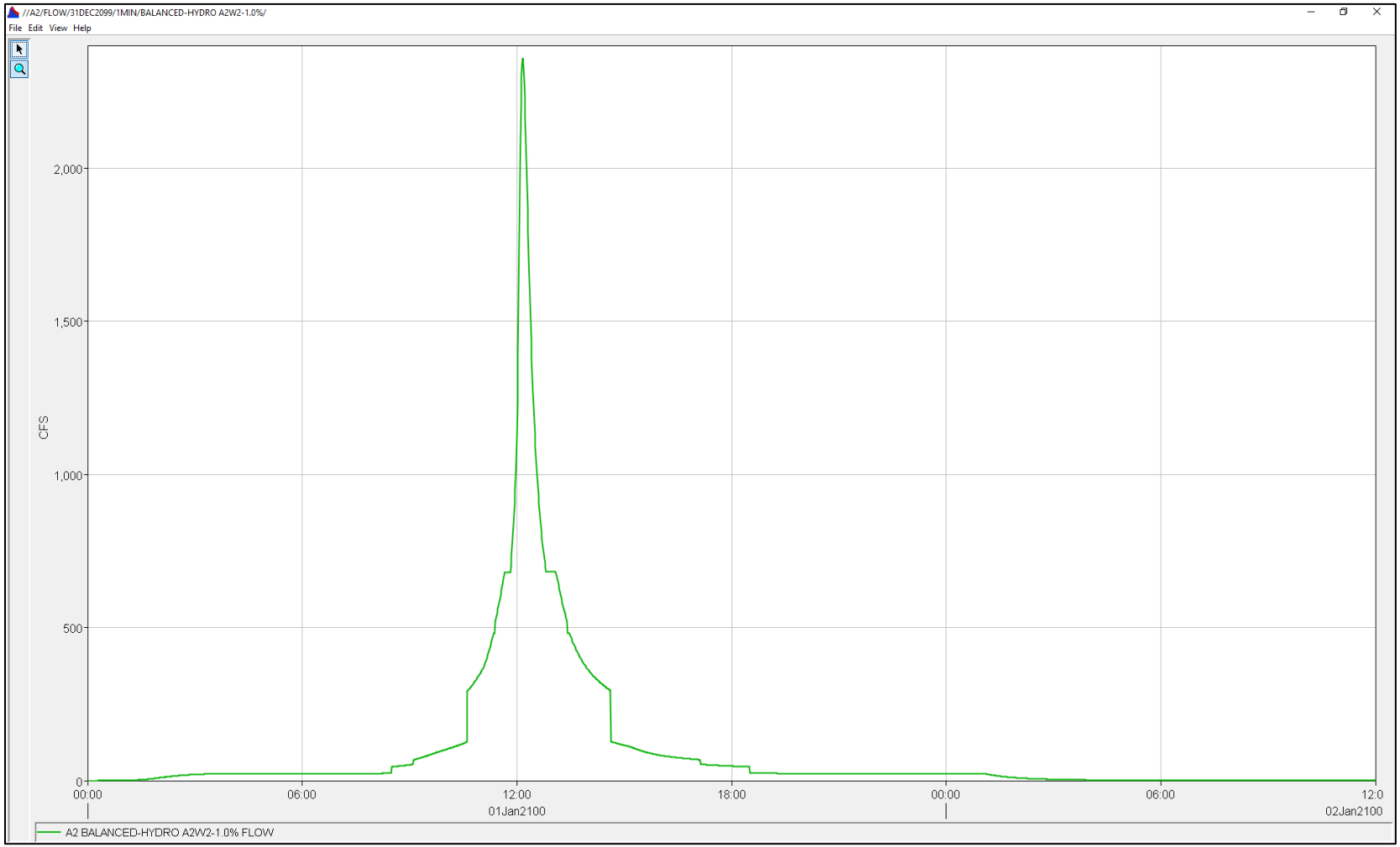

Figure 55: Ala Wai Middle RS 5195 - 2513 (A2 – FLOW)

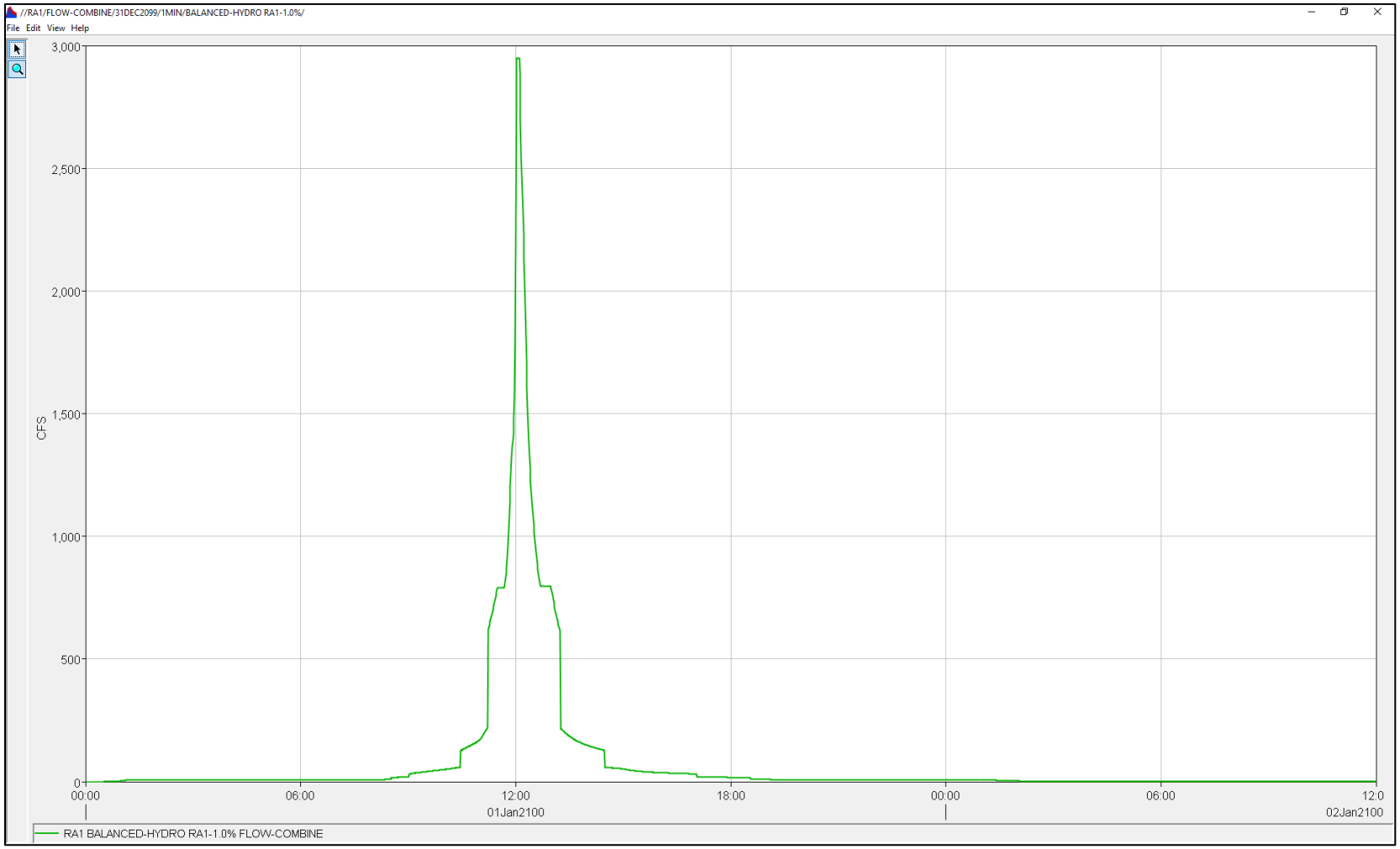

Figure 56: Ala Wai Middle RS 4676 (RA1 – FLOW-COMBINE)

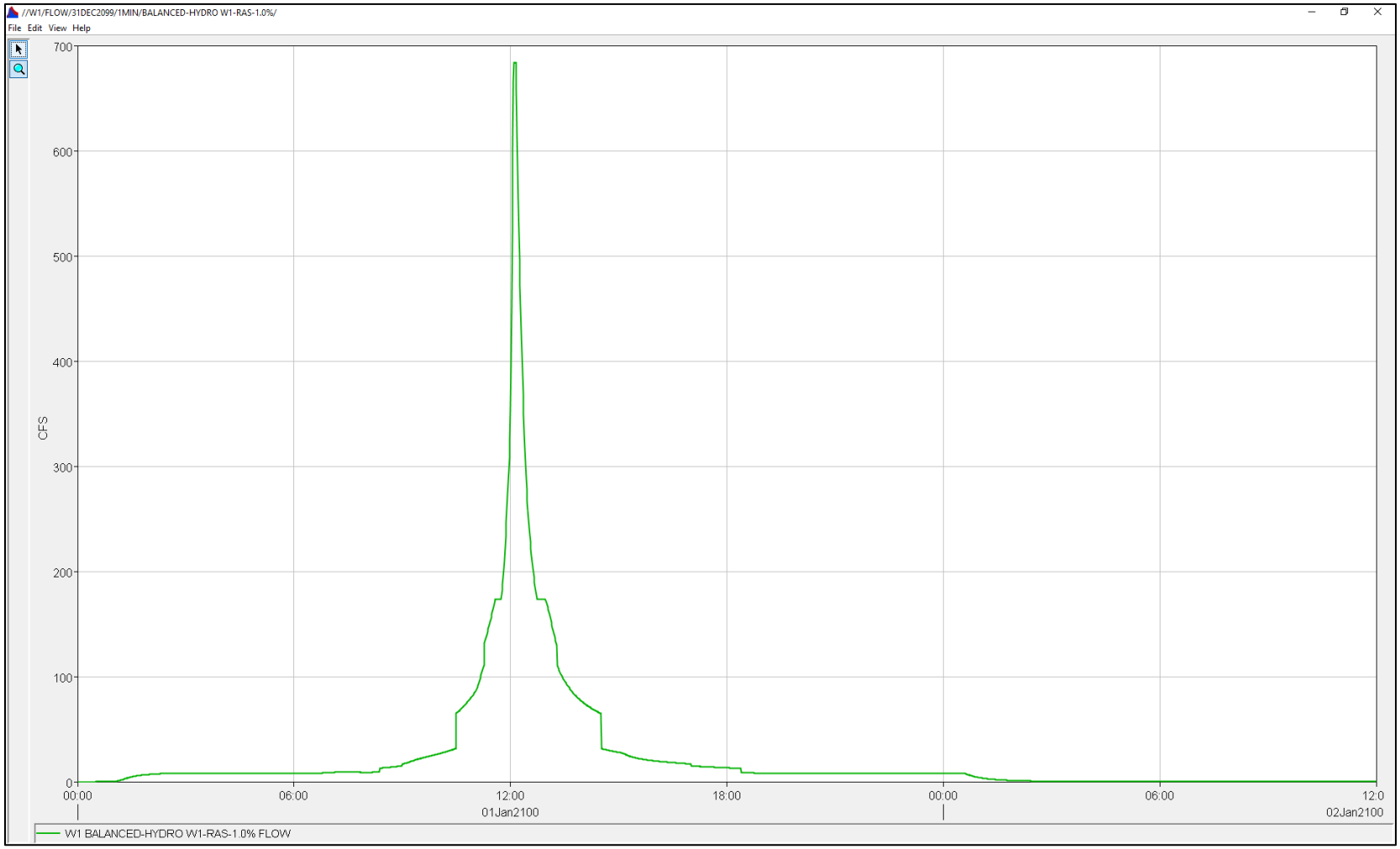

Figure 57: Ala Wai Lower RS 1188 - 79 (W1 – FLOW)

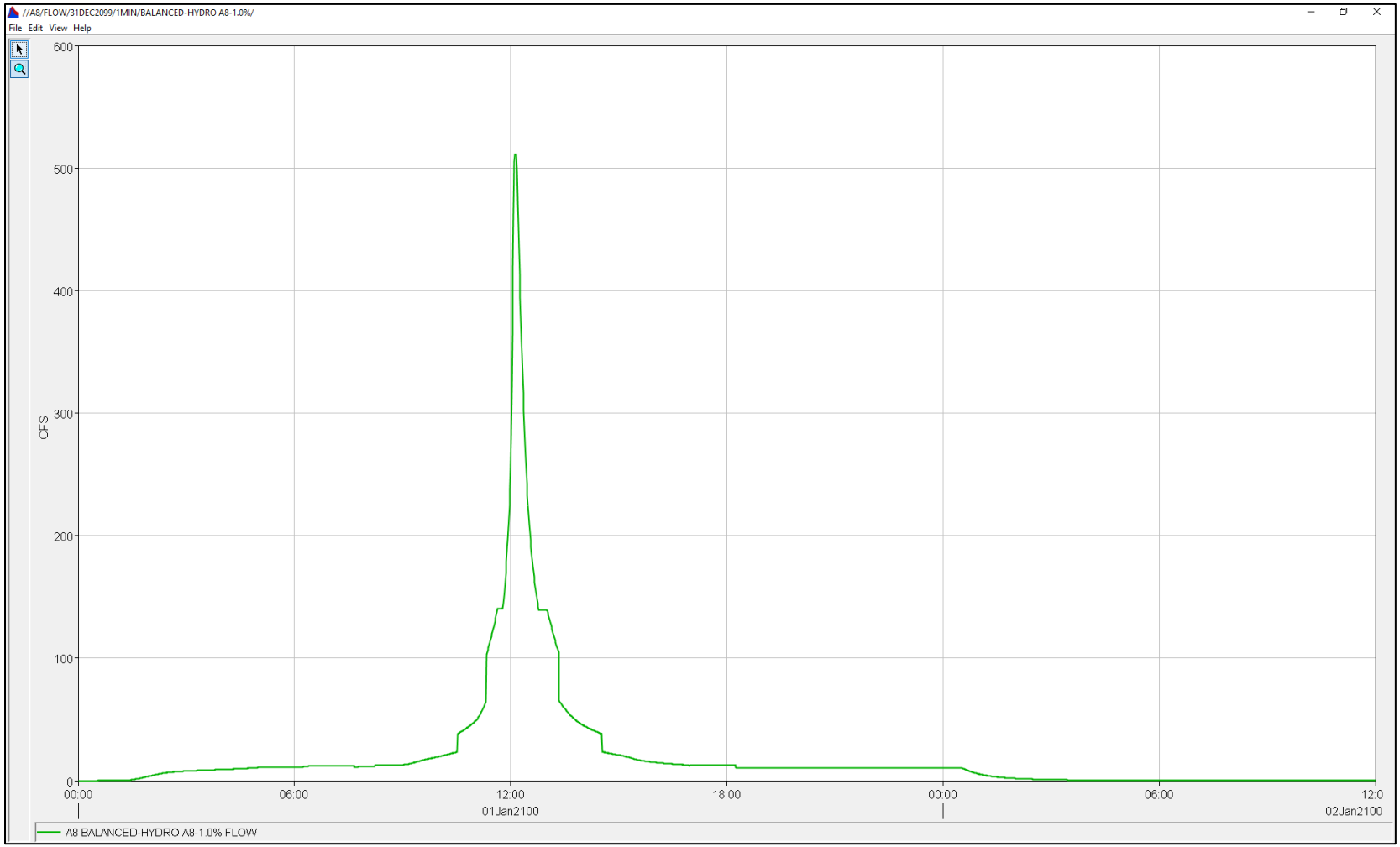

Figure 58: Ala Wai Lower RS 812 (A8 – FLOW)

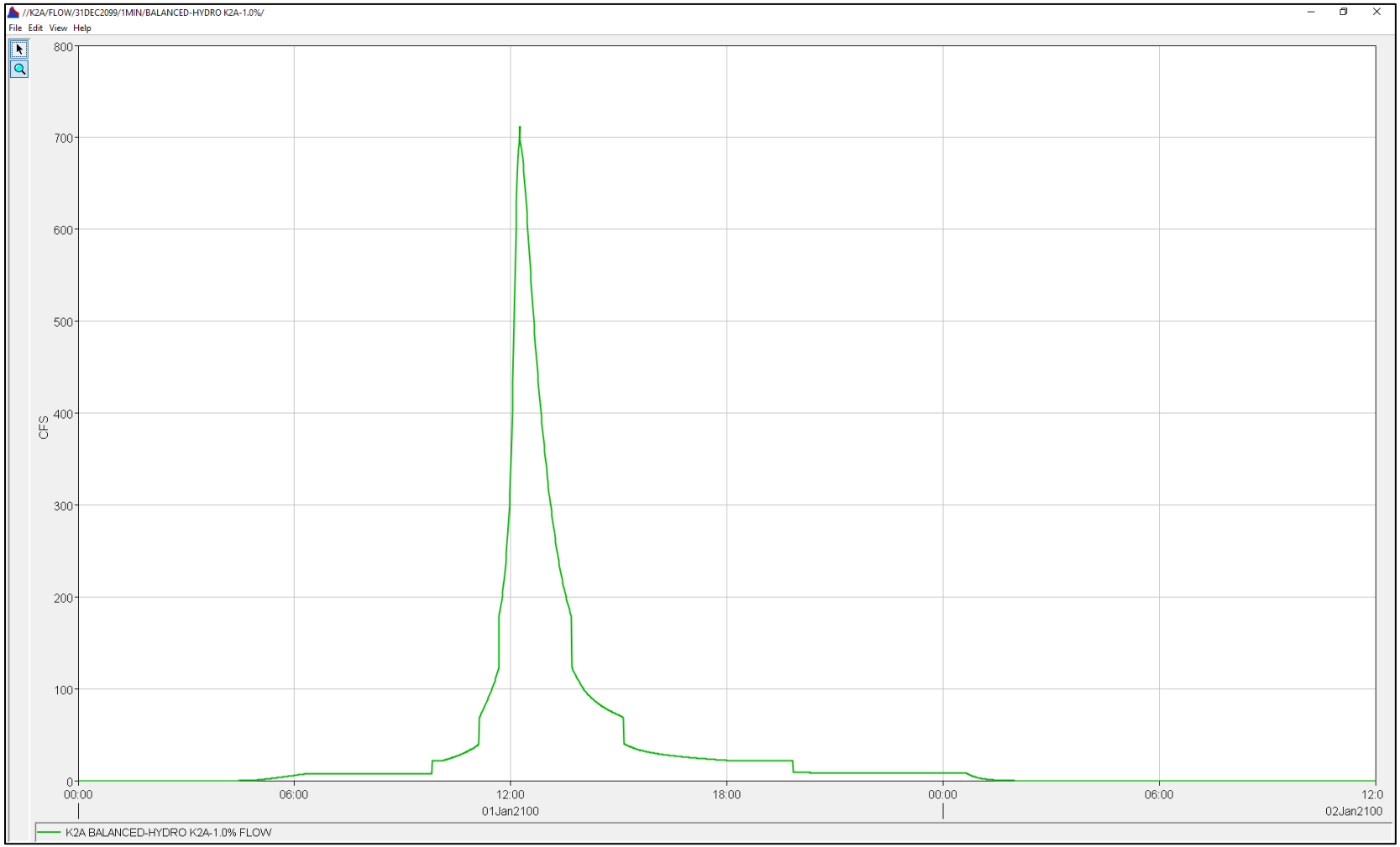

Figure 59: Kanaha Ditch RS 4372 (K2A – FLOW)

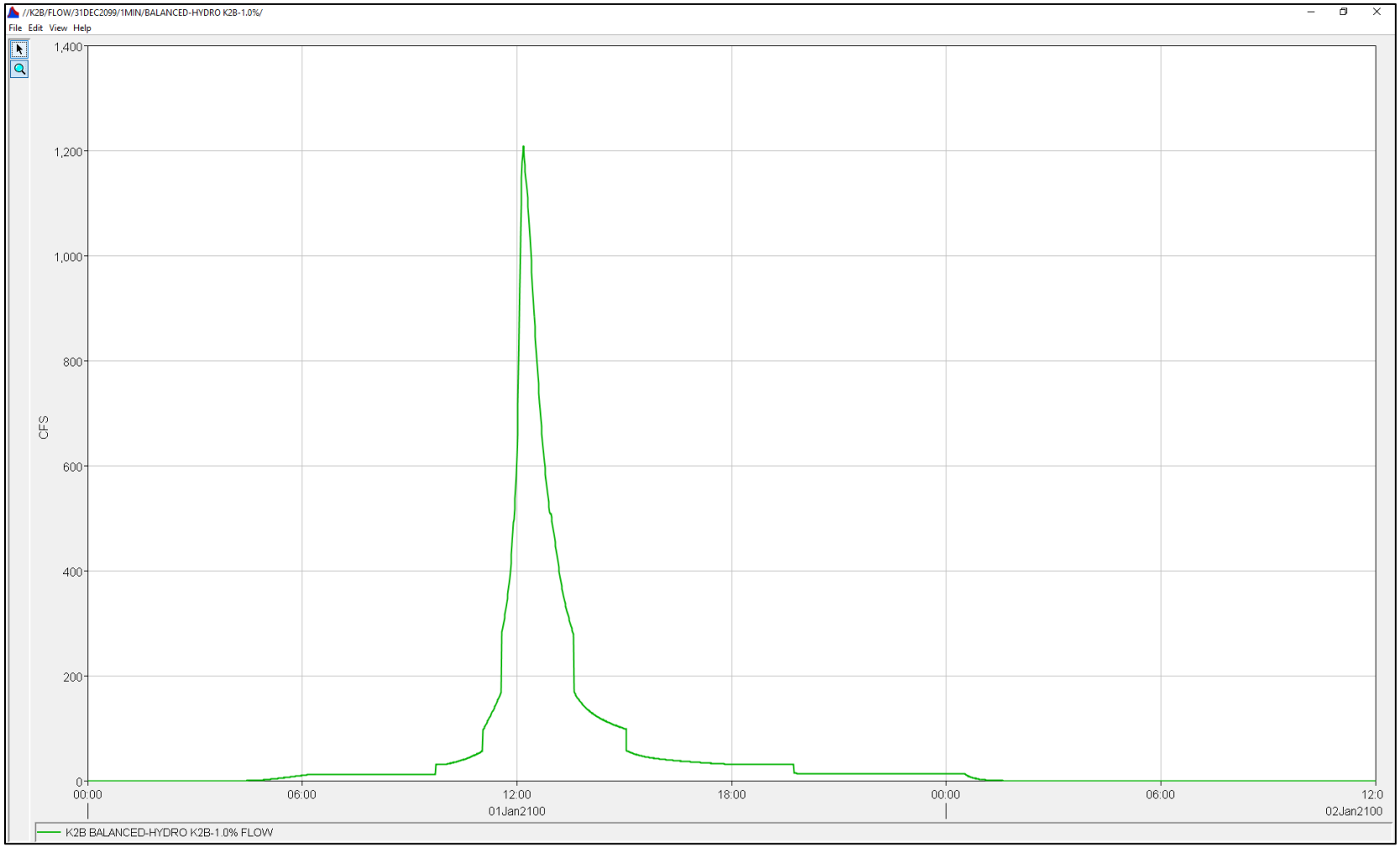

Figure 60: Kanaha Ditch RS 4278 - 200 (K2B – FLOW)

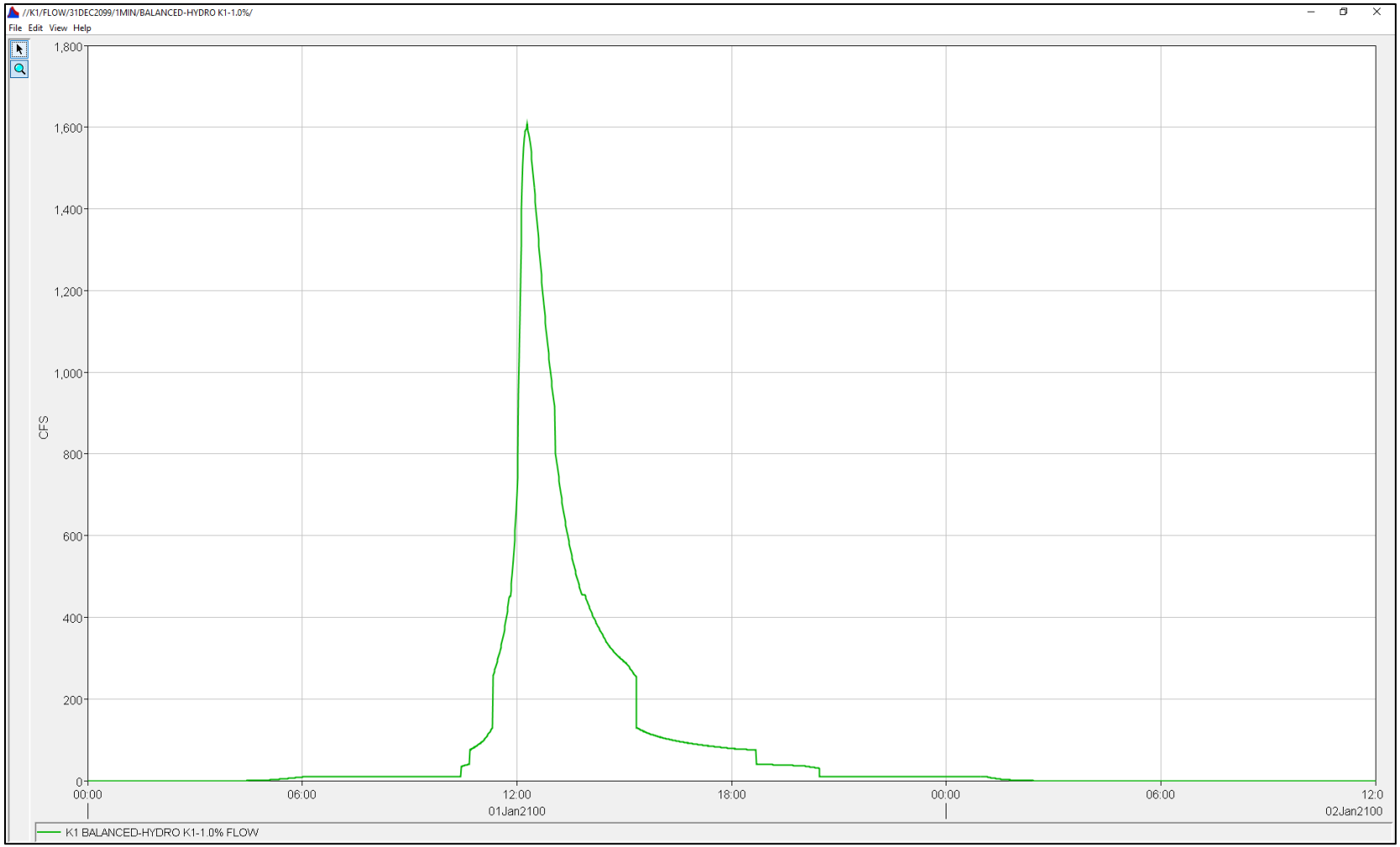

Figure 61: Makiki Upper RS 9543 (K1 – FLOW)

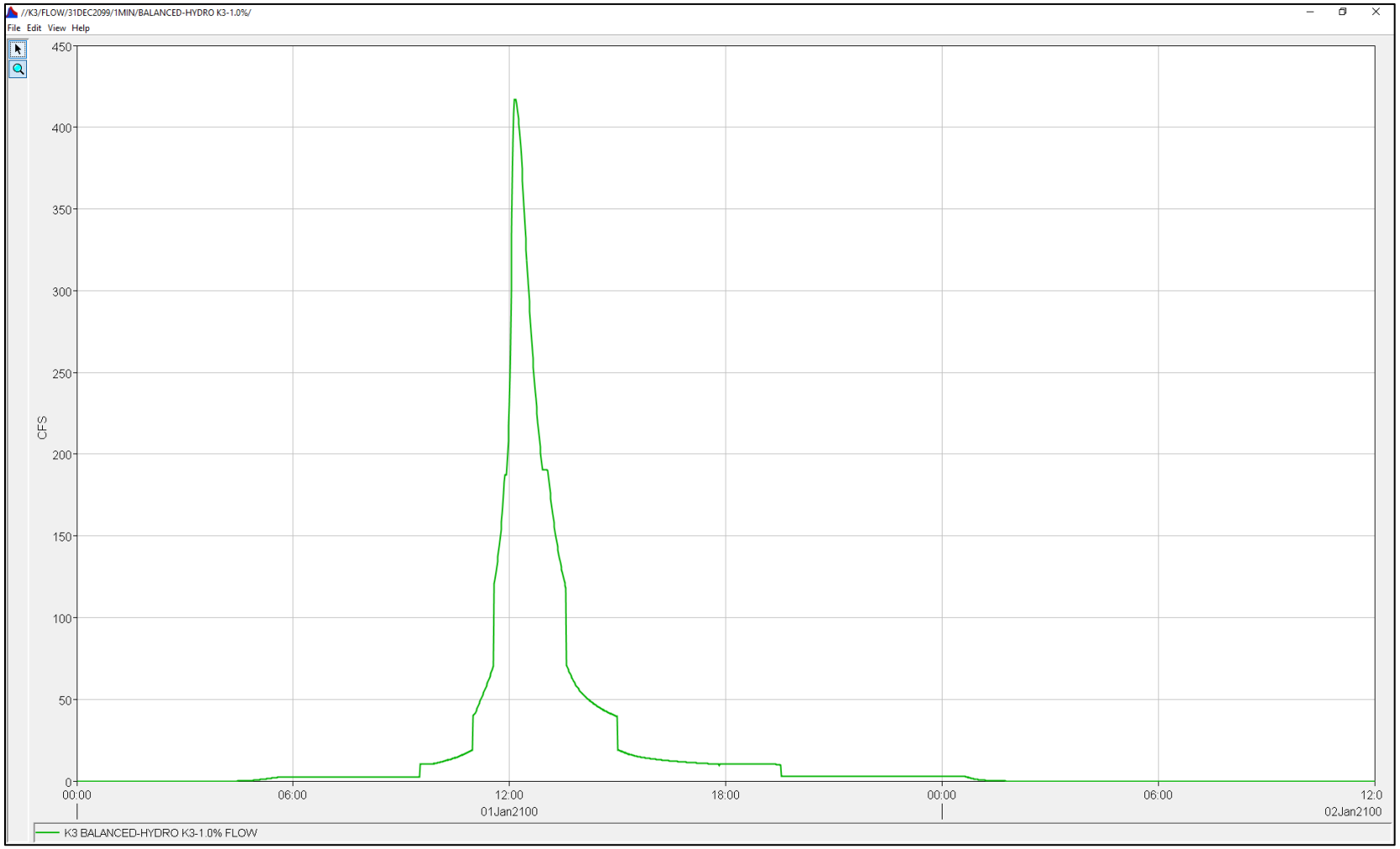

Figure 62: Makiki Upper RS 7760 (K3 – FLOW)

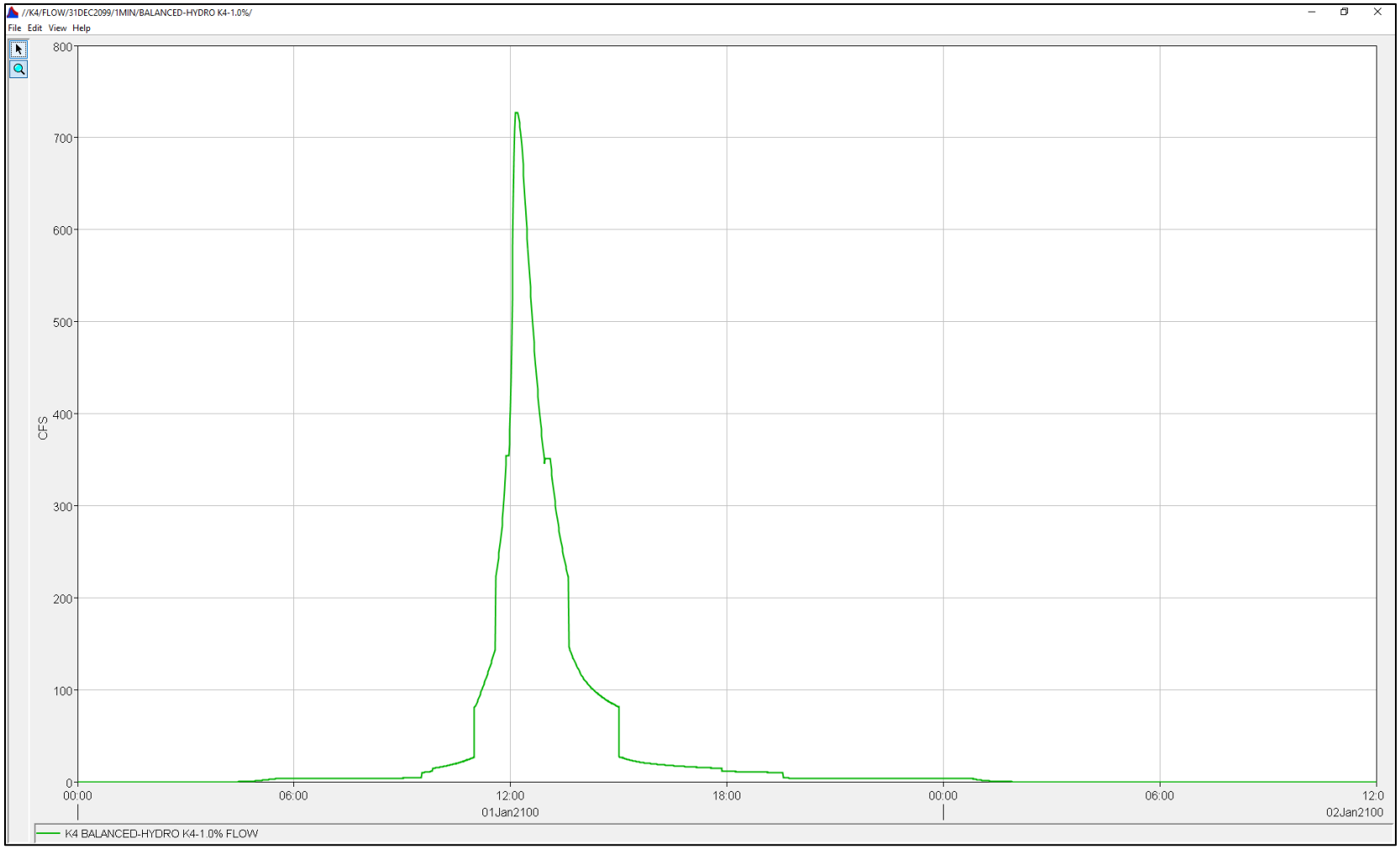

Figure 63: Makiki Lower RS 6279.67 - 5931 (K4 – FLOW)

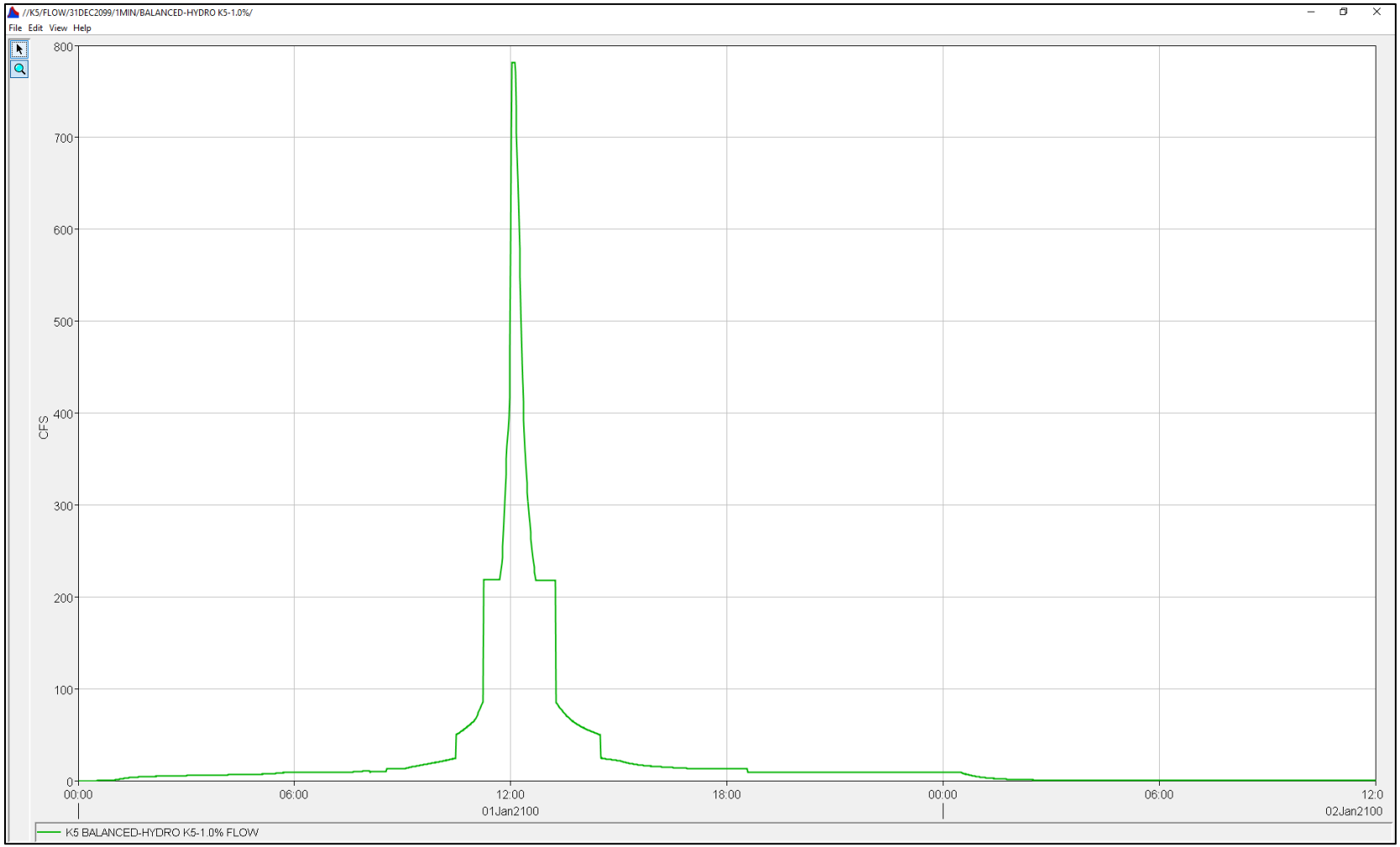

Figure 64: Makiki Lower RS 4716 - 3176 (K5 – FLOW)

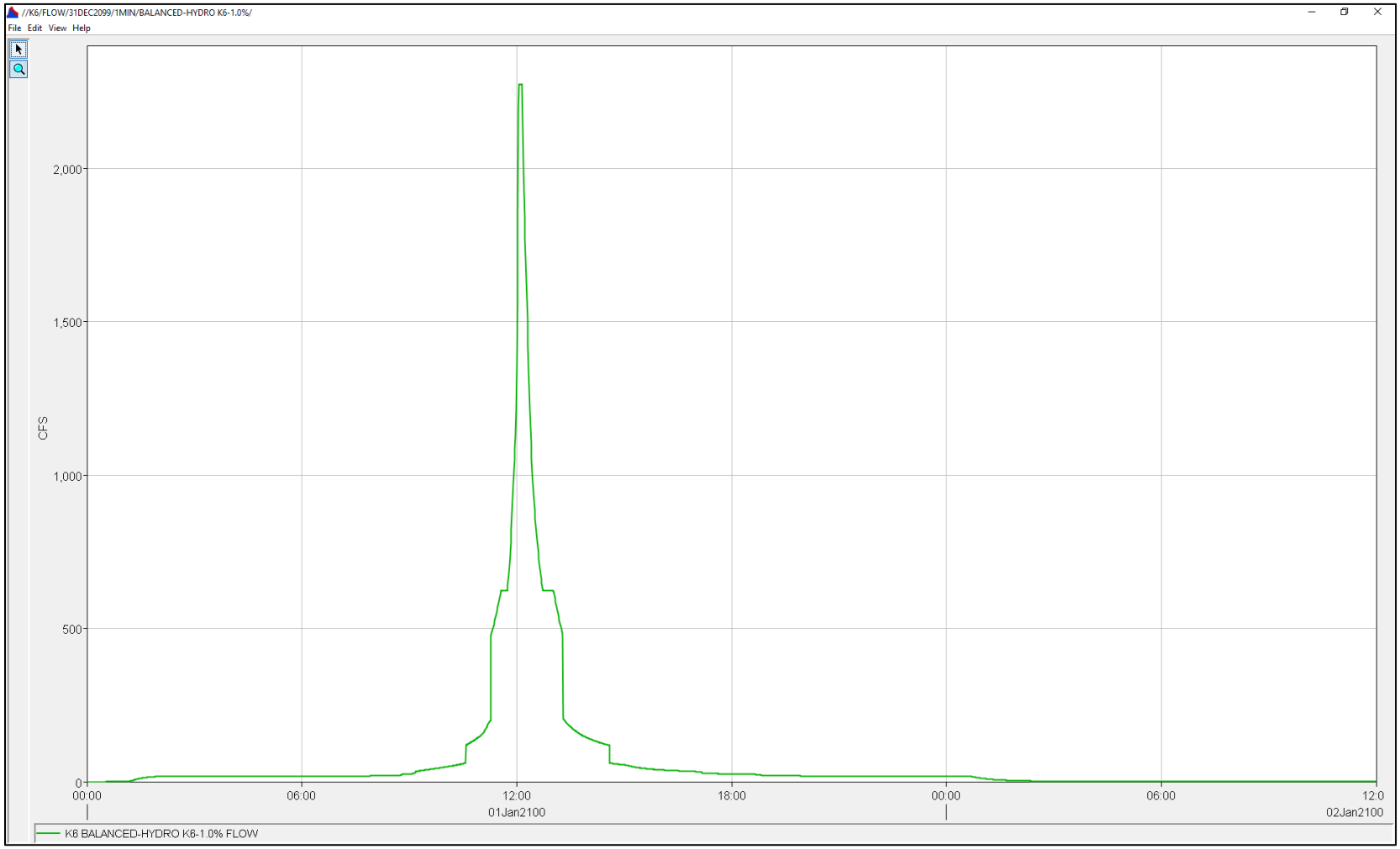

Figure 65: Makiki Lower RS 3062 - 203 (K6 – FLOW)

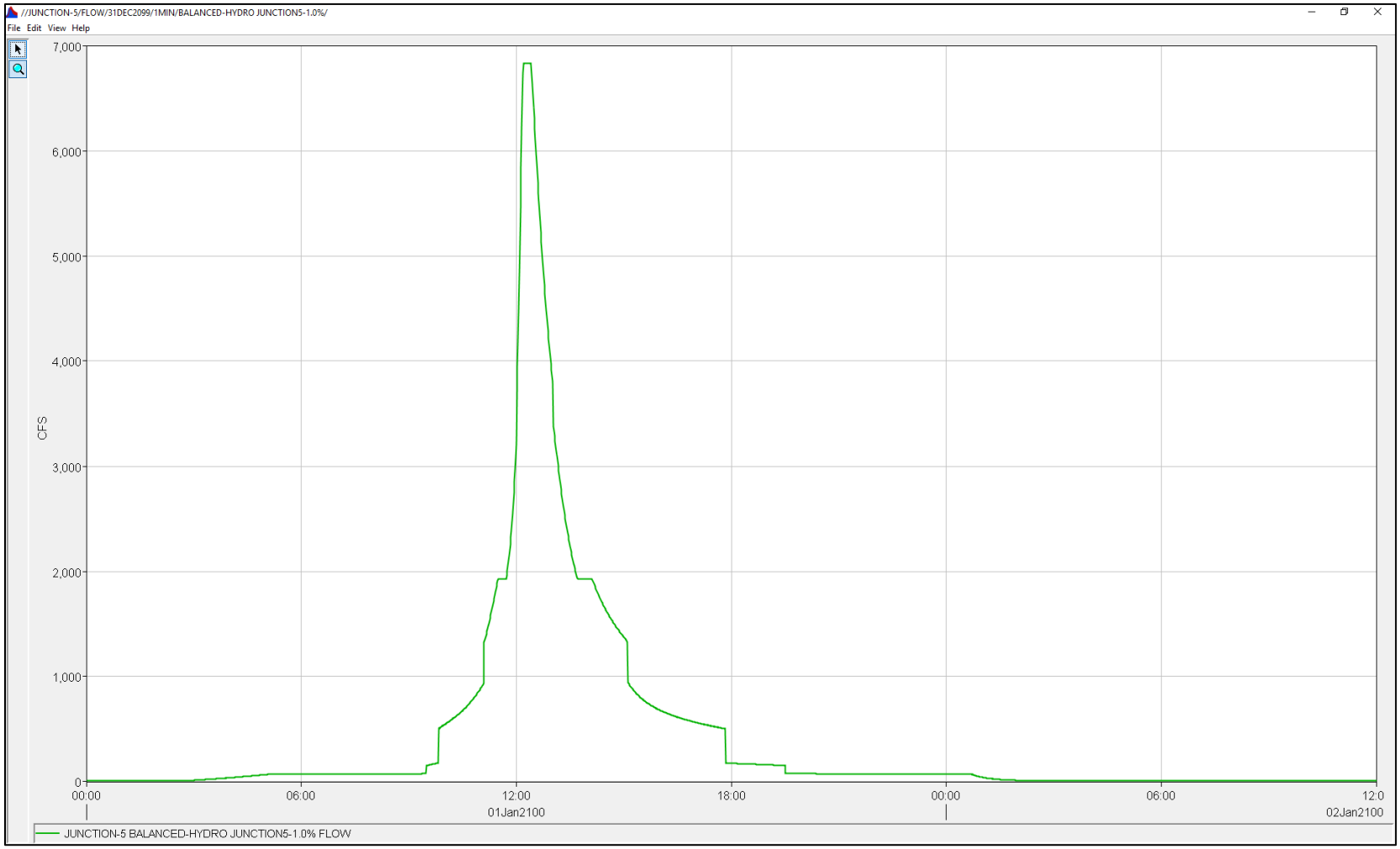

Figure 66: Manoa Main RS 16506 (JUNCTION-5 – FLOW)

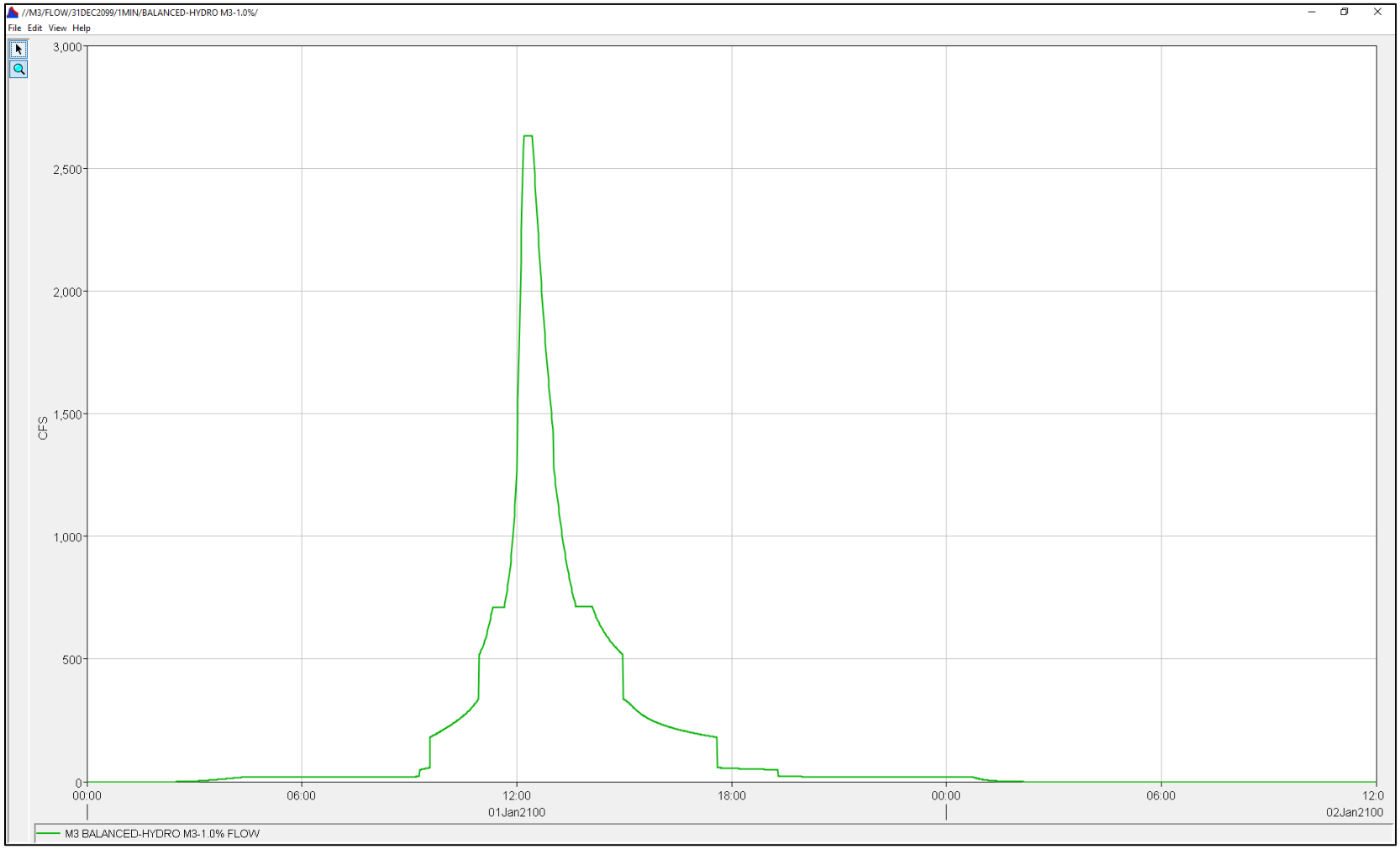

Figure 67: Manoa Main RS 16458 - 11951 (M3 – FLOW)

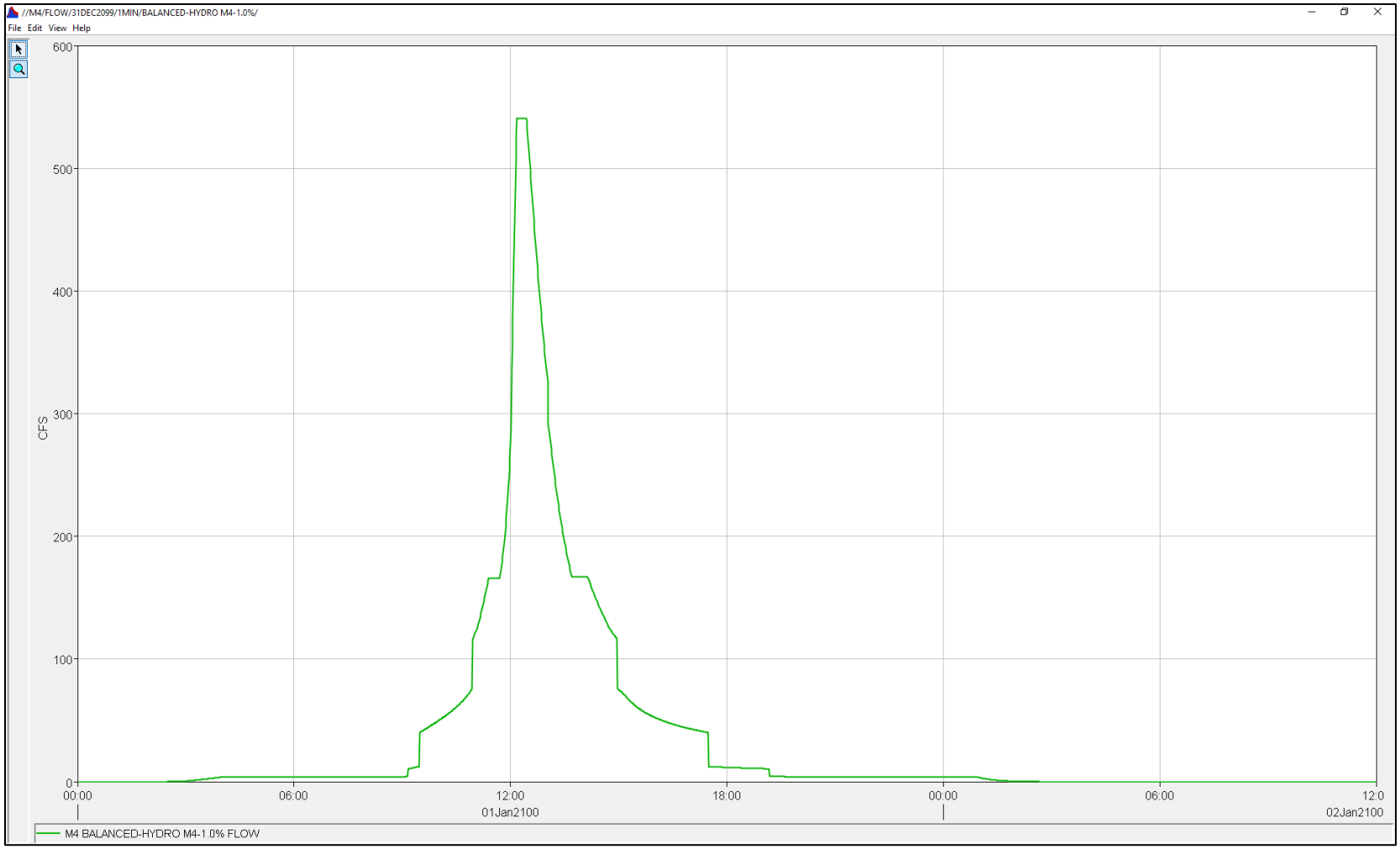

Figure 68: Manoa Main RS 12795 - 11112 (M4 – FLOW)

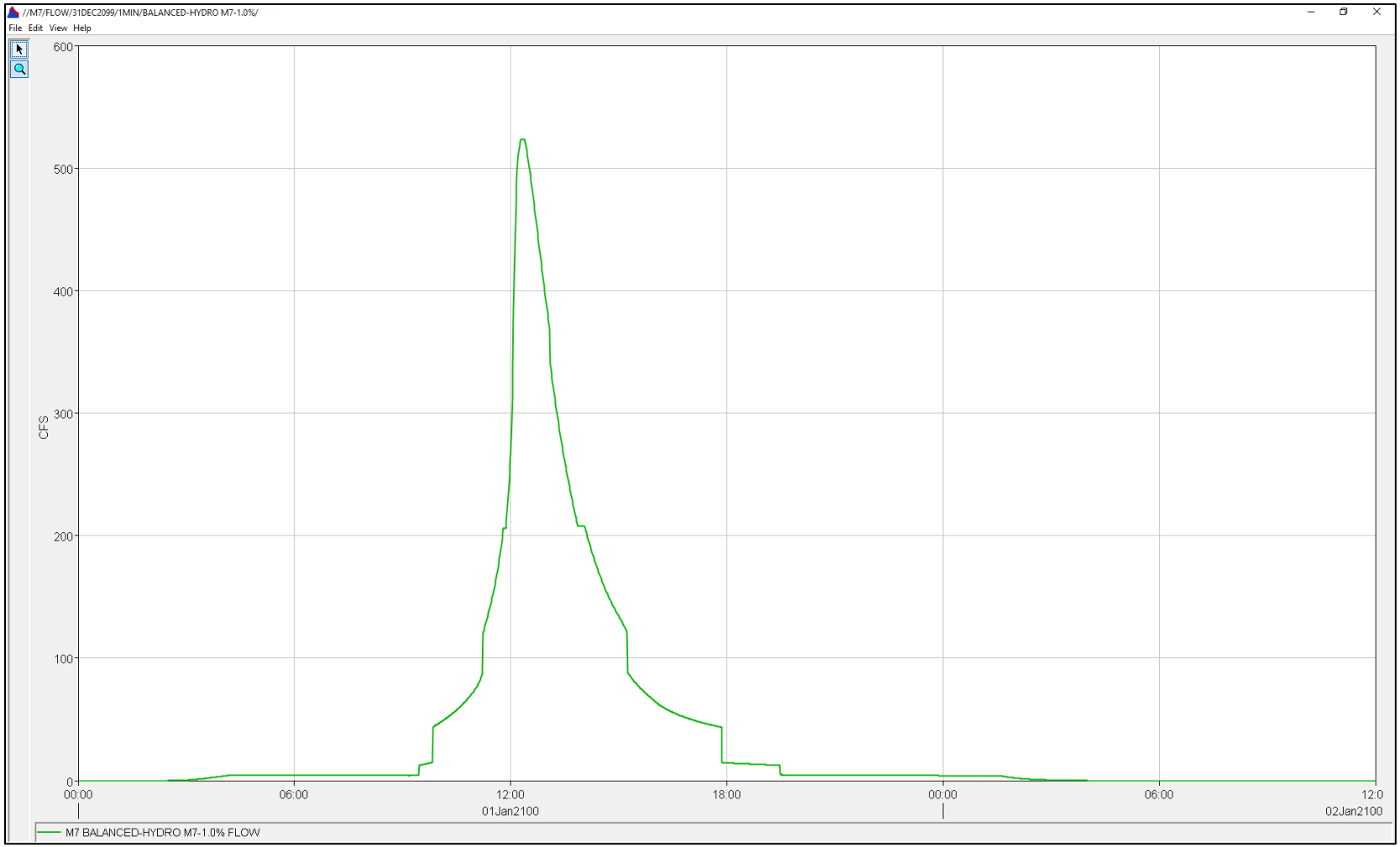

Figure 69: Manoa Main RS 11039 - 9501 (M7 – FLOW)

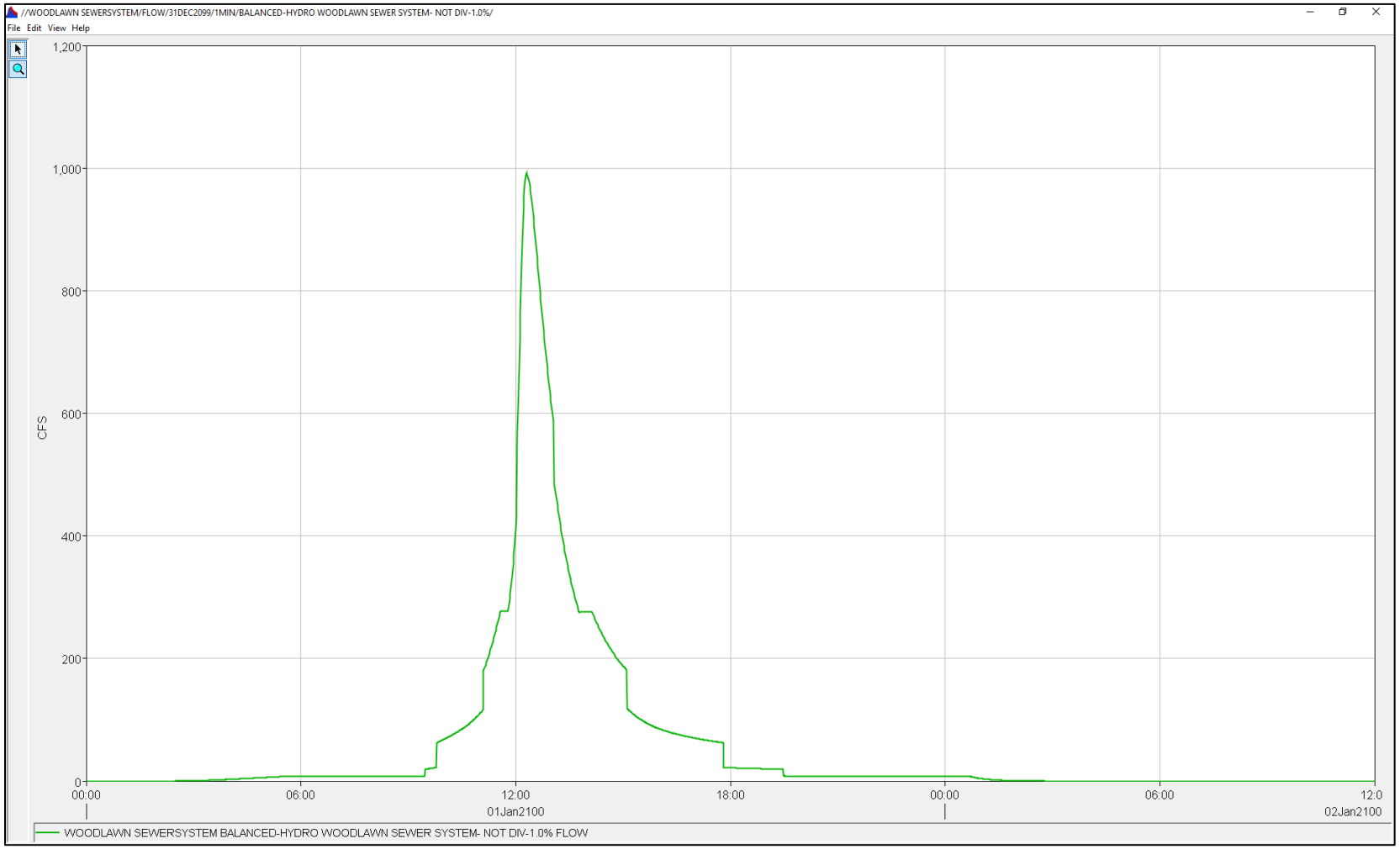

Figure 70: Manoa Main RS 10968 (WOODLAWN SEWERSYSTEM – FLOW)

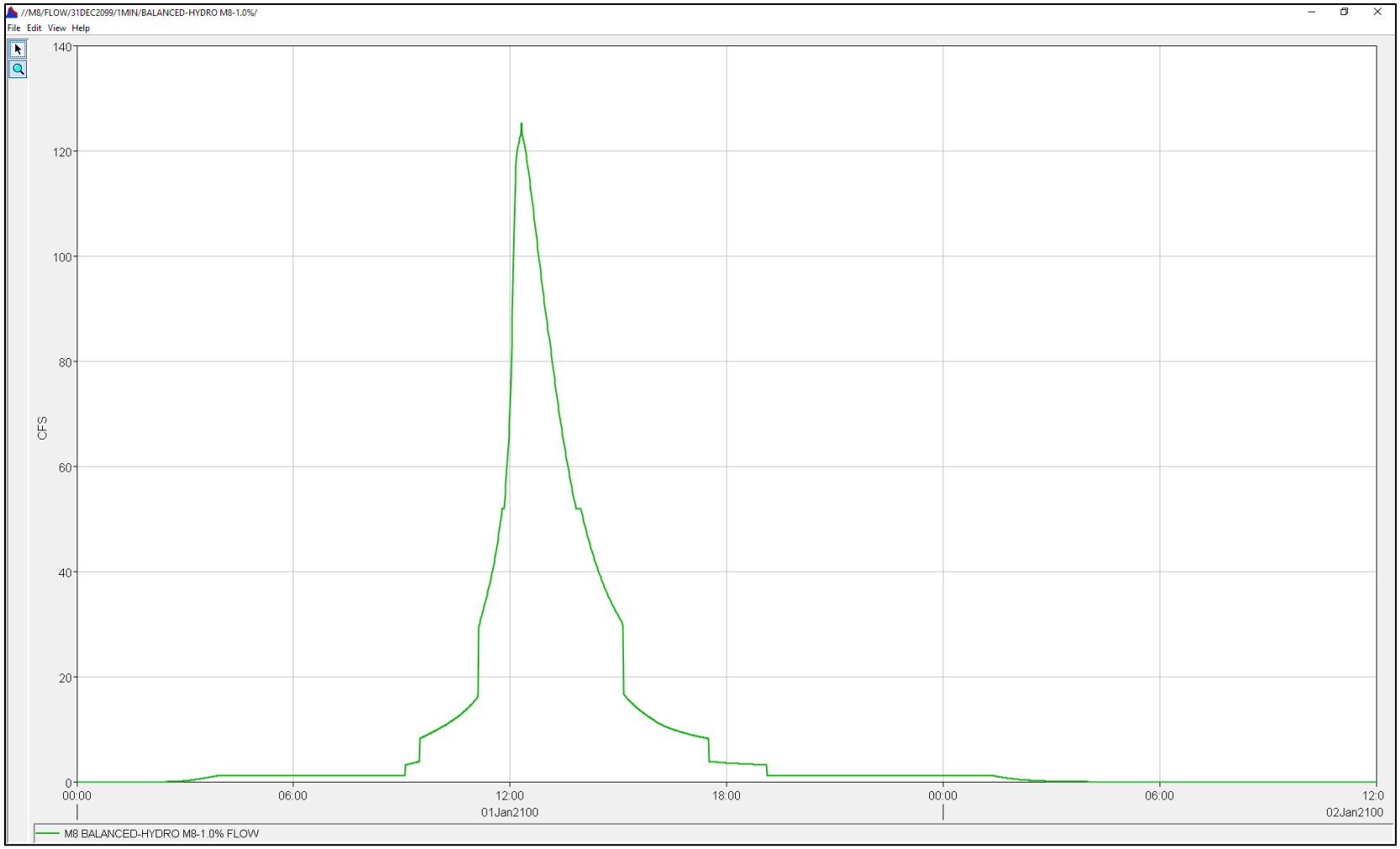

Figure 71: Manoa Main RS 10429 (M8– FLOW)

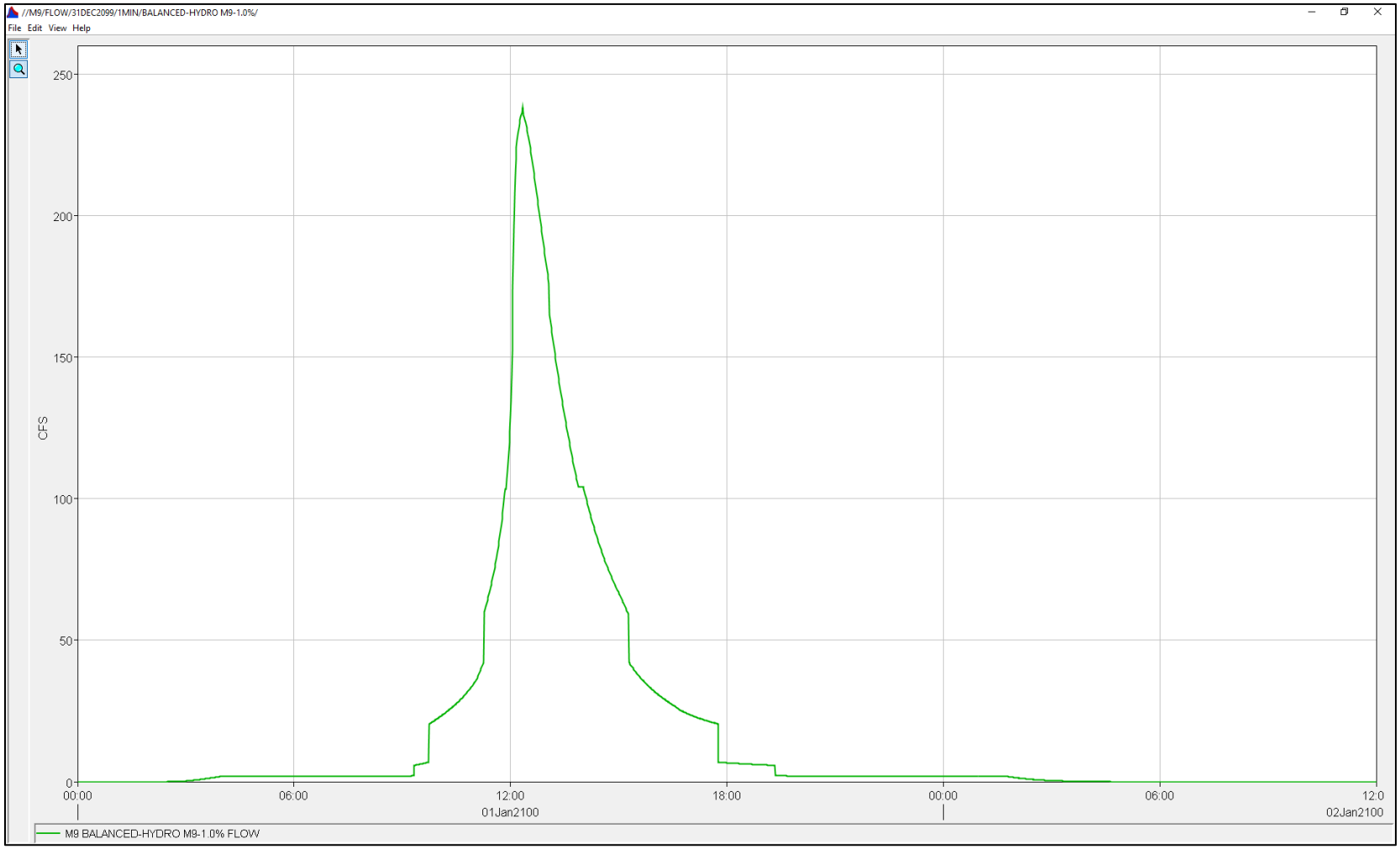

Figure 72: Manoa Main RS 9192 (M9– FLOW)

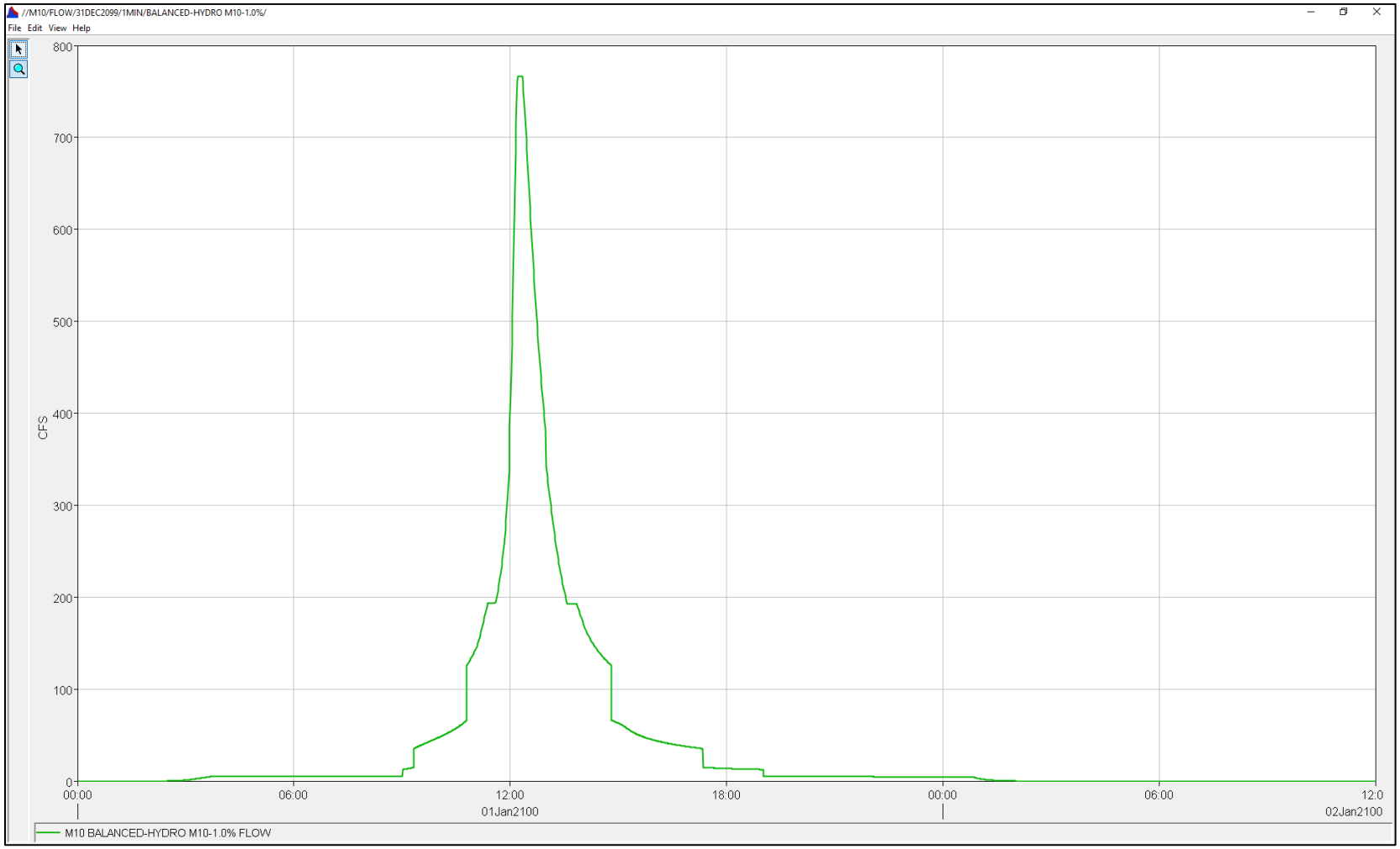

Figure 73: Manoa Main RS 8871 - 7734 (M10– FLOW)

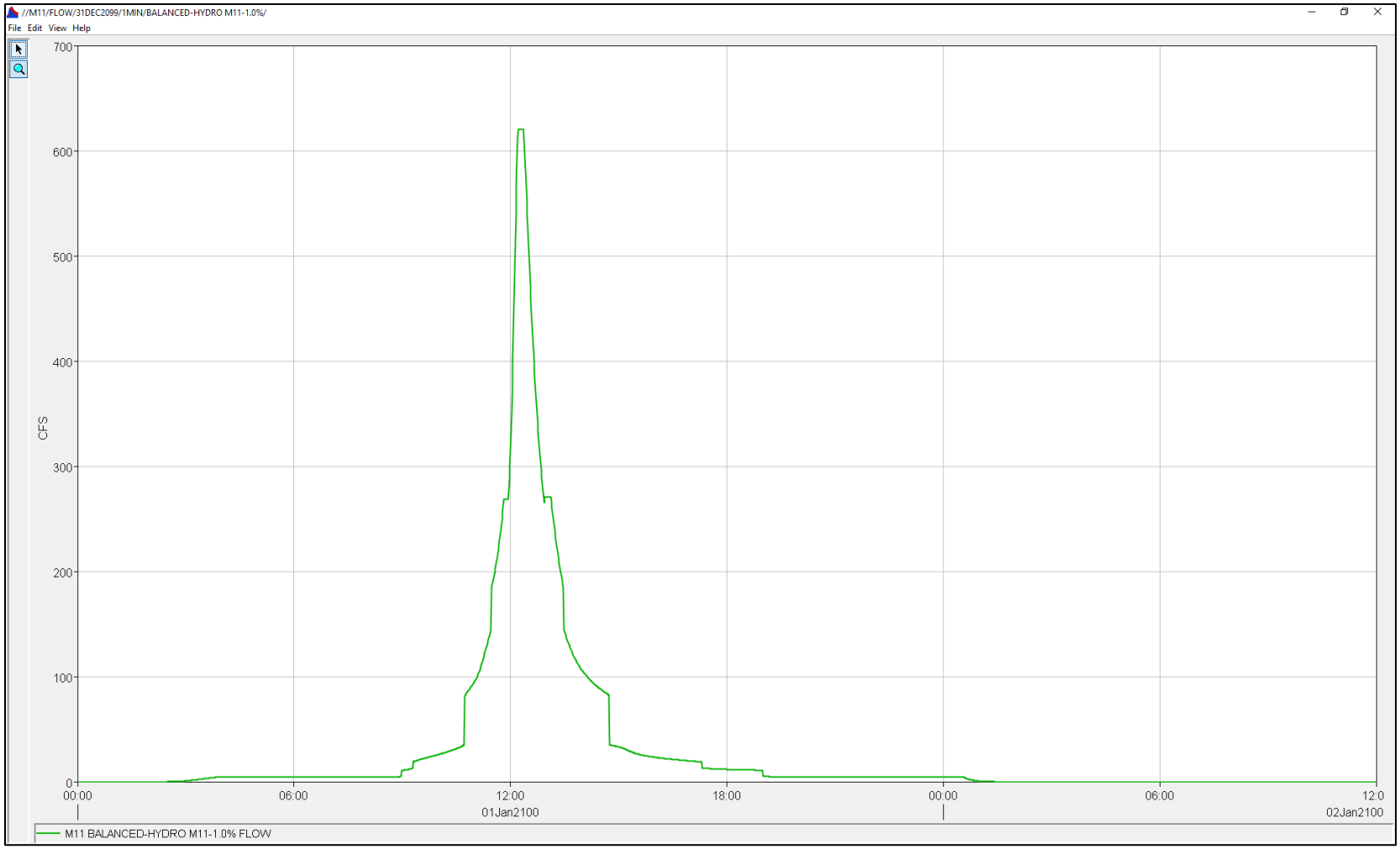

Figure 74: Manoa Main RS 7653 - 6241 (M11– FLOW)

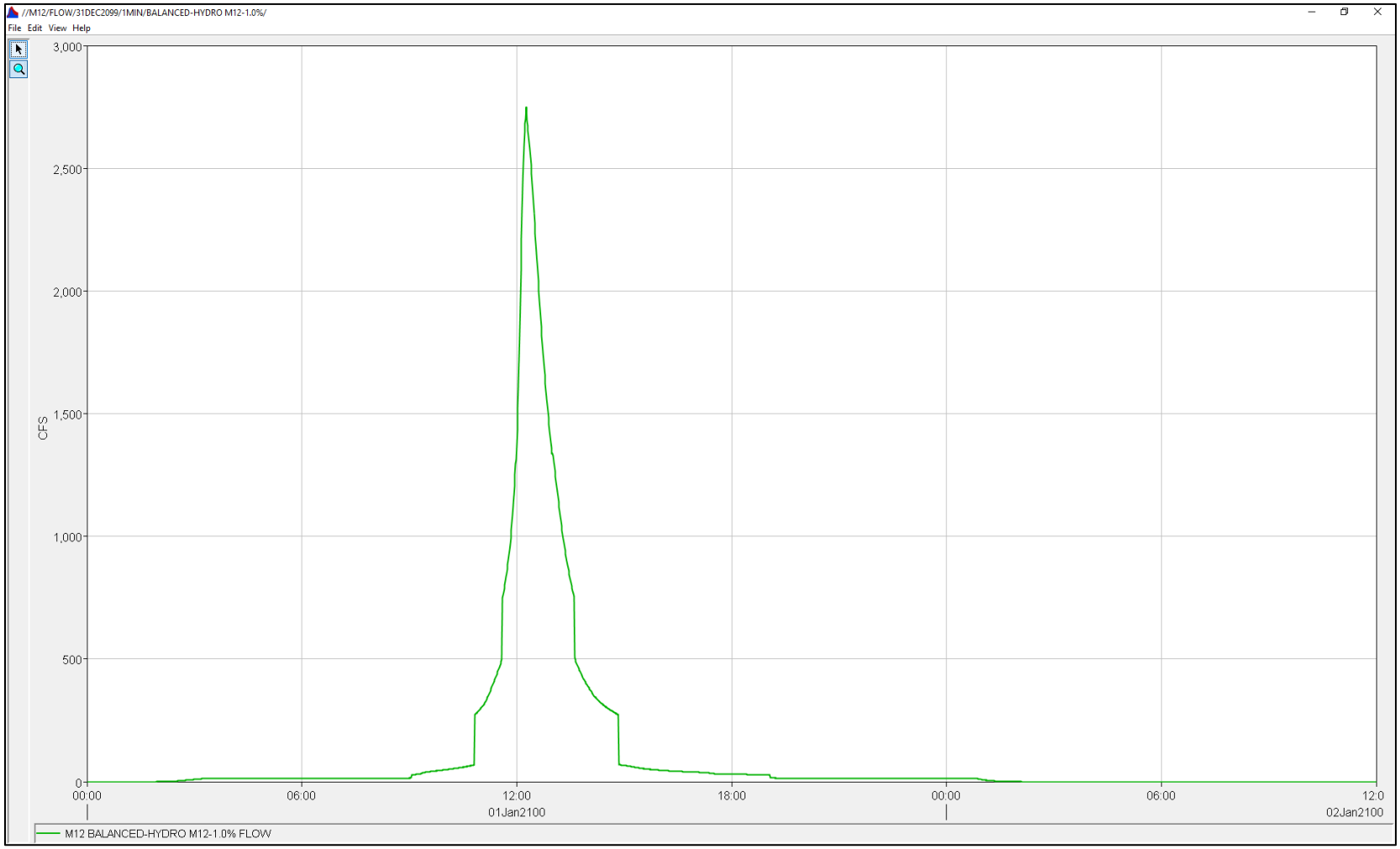

Figure 75: Manoa Main RS 2891 (M12– FLOW)

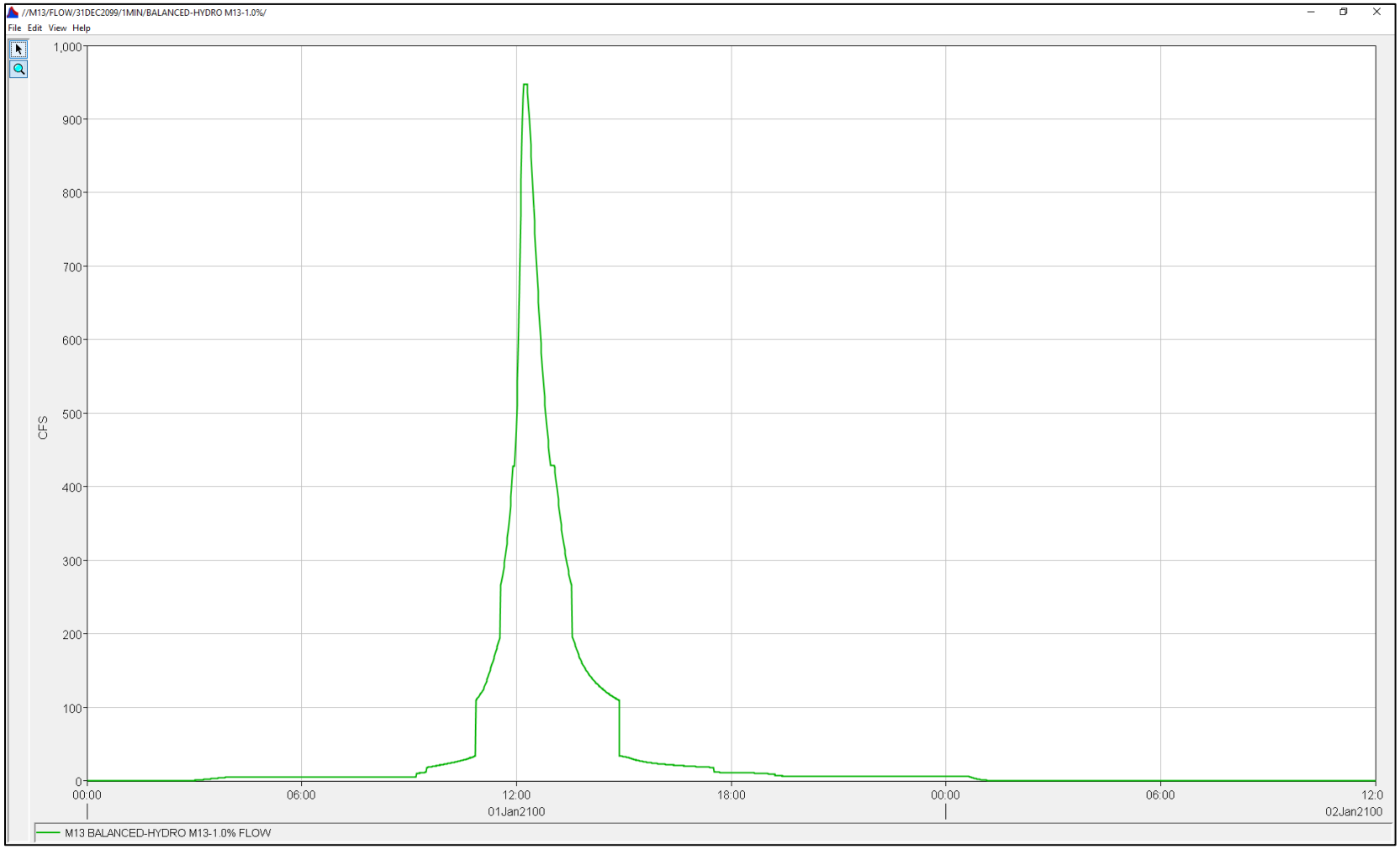

Figure 76: Manoa Main RS 1807 (M13– FLOW)

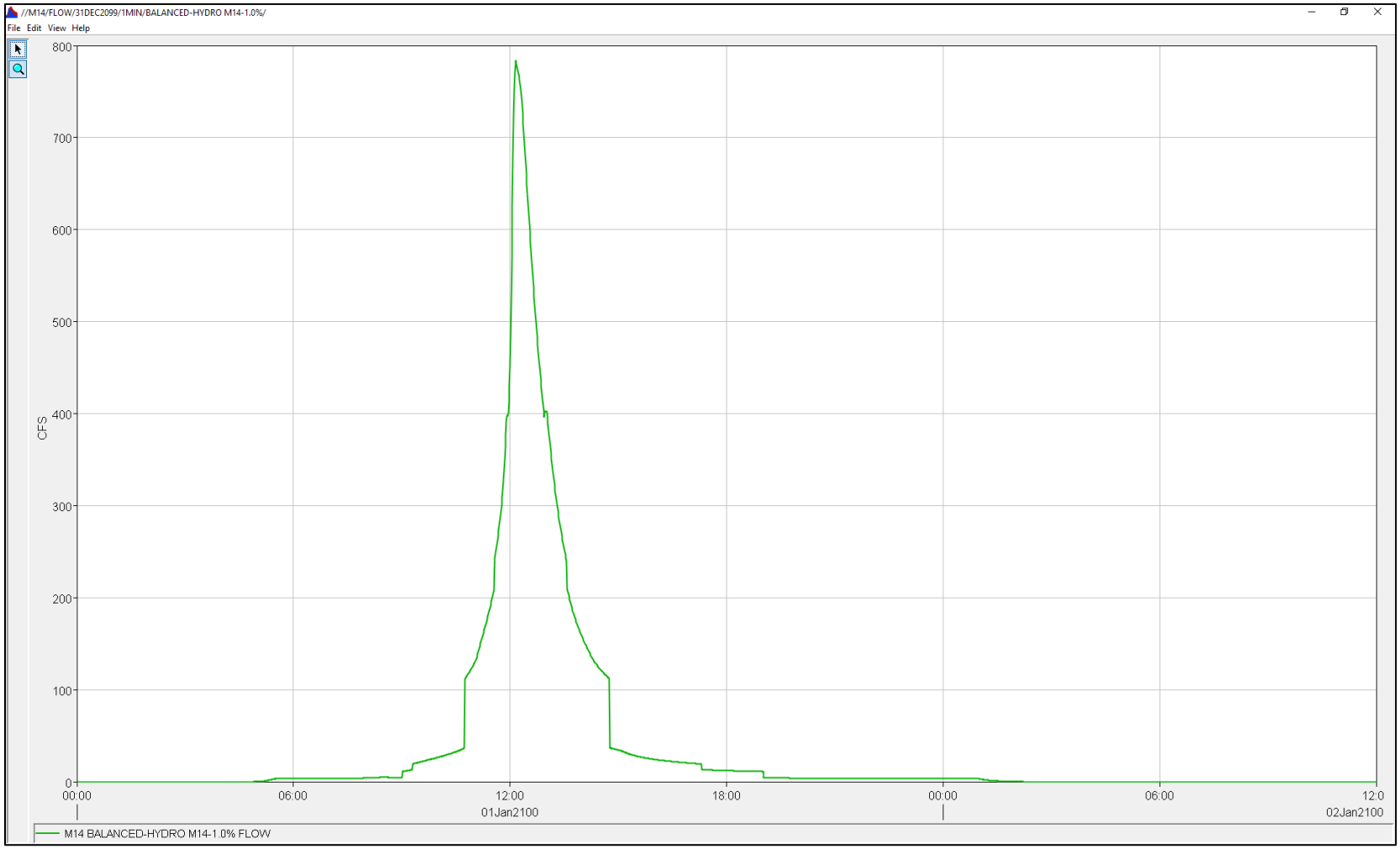

Figure 77: Manoa Main RS 1230 (M14– FLOW)

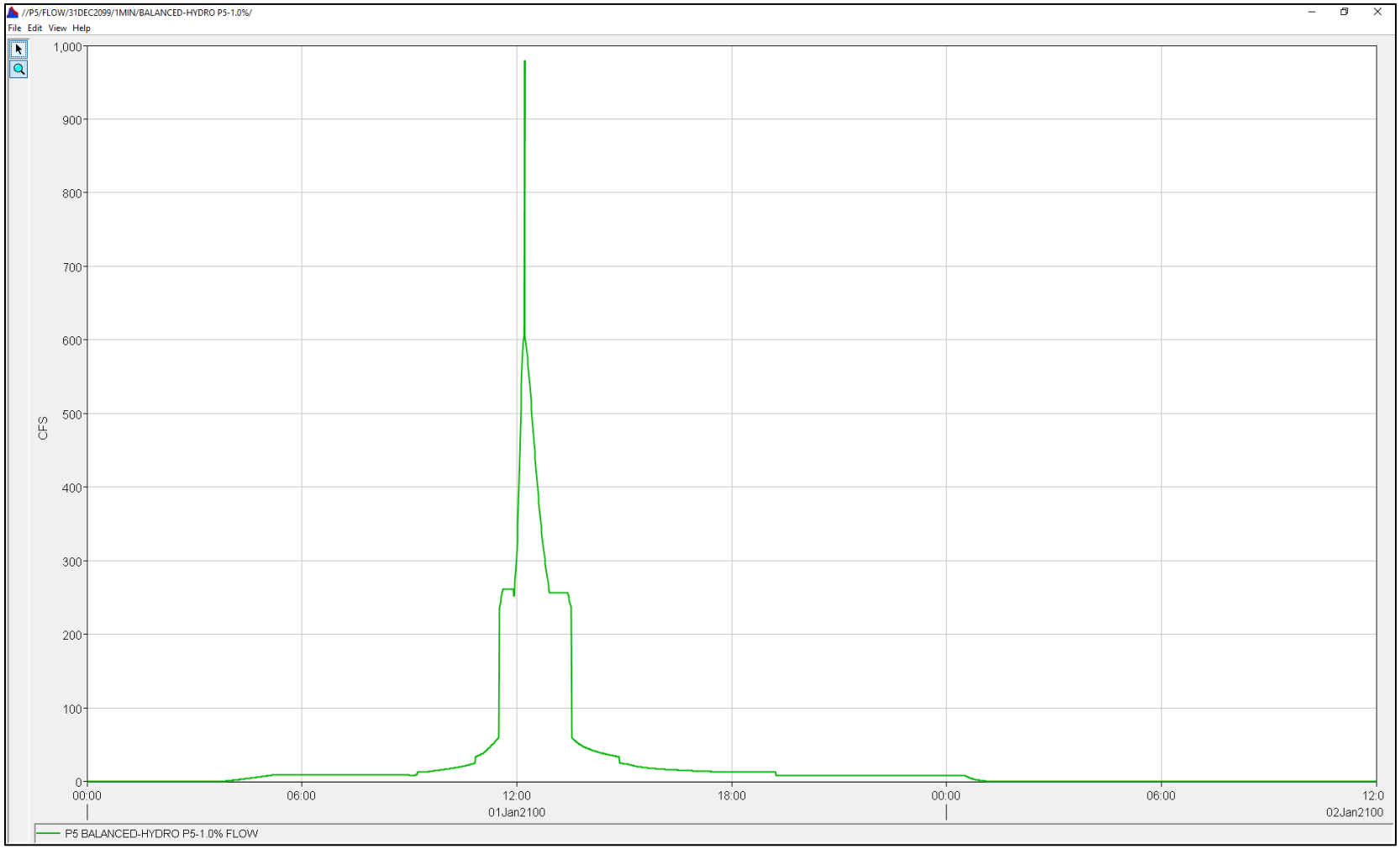

Figure 78: Palolo Main RS 15440 (P5– FLOW)

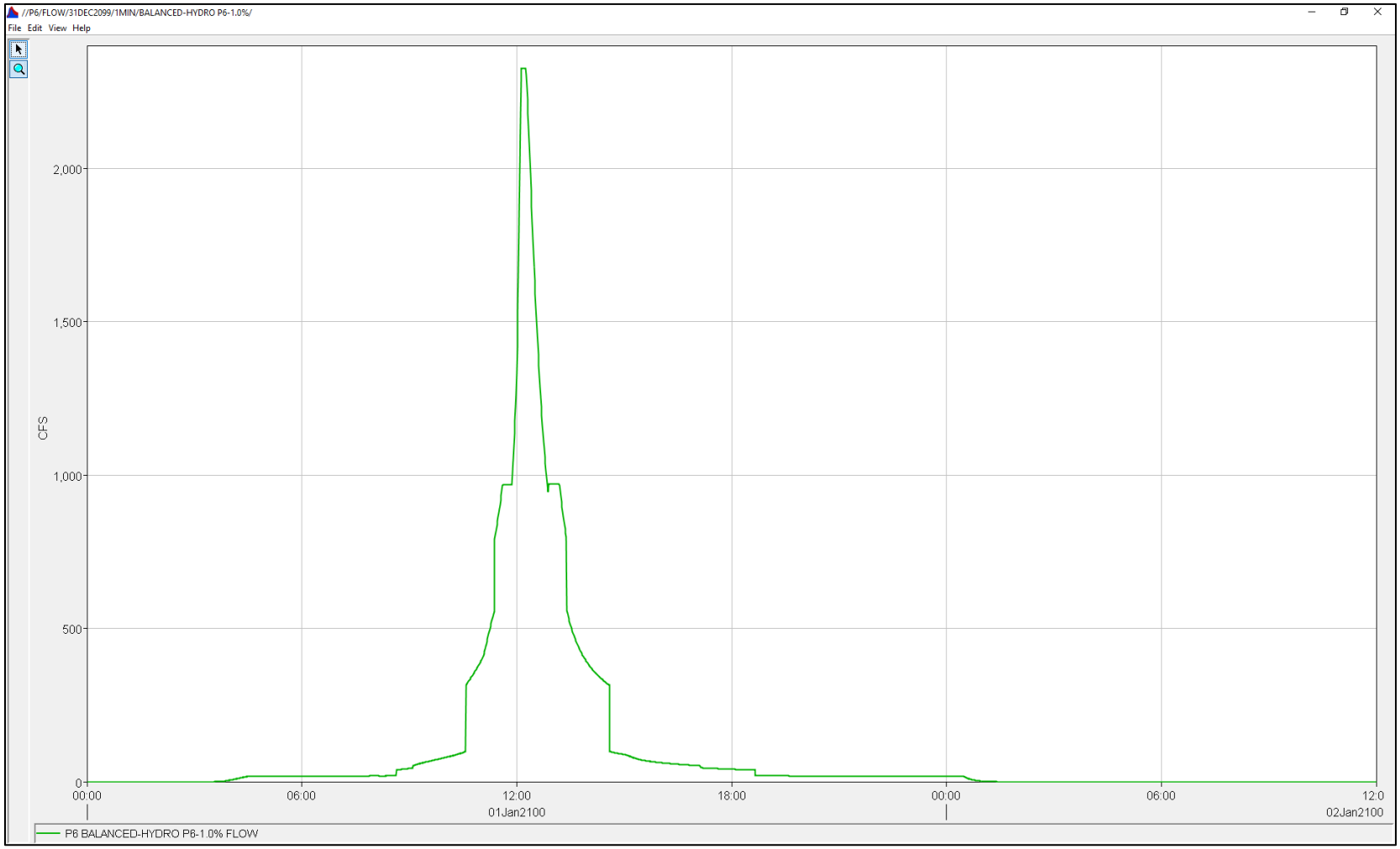

Figure 79: Palolo Main RS 15134 - 9709 (P6– FLOW)

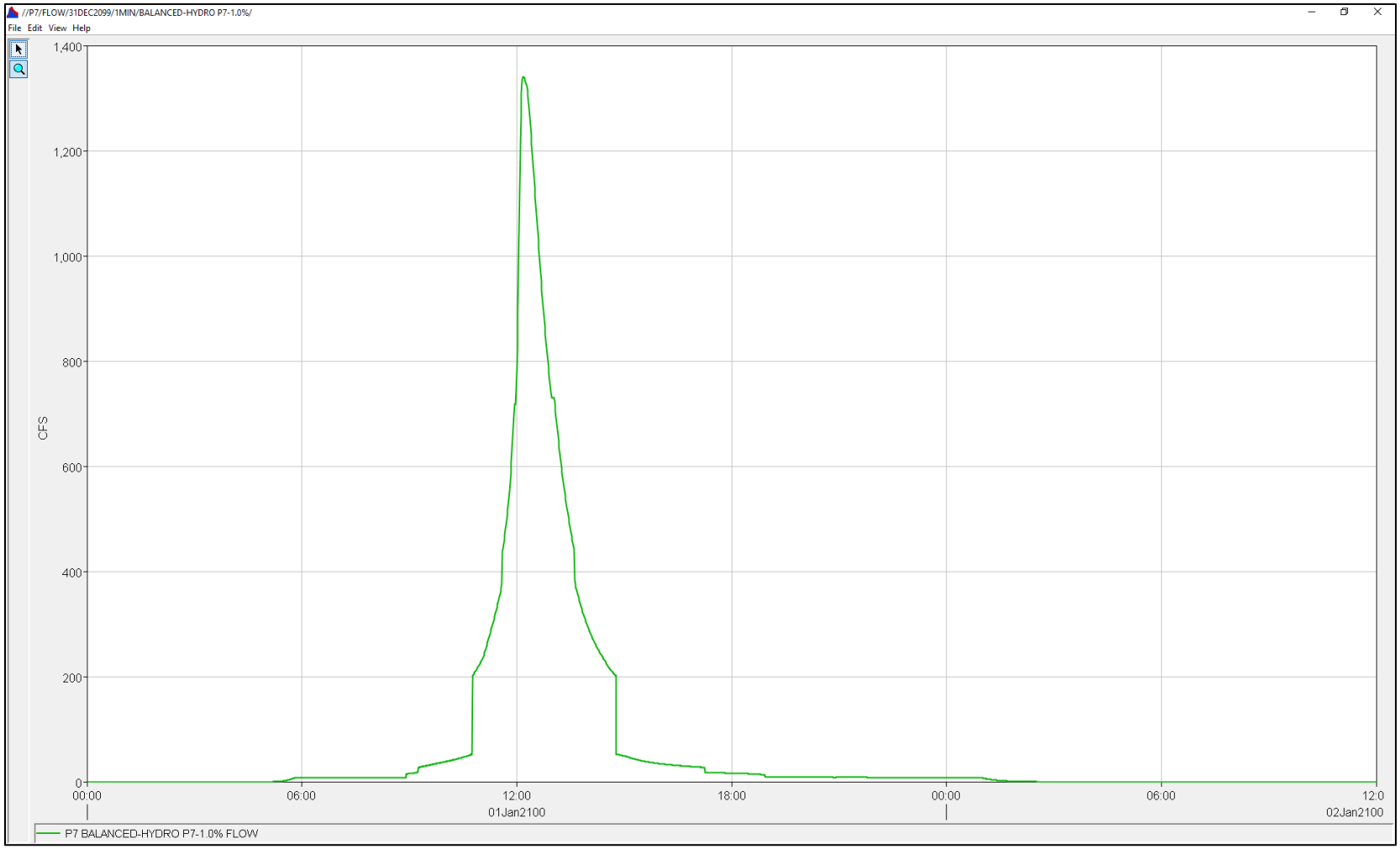

Figure 80: Palolo Main RS 9520 - 5525 (P7– FLOW)

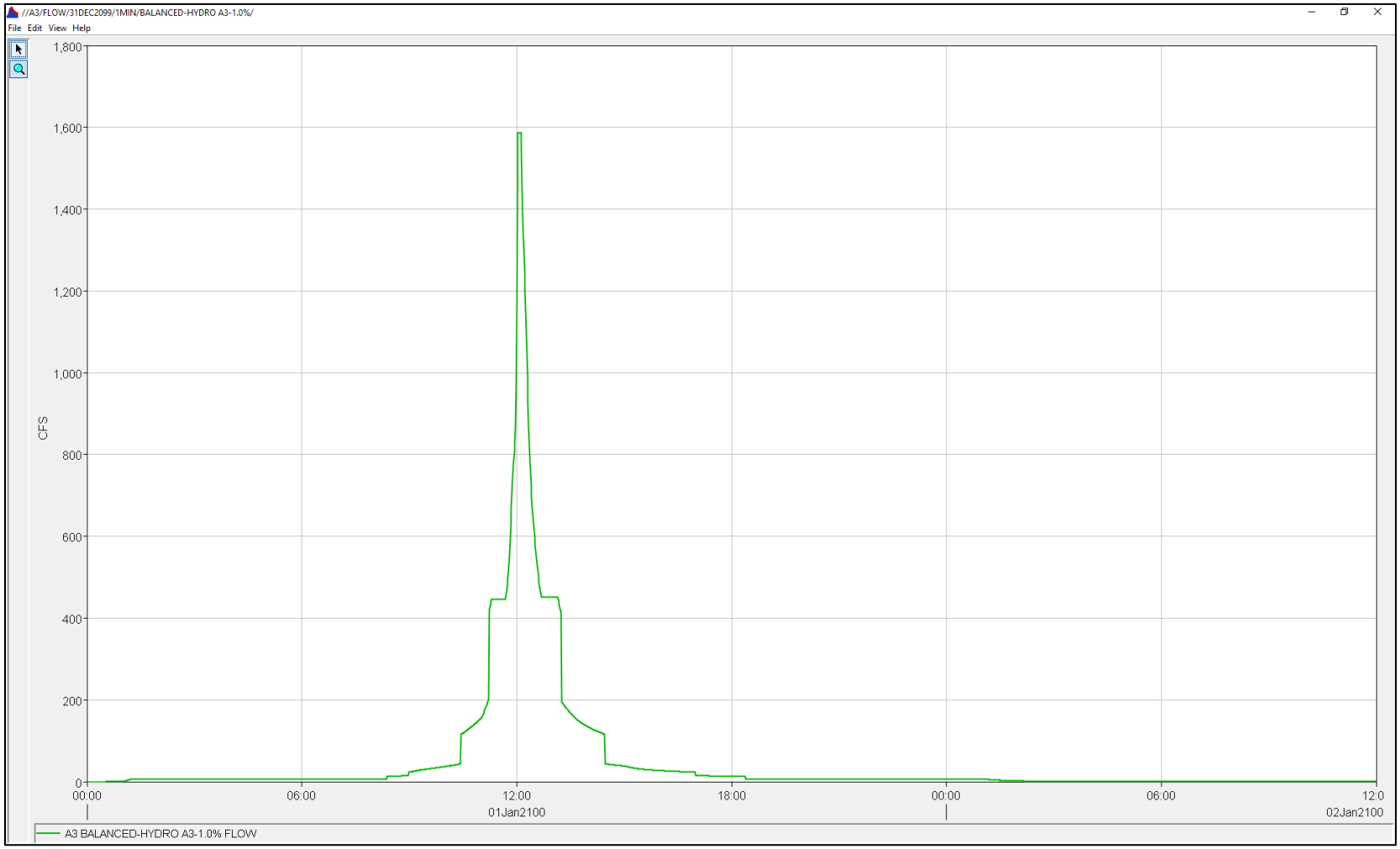

Figure 81: Palolo Lower RS 4352 (A3– FLOW)

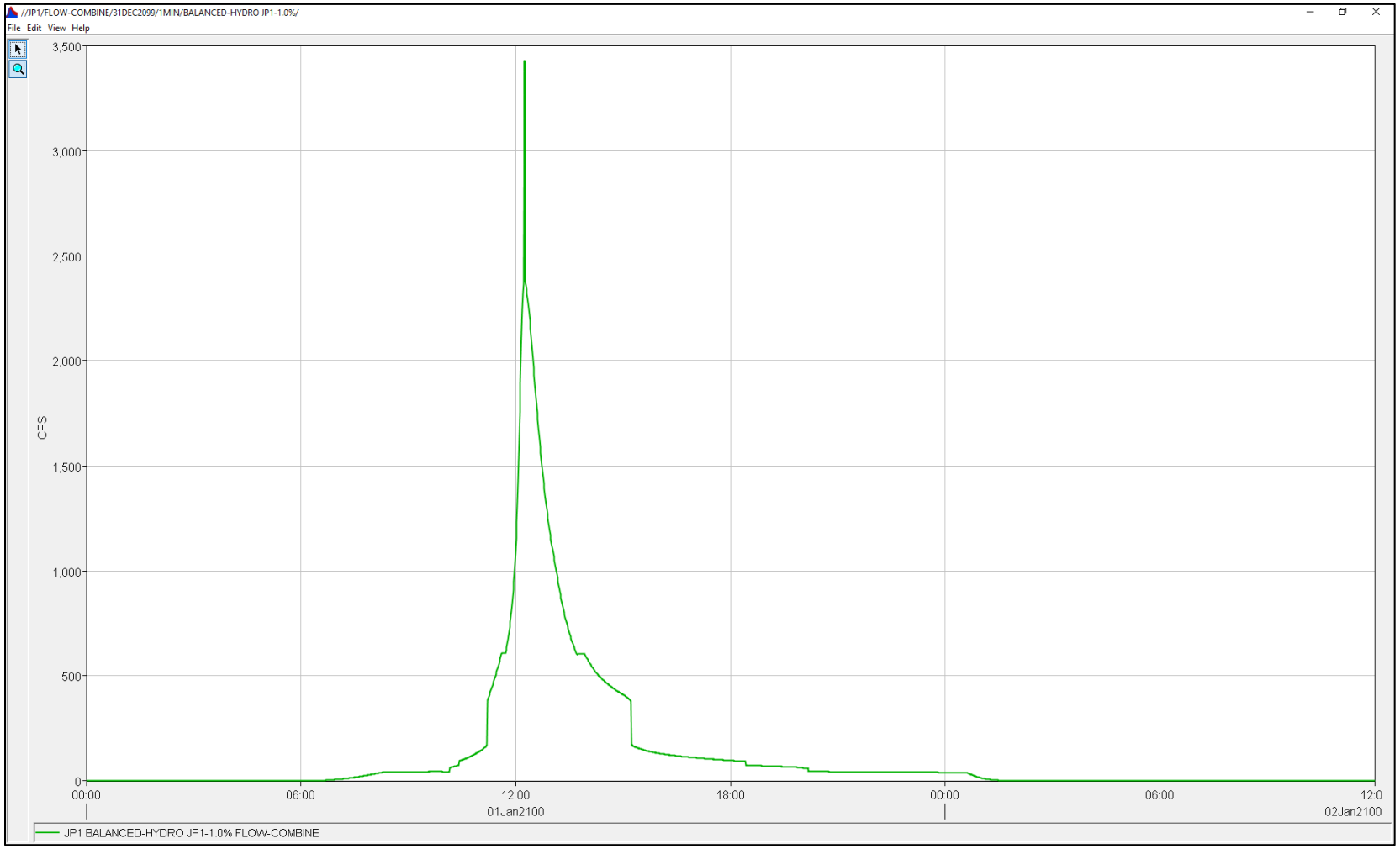

Figure 82: Pukele Tributary RS 5958 (JP1– FLOW-COMBINE)

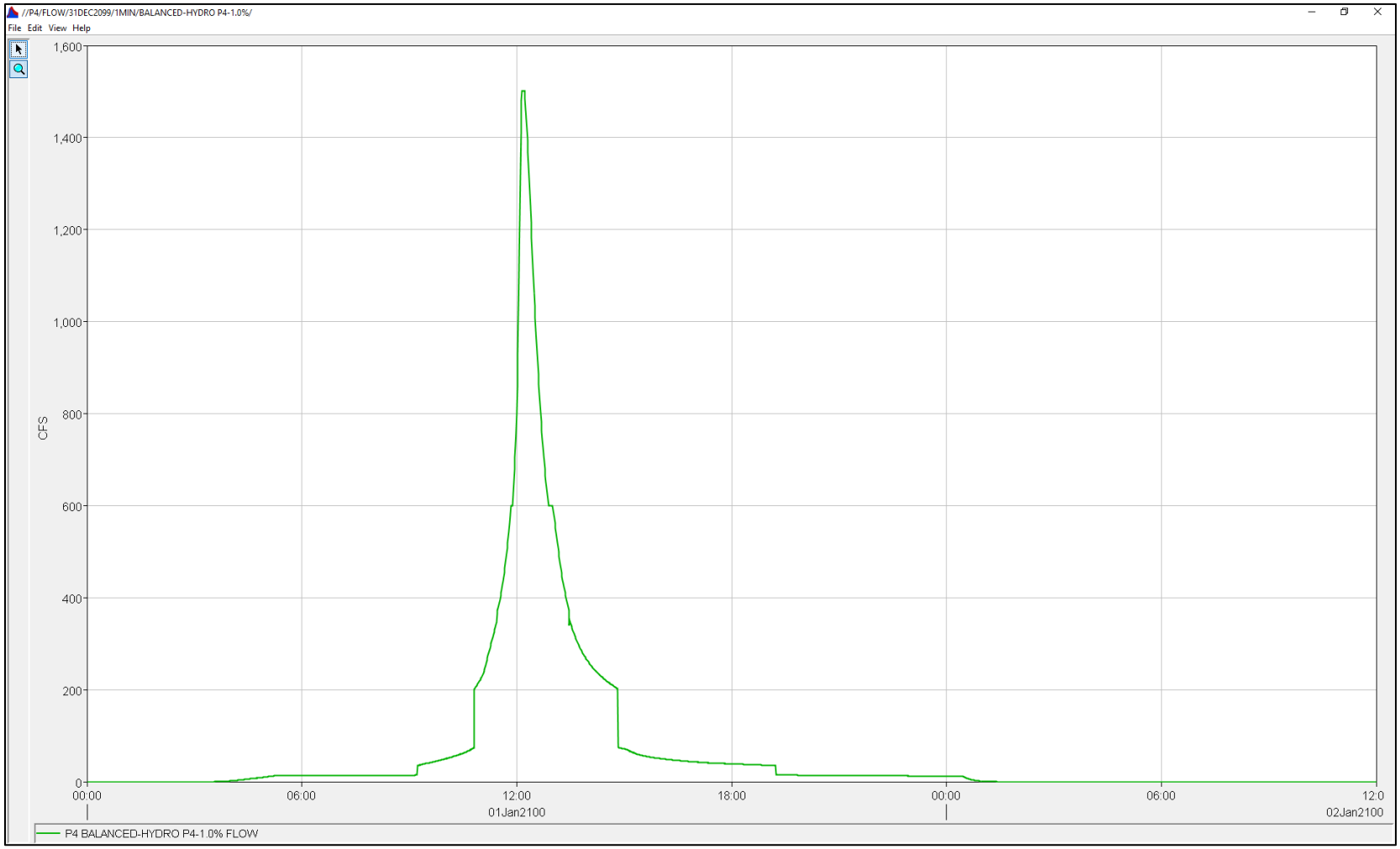

Figure 83: Pukele Tributary RS 3514 - 237 (P4– FLOW)

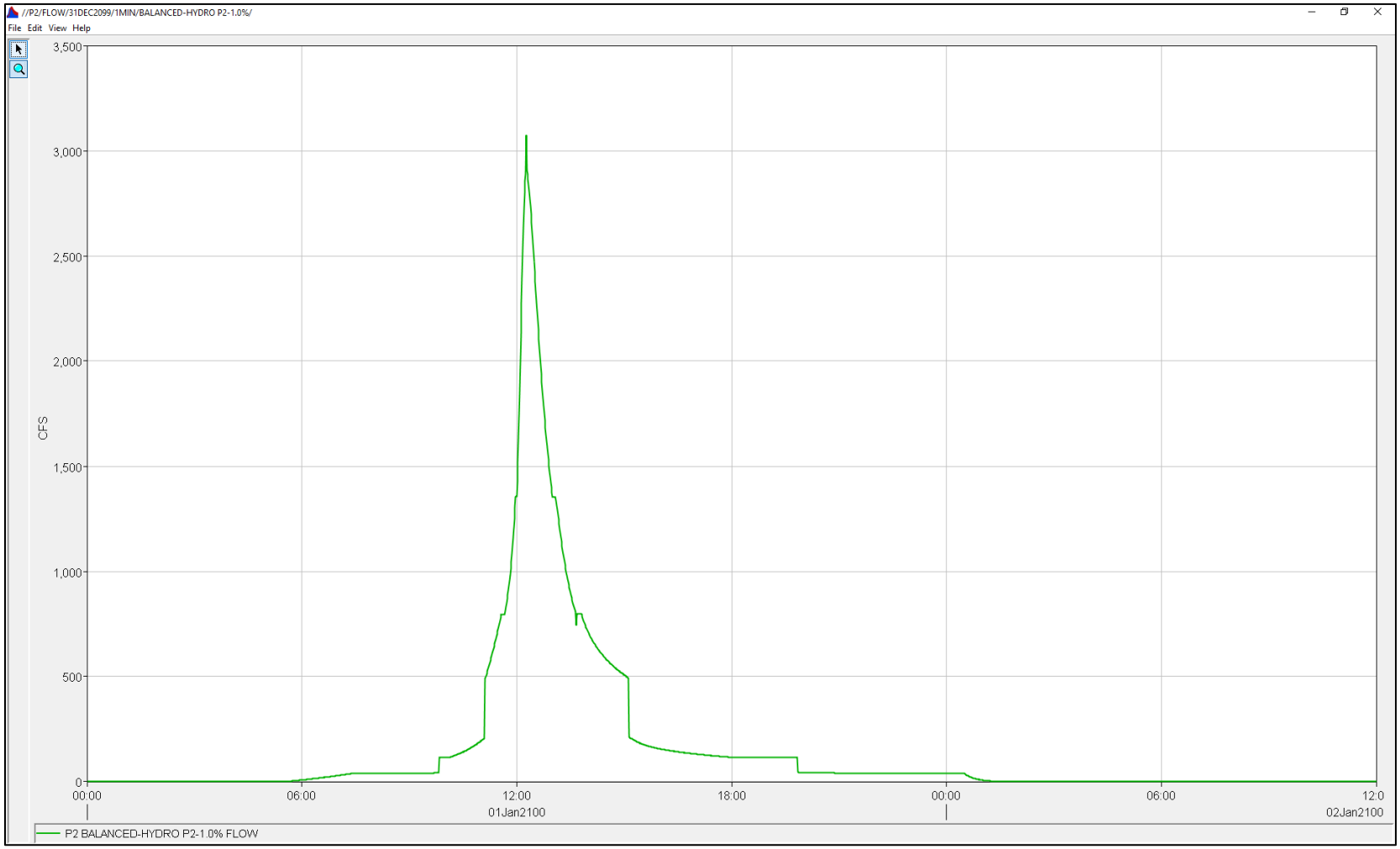

Figure 84: Waiomao Tributary RS 4900 (P2– FLOW)

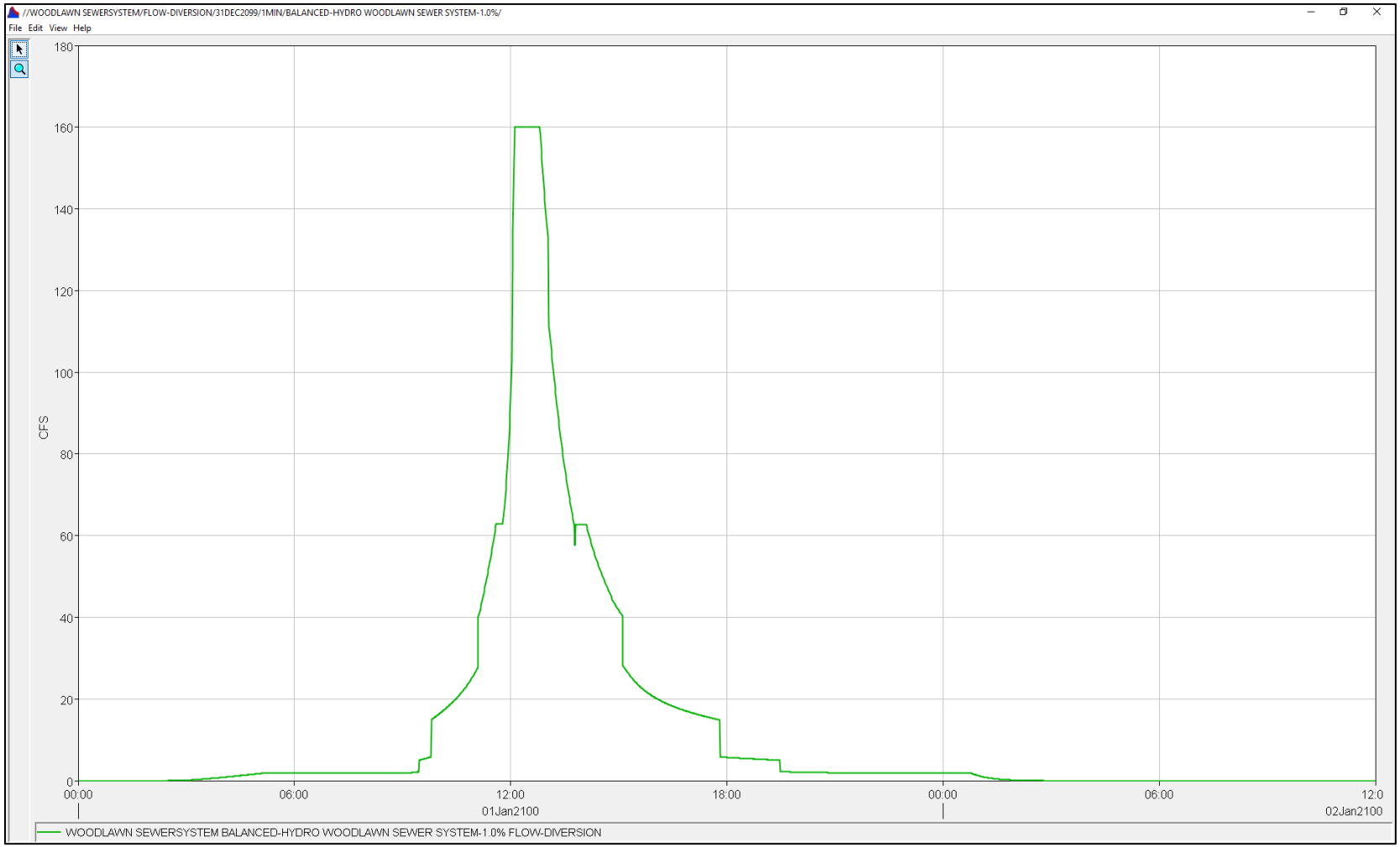

Figure 85: Perimeter 7 BC Line: M6B_Diversion (WOODLAWN SEWERSYSTEM– FLOW-DIVERSION)

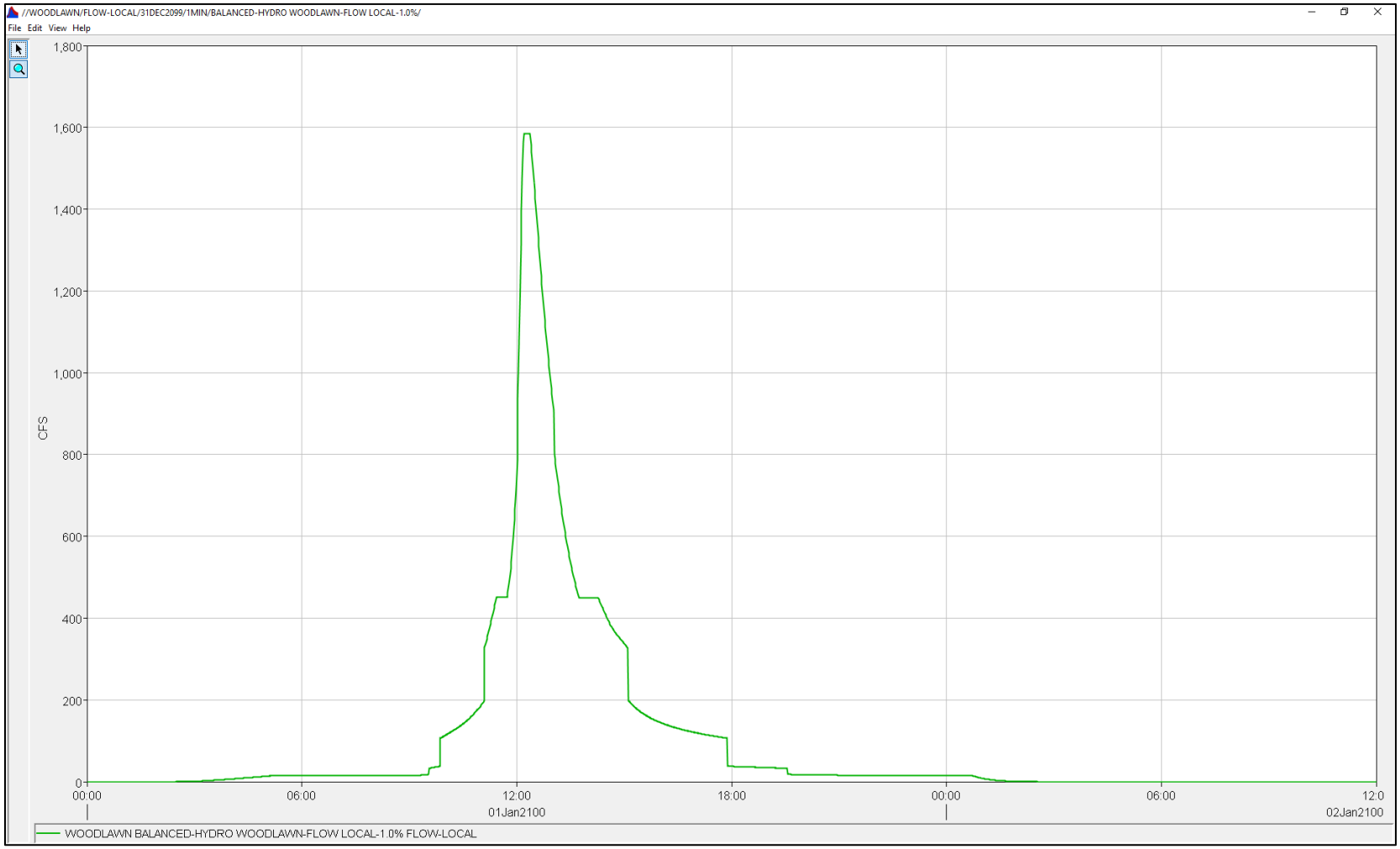

Figure 86: Perimeter 7 BC Line: Woodlawn_Inflow (WOODLAWN– FLOW-LOCAL)

December 6-8, 2021 Rainfall Event on Ala Wai Watershed

Summary

An unusual December storm was experienced throughout Hawaii on 6-8 Dec 2021. The following is an excerpt from National Weather Service report on the event:

> *A strong kona low developed northwest of the main Hawaiian Islands and produced heavy rainfall and strong winds over many areas of the state. The main rain band hit the Big Island first on Sunday, December 5, then shifted slowly westward across the island chain over the next two days. Rainfall totals were greatest over the southeastern flank of the Big Island, the south- and west-facing slopes of Haleakala, and most of Oahu,…*
>
> (https://www.weather.gov/hfo/konaLowDec2021)

At request of local sponsor for use in communications with local media, the H&H PDT examined gauge records, published frequency information, and prior study information to assign an estimate of the return frequency for this event. It should be noted that this analysis exclusively focused on the Ala Wai watershed (Manoa, Palolo and Makiki subbasins) and may not be representative of other portions of Oahu or Hawaii. Based on both a precipitation frequency analysis and flow frequency analysis of gages within the basin, the storm event can be characterized as approximately a 0.2 Annual Exceedance Probability (AEP) (commonly referred to as a "5-year") event. Analysis of both precipitation gauges and discharge gauges is performed in order to gain an overall understanding of the storm event and the watershed response, given that any individual result can be highly localized and not reflective of the overall event.

Precipitation Gauge Analysis

Data from five rain gages were used in the precipitation frequency analysis as shown in Table 1. The gauge locations are shown in Figure 1. The reported total precipitation at the Waihi gauge for the event (0.29 inches) was a significant outlier compared to surrounding totals, therefore it is excluded from further study. No precipitation gauges were readily available in the Palolo watershed. 24-hour precipitation maximums ranged from approximately 7.8 inches (Honolulu 0.5 SSE) to 8.9 inches (Lyon Arboretum).

Based upon published precipitation frequency estimates by the National Weather Service (NOAA Atlas 14), these precipitation totals would fall generally between a 0.04 and 0.2 annual exceedance probability ("5-25" year) event, with the precipitation recorded at the Honolulu 2.0 SW gauge in the lower portion of the Makiki watershed within the 90% confidence band for a 0.04 AEP. Precipitation totals trended toward an 0.20 AEP on the eastern edge of the Manoa watershed. Excerpts from the Atlas 14 data server are included as an appendix to text.

Figure 1 - Precipitation Gauge Locations

Table 1

Precipitation Gauge	Recording Frequency	Maximum recorded value for interval							
		15-minute	30-minute	1-hour	2-hour	3-hour	6-hour	12-hour	24-hour
Palolo Fire Station	Irregular, converted to 15-min	0.76 †	1.40 †	2.25	2.89	3.35	4.37	6.55 †	8.01 †
Lyon Arboretum	hourly			2.34	3.05	3.91	5.37	7.97	8.89
Honolulu 0.5SSE [CoCoRaHS]	daily								7.79
Honolulu 2.0 SW [CoCoRaHS]	daily								8.24
Aloha Tower	Hourly			1.59	2.92	3.54	4.72	7.19	8.39

† Values based upon 15-minute data rolling totals

Discharge Gauge Analysis

Data from six stream gages across the basin, shown in Figure 2, were reviewed and compared to the latest available frequency analysis, which was derived from a rainfall-runoff and peak flow frequency hydrologic model that was weighted and compared to arrive at estimated peak flow discharges (See Table 2). Flows from Waihi Stream and Waiakeakua Stream were added together as the guagues are very near the confluence, and the reported frequency values are at the confluence. The frequencies were graphically compared to these computed discharge estimate curves, which are included in the Appendix. The observed flows ranged from approximately a 0.2 AEP (5-year) event to approximately a 0.45 AEP (~2-year) event.

It is noted that the USGS performed a flow measurement at the Woodlawn gauge on 12/8 during the recession of the storm event, and rating may be adjusted from previous values due to observed scour.

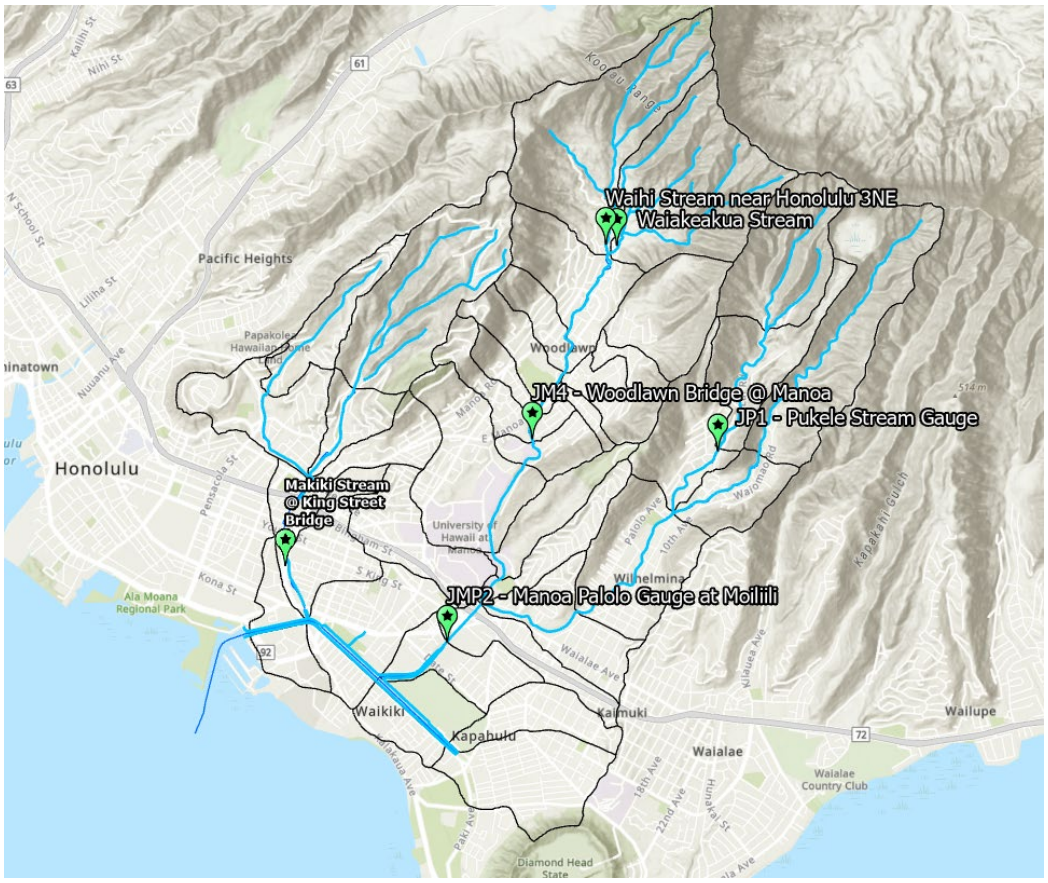

Figure 2 - Stream Gauge Locations

Table 2

Location		Peak Flow Discharge (cfs) *Source: (Table 2, Ala Wai Validation Report with Appendices.PDF, March 25, 2021 Appendix A.1 Hydrology Report)*								Event Observed Peak (cfs)	Approximate AEP *
	Average Return Interval	2	5	10	20	50	100	200	500	12/7/2021	
	AEP	0.50	0.20	0.10	0.05	0.02	0.01	0.005	0.002		
Confluence of Waihi and Waiakeakua Streams		1,200	2,000	2,800	3,600	4,600	5,500	6,200	7,400	1,510	0.36
(Manoa at) Woodlawn Dr. Bridge		2,000	3,700	5,000	6,300	7,700	8,800	9,900	11,700	3,310	0.25
USGS Stream Gage (Makiki) near King Street		700	1,400	2,000	2,700	3,500	4,500	5,600	6,700	1,510	0.18
USGS Pukele Gage 16244000		440	820	1,200	1,600	2,100	2,700	3,000	3,900	474	0.47
USGS Stream Gage 16247100 (Manoa-Palolo Canal)		3,600	6,400	8,600	11,200	14,500	17,000	20,900	23,200	6,290	0.22

* Graphically approximated

Conclusions

Based upon available news reports and social media posts, street flooding was the primary impact. Flooding also damaged the Iliwei Power Substation and an underground transmission cable, which is located just northwest of the watershed boundary, causing a power outage that affected much of the metropolitan area. Several water rescues also occurred. Precipitation and associated damages appear to be slightly greater in the Makiki watershed than the Palolo and Manoa watersheds.

The general range in precipitation frequency is consistent with the runoff frequency estimates. When considering both sets of data, characterization of the storm overall as a 0.20 annual exceedance probability ("5-year") event is a good estimate. The reports of primarily street flooding and minimal other damages also seems consistent with the estimated annual exceedance probability. Differences in estimated AEP between the observed precipitation and observed runoff peaks can be attributed to many things, including overall distribution of rainfall in time as well as antecedent conditions. It is understood that prior to this event that there had been a relatively long period of dry weather. Localized "point" totals at rain gauges may not accurately reflect the distribution of flow contributing to a particular stream gauge. Frequency analyses can and will change over time as more data becomes available and the period of record becomes more reliable.

Appendices

1. Hourly Precipitation records – Manoa Lyon Arboretum, Palolo Fire Station, Aloha Tower
2. Daily Precipitation Records – CoCoRaHS gauges
3. Atlas 14 Precipitation Frequency values for selected gauges
4. Discharge Frequency Curves for selected stream guages

Appendix 1

Hourly precipitation totals from National Weather Service https://www.weather.gov/hfo/RR5_archive

	MNLH1 : Manoa Lyon Arboretum (3050) :						PFSH1 : Palolo Fire Station (13010) :					
Precipitation Totals ending at:	1-hour total	2-hour totals	3-hour totals	6-hour totals	12-hour totals	24-hour totals	1-hour total	2-hour totals	3-hour totals	6-hour totals	12-hour totals	24-hour totals
12/5/2021 15:00	0.01						-					
12/5/2021 16:00	0.20	0.21					0.01	0.01				
12/5/2021 17:00	0.04	0.24	0.25				0.04	0.05	0.05			
12/5/2021 18:00	0.18	0.22	0.42				0.15	0.19	0.20			
12/5/2021 19:00	0.24	0.42	0.46				0.29	0.44	0.48			
12/5/2021 20:00	0.07	0.31	0.49	0.74			0.09	0.38	0.53	0.58		
12/5/2021 21:00	0.06	0.13	0.37	0.79			0.06	0.15	0.44	0.64		
12/5/2021 22:00	0.02	0.08	0.15	0.61			0.02	0.08	0.17	0.65		
12/5/2021 23:00	0.02	0.04	0.10	0.59			0.02	0.04	0.10	0.63		
12/6/2021 0:00	0.26	0.28	0.30	0.67			0.17	0.19	0.21	0.65		
12/6/2021 1:00	0.21	0.47	0.49	0.64			0.11	0.28	0.30	0.47		
12/6/2021 2:00	0.02	0.23	0.49	0.59	1.33		0.01	0.12	0.29	0.39	0.97	
12/6/2021 3:00	0.05	0.07	0.28	0.58	1.37		0.04	0.05	0.16	0.37	1.01	
12/6/2021 4:00	-	0.05	0.07	0.56	1.17		-	0.04	0.05	0.35	1.00	
12/6/2021 5:00	-	-	0.05	0.54	1.13		-	-	0.04	0.33	0.96	
12/6/2021 6:00	-	-	-	0.28	0.95		-	-	-	0.16	0.81	
12/6/2021 7:00	-	-	-	0.07	0.71		-	-	-	0.05	0.52	
12/6/2021 8:00	0.15	0.15	0.15	0.20	0.79		-	-	-	0.04	0.43	
12/6/2021 9:00	-	0.15	0.15	0.15	0.73		-	-	-	-	0.37	
12/6/2021 10:00	-	-	0.15	0.15	0.71		-	-	-	-	0.35	
12/6/2021 11:00	0.20	0.20	0.20	0.35	0.89		0.20	0.20	0.20	0.20	0.53	
12/6/2021 12:00	0.06	0.26	0.26	0.41	0.69		0.05	0.25	0.25	0.25	0.41	
12/6/2021 13:00	0.06	0.12	0.32	0.47	0.54		0.16	0.21	0.41	0.41	0.46	

Appendix 1

12/6/2021 14:00	0.21	0.27	0.33	0.53	0.73	2.06	0.04	0.20	0.25	0.45	0.49	1.46
12/6/2021 15:00	1.10	1.31	1.37	1.63	1.78	3.15	0.94	0.98	1.14	1.39	1.39	2.40
12/6/2021 16:00	0.69	1.79	2.00	2.32	2.47	3.64	0.70	1.64	1.68	2.09	2.09	3.09
12/6/2021 17:00	0.31	1.00	2.10	2.43	2.78	3.91	0.24	0.94	1.88	2.13	2.33	3.29
12/6/2021 18:00	0.23	0.54	1.23	2.60	3.01	3.96	0.22	0.46	1.16	2.30	2.55	3.36
12/6/2021 19:00	0.41	0.64	0.95	2.95	3.42	4.13	0.32	0.54	0.78	2.46	2.87	3.39
12/6/2021 20:00	0.71	1.12	1.35	3.45	3.98	4.77	0.64	0.96	1.18	3.06	3.51	3.94
12/6/2021 21:00	2.34	3.05	3.46	4.69	6.32	7.05	2.25	2.89	3.21	4.37	5.76	6.13
12/6/2021 22:00	0.60	2.94	3.65	4.60	6.92	7.63	0.46	2.71	3.35	4.13	6.22	6.57
12/6/2021 23:00	0.97	1.57	3.91	5.26	7.69	8.58	M	0.46	2.71	3.89	6.02	6.55
12/7/2021 0:00	0.34	1.31	1.91	5.37	7.97	8.66	M	-	0.46	3.67	5.97	6.38
12/7/2021 1:00	-	0.34	1.31	4.96	7.91	8.45	M	-	-	3.35	5.81	6.27
12/7/2021 2:00	0.17	0.17	0.51	4.42	7.87	8.60	M	-	-	2.71	5.77	6.26
12/7/2021 3:00	0.09	0.26	0.26	2.17	6.86	8.64	M	-	-	0.46	4.83	6.22
12/7/2021 4:00	0.23	0.32	0.49	1.80	6.40	8.87	M	-	-	-	4.13	6.22
12/7/2021 5:00	0.02	0.25	0.34	0.85	6.11	8.89	M	-	-	-	3.89	6.22
12/7/2021 6:00	-	0.02	0.25	0.51	5.88	8.89	M	-	-	-	3.67	6.22
12/7/2021 7:00	-	-	0.02	0.51	5.47	8.89	M	-	-	-	3.35	6.22
12/7/2021 8:00	0.01	0.01	0.01	0.35	4.77	8.75	M	-	-	-	2.71	6.22
12/7/2021 9:00	0.02	0.03	0.03	0.28	2.45	8.77	0.03	0.03	0.03	0.03	0.49	6.25
12/7/2021 10:00	0.01	0.03	0.04	0.06	1.86	8.78	-	0.03	0.03	0.03	0.03	6.25
12/7/2021 11:00	-	0.01	0.03	0.04	0.89	8.58	-	-	0.03	0.03	0.03	6.05
12/7/2021 12:00	-	-	0.01	0.04	0.55	8.52	-	-	-	0.03	0.03	6.00
12/7/2021 13:00	-	-	-	0.04	0.55	8.46	-	-	-	0.03	0.03	5.84
12/7/2021 14:00	-	-	-	0.03	0.38	8.25	-	-	-	0.03	0.03	5.80
MAX VALUES:	2.34	3.05	3.91	5.37	7.97	8.89	2.25	2.89	3.35	4.37	6.22	6.57
						24-hr on 12/6						24-hr on 12/6
						8.58						6.55

Appendix 1

HST	ALOH1 : Aloha Tower (HI26):					
Precipitation Totals ending at:	1-hour total	2-hour totals	3-hour totals	6-hour totals	12-hour totals	24-hour totals
12/6/2021 0:00	0.00					
12/6/2021 1:00	0.02	0.02				
12/6/2021 2:00	0.00	0.02	0.02			
12/6/2021 3:00	0.03	0.03	0.05			
12/6/2021 4:00	0.00	0.03	0.03			
12/6/2021 5:00	0.00	0.00	0.03			
12/6/2021 6:00	0.00	0.00	0.00	0.05		
12/6/2021 7:00	0.00	0.00	0.00	0.03		
12/6/2021 8:00	0.07	0.07	0.07	0.10		
12/6/2021 9:00	0.00	0.07	0.07	0.07		
12/6/2021 10:00	0.00	0.00	0.07	0.07		
12/6/2021 11:00	0.01	0.01	0.01	0.08	0.13	
12/6/2021 12:00	0.01	0.02	0.02	0.09	0.14	
12/6/2021 13:00	0.27	0.28	0.29	0.36	0.39	
12/6/2021 14:00	0.52	0.79	0.80	0.81	0.91	
12/6/2021 15:00	1.14	1.66	1.93	1.95	2.02	
12/6/2021 16:00	0.83	1.97	2.49	2.78	2.85	
12/6/2021 17:00	0.23	1.06	2.20	3.00	3.08	
12/6/2021 18:00	0.12	0.35	1.18	3.11	3.20	
12/6/2021 19:00	0.62	0.74	0.97	3.46	3.82	
12/6/2021 20:00	1.59	2.21	2.33	4.53	5.34	
12/6/2021 21:00	1.33	2.92	3.54	4.72	6.67	
12/6/2021 22:00	0.26	1.59	3.18	4.15	6.93	
12/6/2021 23:00	0.27	0.53	1.86	4.19	7.19	7.32
12/7/2021 0:00	0.22	0.49	0.75	4.29	7.40	7.54

Appendix 1

12/7/2021 1:00	0.07	0.29	0.56	3.74	7.20	7.59
12/7/2021 2:00	0.36	0.43	0.65	2.51	7.04	7.95
12/7/2021 3:00	0.09	0.45	0.52	1.27	5.99	8.01
12/7/2021 4:00	0.29	0.38	0.74	1.30	5.45	8.30
12/7/2021 5:00	0.09	0.38	0.47	1.12	5.31	8.39
12/7/2021 6:00	0.00	0.09	0.38	0.90	5.19	8.39
12/7/2021 7:00	0.00	0.00	0.09	0.83	4.57	8.39
12/7/2021 8:00	0.01	0.01	0.01	0.48	2.99	8.33
12/7/2021 9:00	0.01	0.02	0.02	0.40	1.67	8.34
12/7/2021 10:00	0.00	0.01	0.02	0.11	1.41	8.34
12/7/2021 11:00			0.01	0.02	1.14	8.33
12/7/2021 12:00				0.02	0.92	8.32
12/7/2021 13:00				0.02	0.85	8.05
12/7/2021 14:00				0.01	0.49	7.53
12/7/2021 15:00					0.40	6.39
12/7/2021 16:00					0.11	5.56
12/7/2021 17:00					0.02	5.33
12/7/2021 18:00					0.02	5.21
12/7/2021 19:00					0.02	4.59
12/7/2021 20:00					0.01	3.00
12/7/2021 21:00					0.00	1.67
12/7/2021 22:00					0.00	1.41
12/7/2021 23:00						1.14
12/8/2021 0:00						0.92
12/8/2021 1:00						0.85
12/8/2021 2:00						0.49
12/8/2021 3:00						0.40
12/8/2021 4:00						0.11
12/8/2021 5:00						0.02
12/8/2021 6:00						0.02
12/8/2021 7:00						0.02

12/8/2021 8:00						0.01
12/8/2021 9:00						0.00
12/8/2021 10:00						
12/8/2021 11:00						
MAX VALUES:	1.59	2.92	3.54	4.72	7.40	8.39
						24-hr on 12/6
						7.32

Stations:		
	HI-HN-23 Honolulu 2.0 SW Lat: 21.300423 Lon: -157.829327	HI-HN-35 Honolulu 0.5 SSE Lat: 21.3114941 Lon: -157.8000876

* indicates Multi-Day Accumulation Report

Station	HI-HN-23	HI-HN-35
Date	**Precip in.**	**Precip in.**
12/1/2021	0.04	0.69
12/2/2021	0	0.08
12/3/2021	0.32	0.26
12/4/2021	0	0.02
12/5/2021	T	0.21
12/6/2021	2.35	1.9
12/7/2021	8.24	7.79
12/8/2021	T	--
12/9/2021	0	--
12/10/2021	--	--
Totals :	**10.95 in.**	**10.95 in.**

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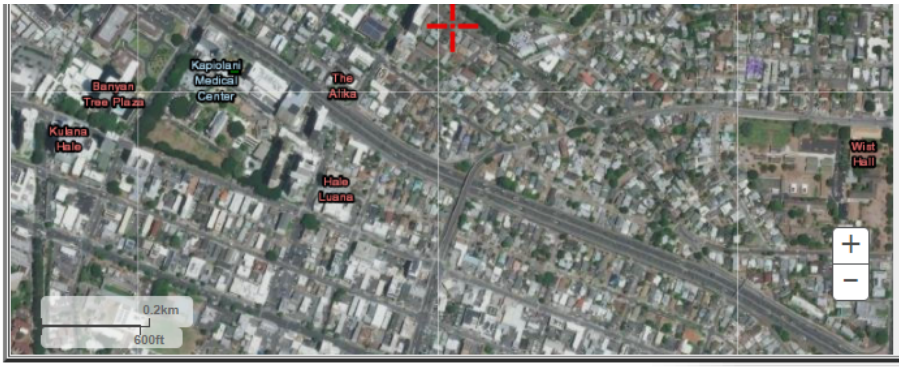
Appendix 3

Honolulu 2.0 SW



Location information:
Name: Honolulu, Hawaii, USA*
Station name: AIHILIANI
Site ID: 53-0097
Latitude: 21.3007°
Longitude: -157.8293°
Elevation: 205 ft

* Source: ESRI Maps
** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 4, Version 3

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PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.330 (0.280-0.377)	0.416 (0.355-0.487)	0.555 (0.468-0.655)	0.671 (0.562-0.795)	0.841 (0.691-0.998)	0.982 (0.793-1.17)	1.13 (0.897-1.36)	1.30 (1.00-1.57)	1.53 (1.14-1.87)	1.73 (1.25-2.13)
10-min	0.489 (0.416-0.559)	0.617 (0.526-0.722)	0.823 (0.694-0.971)	0.995 (0.833-1.18)	1.25 (1.02-1.48)	1.46 (1.18-1.74)	1.68 (1.33-2.01)	1.92 (1.49-2.32)	2.27 (1.69-2.77)	2.56 (1.85-3.15)
15-min	0.614 (0.522-0.703)	0.775 (0.660-0.906)	1.03 (0.872-1.22)	1.25 (1.05-1.48)	1.57 (1.29-1.86)	1.83 (1.48-2.18)	2.11 (1.67-2.53)	2.41 (1.87-2.92)	2.85 (2.12-3.48)	3.22 (2.32-3.96)
30-min	0.864 (0.735-0.989)	1.09 (0.929-1.27)	1.45 (1.23-1.72)	1.76 (1.47-2.08)	2.21 (1.81-2.62)	2.57 (2.08-3.07)	2.97 (2.35-3.56)	3.40 (2.63-4.10)	4.01 (2.99-4.89)	4.53 (3.26-5.57)
60-min	1.14 (0.967-1.30)	1.44 (1.22-1.68)	1.91 (1.62-2.26)	2.32 (1.94-2.74)	2.90 (2.38-3.44)	3.39 (2.74-4.04)	3.90 (3.09-4.68)	4.47 (3.45-5.40)	5.28 (3.93-6.44)	5.96 (4.29-7.33)
2-hr	1.52 (1.29-1.73)	1.96 (1.67-2.29)	2.61 (2.20-3.09)	3.16 (2.64-3.75)	3.96 (3.25-4.71)	4.61 (3.73-5.51)	5.30 (4.20-6.38)	6.05 (4.69-7.33)	7.12 (5.31-8.71)	8.01 (5.78-9.88)
3-hr	1.73 (1.47-1.96)	2.28 (1.95-2.68)	3.06 (2.59-3.62)	3.71 (3.10-4.40)	4.63 (3.81-5.52)	5.39 (4.37-6.46)	6.20 (4.91-7.45)	7.07 (5.47-8.56)	8.31 (6.20-10.2)	9.34 (6.73-11.5)
6-hr	2.24 (1.89-2.54)	2.93 (2.50-3.42)	3.95 (3.33-4.66)	4.79 (4.00-5.67)	5.98 (4.92-7.11)	6.96 (5.64-8.32)	8.00 (6.34-9.60)	9.11 (7.06-11.0)	10.7 (7.98-13.1)	12.0 (8.67-14.8)
12-hr	2.72 (2.30-3.11)	3.59 (3.06-4.21)	4.88 (4.11-5.76)	5.94 (4.96-7.04)	7.44 (6.11-8.85)	8.66 (7.00-10.4)	9.96 (7.88-12.0)	11.3 (8.77-13.7)	13.3 (9.91-16.3)	14.9 (10.7-18.4)
24-hr	3.18 (2.72-3.75)	4.34 (3.69-5.10)	5.99 (5.09-7.06)	7.35 (6.22-8.68)	9.31 (7.81-11.0)	10.9 (9.08-13.0)	12.6 (10.4-15.1)	14.5 (11.8-17.5)	17.2 (13.7-20.9)	19.4 (15.2-23.7)
2-day	3.85 (3.32-4.49)	5.24 (4.50-6.12)	7.20 (6.17-8.42)	8.77 (7.48-10.3)	11.0 (9.30-13.0)	12.8 (10.7-15.1)	14.7 (12.2-17.5)	16.7 (13.7-20.0)	19.6 (15.7-23.6)	21.9 (17.3-26.6)
3-day	4.28 (3.70-4.97)	5.81 (5.02-6.77)	7.97 (6.86-9.29)	9.68 (8.30-11.3)	12.1 (10.3-14.2)	14.0 (11.8-16.5)	16.0 (13.3-19.0)	18.1 (14.9-21.7)	21.1 (17.1-25.5)	23.5 (18.7-28.6)
4-day	4.71 (4.08-5.44)	6.39 (5.54-7.42)	8.74 (7.55-10.2)	10.6 (9.12-12.4)	13.2 (11.2-15.4)	15.2 (12.9-17.9)	17.3 (14.5-20.5)	19.6 (16.2-23.3)	22.7 (18.4-27.3)	25.1 (20.0-30.5)
7-day	5.34 (4.63-6.18)	7.20 (6.24-8.36)	9.80 (8.47-11.4)	11.9 (10.2-13.8)	14.7 (12.5-17.2)	17.0 (14.3-20.0)	19.3 (16.1-22.8)	21.8 (18.0-25.9)	25.1 (20.4-30.2)	27.8 (22.2-33.7)
10-day	5.94 (5.15-6.87)	7.99 (6.93-9.28)	10.8 (9.36-12.6)	13.1 (11.2-15.2)	16.1 (13.7-18.9)	18.5 (15.7-21.8)	21.0 (17.6-24.8)	23.5 (19.5-28.0)	27.0 (21.9-32.5)	29.8 (23.8-36.1)

Appendix 3

Honolulu 0.5 SSE

Location information:
Name: Honolulu, Hawaii, USA*
Station name: AIHILIANI
Site ID: 53-0097
Latitude: 21.3115°
Longitude: -157.7998°
Elevation: 205 ft

* Source: ESRI Maps
** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 4, Version 3

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PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.419 (0.371-0.465)	0.512 (0.451-0.577)	0.661 (0.579-0.750)	0.785 (0.682-0.893)	0.963 (0.822-1.10)	1.11 (0.930-1.27)	1.26 (1.04-1.46)	1.43 (1.15-1.66)	1.66 (1.29-1.96)	1.86 (1.39-2.21)
10-min	0.621 (0.550-0.690)	0.759 (0.669-0.856)	0.980 (0.859-1.11)	1.16 (1.01-1.32)	1.43 (1.22-1.63)	1.64 (1.38-1.89)	1.87 (1.54-2.17)	2.12 (1.70-2.47)	2.47 (1.91-2.90)	2.75 (2.06-3.27)
15-min	0.780 (0.691-0.866)	0.953 (0.840-1.08)	1.23 (1.08-1.40)	1.46 (1.27-1.66)	1.79 (1.53-2.05)	2.06 (1.73-2.37)	2.35 (1.94-2.72)	2.66 (2.14-3.10)	3.10 (2.40-3.65)	3.46 (2.59-4.11)
30-min	1.10 (0.972-1.22)	1.34 (1.18-1.51)	1.73 (1.52-1.97)	2.06 (1.79-2.34)	2.52 (2.15-2.88)	2.91 (2.44-3.34)	3.31 (2.72-3.83)	3.74 (3.01-4.36)	4.36 (3.38-5.13)	4.86 (3.65-5.78)
60-min	1.45 (1.28-1.60)	1.77 (1.56-1.99)	2.28 (2.00-2.59)	2.71 (2.35-3.08)	3.32 (2.83-3.80)	3.82 (3.21-4.40)	4.35 (3.58-5.03)	4.93 (3.96-5.74)	5.73 (4.44-6.75)	6.40 (4.80-7.61)
2-hr	1.93 (1.70-2.12)	2.40 (2.12-2.71)	3.12 (2.73-3.53)	3.70 (3.21-4.21)	4.53 (3.86-5.19)	5.21 (4.37-6.00)	5.92 (4.87-6.86)	6.68 (5.37-7.80)	7.75 (6.01-9.16)	8.63 (6.47-10.3)
3-hr	2.19 (1.93-2.40)	2.79 (2.47-3.16)	3.64 (3.19-4.13)	4.32 (3.75-4.93)	5.29 (4.51-6.07)	6.08 (5.10-7.02)	6.91 (5.69-8.02)	7.79 (6.26-9.11)	9.03 (7.00-10.7)	10.0 (7.53-12.0)
6-hr	2.83 (2.48-3.12)	3.58 (3.16-4.04)	4.70 (4.11-5.32)	5.59 (4.85-6.36)	6.85 (5.84-7.84)	7.87 (6.60-9.06)	8.94 (7.35-10.4)	10.1 (8.09-11.8)	11.7 (9.04-13.8)	13.0 (9.73-15.5)
12-hr	3.45 (3.03-3.81)	4.41 (3.88-4.99)	5.82 (5.08-6.60)	6.96 (6.02-7.92)	8.54 (7.27-9.79)	9.82 (8.22-11.3)	11.1 (9.15-12.9)	12.6 (10.1-14.7)	14.5 (11.2-17.2)	16.1 (12.0-19.2)
24-hr	4.05 (3.60-4.56)	5.33 (4.73-6.01)	7.14 (6.31-8.07)	8.60 (7.55-9.75)	10.7 (9.28-12.1)	12.3 (10.6-14.1)	14.0 (12.0-16.2)	15.9 (13.4-18.5)	18.5 (15.4-21.7)	20.6 (16.8-24.4)
2-day	5.38 (4.83-6.02)	7.01 (6.28-7.86)	9.26 (8.25-10.4)	11.0 (9.79-12.4)	13.5 (11.8-15.3)	15.4 (13.4-17.5)	17.3 (15.0-19.9)	19.4 (16.6-22.4)	22.2 (18.6-25.9)	24.5 (20.2-28.8)
3-day	6.02 (5.40-6.72)	7.83 (7.02-8.78)	10.3 (9.21-11.6)	12.2 (10.9-13.8)	14.9 (13.1-16.8)	16.9 (14.8-19.3)	19.0 (16.4-21.8)	21.2 (18.1-24.4)	24.1 (20.2-28.1)	26.4 (21.8-31.1)
4-day	6.65 (5.98-7.43)	8.66 (7.77-9.70)	11.4 (10.2-12.8)	13.5 (12.0-15.2)	16.3 (14.4-18.4)	18.4 (16.1-21.0)	20.6 (17.9-23.6)	22.9 (19.6-26.4)	26.0 (21.8-30.3)	28.4 (23.4-33.3)
7-day	7.87 (7.07-8.79)	10.1 (9.11-11.4)	13.2 (11.8-14.8)	15.6 (13.8-17.5)	18.7 (16.5-21.2)	21.1 (18.5-24.1)	23.6 (20.4-27.0)	26.1 (22.3-30.1)	29.5 (24.7-34.3)	32.1 (26.5-37.7)

Appendix 3

Manoa Arboretum

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PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.591 (0.532-0.643)	0.701 (0.628-0.775)	0.884 (0.791-0.978)	1.03 (0.914-1.14)	1.24 (1.08-1.38)	1.40 (1.21-1.57)	1.58 (1.33-1.78)	1.76 (1.45-2.00)	2.02 (1.61-2.31)	2.23 (1.72-2.58)
10-min	0.876 (0.789-0.954)	1.04 (0.932-1.15)	1.31 (1.17-1.45)	1.53 (1.36-1.69)	1.83 (1.60-2.04)	2.08 (1.79-2.33)	2.34 (1.97-2.63)	2.61 (2.15-2.96)	3.00 (2.38-3.43)	3.30 (2.55-3.82)
15-min	1.10 (0.991-1.20)	1.31 (1.17-1.44)	1.65 (1.47-1.82)	1.92 (1.70-2.13)	2.30 (2.01-2.56)	2.61 (2.24-2.93)	2.93 (2.48-3.31)	3.28 (2.70-3.72)	3.76 (2.99-4.31)	4.15 (3.20-4.80)
30-min	1.55 (1.40-1.69)	1.84 (1.65-2.03)	2.32 (2.07-2.56)	2.70 (2.40-2.99)	3.24 (2.83-3.61)	3.68 (3.16-4.12)	4.13 (3.48-4.65)	4.61 (3.80-5.23)	5.29 (4.21-6.06)	5.84 (4.50-6.75)
60-min	2.04 (1.84-2.22)	2.42 (2.17-2.67)	3.05 (2.73-3.37)	3.55 (3.15-3.94)	4.26 (3.72-4.75)	4.84 (4.16-5.42)	5.43 (4.58-6.12)	6.07 (5.01-6.89)	6.97 (5.54-7.98)	7.68 (5.92-8.88)
2-hr	2.74 (2.46-2.95)	3.31 (2.97-3.66)	4.19 (3.74-4.63)	4.88 (4.32-5.41)	5.85 (5.10-6.52)	6.62 (5.68-7.42)	7.42 (6.25-8.37)	8.25 (6.81-9.38)	9.42 (7.50-10.8)	10.4 (7.98-12.0)
3-hr	3.11 (2.80-3.35)	3.86 (3.47-4.28)	4.90 (4.39-5.43)	5.72 (5.08-6.35)	6.85 (5.98-7.65)	7.75 (6.66-8.70)	8.68 (7.32-9.81)	9.66 (7.97-11.0)	11.0 (8.78-12.7)	12.1 (9.34-14.0)
6-hr	4.03 (3.60-4.36)	4.96 (4.46-5.48)	6.33 (5.66-7.00)	7.39 (6.56-8.20)	8.87 (7.75-9.88)	10.0 (8.63-11.2)	11.2 (9.49-12.7)	12.5 (10.3-14.2)	14.3 (11.4-16.4)	15.7 (12.1-18.2)
12-hr	4.89 (4.38-5.30)	6.06 (5.45-6.73)	7.79 (6.96-8.64)	9.14 (8.10-10.1)	11.0 (9.58-12.3)	12.4 (10.7-13.9)	13.9 (11.7-15.7)	15.5 (12.8-17.6)	17.6 (14.0-20.2)	19.3 (14.9-22.3)
24-hr	5.76 (5.25-6.35)	7.35 (6.68-8.09)	9.54 (8.65-10.5)	11.3 (10.2-12.5)	13.7 (12.2-15.2)	15.6 (13.8-17.4)	17.5 (15.4-19.7)	19.6 (17.0-22.1)	22.4 (19.1-25.6)	24.6 (20.7-28.4)
2-day	7.69 (7.04-8.42)	9.73 (8.90-10.7)	12.5 (11.4-13.7)	14.6 (13.2-16.0)	17.4 (15.7-19.2)	19.5 (17.5-21.7)	21.7 (19.2-24.2)	23.9 (20.9-26.9)	26.8 (23.1-30.5)	29.1 (24.7-33.3)
3-day	8.60 (7.87-9.42)	10.9 (9.94-11.9)	13.9 (12.6-15.2)	16.1 (14.7-17.8)	19.1 (17.2-21.2)	21.4 (19.1-23.8)	23.6 (20.9-26.4)	25.9 (22.7-29.1)	28.8 (24.8-32.8)	31.1 (26.4-35.6)
4-day	9.51 (8.70-10.4)	12.0 (11.0-13.2)	15.3 (13.9-16.8)	17.7 (16.1-19.5)	20.8 (18.8-23.1)	23.2 (20.8-25.8)	25.5 (22.6-28.6)	27.8 (24.4-31.4)	30.8 (26.6-35.1)	33.1 (28.1-38.0)
7-day	11.7 (10.7-12.8)	14.6 (13.4-16.1)	18.4 (16.8-20.2)	21.2 (19.2-23.3)	24.7 (22.3-27.4)	27.4 (24.5-30.5)	30.0 (26.6-33.6)	32.5 (28.5-36.7)	35.8 (30.9-40.8)	38.3 (32.5-43.9)
10-day	13.4 (12.3-14.8)	16.6 (15.2-18.3)	20.8 (18.9-22.8)	23.8 (21.6-26.2)	27.7 (24.9-30.6)	30.5 (27.3-34.0)	33.3 (29.5-37.3)	36.0 (31.6-40.6)	39.5 (34.0-44.9)	42.1 (35.7-48.3)
20-day	18.7 (17.1-20.5)	22.7 (20.7-24.9)	27.8 (25.3-30.6)	31.6 (28.6-34.8)	36.4 (32.7-40.3)	39.9 (35.7-44.4)	43.3 (38.4-48.5)	46.7 (40.9-52.7)	51.1 (44.0-58.1)	54.3 (46.1-62.3)
30-day	23.6 (21.6-25.8)	28.3 (25.9-31.1)	34.4 (31.3-37.8)	38.8 (35.2-42.8)	44.5 (40.1-49.3)	48.6 (43.5-54.1)	52.6 (46.6-58.9)	56.6 (49.6-63.8)	61.6 (53.1-70.2)	65.4 (55.5-75.0)
45-day	30.6 (28.0-33.6)	36.3 (33.2-39.9)	43.6 (39.7-48.0)	48.9 (44.4-54.0)	55.6 (50.2-61.7)	60.5 (54.2-67.4)	65.3 (57.9-73.1)	69.9 (61.3-78.7)	75.7 (65.3-86.1)	79.9 (67.9-91.8)
60-day	36.9 (33.8-40.5)	43.5 (39.7-47.8)	51.7 (47.1-57.0)	57.6 (52.3-63.6)	65.0 (58.6-72.1)	70.4 (62.9-78.4)	75.5 (66.8-84.5)	80.4 (70.4-90.5)	86.5 (74.4-98.4)	90.9 (77.1-104)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in CSV format: Precipitation frequency estimates | Submit

Appendix 3

Palolo Fire Station

PF tabular | PF graphical | Supplementary information | Print page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.347 (0.302-0.391)	0.434 (0.376-0.497)	0.571 (0.493-0.660)	0.688 (0.590-0.798)	0.859 (0.722-0.999)	1.00 (0.827-1.17)	1.15 (0.934-1.35)	1.32 (1.04-1.56)	1.55 (1.19-1.86)	1.75 (1.29-2.11)
10-min	0.514 (0.448-0.580)	0.643 (0.558-0.737)	0.847 (0.731-0.979)	1.02 (0.875-1.18)	1.27 (1.07-1.48)	1.48 (1.23-1.74)	1.71 (1.38-2.01)	1.95 (1.55-2.31)	2.30 (1.76-2.76)	2.60 (1.92-3.13)
15-min	0.646 (0.562-0.728)	0.807 (0.701-0.926)	1.06 (0.919-1.23)	1.28 (1.10-1.49)	1.60 (1.35-1.86)	1.86 (1.54-2.18)	2.14 (1.74-2.52)	2.45 (1.94-2.90)	2.89 (2.21-3.46)	3.26 (2.41-3.94)
30-min	0.909 (0.791-1.02)	1.14 (0.986-1.30)	1.50 (1.29-1.73)	1.80 (1.55-2.09)	2.25 (1.89-2.62)	2.62 (2.17-3.07)	3.02 (2.45-3.55)	3.45 (2.73-4.09)	4.07 (3.11-4.87)	4.59 (3.39-5.54)
60-min	1.20 (1.04-1.35)	1.50 (1.30-1.71)	1.97 (1.70-2.28)	2.37 (2.03-2.75)	2.96 (2.49-3.45)	3.45 (2.85-4.04)	3.97 (3.22-4.67)	4.54 (3.59-5.38)	5.36 (4.09-6.41)	6.04 (4.46-7.29)
2-hr	1.60 (1.39-1.78)	2.03 (1.77-2.33)	2.69 (2.33-3.11)	3.24 (2.77-3.76)	4.04 (3.40-4.70)	4.70 (3.89-5.50)	5.40 (4.39-6.37)	6.16 (4.89-7.31)	7.25 (5.54-8.69)	8.15 (6.03-9.86)
3-hr	1.81 (1.57-2.02)	2.37 (2.06-2.72)	3.15 (2.71-3.63)	3.79 (3.24-4.40)	4.72 (3.97-5.50)	5.49 (4.54-6.43)	6.30 (5.11-7.43)	7.18 (5.69-8.52)	8.44 (6.44-10.1)	9.49 (7.00-11.5)
6-hr	2.34 (2.02-2.62)	3.03 (2.64-3.48)	4.06 (3.51-4.68)	4.91 (4.20-5.68)	6.11 (5.14-7.12)	7.10 (5.88-8.31)	8.15 (6.61-9.60)	9.29 (7.36-11.0)	10.9 (8.32-13.1)	12.2 (9.04-14.8)
12-hr	2.85 (2.46-3.19)	3.72 (3.23-4.29)	5.02 (4.33-5.80)	6.08 (5.19-7.06)	7.59 (6.38-8.85)	8.82 (7.29-10.3)	10.1 (8.19-11.9)	11.5 (9.10-13.6)	13.5 (10.3-16.1)	15.1 (11.1-18.2)
24-hr	3.35 (2.93-3.83)	4.51 (3.94-5.18)	6.17 (5.37-7.10)	7.53 (6.52-8.69)	9.47 (8.13-11.0)	11.1 (9.41-12.9)	12.8 (10.7-14.9)	14.6 (12.1-17.2)	17.2 (14.0-20.4)	19.3 (15.5-23.1)
2-day	4.16 (3.66-4.75)	5.59 (4.90-6.39)	7.59 (6.64-8.70)	9.19 (8.00-10.6)	11.4 (9.87-13.2)	13.2 (11.3-15.4)	15.1 (12.8-17.7)	17.1 (14.3-20.1)	19.9 (16.3-23.6)	22.2 (17.9-26.5)
3-day	4.64 (4.08-5.29)	6.22 (5.47-7.12)	8.43 (7.38-9.67)	10.2 (8.87-11.7)	12.6 (10.9-14.6)	14.6 (12.5-16.9)	16.6 (14.0-19.3)	18.7 (15.6-21.9)	21.6 (17.7-25.6)	23.9 (19.3-28.6)
4-day	5.11 (4.51-5.83)	6.86 (6.04-7.85)	9.28 (8.13-10.6)	11.2 (9.75-12.8)	13.8 (11.9-15.9)	15.9 (13.6-18.4)	18.0 (15.3-21.0)	20.2 (16.9-23.7)	23.3 (19.1-27.6)	25.7 (20.7-30.7)
7-day	5.89 (5.19-6.72)	7.84 (6.90-8.97)	10.5 (9.24-12.1)	12.7 (11.0-14.6)	15.6 (13.5-18.0)	17.9 (15.3-20.7)	20.2 (17.2-23.6)	22.7 (19.0-26.7)	26.1 (21.5-31.0)	28.8 (23.3-34.5)
10-day	6.68 (5.88-7.62)	8.85 (7.79-10.1)	11.8 (10.4-13.6)	14.1 (12.3-16.3)	17.3 (15.0-20.0)	19.8 (17.0-23.0)	22.3 (18.9-26.1)	25.0 (20.9-29.3)	28.6 (23.5-33.9)	31.4 (25.4-37.6)
20-day	8.68 (7.66-9.90)	11.4 (10.00-13.0)	15.0 (13.1-17.1)	17.7 (15.5-20.3)	21.4 (18.5-24.7)	24.2 (20.8-28.1)	27.1 (23.0-31.6)	30.0 (25.1-35.2)	33.9 (27.9-40.2)	36.9 (29.8-44.1)
30-day	10.5 (9.25-12.0)	13.6 (12.0-15.5)	17.7 (15.5-20.3)	20.8 (18.2-23.9)	24.9 (21.5-28.7)	28.0 (24.0-32.5)	31.1 (26.4-36.3)	34.3 (28.7-40.2)	38.4 (31.6-45.4)	41.5 (33.6-49.6)
45-day	13.0 (11.5-14.8)	16.7 (14.7-19.1)	21.5 (18.9-24.7)	25.2 (22.0-28.9)	29.9 (25.8-34.5)	33.4 (28.7-38.7)	36.9 (31.3-43.0)	40.4 (33.8-47.3)	44.9 (36.9-53.2)	48.4 (39.1-57.7)
60-day	15.3 (13.5-17.4)	19.4 (17.1-22.2)	24.9 (21.8-28.4)	28.9 (25.2-33.1)	34.1 (29.5-39.3)	38.0 (32.6-44.1)	41.9 (35.5-48.8)	45.7 (38.3-53.6)	50.7 (41.7-60.0)	54.4 (44.0-64.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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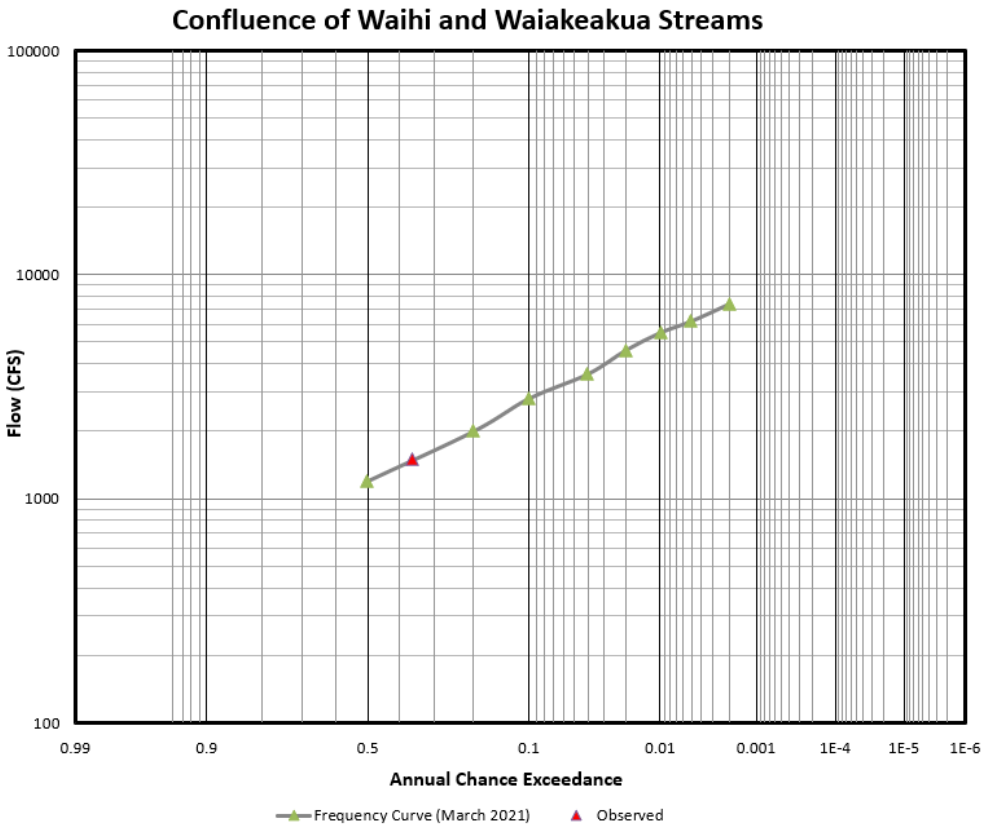
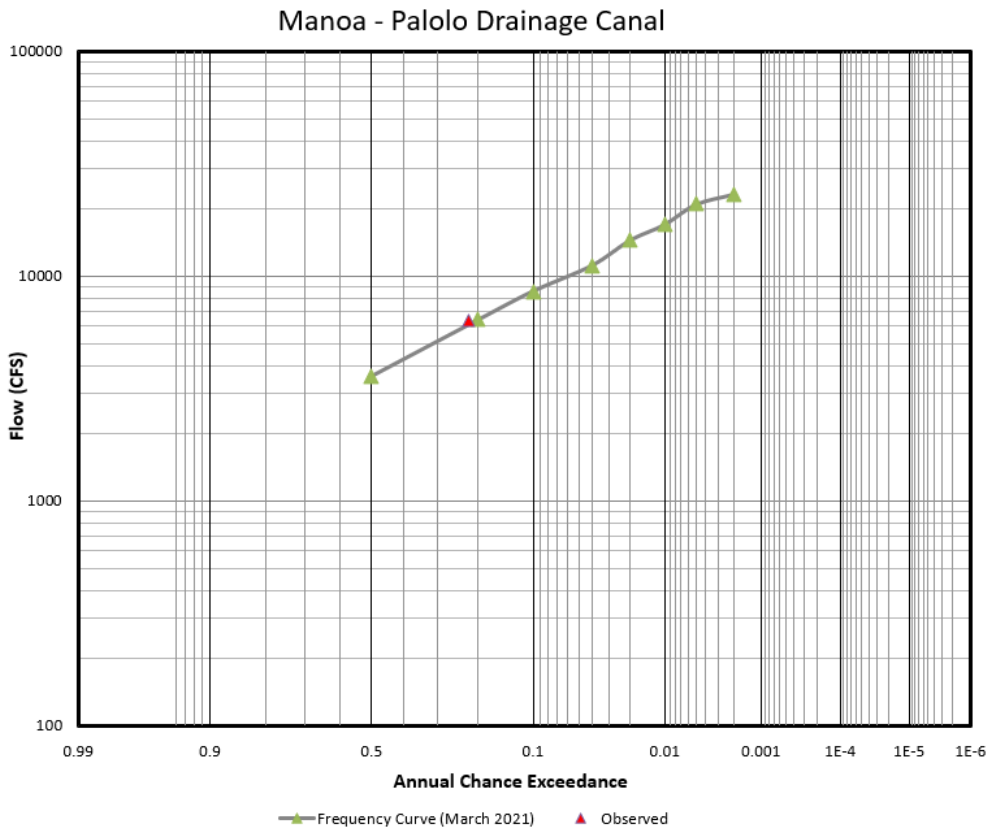
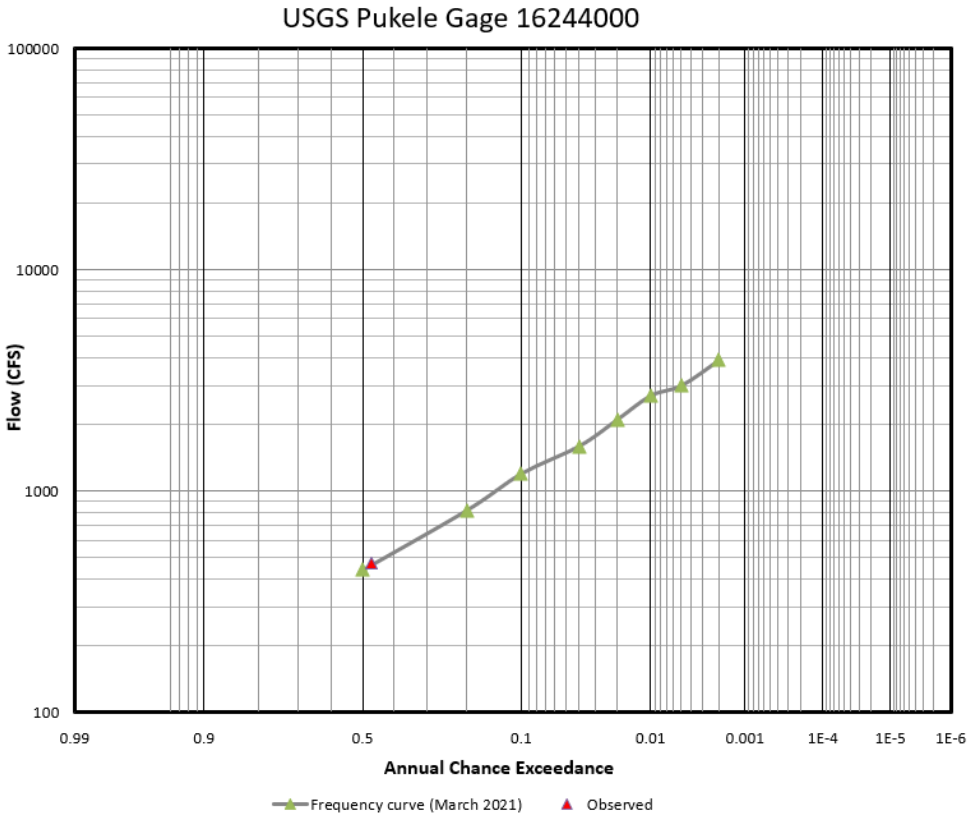
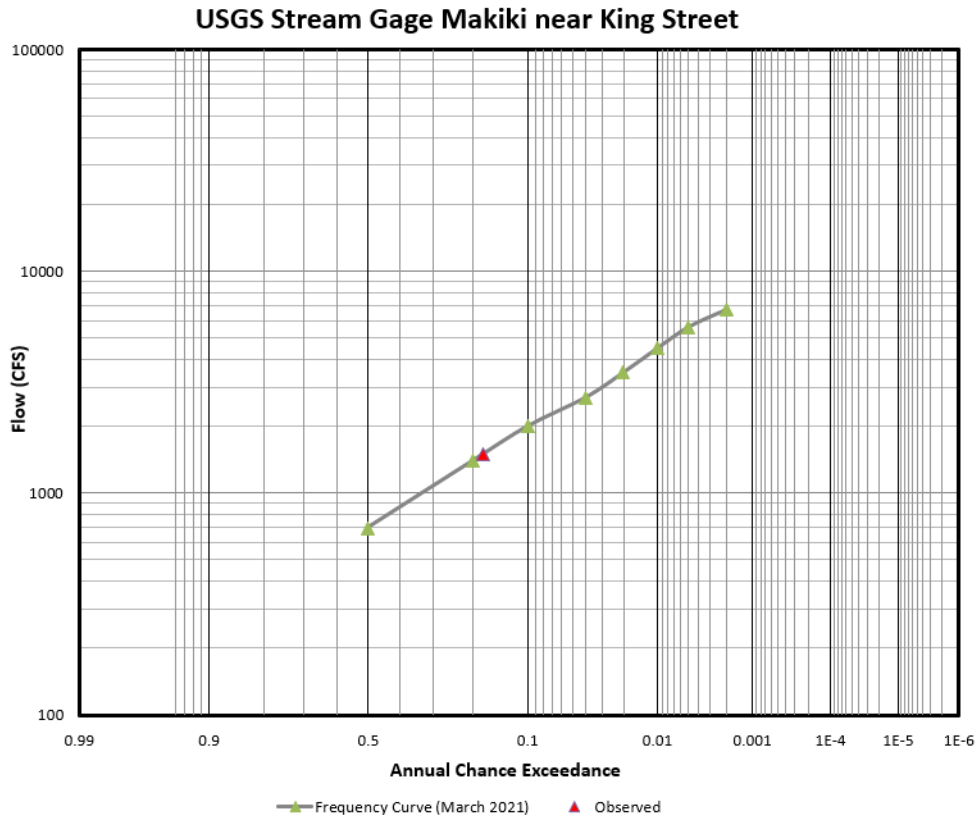
Estimates from the table in CSV format: Precipitation frequency estimates | Submit

Manoa at Woodlawn Bridge
100000
10000
1000
100
Flow (CFS)
0.99
0.9
0.5
0.1
0.01
0.001
1E-4
1E-5
1E-6
Annual Chance Exceedance
Frequence Curve (March 2021)
Observed

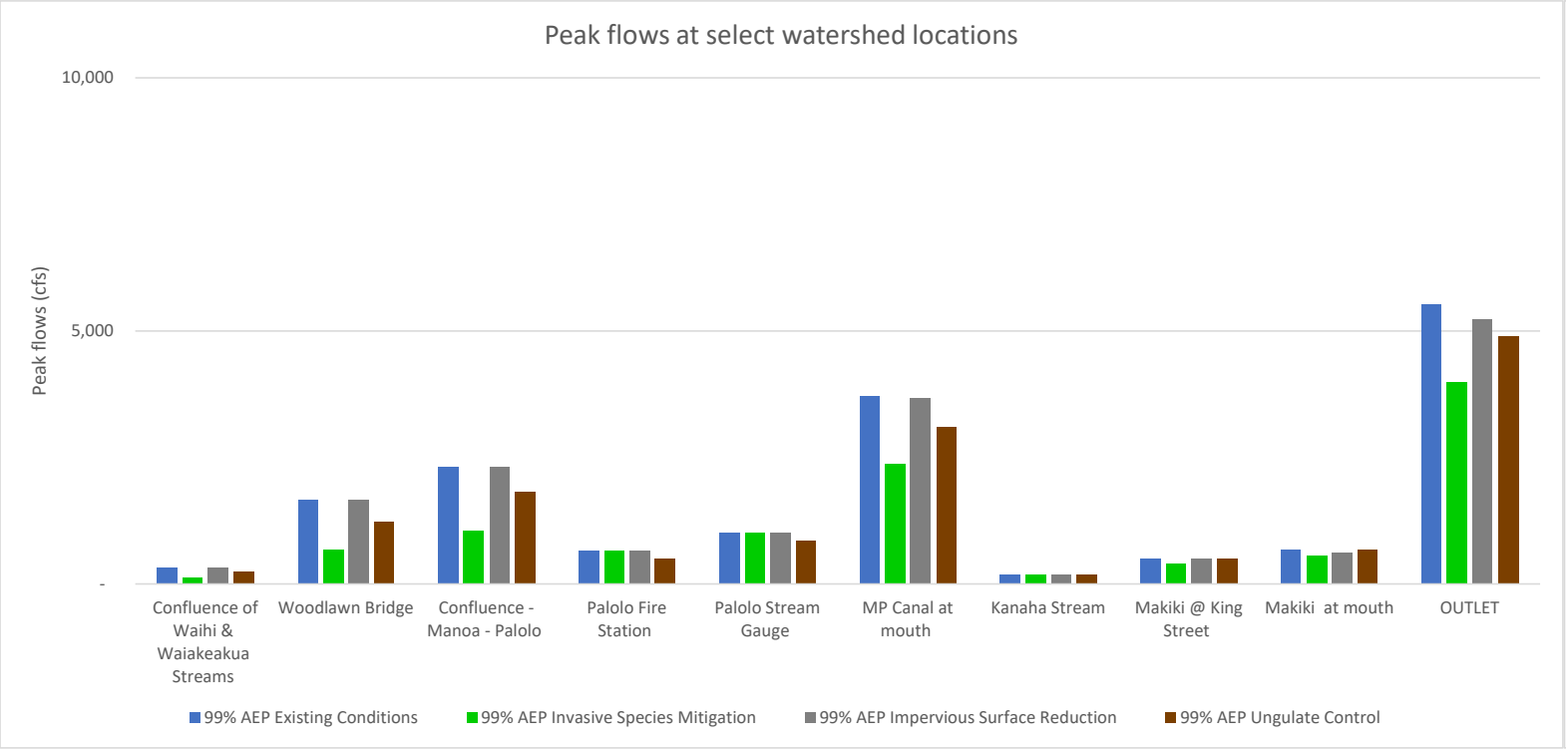

Confluence of Waihi and Waiakeakua Streams
100000
10000
1000
100
Flow (CFS)
0.99
0.9
0.5
0.1
0.01
0.001
1E-4
1E-5
1E-6
Annual Chance Exceedance
Frequency Curve (March 2021)
Observed


Manoa - Palolo Drainage Canal
100000
10000
1000
100
Flow (CFS)
0.99
0.9
0.5
0.1
0.01
0.001
1E-4
1E-5
1E-6
Annual Chance Exceedance
Frequency Curve (March 2021)
Observed

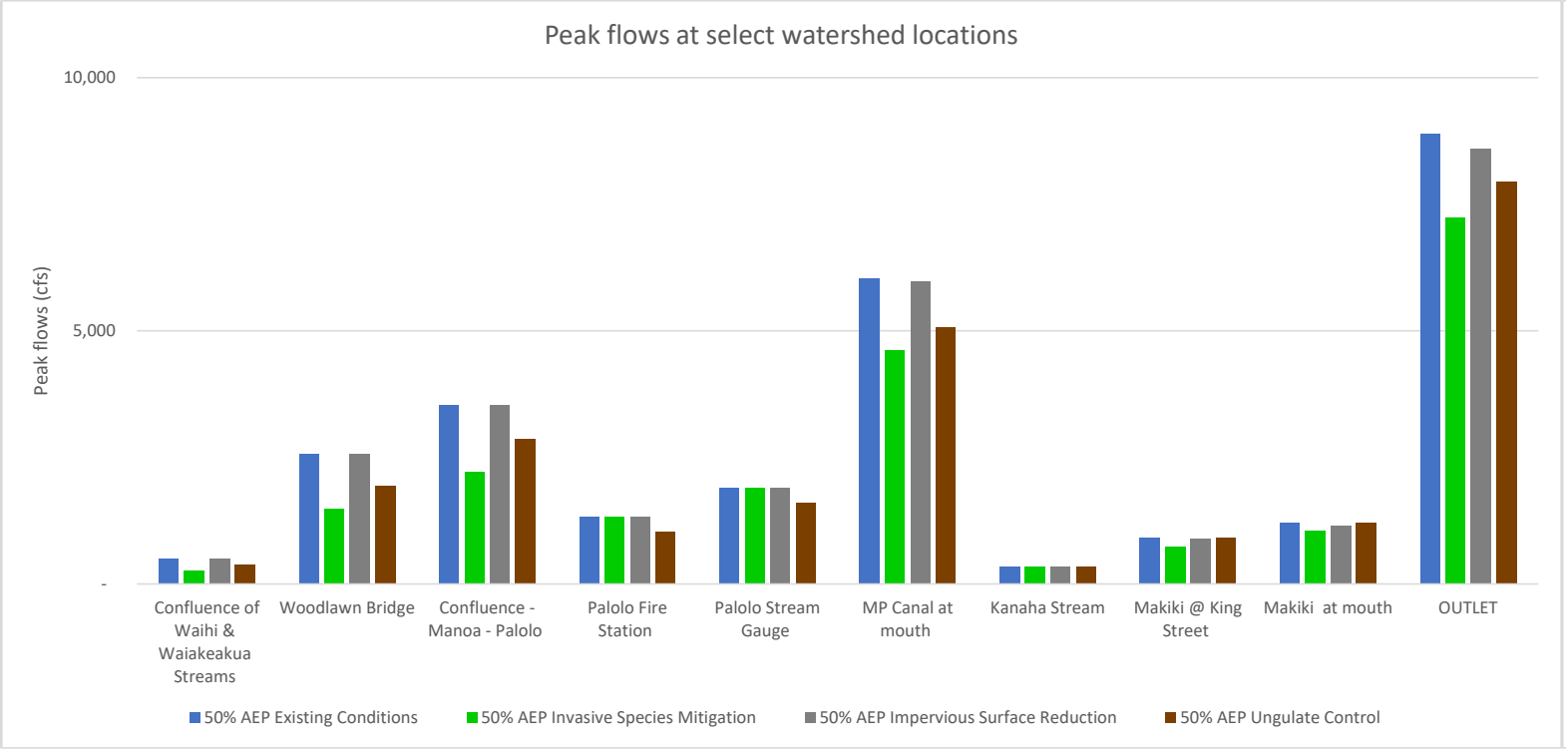

USGS Pukele Gage 16244000
100000
10000
1000
100
Flow (CFS)
0.99
0.9
0.5
0.1
0.01
0.001
1E-4
1E-5
1E-6
Annual Chance Exceedance
Frequency curve (March 2021)
Observed


USGS Stream Gage Makiki near King Street
100000
10000
1000
100
Flow (CFS)
0.99
0.9
0.5
0.1
0.01
0.001
1E-4
1E-5
1E-6
Annual Chance Exceedance
Frequency Curve (March 2021)
Observed

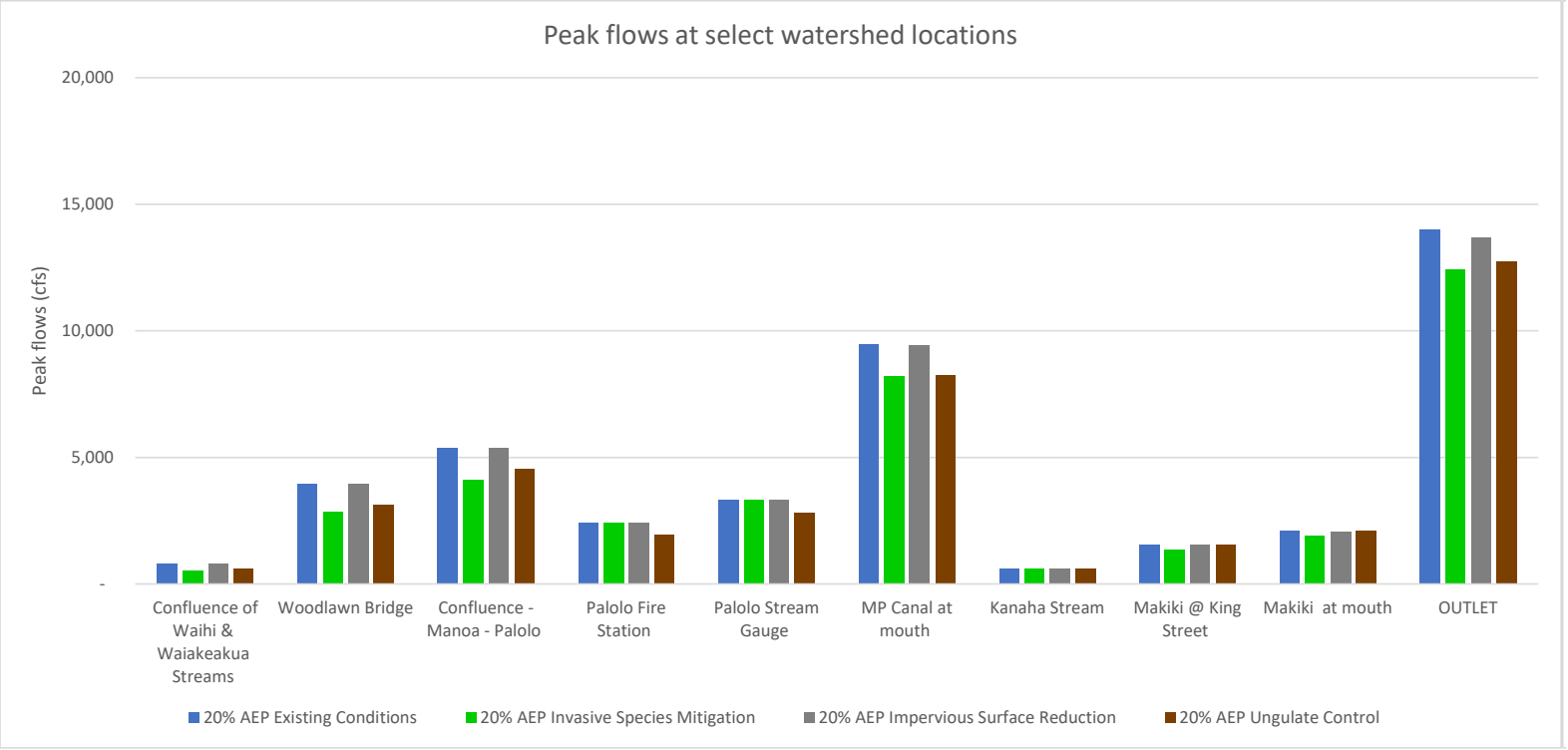
	Frequency Event	99% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	332	118	65%	332	0%	238	28%
Woodlawn Bridge	JM4	1,670	679	59%	1,670	0%	1,234	26%
Confluence - Manoa - Palolo	JM8	2,305	1,062	54%	2,305	0%	1,826	21%
Palolo Fire Station	JP2	658	658	0%	658	0%	510	22%
Palolo Stream Gauge	JP3	1,023	1,023	0%	1,023	0%	860	16%
MP Canal at mouth	JMP3	3,726	2,378	36%	3,668	2%	3,098	17%
Kanaha Stream	Junction-4	194	194	0%	194	0%	194	0%
Makiki @ King Street	JK2	514	401	22%	506	1%	514	0%
Makiki at mouth	JK3	676	557	18%	624	8%	676	0%
OUTLET	OUTLET	5,523	3,989	28%	5,233	5%	4,899	11%



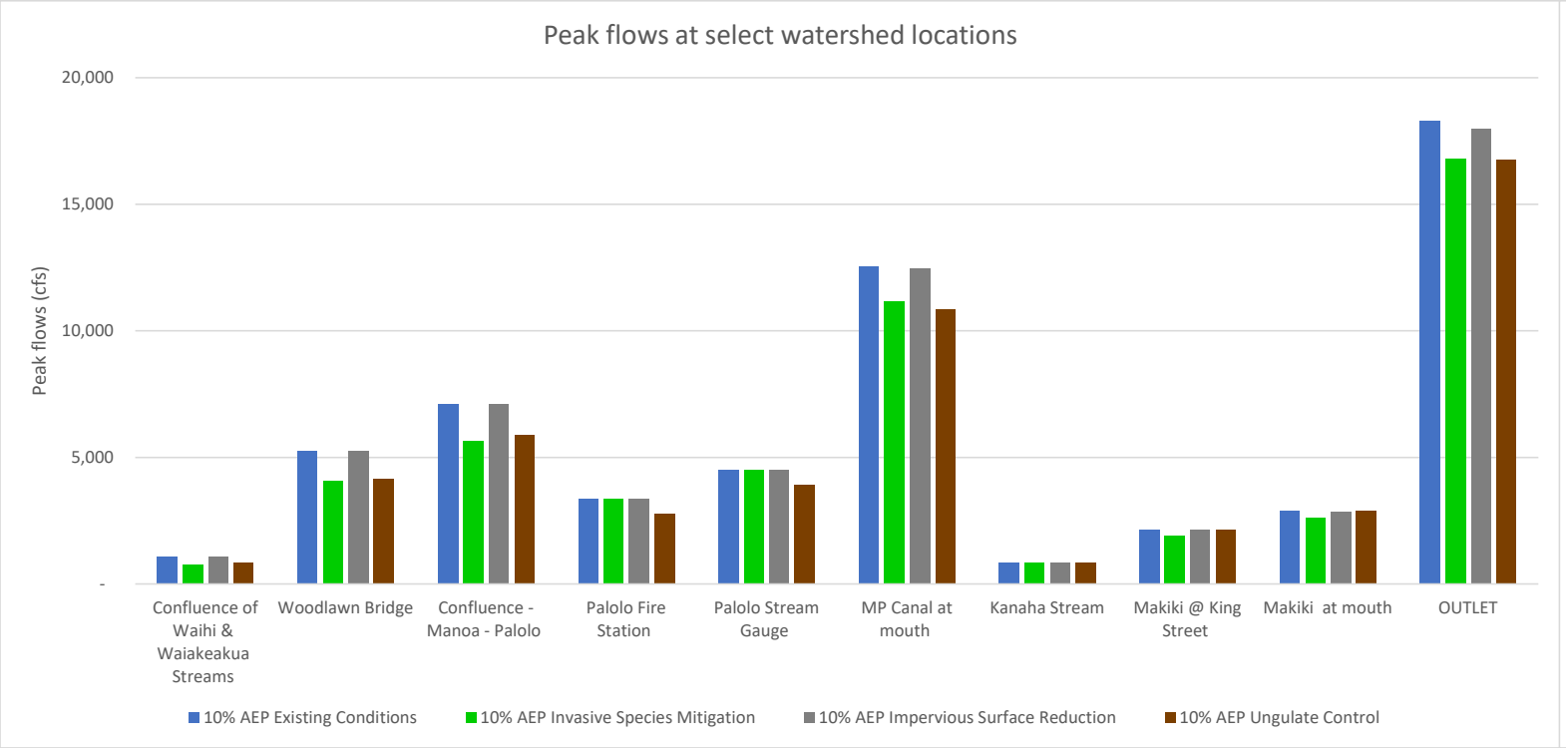
	Frequency Event	50% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	514	268	48%	514	0%	380	26%
Woodlawn Bridge	JM4	2,572	1,485	42%	2,572	0%	1,949	24%
Confluence - Manoa - Palolo	JM8	3,544	2,214	38%	3,544	0%	2,860	19%
Palolo Fire Station	JP2	1,322	1,322	0%	1,322	0%	1,038	21%
Palolo Stream Gauge	JP3	1,907	1,907	0%	1,907	0%	1,607	16%
MP Canal at mouth	JMP3	6,037	4,611	24%	5,982	1%	5,075	16%
Kanaha Stream	Junction-4	351	351	0%	351	0%	351	0%
Makiki @ King Street	JK2	910	744	18%	903	1%	910	0%
Makiki at mouth	JK3	1,209	1,047	13%	1,152	5%	1,209	0%
OUTLET	OUTLET	8,903	7,247	19%	8,599	3%	7,949	11%



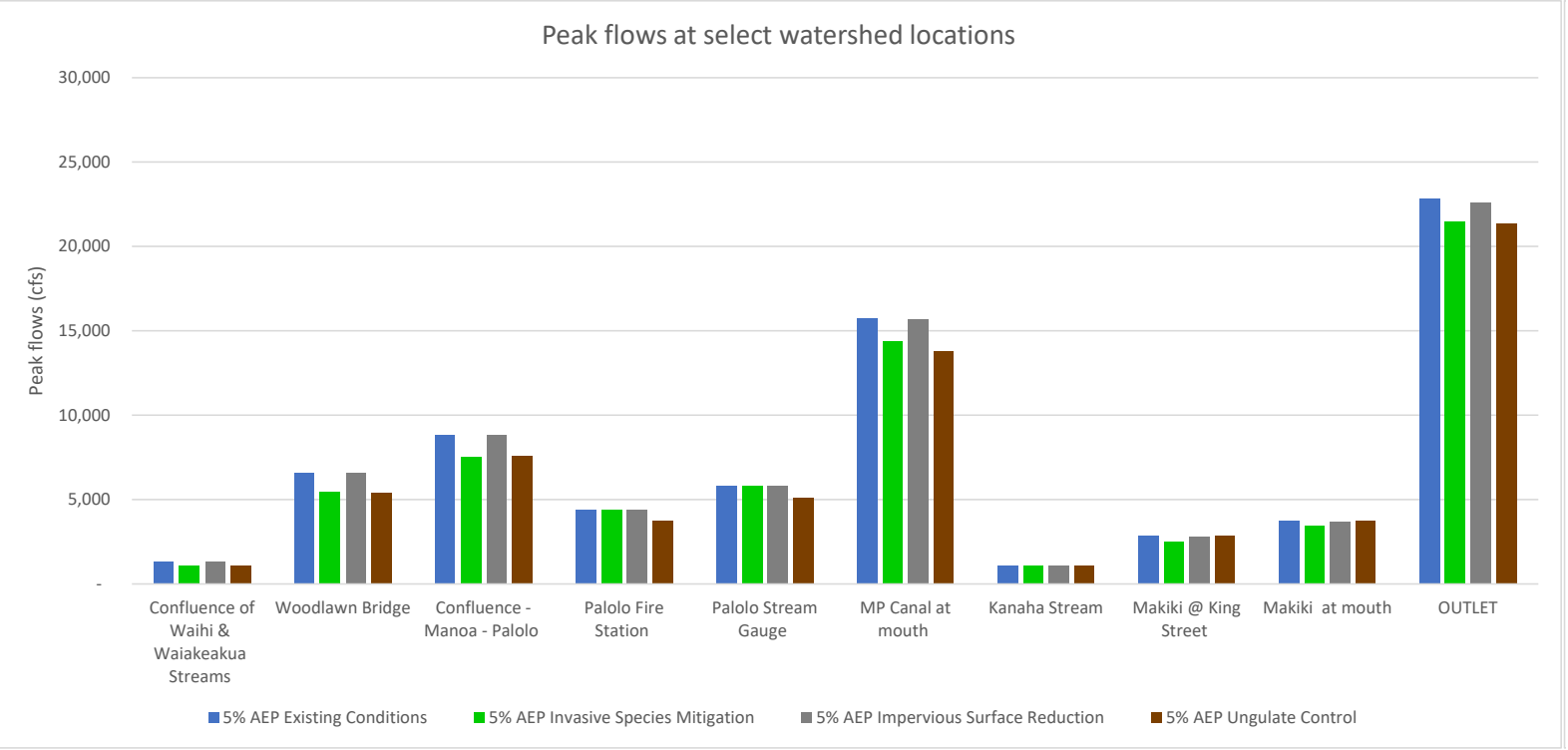
	Frequency Event	20% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	811	541	33%	811	0%	623	23%
Woodlawn Bridge	JM4	3,977	2,875	28%	3,977	0%	3,146	21%
Confluence - Manoa - Palolo	JM8	5,387	4,136	23%	5,387	0%	4,555	15%
Palolo Fire Station	JP2	2,417	2,417	0%	2,417	0%	1,952	19%
Palolo Stream Gauge	JP3	3,311	3,311	0%	3,311	0%	2,835	14%
MP Canal at mouth	JMP3	9,474	8,204	13%	9,421	1%	8,246	13%
Kanaha Stream	Junction-4	610	610	0%	610	0%	610	0%
Makiki @ King Street	JK2	1,571	1,347	14%	1,563	1%	1,571	0%
Makiki at mouth	JK3	2,120	1,898	10%	2,055	3%	2,120	0%
OUTLET	OUTLET	14,004	12,418	11%	13,710	2%	12,726	9%



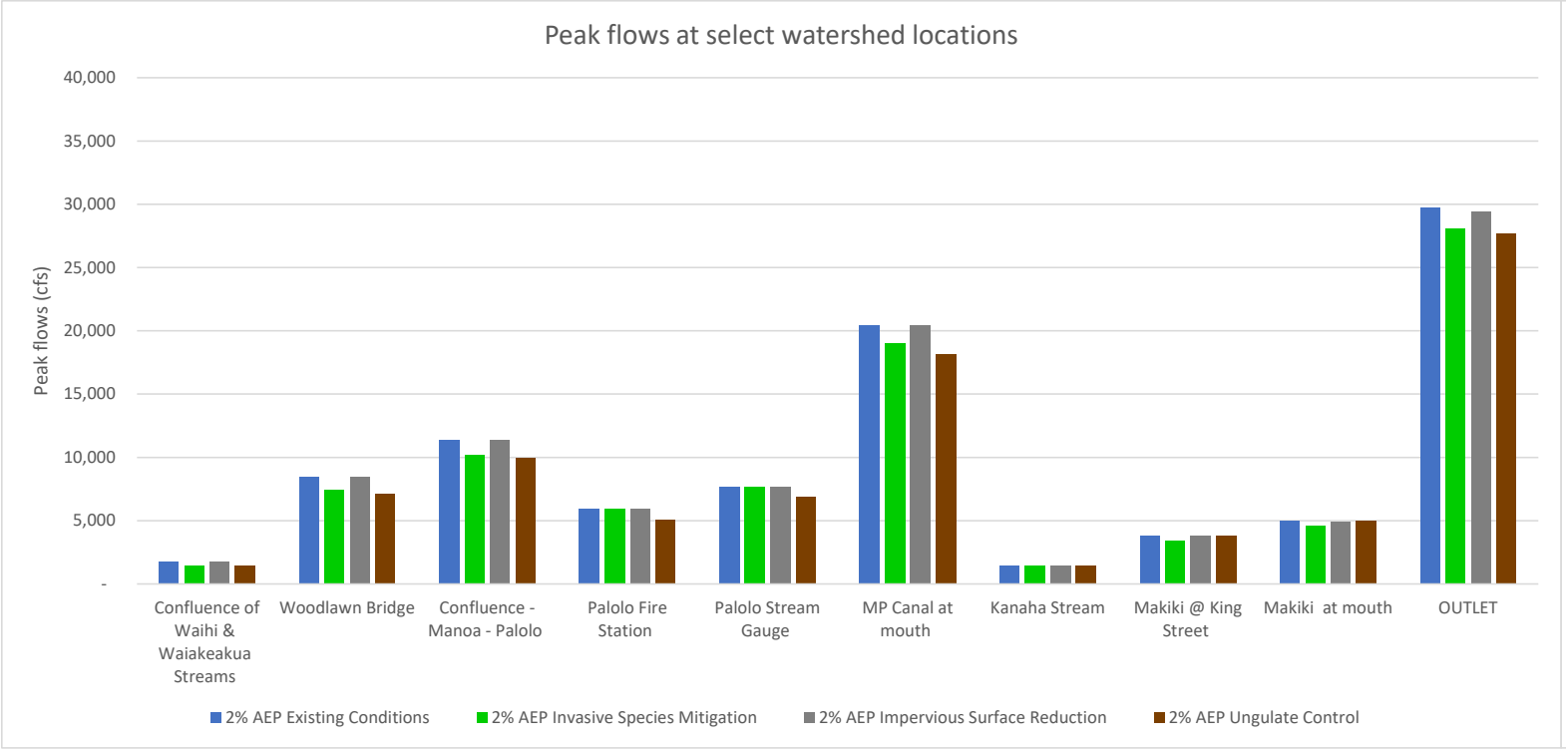
	Frequency Event	10% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	1,072	790	26%	1,072	0%	844	21%
Woodlawn Bridge	JM4	5,240	4,060	23%	5,240	0%	4,165	21%
Confluence - Manoa - Palolo	JM8	7,102	5,670	20%	7,102	0%	5,893	17%
Palolo Fire Station	JP2	3,368	3,368	0%	3,368	0%	2,778	18%
Palolo Stream Gauge	JP3	4,509	4,509	0%	4,509	0%	3,909	13%
MP Canal at mouth	JMP3	12,532	11,152	11%	12,484	0%	10,851	13%
Kanaha Stream	Junction-4	839	839	0%	839	0%	839	0%
Makiki @ King Street	JK2	2,164	1,903	12%	2,156	0%	2,164	0%
Makiki at mouth	JK3	2,903	2,615	10%	2,840	2%	2,903	0%
OUTLET	OUTLET	18,310	16,821	8%	17,991	2%	16,748	9%



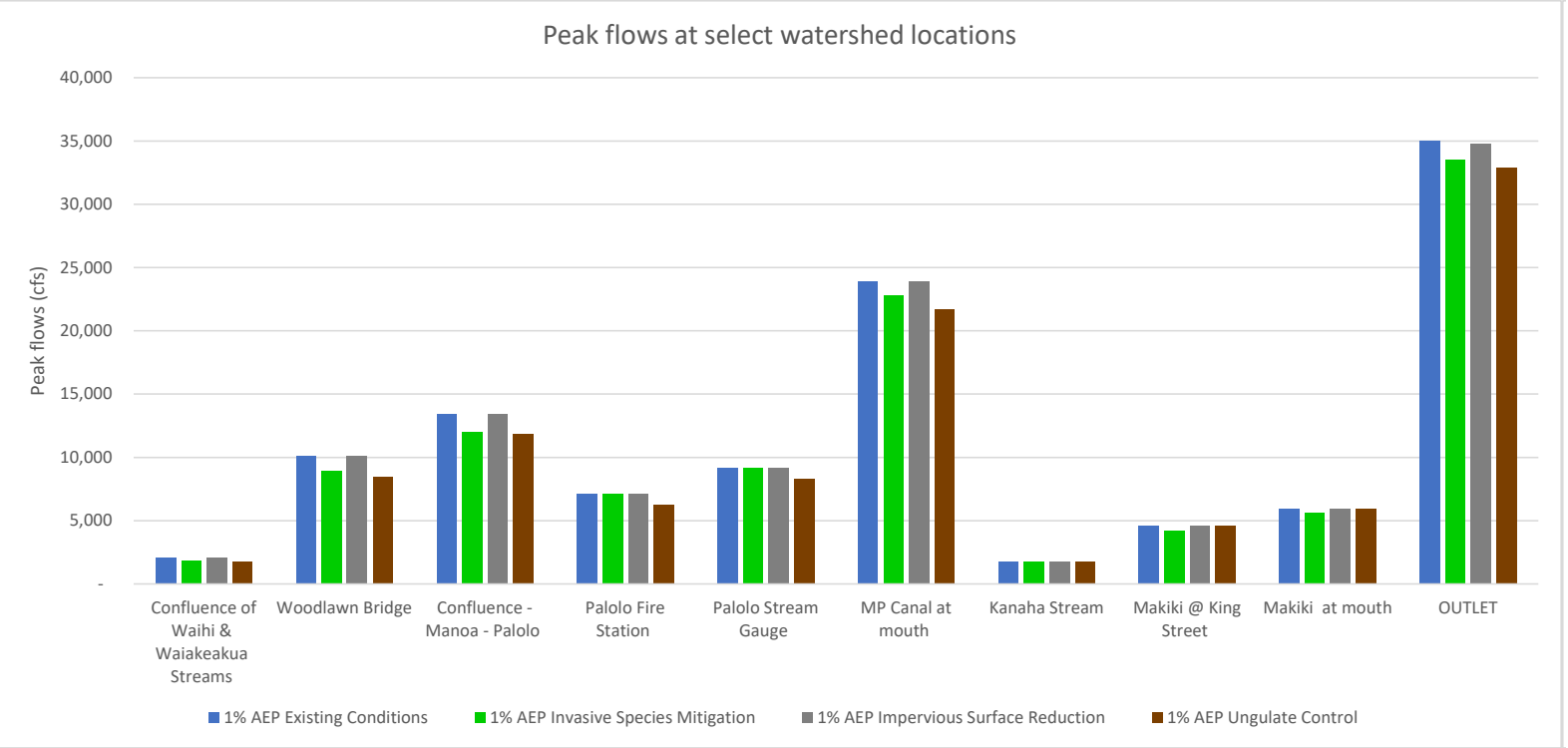
	Frequency Event	5% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	1,363	1,073	21%	1,363	0%	1,099	19%
Woodlawn Bridge	JM4	6,609	5,452	18%	6,609	0%	5,391	18%
Confluence - Manoa - Palolo	JM8	8,855	7,548	15%	8,855	0%	7,582	14%
Palolo Fire Station	JP2	4,433	4,433	0%	4,433	0%	3,731	16%
Palolo Stream Gauge	JP3	5,835	5,835	0%	5,835	0%	5,121	12%
MP Canal at mouth	JMP3	15,730	14,367	9%	15,685	0%	13,793	12%
Kanaha Stream	Junction-4	1,091	1,091	0%	1,091	0%	1,091	0%
Makiki @ King Street	JK2	2,843	2,544	11%	2,836	0%	2,843	0%
Makiki at mouth	JK3	3,766	3,482	8%	3,709	2%	3,766	0%
OUTLET	OUTLET	22,859	21,516	6%	22,602	1%	21,343	7%



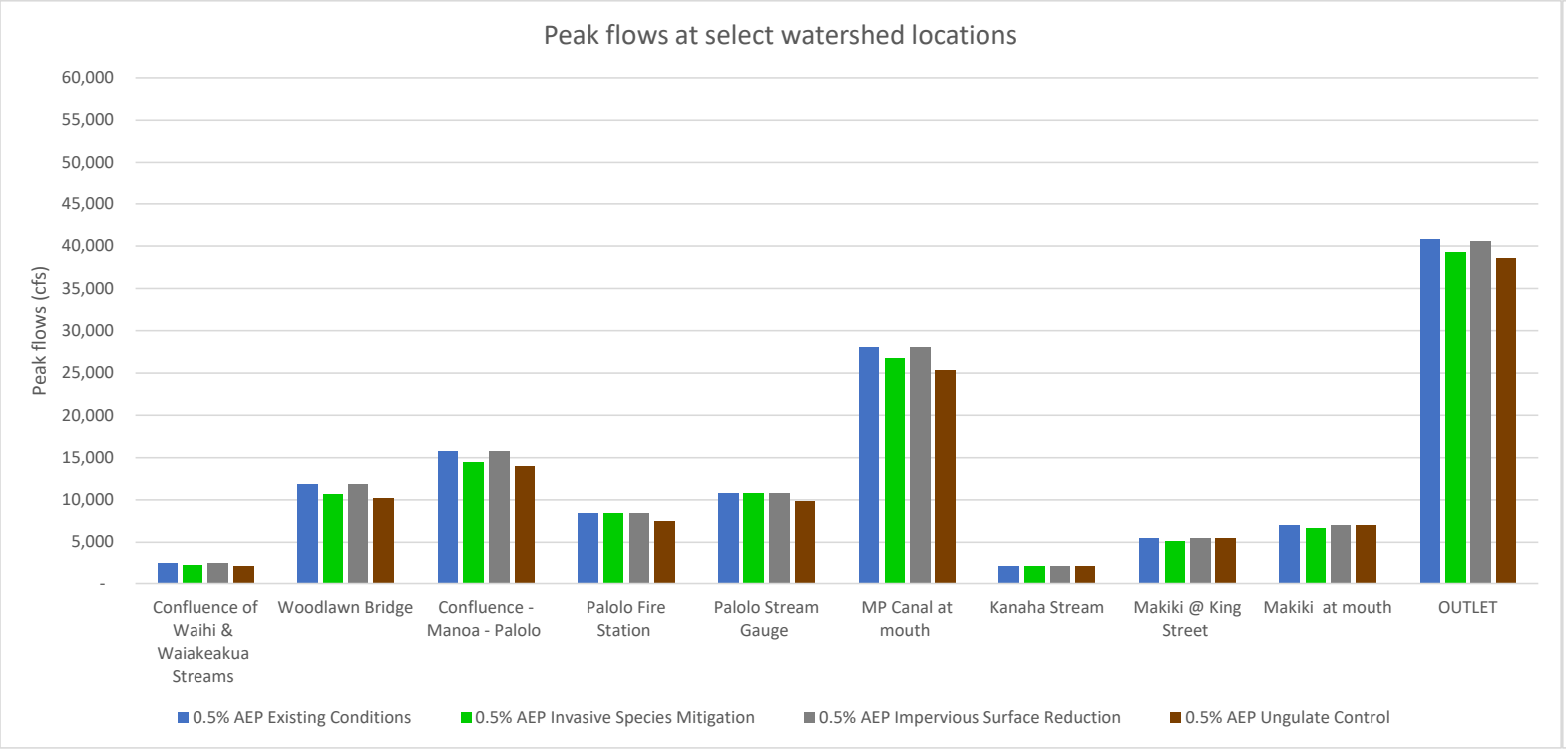
	Frequency Event	2% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	1,780	1,485	17%	1,780	0%	1,474	17%
Woodlawn Bridge	JM4	8,443	7,414	12%	8,443	0%	7,158	15%
Confluence - Manoa - Palolo	JM8	11,419	10,162	11%	11,419	0%	9,955	13%
Palolo Fire Station	JP2	5,931	5,931	0%	5,931	0%	5,102	14%
Palolo Stream Gauge	JP3	7,704	7,704	0%	7,704	0%	6,863	11%
MP Canal at mouth	JMP3	20,472	19,065	7%	20,430	0%	18,156	11%
Kanaha Stream	Junction-4	1,471	1,471	0%	1,471	0%	1,471	0%
Makiki @ King Street	JK2	3,820	3,473	9%	3,813	0%	3,820	0%
Makiki at mouth	JK3	4,971	4,637	7%	4,919	1%	4,971	0%
OUTLET	OUTLET	29,715	28,120	5%	29,437	1%	27,710	7%



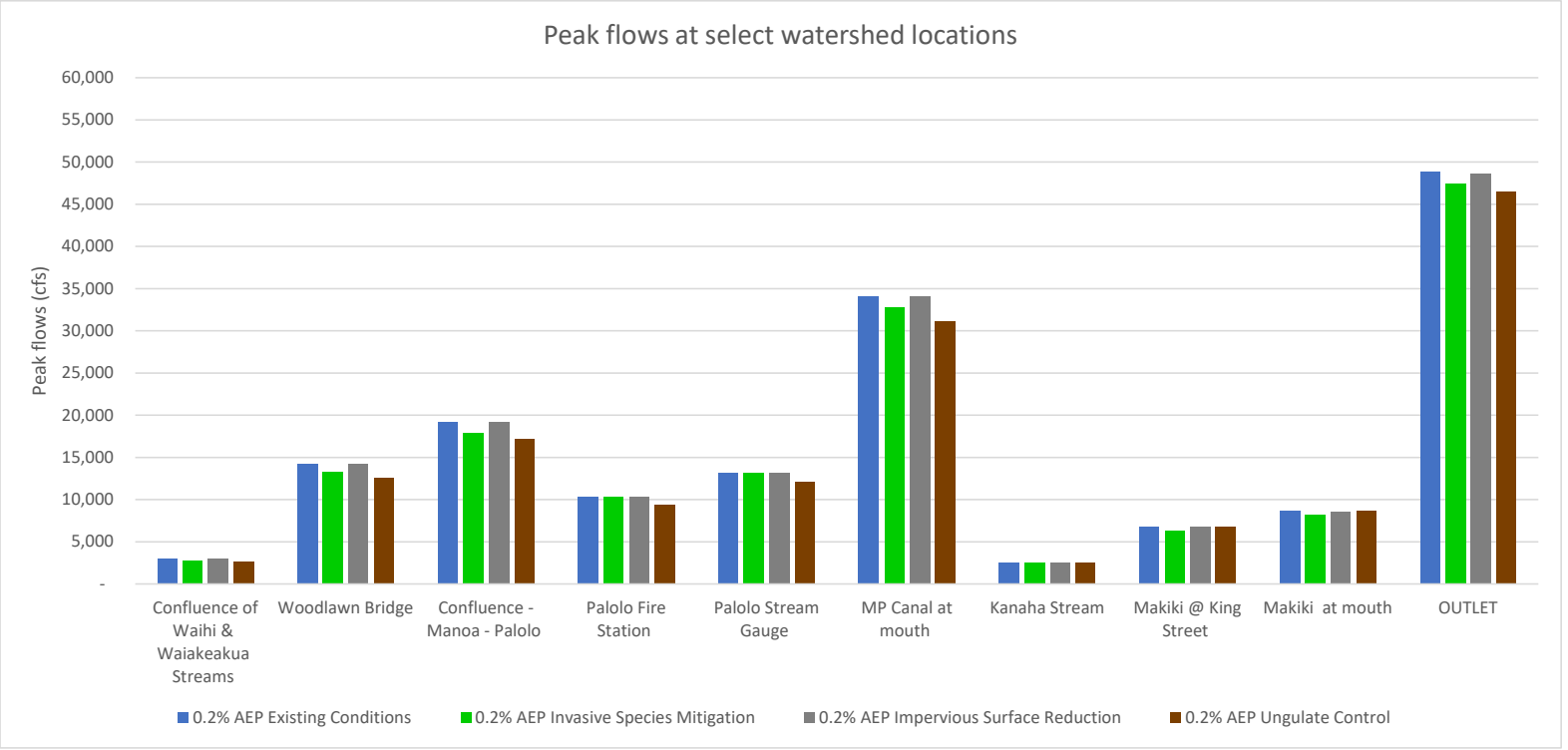
	Frequency Event	1% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	2,121	1,826	14%	2,121	0%	1,789	16%
Woodlawn Bridge	JM4	10,097	8,932	12%	10,097	0%	8,497	16%
Confluence - Manoa - Palolo	JM8	13,457	12,048	10%	13,457	0%	11,864	12%
Palolo Fire Station	JP2	7,153	7,153	0%	7,153	0%	6,252	13%
Palolo Stream Gauge	JP3	9,214	9,214	0%	9,214	0%	8,301	10%
MP Canal at mouth	JMP3	23,939	22,810	5%	23,902	0%	21,744	9%
Kanaha Stream	Junction-4	1,775	1,775	0%	1,775	0%	1,775	0%
Makiki @ King Street	JK2	4,635	4,253	8%	4,629	0%	4,635	0%
Makiki at mouth	JK3	5,977	5,612	6%	5,930	1%	5,977	0%
OUTLET	OUTLET	35,007	33,516	4%	34,759	1%	32,904	6%



	Frequency Event	0.5% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	2,495	2,203	12%	2,495	0%	2,140	14%
Woodlawn Bridge	JM4	11,844	10,743	9%	11,844	0%	10,214	14%
Confluence - Manoa - Palolo	JM8	15,788	14,511	8%	15,788	0%	14,007	11%
Palolo Fire Station	JP2	8,488	8,488	0%	8,488	0%	7,522	11%
Palolo Stream Gauge	JP3	10,866	10,866	0%	10,866	0%	9,883	9%
MP Canal at mouth	JMP3	28,116	26,777	5%	28,081	0%	25,419	10%
Kanaha Stream	Junction-4	2,111	2,111	0%	2,111	0%	2,111	0%
Makiki @ King Street	JK2	5,539	5,122	8%	5,533	0%	5,539	0%
Makiki at mouth	JK3	7,077	6,682	6%	7,033	1%	7,077	0%
OUTLET	OUTLET	40,833	39,349	4%	40,569	1%	38,610	5%



	Frequency Event	0.2% AEP						
	Plan	Existing Conditions	Invasive Species Mitigation		Impervious Surface Reduction		Ungulate Control	
Landmark	Hydrologic Element	Peak Discharge (CFS)	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction	Peak Discharge (CFS)	Percent Reduction
Confluence of Waihi & Waiakeakua Streams	JM1	3,025	2,737	10%	3,025	0%	2,645	13%
Woodlawn Bridge	JM4	14,296	13,242	7%	14,296	0%	12,572	12%
Confluence - Manoa - Palolo	JM8	19,137	17,872	7%	19,137	0%	17,203	10%
Palolo Fire Station	JP2	10,376	10,376	0%	10,376	0%	9,342	10%
Palolo Stream Gauge	JP3	13,194	13,194	0%	13,194	0%	12,149	8%
MP Canal at mouth	JMP3	34,121	32,754	4%	34,089	0%	31,107	9%
Kanaha Stream	Junction-4	2,586	2,586	0%	2,586	0%	2,586	0%
Makiki @ King Street	JK2	6,831	6,375	7%	6,826	0%	6,831	0%
Makiki at mouth	JK3	8,643	8,206	5%	8,603	0%	8,643	0%
OUTLET	OUTLET	48,919	47,466	3%	48,672	1%	46,562	5%



US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix C — Economics

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Report Status: Draft, November 2023

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1. Introduction

The Ala Wai Canal General Reevaluation Study is a U.S. Army Corps of Engineers (USACE) is focused on evaluating flood risk management (FRM) alternatives to reduce flood and life safety risk in the Ala Wai Watershed. The nonfederal sponsor for this study is the State of Hawaii Department of Land and Natural Resources (DLNR). The study was authorized by Section 209 of the Flood Control Act of 1962 and the Flood Control Act of 1970 and was appropriated under the Supplemental Appropriations of the Bipartisan Budget Act of 2018. Additional information regarding the study can be found in the main report and report appendices.

This study finds that the NED plan provides average annual benefits of approximately of $48 million and has a benefit-to-cost ratio (BCR) of 2.5 at the current Fiscal Year 2023 (FY23) discount rate of 2.5 percent.

1.1. Purpose and Overview

The purpose of the economic appendix is to present the socioeconomic analysis completed to identify a recommended plan for a federal project as a result of the Ala Wai Canal General Reevaluation Study. The analysis follows the framework and methodology as directed by the USACE Planning Guidance Notebook (ER 1105-2-100) dated 22 April 2000 and the guidance listed in Section 1.4 below. The economic appendix includes the following:

- A description of the framework of the economic analysis including the major assumptions, data, methodologies, and analytical tools used
- A discussion of relevant background information including demographic, social, economic, and housing data for the study area
- A description of the flood risk analysis completed in terms of probability and consequence of flooding for the without-project (WOP) and with-project (WP) conditions for the study area. This includes the evaluation of flood damages in the study area on an equivalent annualized basis and calculates project performance by simulating a range of possible flood events, considering all pertinent economic and engineering data and risk and uncertainty parameters.

1.2. Location

The Ala Wai Watershed is located on the south side of the island of Oahu in urban Honolulu, Hawaii. The watershed includes the Makiki, Manoa, and Palolo streams, which all drain to the Ala Wai Canal. The two-mile-long canal was constructed during the 1920s to drain coastal wetlands and allow for the development of Waikiki. The watershed is characterized by steep mountain ridges on the northeast boundary near the Ko'olau Mountains that drain to the flatter portion of the watershed near Waikiki and eventually to the Pacific Ocean at Kahanomoku Lagoon and Kewalo Basin Harbor. The watershed encompasses 19 square miles, and a large portion of the watershed is susceptible to flooding.

1.3. Historical Background

On October 30, 2004, a thunderstorm moved from the east-northeast over the Ko'olau Mountains and into the Manoa Valley. Flash flooding occurred when peak rates of rainfall reached 1.29 inches in 15 minutes and 8.71 inches in 6 hours. The Manoa Stream overflowed its banks in several areas and debris above a bridge forced floodwaters out of the channel into residential areas and the University of Hawaii at Manoa campus. Historical archives were

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destroyed, and instructional facilities and laboratories were damaged. The total damage estimate from the flood event was $85 million (unadjusted dollars), which includes damages to the university and approximately 120 homes. Several vehicles were also damaged.[1]

Significant flooding also occurred on Oahu in April 2018, and March 2021, and although the study area did not experience significant flooding, power outages associated with the storms affected residential areas in Palolo, Waikiki, Manoa, and Moilili.

1.4. Previous Studies

The Ala Wai Canal Flood Risk Management Feasibility Study was completed and the Chief of Engineers' report signed in December 2017. The Pre-construction, Engineering, and Design (PED) phase was funded by the Bi-Partisan Budget Act of 2018. During the PED phase, a validation report was completed. The validation report found that necessary modifications to the authorized project were not cost effective and lacked economic justification. The Ala Wai General Reevaluation Study was initiated in June 2021 to reevaluate the 2017 authorized feasibility study. This appendix documents the economic analysis for the Ala Wai Canal General Reevaluation Study.

1.5. Study Guidance

The analysis completed for this study is consistent with current regulations and policies. Pertinent guidance governing economic analysis procedures includes:

- Engineer Regulation (ER) 1165-217, Civil Works Review Policy, 1 May 2021
- Engineer Circular (EC) 1165-2-218 USACE Levee Safety Program, 22 Apr 2021
- Economic Guidance Memorandum (EGM) 01-03, Generic Depth-Damage Relationships, 4 Dec 2000
- Economic Guidance Memorandum (EGM) 04-01, Generic Depth-Damage Relationships for Residential Structures with Basements, 10 Oct 2003
- Economic Guidance Memorandum (EGM) 09-04, Generic Depth-Damage Relationships for Vehicles, 22 Jun 2009
- Engineer Manual (EM) 1110-2-1619, Risk-Based Analysis for Flood Damage Reduction Studies, 1 Aug 1996
- Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook, 22 Apr 2000
- Engineer Regulation (ER) 1105-2-101, Risk Assessment for Flood Risk Management Studies, 17 Jul 2017
- Engineer Regulation (ER) 1165-2-26, Implementation of Executive Order 11988 on Flood Plain Management, 30 Mar 84
- Institute for Water Resources (IWR) Report 96-R-12, Analysis of Nonresidential Content Value and Depth-Damage Data for Flood Damage Reduction Studies, May 1996
- Planning Bulletin (PB) 2019-04, Incorporating Life Safety into Flood and Coastal Storm Risk Management Studies
- Secretary of the Army (Civil Works) (SACW) POLICY DIRECTIVE – Comprehensive Documentation of Benefits in Decision Document, 5 Jan 2021
- Water Resources Development Act (WRDA) of 1990, Sec. 308 Flood Plain Management, 28 Nov 1990

[1] https://www.weather.gov/safety/flood-states-hi

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1.6. The System of Accounts

Per the 5 January 2021 SACW POLICY DIRECTIVE – Comprehensive Documentation of Benefits in Decision Document, all USACE planning study project delivery teams (PDTs) must evaluate and provide a complete accounting, consideration, and documentation of the total benefits of alternative plans across all benefit categories. Total benefits involve a summation of monetized and/or quantified benefits, along with a complete accounting of qualitative benefits, for project alternatives across national and regional economic, environmental, and social benefit categories.

In computing total benefits of a project alternative, it is imperative that any benefits reflected in more than one category are only counted once. The level of detail will vary based on study type and the decision-context for the specific problems identified, recognizing that not all benefits can be monetized, and some cannot be cost-effectively quantified. Even if non-monetary measures are used, these benefits and impacts must be accounted for in the most substantive way possible.

Each study must include, at a minimum, the following plans in the final array of alternatives for evaluation:

1) The “No Action” alternative
2) A plan that maximizes net total benefits across all benefit categories
3) A plan that maximizes net benefits consistent with the study purpose
4) For flood-risk management studies, a nonstructural plan, which includes modified floodplain management practices, elevation, relocation, buyout/acquisition, dry flood proofing, and wet floodproofing
5) A locally preferred plan, if requested by a non-federal partner, if not one of the aforementioned plans

1.6.1. National Economic Development (NED)

Economic costs and benefits associated with an alternative are evaluated by measuring the impact the alternative will have on national wealth without regard to where in the United States the impact may occur. NED benefits must result directly from a project and must represent net increases in the value of the national economy. Equivalent annual damages and damages reduced (benefits) are calculated using a 50-year period of analysis and the current federal discount rate of 2.5 percent.

NED costs represent the costs of diverting resources from other uses in implementing the project as well as the costs of uncompensated economic losses resulting from detrimental effects of the project. NED annual benefits, the benefit-cost ratio (BCR), and the net NED annual benefits are calculated during the evaluation process. Net benefits represent the amount by which the annual NED benefits exceed annual NED costs, thereby defining the plan’s contribution to the nation’s economic output. A BCR of 1.0 or greater must be demonstrated for federal interest. The plan with the highest net benefits is considered the recommended NED plan, assuming technical feasibility, environmental soundness, and acceptability.

1.6.2. Regional Economic Development (RED)

Studies must quantify the regional economic impacts on local and regional income, employment, and other measures of the regional economy from the construction and operation of a project to the extent practical for each alternative. Where impacts are anticipated to be the

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same across all alternatives or not play a significant role in the evaluation of alternatives and selection of a recommended plan, a qualitative assessment may suffice.

1.6.3. Other Social Effects (OSE)

Flood and coastal storm risk management reports must include an assessment of potential mortality (life loss) for the future without project (FWOP) condition and estimated changes in potential magnitude of mortality (life risk) for all alternatives in the final array. Where the change is anticipated to be the same across all alternatives or not play a significant role in the evaluation and selection of a recommended plan, a qualitative risk assessment will suffice. The residual risk to life safety must be determined for the recommended plan

Other relevant impacts to society must be described and analyzed in the most substantive manner possible, whether quantitative or qualitative. The analysis may present the same factor from multiple points of view. The analysis must describe groups that benefit from or are adversely affected by each alternative.

1.6.4. Environmental Quality (EQ)

For each alternative plan, positive and negative impacts to the environment must be analyzed in a manner consistent with current ecosystem restoration or environmental compliance guidance. The benefit assessment can be quantitative or qualitative and, if appropriate, monetized. The analysis must distinguish between national and regional benefits while ensuring benefits are not accounted for more than once.

2. Study Area

The study area, shown in Figure 1 below, is located on the south side of Oahu, Hawaii, and includes 19 square miles of highly urbanized land, including the commercial areas of Ala Moana and Waikiki and the industrial area near Kewalo Basin Harbor. The study area is part of the County of Honolulu and part of the City of Honolulu. The study area intersects 47 census tracts and is characterized by steep slopes through the residential areas along Makiki and Palolo streams that drain to the flatter land south of the H1 highway. The ground elevation changes from a few feet above average sea level near the confluence with the Pacific Ocean to approximately 800 ft (NAVD) at the upstream boundary.

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Figure 1. Ala Wai Study Area Census Tracts

2.1. Land Use

The study area includes commercial, industrial, residential, educational, and government structures. The area is mostly built out and the only areas that are currently undeveloped are public parks. The National Land Cover Database (NLCD), which provides data on land use and land use changes, does not have data available for Hawaii.

2.2. Population and Socioeconomics

The total estimated population count in the study area was approximately 174,051 as of 2021[2]. The following figures display the distribution of the population by census tract, and other socioeconomic and demographic factors that impact the population at risk in the study area. Demographic data for the following maps was taken from the American Community Survey (ACS) 2017-2021 5-year estimates available on census.gov, unless otherwise indicated. Values for Census Tract 9821 are null since there are no households in this tract.

Figure 2 displays population count by census tract. The most populated tract is located around The University of Hawaii at Manoa, while the least populated census tracts are located along the coast of the Pacific Ocean, in Waikiki. It is important to note that Waikiki contains mostly

[2] https://data.census.gov/

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high-rise hotels and that there are approximately 100,000 tourists visiting Oahu per day which are not included in population census estimates.[3]

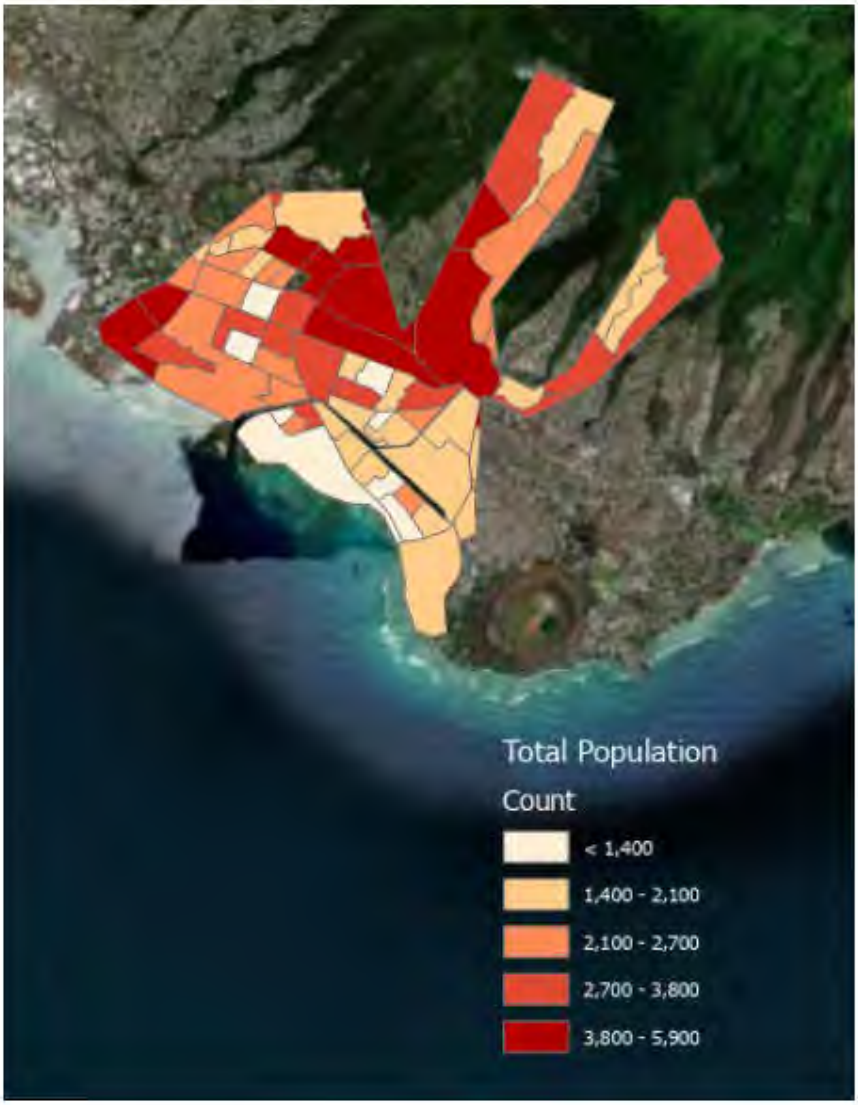

Figure 2. Population Count by Census Tract, ACS 2021 5-year Estimates

Figure 3 shows the Population Density in 2020, measured in persons per square mile. The tracts with the highest population density are located between Ala Wai Blvd and Ala Moana Blvd, and the tracts with the lowest population density are located near Makiki Heights, Woodlawn, Maunalani Heights, and Waikiki Beach. As previously noted, the daily influx of tourists in Waikiki Beach is not included in census data.

[3] https://www.hawaiitourismauthority.org/media/7454/may-2021-visitor-statistics-press-release-final.pdf

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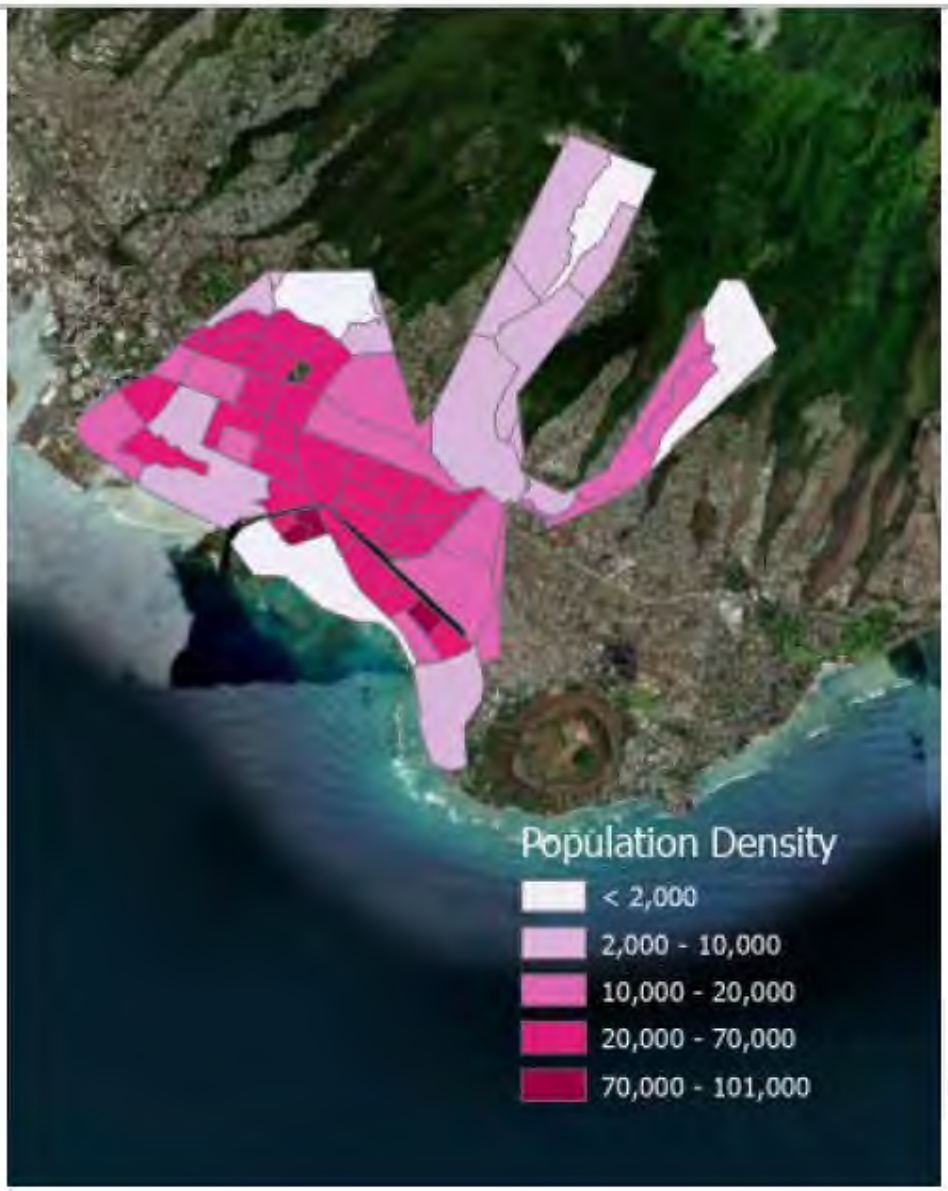

Figure 3. Population Density by Census Tract, ACS 202 5-year Estimates

Figure 4 displays median household income in 2021 inflation-adjusted dollars overlaid by average household size, by census tract. The average median household income by tract is $77,661 annually, while the lowest median household income is $21,522 and the highest median household income in a census tract is $154,044. Census tracts with the highest median income are located near Woodlawn and Makiki Heights. Census tracts with average median household income less than $50,000 don't contain many households and are near Ala Moana Center and Ala Wai Golf Course. Tracts with less than the average median household income are concentrated in Waikiki near the Ala Wai Canal, and in the neighborhood of Moilili. The average household size is two individuals. Larger households are located in the residential areas of Manoa and Palolo.

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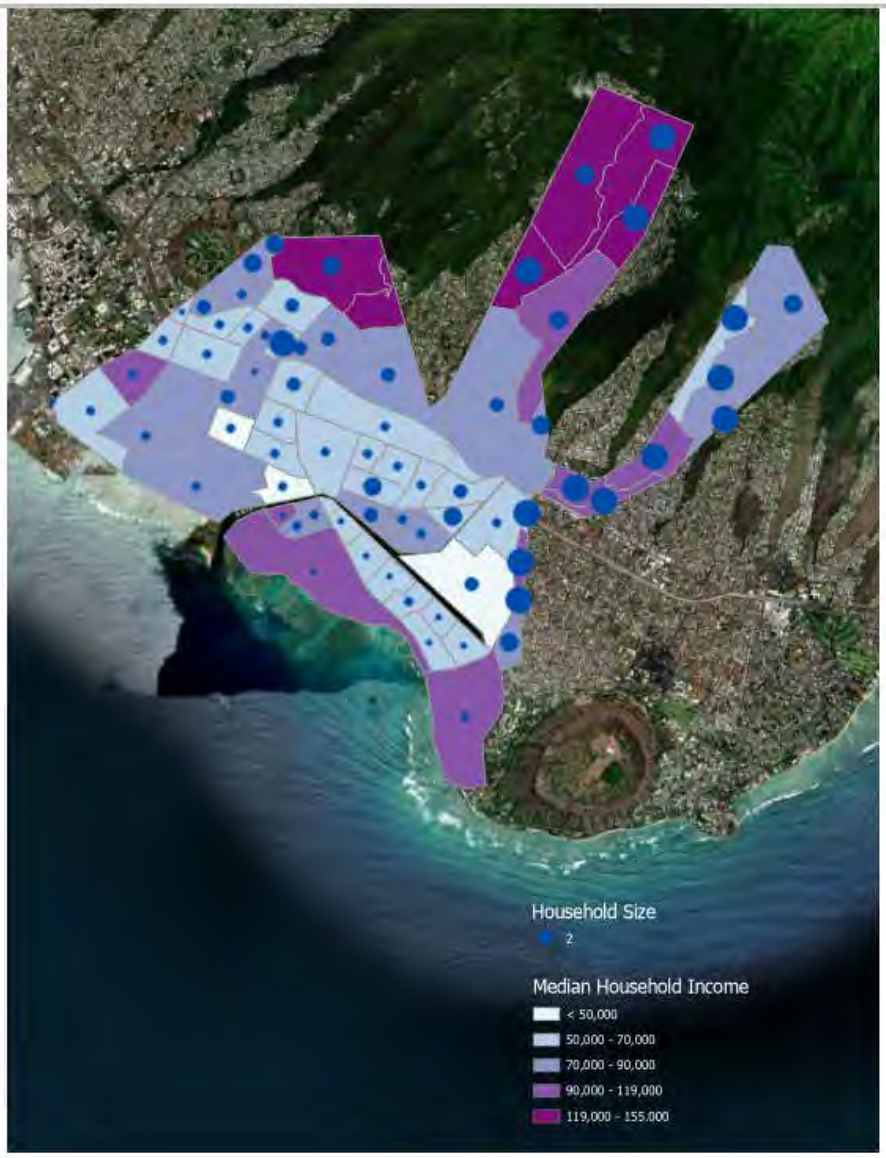

Figure 4. Median Household Income in 2021 Inflation-adjusted Dollars vs Household Size

Figure 5 shows the non-White population count by census tract. Census tracts with the highest non-White population are located near the University of Hawaii at Manoa and west of Ward Village.

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Figure 5. Non-White Population Count by Census Tract, ACS 2021 5-year Estimates

Figure 6 shows the percent of the population that is older than 65 and may be more vulnerable in event of a flood than younger individuals who often can more easily evacuate. Areas with more than 30 percent of the population aged 65 or older include Makiki Heights, upper Manoa, upper Palolo, and coastal Waikiki. The census tract along the coastline in Waikiki contains many hotels, and hotel guests may have a range of ages that are not captured in census data estimates.

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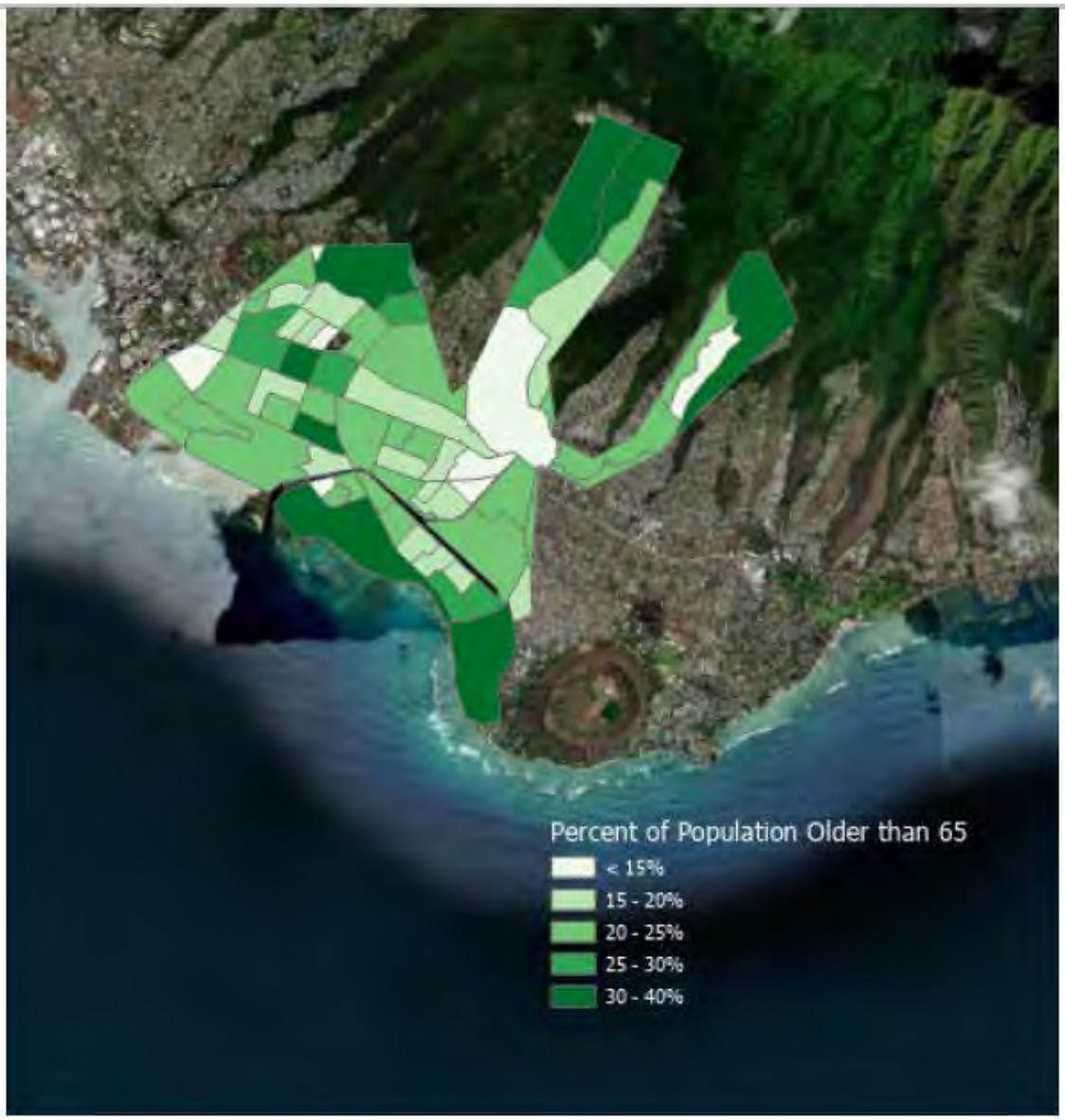

Figure 6. Percent of Population Age 65 or Older, ACS 2021 5-year Estimates

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Figure 7 displays the percent of the population under the poverty line by census tract. The poverty line for a household of four in Hawaii in 2021 was $30,480. The poverty rate in Honolulu in 2021 was approximately 12 percent. The highest poverty rate in a census tract in the study area is located just west of Makiki District Park, where 39 percent of the population was under the poverty line in 2021. The lowest poverty incidence occurs in the census tract just south of the National Memorial Cemetery, which has a poverty rate below one percent.

Figure 7. Percent of Population under Poverty Line by Census Tract, 2021 ACS 5-year Estimates

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The Center for Disease Control computes a Social Vulnerability Index (SVI) based on demographic census data.[4] The SVI is represented as a percentile ranking in Figure 8, by census tract. Census tracts with a score of 0.90 are, on average, 90 percent more vulnerable than the rest of Hawaii, while census tracts with a score of 0.30 are 30 percent more vulnerable than the rest of the state. Census tracts that are lighter orange or yellow represent lower SVI scores, while census tracts that are darker orange or red represent higher SVI scores, indicating higher social vulnerability. The figure shows that there are socially vulnerable areas throughout the basin, especially along Highway 1. The neighborhoods of Woodlawn and Makiki Heights have lower social vulnerability scores, and median household income is also higher in these areas.

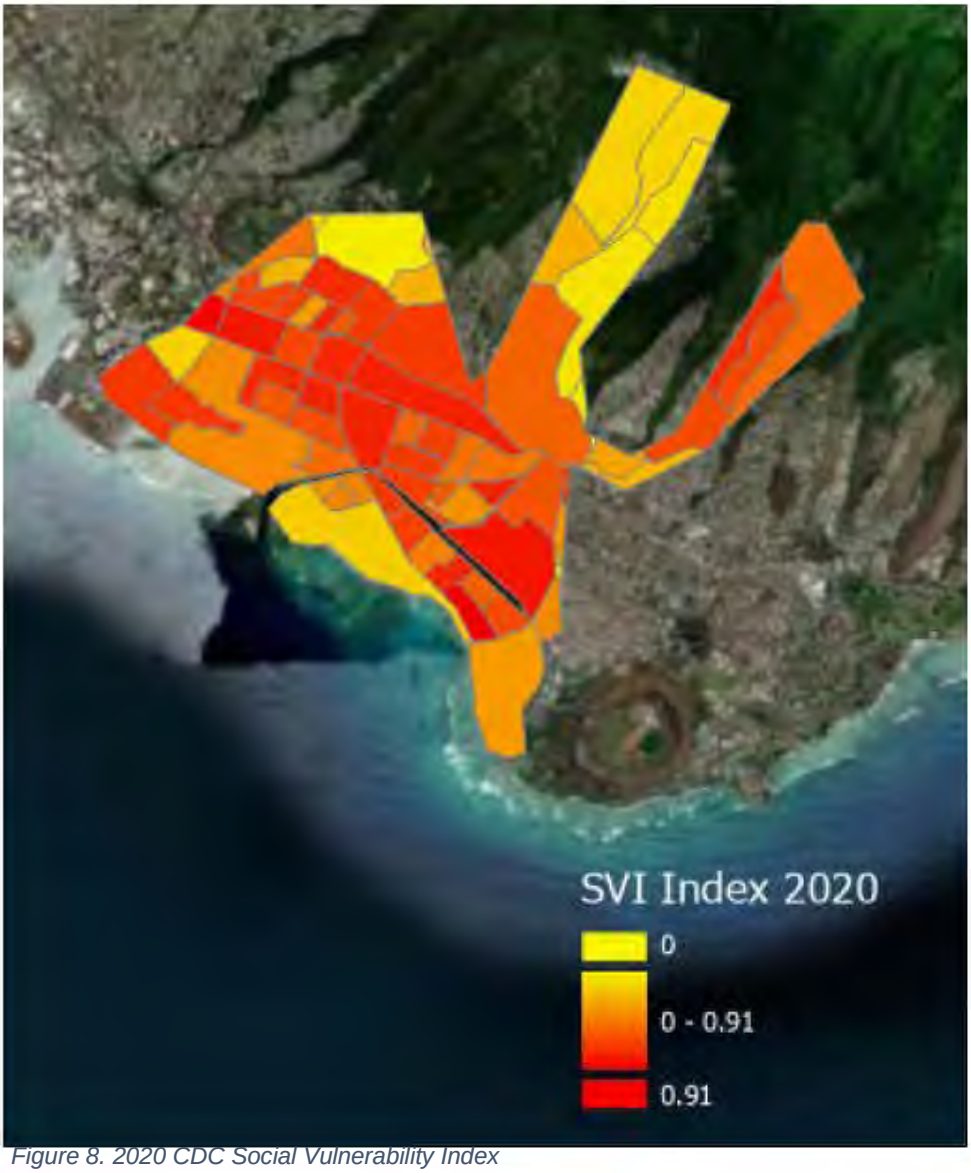

Figure 8. 2020 CDC Social Vulnerability Index

[4] Source: https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html

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The following tables display demographic census data. Table 1 shows the population from 2010 and 2021 for Honolulu County (which encompasses the island of Oahu), the State of Hawaii, and the U.S.

Table 1. Study Area Population Trends

Geography	2010	2021	Percent Change 2010-2021
Honolulu County	936,984	979,682	5%
Hawaii	1,333,591	1,420,074	6%
U.S.	303,965,272	326,569,308	7%

Source: 2010 and 2021 ACS 5-Year Estimates

Table 2 shows the distribution of age and race for Honolulu County, Hawaii, and the U.S. A higher percentage of the population is above the age of 65 in Hawaii than in the U.S. In Honolulu County, the portion of the population that is Asian is near 61 percent, compared to 7 percent in the U.S. The percent of the population that is Native Hawaiian/Pacific Islander is nearly 25 percent in Honolulu County, compared to 0.4 percent in the U.S.

Table 2. Selected Population Characteristics

Demographic	Honolulu County	Hawaii	U.S.
Population	1,015,167	1,406,299	316,515,021
Percent 65 and above	17.8	19.1	16
Percent under 18	21.3	21.4	22.5
Hispanic or Latino (of any race), %	10.2	10.9	18.4
Two or more races, %	23.4	24.4	7
White, %	37.7	42.3	74.5
Native Hawaiian/Pacific Islander, %	24.8	26.3	0.4
Asian, %	60.8	56.3	6.9
All Other Non-White, %	10.1	10.1	25.6

Source: 2021 ACS 5-Year Estimates

Table 3 displays household demographics for Honolulu County, Hawaii, and the U.S. The median value of owner-occupied housing in Honolulu and Hawaii is more than 2.5 times the national average, and the median gross rent is more than 50 percent higher in Honolulu County and Hawaii than in the U.S. A higher percentage of households in Hawaii speak a language other than English at home, and the percentage of individuals with at least a bachelor's degree is slightly higher in Honolulu County than the rest of Hawaii and the U.S.

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Table 3. Household Demographics

Demographic	Honolulu County	Hawaii	U.S.
Total Housing Units	367,126	556,937	139,647,020
Percent Owner Occupied	58.4	61	57.4
Median Value of Owner-occupied housing	$726,800	$662,100	$244,900
Median gross rent	$1,870	$1,755	$1,163
Average household size	2.96	2.95	2.6
Language other than English spoken at home (%)	26.8	25.9	21.7
Bachelor's degree or higher, percent of persons age 25+	36.2	34.3	33.7

Source: 2021 ACS 5-Year Estimates

Table 4 displays income demographics for Hawaii and the U.S. Although per capita and median household income are higher in Hawaii than the national average, housing costs are significantly higher in Hawaii. For example, the median home value in Hawaii is 7.5 times the median income, while this ratio is 3.5 for the U.S. The unemployment rate in Hawaii was slightly higher than that of the U.S. in 2021, and the poverty rate was near the national poverty rate.

Table 4. Income Demographics

Geography	Unemployment Rate 2021, %	Per Capita Income, last 12 months	Median Household Income, 2021 Dollars	Percent of Individuals Living Below Poverty
Hawaii	7.3	$39,045	$88,005	10.2
U.S.	6.3	$37,638	$69,021	10.7

Source: 2021 ACS 5-Year Estimates

3. NED Methodology

This section provides an overview of the economic analysis used to evaluate flood risk management alternatives to identify the NED plan. It includes a discussion of the models and inputs used to compute NED economic benefits.

3.1. Framework of Economic Analysis

3.1.1. Price Level, Period of Analysis, and Discount Rate

Values listed in this analysis are based on fiscal year (FY) 2023 price levels. Annualized benefits and costs were computed using a 50-year period of analysis and the FY 2023 federal discount rate of 2.5 percent. Annualized values are presented in thousands of dollars unless otherwise noted.

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3.1.2. Economic Analysis Model: HEC-FDA Program

The economic analysis uses the Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) software to compute damages. Economic damages serve as a basis for computing net economic benefits, and the BCR. HEC-FDA is a USACE-certified risk-based program and is standard for economic computations for FRM studies. HEC-FDA integrates engineering data (hydrologic, hydraulic, and geotechnical when applicable) and economic data (structure/content inventory and depth-percent damage curves) to model the potential flood risk for the WOP condition and study alternatives. HEC-FDA version 1.4.3 is used in this analysis.

ER 1105-2-101 requires incorporating risk and uncertainty in calculating damage estimates for flood events. This is best represented by a range of possible damage values and their likelihood of occurring, or a probability distribution. HEC-FDA uses Monte Carlo simulation to obtain a random sample of the contributing relationships and computes stage-damage functions, exceedance probability discharge curves, and conditional stage-discharge relationships to generate EAD values. EAD estimates capture the mean of the probability distribution of annual damage and are the basis for calculating equivalent annual damages and benefits. Uncertainty is incorporated into EAD estimates using Monte Carlo simulation; each iteration of a simulation randomly samples the uncertainty distributions, and the resulting values are used to transform the flow and stage distributions to a damage distribution. The area under the curve of the distribution is integrated to compute EAD. Thousands of iterations of this process are repeated to infer the EAD distribution and estimate EAD as the probability weighted average of all possible peak annual damages, where damage is a continuous random variable.[5] This process is depicted in Figure 9.

[5] This process is described in more detail in the HEC-FDA User's Manual Version 1.4.1 available at http://www.hec.usace.army.mil/software/hec-fda/documentation/CPD-72_V1.4.1.pdf and the HEC-FDA update notes Version 1.4.3 available at https://www.hec.usace.army.mil/software/hec-fda/documentation/HEC-FDA_ReleaseNotes_Jun2021.pdf.

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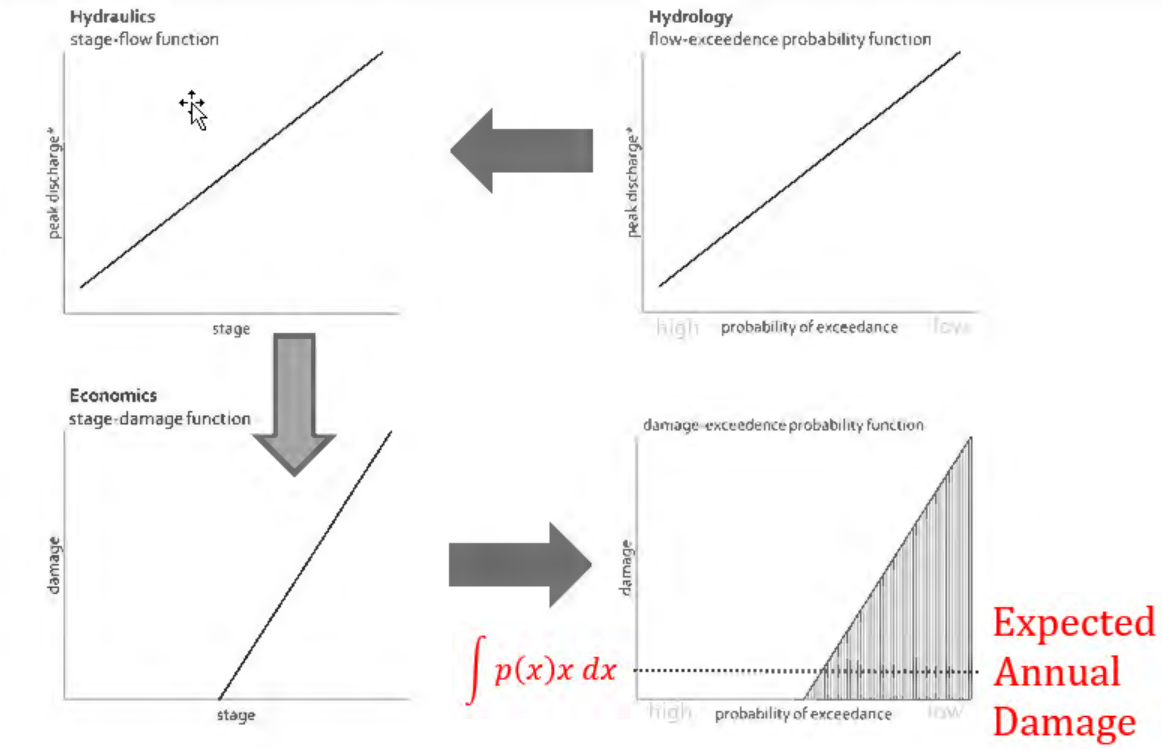

Figure 9. EAD Computation Process

To compute EAD values, HEC-FDA requires the following data:

1. **Structure Inventory Data** – This includes a structure identification number, a use category (industrial, commercial, single-family residence, etc.), stream location identified by cross sectional or grid data, first floor elevation, and depreciated structure and content values. This data was compiled using ArcGIS Pro 3.0, Spyder 5.2.1, and Microsoft Excel and was imported into HEC-FDA.

2. **Hydrologic and Hydraulic Data** – This data includes water surface profiles, exceedance probability discharge relationships, stage/discharge relationships, and levee fragility curves. Water surface profiles were developed in Hydrologic Engineering Center River Analysis System (HEC-RAS), processed in ArcGIS Pro and Excel to combine with the structure inventory and then imported into the HEC-FDA program.

   Gridded water surface elevations from the HEC-RAS model were assigned to structures at the structure location in ArcGIS Pro. Cross sections from the HEC-RAS model were selected to represent the discharge at each reach index station. These representative stations are referred to as reach index points throughout this appendix.

3. **Depth/Damage Functions for Structures and Structure Contents** – Depth-damage functions are used to calculate the percent damage a structure will incur at a specific water elevation in a flood event. Depth-damage functions and associated standard errors for residential structures and their contents were developed by the Institute for Water Resources (IWR) and published in *Economic Guidance Memorandum 04-01: Generic Depth-Damage Relationships for Residential Structures with Basements, October 2003.* The depth-damage functions and standard error estimates are based

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upon previous damages that occurred during flood events in the United States. Depth-damage functions for multi-family residential structures and non-residential structures were obtained from the URS Group's expert elicitation report *Solicitation of Expert Opinion Depth-Damage Function Calculations for the Benefit-Cost Analysis Tool, October 2008.*

4. **Risk and Uncertainty Parameters** – Uncertainty parameters discussed in Section 3.2 of this report were also entered into HEC-FDA.

Discharge-exceedance probability, stage-discharge, and stage-damage functions derived at a damage reach index location are used to compute the damage-exceedance probability function. Monte Carlo simulation is a computationally efficient method of obtaining the damage-exceedance probability function due to uncertainty in input parameters. This numerical integration process requires all these relationships, and risk and uncertainty parameters be input into HEC-FDA. EAD values are obtained from the cumulative distribution function produced in successive iterations of the Monte Carlo simulation process.

3.1.3. Primary Sources of Uncertainty

Uncertainties are accounted for in the HEC-RAS model (see Appendix A, H&H Engineering) and in the HEC-FDA portion of the analysis. The primary sources of uncertainty present in the calculation of economic damages include storm water discharge, water surface elevations, levee performance, structure elevations, structure and structure content values, and depth-damage relationships. These are described in more detail below.

1. **Levels of Storm Water Discharge –** The amount of rainfall from storm events with equal probabilities can vary by location throughout the watershed. Variability in storm intensity, elapsed time during rainfall, ground permeability, soil, ambient temperature, and other physical factors can also cause variation in the location and timing of rainwater entering the channel. This variation causes uncertainty in the level of storm water discharge at any location along the river.

   In addition to natural variation arising from physical factors, there is uncertainty in the modeling of water discharges for a storm event due to limited historical meteorological and stream gauge data. This data can often be incomplete or limited in sample size (length of record for time-series data). Discharge-probability distributions in this study were computed using the graphical method and were based on a period of record length of 50 years. For additional information on the period of record, refer to Appendix A (H&H) of this report. HEC-FDA calculates 95 percent confidence intervals for storm discharges that are used in economic computations.

2. **Water Surface Elevation –** River bathymetry, water temperature, debris, and obstructions in the channel can affect the water surface elevation for a specific location along the river. When the water surface elevation exceeds the top of the bank elevation, water flows onto the floodplain. Thus, uncertainty affects water surface elevations in the floodplain and in the channel. To address this uncertainty, a standard deviation with standard normal distributions were input into HEC-FDA for water surface elevations. A standard deviation of 0.5 feet, held constant at the 2% annual exceedance probability (AEP) event was used.

3. **Levee Performance –** There is uncertainty about how an existing levee will perform under certain water surface elevations, how interior water-control facilities will perform,

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and the thoroughness of closures or openings in an existing levee. For this analysis, top of bank elevations were used without geotechnical failure functions.

4. **First Floor Elevations –** Structure elevation is key in determining the depth of flooding inside of a structure during a flood event. First floor structure elevation is the aggregate of topographical elevation and foundation height. Both elevations are prone to uncertainty. Uncertainty in topographical and foundation height varies by the survey methodology and resolution, and foundation height uncertainty varies by surveying methodology. Statistical uncertainty was determined by referencing the standard deviation estimates contained in EM 1110-1-1619, which presents standard deviation of error estimates for various measurement methods, based on Institute for Water Resources (IWR) research. First floor elevations were derived by combining terrain elevation at the structure location with structure foundation height. Foundation heights used were obtained from the National Structure Inventory (NSI) 2022 data. Structures were assigned standard deviations of error for first floor elevations of 0.60 feet, based on requirements for aerial survey with 5-foot contour data. It is assumed that joint distribution error and corresponding probability distribution functions are normally distributed with a mean error of zero.

5. **Depreciated Structure and Content Replacement Values –** The depreciated replacement values for structures and contents are used to determine economic damages in the floodplain and are a function of structure type, condition, and size. Since surveying every structure in the floodplain was not feasible for this study, there is uncertainty in estimated values. Depreciated structure values were taken from the NSI 2022 data. Structures that existed in state parcel data that were not included in the NSI were added to the NSI data and were surveyed in Google Earth Pro to determine structure type, condition, and foundation height. Square footage was calculated in Google Earth Pro for these structures and multiplied by the RS Means square foot value to obtain the depreciated replacement cost.

   Errors for structure value estimates are assumed to be normally distributed with a mean error of zero, and standard deviations range from 10 to 15 percent of mean structure value. Structure content values are estimated as a percentage of the structure value, based on structure type and the depth-damage function.

6. **Depth-Damage Relationships** – Depth-damage functions are used to calculate the percent damage a structure will incur at a specific water elevation in a flood event and is subject to uncertainty. The methodology used to construct depth-damage relationships for non-residential structures was developed by an expert-opinion elicitation process, conducted by the URS Group and published in the report *Solicitation of Expert Opinion Depth-Damage Function Calculations for the Benefit-Cost Analysis Tool, October 2008.* This report provides non-residential depth-damage curves for structure contents by structure type as well as content-to-structure value ratios (CSVRs) and associated standard errors.

   Depth-damage functions and associated standard errors for single family residential structures and their contents were developed by the Institute for Water Resources (IWR) and published in Economic Guidance Memorandum (EGM) 01-03*: Generic Depth-Damage Relationships.* The depth-damage functions and standard error estimates are based on previous damages that occurred during flood events in the United States.

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For high-rise residential structures with more than 20 units, Prototype 4A depth-damage curves published in *North Atlantic Coast Comprehensive Study (NACCS) Resilient Adaptation to Increasing Risk Physical Depth Damage Function Summary Report, January 2015,* were used. The Prototype 4A category includes high-rise structures in urban areas that are subject to inundation only and exclude coastal storm surge and erosion. Since no residential-specific curves were available for high-rise apartments, the NACCS Prototype 4A curves were used. It should be noted that most high-rise residential structures in the study area have retail/commercial areas on the first floor.

Depth-damage functions for other damage categories are described in the discussion of damages by category in the following sections.

3.1.4. Economic Damage Reaches and Index Stations

The study area was divided into 14 damages reaches based on similar topography, hydromorphology, hydraulic characteristics, and plan formulation measures. Figure 10 depicts study area reach boundaries.

Figure 10. Study Area Reach Delineation

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Each reach is associated with an index station, which is used to specify discharge-probability, stage-discharge, stage-damage functions, and top of bank elevations for each reach. The index station assignments are based on hydrologic parameters and hydraulic conditions specific to each reach. The assigned index station is generally representative of the conditions throughout the reach. Terrain elevations increase quickly throughout the study area, particularly in reaches AW7 through AW9. In these reaches, the index station is less representative of the changing conditions throughout the reach. Since there are multiple streams within the study area, station numbering in each reach reflects the station numbering associated with the stream in that reach. Table 5 presents reach index and downstream/upstream cross section information for the study area.

Table 5. Ala Wai Reach Index Stations

Reach	DS_XS	US_XS	Index Station	Stream
AW1	67	10082	3282	Ala Wai
AW2R	76	4709.5	1897	Makiki
AW2L	76	4709.5	1897	Makiki
AW3R	2	4372	943	Kanaha
AW3L	5940.67	9543	7672	Makiki
AW4	2961	5770	5195	Ala Wai
AW5	6095	10082	7405	Ala Wai
AW6	305	4653	2609	Palolo
AW7R	1457	8016	7839	Manoa
AW7L	84	2891	1107	Manoa
AW8R	8117	16506	10496	Manoa
AW8L	3042	16506	10968	Manoa
AW9R	6282	15526	10074	Palolo
AW9L	6282	15526	11542	Palolo

3.2. Data Development

3.2.1. Structure Inventory

The structure inventory for the HEC-FDA model was based on the 2022 NSI data available at https://www.hec.usace.army.mil/confluence/nsi. The data includes parcel footprints with several attributes that are a combination of HAZUS, Census Bureau, CoreLogic, FEMA, and USGS data. To develop the structure inventory used in this study, the NSI data was clipped to the 0.2% AEP study area boundary in ArcGIS Pro and converted to a point feature class. Hawaii State parcel data was overlaid in GIS on the NSI data to verify accuracy of NSI data structure location and identify structures that weren't included in the NSI data. Structures that needed to be added to the NSI data were manually surveyed in Google Earth Pro to obtain occupancy type, structure square footage, and foundation height, and were added to the NSI dataset. Depreciated replacement values for the 95 added structures were calculated using RS Means (NSI) values per square foot for a specified occupancy type. Topographic elevations at the structure location for all structures were extracted from the terrain data used in the HEC-RAS

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model in ArcGIS Pro. Occupancy types in the NSI data reflecting basements were changed to no basements, to be representative of the study area. The average number of stories for structures in the studies area is 3.7.

It should be noted that there are differences between the current structure inventory data and the structure inventory used in the 2021 validation report and the 2016 feasibility study. The validation report indexed 2016 structure values to current price levels, and then randomly assigned structure location (xy coordinates) to structures, stratifying by reach. It was determined that the validation report structure inventory was less accurate than the 2022 NSI data and that several structures were not included in the 2021 validation report or the 2017 feasibility study, including in the area south of the University of Hawaii at Manoa, the commercial area of Ala Moana, and the commercial area near Kewalo Basin Harbor. These structures are high-value structures that are susceptible to flooding, and as a result, aggregate structure value and flood damages will be higher in this report than in the previous two reports. Additionally, the average depreciated replacement value for residential structures used for the 2017 feasibility study and the validation report was much lower than this Reevaluation Report. Lastly, the depth at structure locations across the study area was 0.86 and 0.83 ft for the 2017 feasibility study and validation report, respectively, and was 1.3 feet in this study, for the 0.2% AEP event FWOP condition, which results in higher FWOP damages.

Section 308 of the Water Resources Development Act (WRDA) of 1990 has been observed in this analysis. Google Earth historical imagery from 1985 confirms the study area was completely built out prior to 1991.

3.2.2. Damage Categories and Structure Occupancy Types

A structure occupancy type in HEC-FDA is a subgroup of a damage category that is used to associate structures with depth-percent damage functions, first floor uncertainties, structure value uncertainties, and content values and uncertainties. The tables below display summaries of the structure inventory and uncertainties associated with damage categories and their occupancy types.

Table 6 shows the structure count by damage category and depreciated structure replacement and content values for each category. Residential buildings account for the largest portion of structures in the study area, while commercial buildings account for the highest aggregate depreciated structure and content values. Total depreciated structure value is nearly $12 billion and depreciated content value exceeds $3 billion.

Table 6. Structure Inventory Summary FY23 PL ($000)

Damage Category	Structure Count	Depreciated Structure Value	Depreciated Content Value
Residential	3,464	$5,498,736	$1,075,916
Commercial	2,081	$5,595,682	$1,631,742
Industrial	163	$137,109	$57,586
Public	171	$489,345	$271,847
Total	**5,879**	**$11,720,873**	**$3,037,091**

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Table 7 displays damage categories and associated standard deviations for structure values, which were imported into HEC-FDA with depth-damage curves.

Table 7. Structure Value Uncertainty

Damage Category	Description	Normal Distribution Std Dev (%)
RES	Residential	17.00
PUB	Government, Educational, Religious	13.00
COM	Commercial	11.00
IND	Industrial	11.00
EMG	Emergency costs	50.00
CLN	Cleanup Costs	57.60
AUTO	Vehicles	34.18

3.2.3. Structure Content Valuation

The content-to-structure value ratios (CSVRs) associated with the generic content depth-damage curves for residential structures provided in Economic Guidance Memorandum (EGM) 01-03, *Generic Depth-Damage Relationships* were used for single family residential structures in HEC-FDA. These relationships calculate content value as a percentage of structure value, based on occupancy type. CSVRs for nonresidential structures were taken from the URS Groups' *Solicitation of Expert Opinion Depth-Damage Function Calculations for the Benefit-Cost Analysis Tool, October 2008,* and are shown below in Table 8.

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Table 8. Occupancy Types and Content-to-Structure Value Ratios

Occupancy Code	Description	CSVR
RES1	Single Family Residential	100.0
RES3A-RES3F	Multi-Family Residential	9.9
RES4	Hotel	25.6
RES5-RES6	Nursing Home	60.4
COM1	Average Retail	34
COM10	Garage	66
COM2	Average Wholesale	70
COM3	Average Personal & Repair Services	66
COM4	Average Professional Technical Services	18.1
COM5	Bank	18.1
COM6	Hospital	43.9
COM7	Average Medical Office	60.4
COM8	Average Entertainment	24.6
EDU1	Average School	6.5
EDU2	Average University	6.5
GOV1	Average Government Services	24.6
GOV2	Average Emergency Response	69.5
IND1-IND2, IND4-6	Industrial Light	38.2
IND3	Warehouse	35.6
REL1	Religious Facilities	6.9

3.2.4. Depth-Damage Functions: Residential

Depth-damage curves relate the percent of structure and content value that is damaged given the depth of inundation and include uncertainty. As noted above, the depth-damage functions and associated standard deviations developed for EGM 01-03, *Generic Depth-Damage Relationships,* were used for single family residential structures. Basements are very uncommon in Hawaii due to the risk of flooding from hurricanes and rivers, high water tables, and mild climate. Additionally, no surveyed structures contained basements, therefore residential depth-damage functions used were for structures without basements. Depth-damage functions are shown in Table 9 for one-story structures.

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Table 9. One Story, No Basement Residential Depth-Damage Function

Depth	Mean of Damage	Standard Deviation of Damage
-2	0%	0.0%
-1	2.5%	2.7%
0	13.4%	2.0%
1	23.3%	1.6%
2	32.1%	1.6%
3	40.1%	1.8%
4	47.1%	1.9%
5	53.2%	2.0%
6	58.6%	2.1%
7	63.2%	2.2%
8	67.2%	2.3%
9	70.5%	2.4%
10	73.2%	2.7%
11	75.4%	3.0%
12	77.2%	3.3%
13	78.5%	3.7%
14	79.5%	4.1%
15	80.2%	4.5%
16	80.7%	4.9%

3.2.5. Depth-Damage Functions: Nonresidential

The depth-damage functions used for multifamily structures and nonresidential structures and contents are based on the 2008 URS Group draft report *Solicitation of Expert Opinion Depth-Damage Function Calculations for the Benefit-Cost Analysis Tool*. Twenty-one core nonresidential structure types were evaluated by a panel of experts from across the United States using historical flood damage data. The resulting data from the panel included nationally relevant depth-damage functions for use in estimating the value of damages from flooding to commercial, industrial, and public structures nationwide. For high-rise residential structures with more than 20 units, the depth-damage curves for Prototype 4A in the *North Atlantic Coast Comprehensive Study Resilient Adaptation to Increasing Risk Physical Depth Damage Function Summary Report, January 2015,* were used. For nonresidential structures, depth-damage function uncertainties are expressed as a triangular distribution.

Note that published depth-damage functions were edited to exclude damage percentages at depths less than zero. This was to avoid erroneously calculating damages for negative depth changes due to noise in the water surface elevation grid cells, and is appropriate for the study area since structures don't have basements. Damage percentages start interpolating from zero feet of depth.

3.2.6. Other Damage Categories

In addition to damages to structures and contents, other damages generally occur in a flood event, and include cleanup costs, other public assistance, and damage to vehicles. This section

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explains these categories in more detail and justifies them as flood damage reduction categories that are included in the calculation of with project benefits.

3.2.6.1. Cleanup Costs

ER 1105-2-100 provides for emergency expenses, which include hazardous and toxic waste cleanup, to be included in damage estimates for flood events. Structures that are inundated in a flood event require post-flood cleanup to remove floodwater, sediment, debris, mold, mildew, and toxins. These cleanup costs are considered a damage category in the calculation of with project benefits and can vary based on the depth of flooding. A depth-damage curve is used to estimate the cost incurred for a given level of inundation in a structure. The depth-damage function for cleanup costs and the maximum value of $19,000 for cleanup costs was derived from online estimates of natural flood damage remediation costs in Pearl City, Oahu, near the study area[6]. The percent damage for a specific depth was calculated by dividing the cleanup cost associated with each depth by the total cleanup cost for the max depth. A structure incurs the maximum cleanup cost when it is inundated with nine feet of water or more. A structure incurs 41 percent of the maximum cleanup cost up to four inches of floodwater, and 79 percent of the maximum cost when between four and eight inches of floodwaters are present.

3.2.6.2. Emergency Costs

Other emergency costs incurred in flood events were calculated by using FEMA's Individuals and Households Program data for DR-4365-HI, which included the flooding on Oahu in April 2018. This data includes the following: Public Assistance (PA) to aid in public debris removal, emergency protective measures, and repair of roads, bridges, water facilities, public buildings, utilities, public parks, and recreation facilities; and Other Needs Assistance (ONA), which includes aid to replace essential household items and moving, storage medical, dental, and funeral expenses caused by the flood. Housing assistance is not included in the analysis.

Actual PA and ONA claims data was gathered from FEMA's website for DR-4365-HI and used to calculate maximum emergency cost values[7]. PA per household was calculated by taking the total sum of public assistance and dividing it by the number of Individual Assistance Applications approved. As of November 2022, nearly $4.5 million in public assistance emergency work grants had been obligated, and 252 individual assistance applications had been approved for IHP. This resulted in a PA per household amount of $17,946. Other needs assistance from this storm event totaled $300,000 as of November 2022 and is based on 252 approved claims. Average ONA per household was calculated to be $2,847. This was added to the PA per household amount for an emergency cost amount of $20,794.

Emergency costs are assigned a depth-damage function that associates a specific depth of flooding to a percentage of the emergency costs in HEC-FDA. Fifty percent of the total value of emergency costs are incurred when water surface elevations are greater than 0.5 feet, while water surface elevations of one foot or greater incur 100 percent of the emergency cost value. This assumes that households must incur a depth of flooding greater than zero to be eligible to file a claim. Thus, structures which are inundated one foot or more above the first-floor elevation would incur public and other needs assistance related costs reflected in the FEMA claims data.

[6] https://www.homeyou.com/hi/water-clean-up-pearl-city-costs
[7] https://www.fema.gov/disaster/4365#funding-obligations

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3.2.6.3. Vehicle Costs

This economic analysis includes vehicle damages for vehicles at residential structures. Historically, vehicles on Oahu have been trapped in flash flooding from localized rain events and have been inundated with mud and water during major storms. Vehicle damages are calculated as a function of the number of vehicles per residence, estimated average value per vehicle, and the depth of flooding above the ground elevation.

To obtain the vehicle replacement value, the average number of available vehicles per household in Honolulu County was taken from the 2021 American Community Survey 1-year estimates available at census.gov. A weight was then calculated based on the percent of households with zero to five cars per households. The weighted average of cars per household was 1.77. Average vehicle cost was calculated by taking the average cost of vehicles posted on Auto Trader, a website for used vehicles. The average used car value from the sample was $30,646, which was multiplied by 1.77 to calculate the total value per household. This total of $54,245 was then multiplied by 0.5 in accordance with EGM 09-04 Table 5 to account for 50 percent of the vehicles being removed from the floodplain with an estimated warning time of six hours or less. The final vehicle replacement value per household is $27,122 and is used in HEC-FDA to calculate auto damages.

Depth-damage functions and associated standard deviations for vehicle damages were taken from EGM 09-04, *Generic Depth-Damage Relationships for Vehicles.* The maximum damage value of $27,122 is applied when flood depths reach seven feet or more.

3.3. Damage Analysis Modeling

Damages modeled in HEC-FDA are the basis for calculating net NED benefits. The structure inventory including values, elevations, depth-damage relationships, and uncertainty parameters, were imported into HEC-FDA along with water surface profiles to compute damages. HEC-FDA damages include physical inundation damages to commercial, industrial, residential, and public structures, and damages to contents and vehicles.

3.3.1. Model Hydraulic and Hydrologic Inputs

Water surface profiles were modeled in HEC-RAS for the FWOP, future with-project (FWP), existing WOP, and existing WP conditions for analysis years 2030 and 2080. Events included in the water surface profiles include the 50%, 20%, 10%, 5%, 2%, 1%, 0.5%, and 0.2% AEP events. Water surface profiles were developed for the base and future years for the without-project condition and for the base and future years for three alternatives.

Gridded raster data from HEC-RAS was spatially joined to structures using ArcGIS Pro 3.1. Each grid cell represents a numbered “station” that is associated with a structure in HEC-FDA. In addition, water surface profiles for reach index stations were included in HEC-FDA. Reaches were spatially joined to structures in ArcGIS and the geospatial reach assignment was used in HEC-FDA to aggregate damages.

Geotechnical functions were not developed for the FDA models since there are no reaches with a potential levee failure.

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3.3.2. Exceedance Probability-Discharge Functions

Exceedance probability-discharge functions are generated from water surface profiles for each geometry, reach, and analysis year. In this FDA model, the graphical method was used to generate probability-discharge functions. Uncertainty was computed using an Equivalent Record Length (N) of 50 years, based on the hydrology from the Validation Study and a series of discussions between the RMC, HEC, the hydrologist, and the economist. This is documented in Appendix B of this report. The “Less Simple” method of Order Statistics was used to approximate uncertainty with a standard normal distribution. Since HEC-FDA 1.4.3 was used, 173 points were included in the standard probabilities for graphical probability functions.

3.3.3. Stage-Discharge Functions

A stage-discharge function is the relationship between the discharge at a river cross section and the water surface elevation produced by that discharge. Stage-discharge functions were retrieved from the RAS output and entered in FDA for each geometry, reach, and analysis year. The probability density function defining uncertainty for the stage-discharge relationship was specified by a normal distribution with a standard deviation of 0.5 feet, held constant at the 10% AEP event.

4. Without-Project NED Analysis and Results

4.1. FWOP Condition

This section describes damages that are expected to occur in the absence of a Federal project in the study area. These damages include damages to structure and structure contents, and other damages, which include vehicle damages, cleanup costs, and emergency costs associated with flooding. Without-project flooding also impacts OSE, which includes loss of life and impacts to tourism, and is quantified in this section.

HEC-FDA software was used to calculate economic damages for this study. Expected annual flood damages are the basis for calculating WP benefits and are vital to the evaluation of the project. Expected annual damages are equal to the mean of all possible values of damage that are derived through Monte Carlo sampling of discharge-exceedance probability relationships, stage-discharge relationships, and stage-damage relationships and their uncertainties. This section presents EAD as estimates due to the time-dependent variance in hydrologic, hydraulic, and economic data. Uncertainty parameters for the exceedance-probability and stage-discharge relationships are described in Section 3.

Without-project conditions for base and future years were developed in HEC-RAS and modeled in HEC-FDA for the study area.

4.2. FWOP Flood Extent

The WOP analysis results are based on RAS raster outputs of the flood extent and depth of flooding, and the spatial relationship between floodwaters and structures. Flood extents for the 10%, 2%, 1%, and 0.2% AEP events for the study area are shown below.

Figure 11 shows the flood extent for the 10% AEP event. Significant flooding from frequent events occurs in reaches AW1, AW2L, AW2R, AW4, AW5, AW7L, AW7R, and AW8L.

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Figure 11. Flood Extent 10% AEP Event

Figure 12 displays the FWOP flood extent for the 2% AEP event. Significant flooding occurs in all reaches except for AW9R and AW9L.

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Figure 12. Flood Extent 2% AEP Event

Figure 13 displays the FWOP flood extent for the 1% AEP Event.

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Figure 13. Flood Extent 1% AEP Event

Figure 14 displays the FWOP flood extent for the 0.2% AEP event.

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Figure 14. Flood Extent 0.2% AEP Event

4.3. Flood Risk: Probability and Consequences

4.3.1. FWOP EAD

Expected annual damages are the estimated consequences of flooding on an annual basis considering a full range of flood events. FWOP EAD are shown in the following tables by reach and damage category.

Table 10 displays the FWOP EAD to structures and structure contents by reach. Aggregate damages are highest in reach AW1 and exceed $28 million. Total FWOP EAD for structures and structure contents are nearly $70 million. Note that Reach AW5 contains the golf course and only two structures. Floodwaters in reach AW9L floodwaters are generally contained in the channel, resulting in a very narrow overbank flood extent and damages near zero.

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Table 10. FWOP EAD (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$18,421	$9,808	$120	$181	$28,530
AW2L	$2,887	$489	$50	$108	$3,534
AW2R	$5,294	$9,024	$248	$275	$14,841
AW3L	$1,284	$265	$3	$225	$1,778
AW3R	$2,311	$533	$135	$25	$3,005
AW4	$3,234	$585	$74	$713	$4,606
AW5	$0	$7	$0	$0	$8
AW6	$664	$397	$45	$0	$1,106
AW7L	$956	$67	$0	$55	$1,077
AW7R	$633	$5,279	$163	$1,611	$7,686
AW8L	$942	$212	$58	$110	$1,322
AW8R	$111	$651	$0	$14	$776
AW9L	$23	$2	$0	$0	$24
AW9R	$1,411	$247	$0	$19	$1,677
Total	**$38,172**	**$27,565**	**$897**	**$3,337**	**$69,971**

Note: values in $000s; FY23 price level

Table 11 displays damages to vehicles, and clean-up and emergency costs that are incurred as the result of flooding. Damages to vehicles exceed $30 million in all reaches. Clean-up costs account for over $700,000 in EAD in all reaches, and emergency costs account for over $1.6 million in EAD in all reaches. Total FWOP EAD in the study area is nearly $100 million.

Table 11. FWOP EAD (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$15,144	$130	$292	$15,566
AW2L	$1,655	$143	$310	$2,108
AW2R	$4,818	$48	$103	$4,969
AW3L	$489	$28	$60	$577
AW3R	$1,224	$45	$95	$1,364
AW4	$2,334	$134	$306	$2,774
AW5	$1	$0	$0	$1
AW6	$339	$16	$34	$389
AW7L	$191	$33	$77	$301
AW7R	$1,319	$33	$76	$1,428
AW8L	$333	$50	$110	$493
AW8R	$127	$7	$16	$150
AW9L	$10	$1	$3	$14
AW9R	$371	$76	$170	$618
Total	**$28,355**	**$744**	**$1,652**	**$30,751**

Note: values in $000s; FY23 price level

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Table 12 displays the number of structures damaged by the 10%, 20%, 1%, and 0.2% AEP events by reach, and the damages associated with each event and reach. Total estimated damages for the 0.2% AEP event is $1.3 billion. Approximately half of these damages occur in reach AW1, where there are high value commercial, apartment, and hotel buildings. Thirty percent of all structures damaged by the 0.2% AEP event are in reach AW1. Damage estimates shown exclude damages to vehicles, emergency costs and cleanup costs.

Table 12. Structure Count and Damages by Event and Reach

Reach	10% AEP Structures	10% AEP Damages	2% AEP Structures	2% AEP Damages	1% AEP Structures	1% AEP Damages	0.2% AEP Structures	0.2% AEP Damages
AW1	222	$78,229	869	$353,507	1,015	$484,565	1,220	$657,491
AW2L	107	$12,496	204	$26,681	247	$34,157	299	$48,329
AW2R	160	$44,973	434	$109,520	552	$143,293	752	$198,788
AW3L	18	$6,581	102	$22,827	135	$32,159	187	$45,476
AW3R	43	$8,979	88	$33,061	102	$39,213	129	$47,997
AW4	70	$8,624	390	$53,229	497	$80,195	638	$124,977
AW5	0	$0	2	$69	2	$223	2	$368
AW6	1	$3	75	$17,039	113	$27,258	135	$38,304
AW7L	23	$4,644	28	$6,774	36	$8,161	42	$10,418
AW7R	34	$23,899	91	$62,164	94	$75,632	101	$93,477
AW8L	58	$4,645	110	$10,457	125	$13,625	144	$17,053
AW8R	5	$804	36	$3,257	44	$5,052	54	$6,577
AW9L	3	$255	12	$1,012	24	$2,075	31	$3,328
AW9R	28	$3,012	58	$9,621	68	$12,415	80	$15,886
Total	**772**	**$197,144**	**2,499**	**$709,219**	**3,054**	**$958,021**	**3,814**	**$1,308,467**

Note: values in $000s; FY23 price level

4.3.2. Future Without-Project Performance by Reach

Project performance statistics help inform the risk of a specific frequency flood event. Three components are indicators of project performance: AEP, long-term exceedance probability (LTEP), and conditional non-exceedance probability (CNEP). AEP is the likelihood flooding occurs in any given year. LTEP is the probability that flooding occurs in a period of 10, 30, or 50 years. CNP, also called assurance, is the probability that flooding does not occur, conditional on a flood event of 2%, 1%, or 0.2% annual frequency occurring.

AEP represents the probability of any event equaling or exceeding a specified stage in any given year. When levees are present, the stage is the top of levee or effective top of levee specified by geotechnical fragility curves. When levees are not present, which is the case in this study, the top of bank elevation is used. In non-leveed reaches, the target stage is determined by the exceedance of a percentage of the mean damage associated with a specified event. The default criteria of five percent of the total damage for the 1% AEP event was used for this study. The following table displays the project performance statistics for the FWOP condition.

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Table 12 shows performance statistics for the FWOP condition. All reaches except for AW3R, AW4, AW6, AW7R, and AW9L have a high probability of flooding in any given year. The probability that banks are overtopped in 30 or 50 years is nearly 100 percent in all reaches except for AW9L. Correspondingly, assurance is low in all reaches except AW9L, where the probability that no flooding occurs given the occurrence of a 2% AEP event is nearly 1.

Table 13. FWOP Performance

Reach	Expected AEP	LTEP 10 Years	LTEP 30 Years	LTEP 50 Years	CNP 2%	CNP 1%	CNP 0.2%
AW1	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW2L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW2R	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW3L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW3R	0.35	0.99	1.00	1.00	0.00	0.00	0.00
AW4	0.36	0.99	1.00	1.00	0.00	0.00	0.00
AW5	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW6	0.14	0.79	0.99	1.00	0.00	0.00	0.00
AW7L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW7R	0.32	0.98	1.00	1.00	0.00	0.00	0.00
AW8L	0.33	0.98	1.00	1.00	0.00	0.00	0.00
AW8R	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW9L	0.01	0.05	0.14	0.22	0.96	0.82	0.49
AW9R	1.00	1.00	1.00	1.00	0.00	0.00	0.00

4.4. Existing Without-Project Condition

This section presents EAD for the existing WOP condition. Hydraulic modeling resulted in minor differences for project impervious area changes between existing and future conditions. As a result, existing and future EAD estimates are similar.

4.4.1. Existing WOP EAD

Table 14 presents existing WOP EAD estimates by reach and structure type. Total existing WOP EAD for structures and structure contents is approximately $63 million. Existing WOP EAD for structures and contents are approximately $6 million lower than the FWOP condition. Table 15 shows that vehicles, clean-up costs, and emergency costs result in EAD of $27 million. Total existing WOP EAD is approximately $90 million, compared to $100 million for the FWOP condition.

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Table 14. WOP EAD (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$14,456	$7,990	$103	$154	$22,703
AW2L	$2,787	$462	$49	$99	$3,396
AW2R	$5,253	$8,976	$245	$272	$14,746
AW3L	$1,284	$265	$3	$225	$1,778
AW3R	$2,311	$533	$130	$25	$3,000
AW4	$2,741	$531	$67	$636	$3,975
AW5	$0	$7	$0	$0	$7
AW6	$664	$397	$45	$0	$1,106
AW7L	$956	$67	$0	$55	$1,077
AW7R	$633	$5,279	$163	$1,611	$7,686
AW8L	$933	$212	$58	$110	$1,313
AW8R	$111	$651	$0	$14	$776
AW9L	$23	$2	$0	$0	$24
AW9R	$1,411	$247	$0	$19	$1,677
Total	**$33,564**	**$25,619**	**$862**	**$3,220**	**$63,265**

Note: values in $000s; FY23 price level

Table 15. Existing WOP EAD (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$12,083	$103	$233	$12,418
AW2L	$1,590	$137	$295	$2,021
AW2R	$4,756	$48	$102	$4,906
AW3L	$489	$28	$60	$577
AW3R	$1,224	$45	$95	$1,364
AW4	$1,961	$113	$259	$2,333
AW5	$1	$0	$0	$1
AW6	$339	$16	$34	$389
AW7L	$191	$33	$77	$301
AW7R	$1,319	$33	$76	$1,428
AW8L	$333	$50	$109	$492
AW8R	$127	$7	$16	$150
AW9L	$10	$1	$3	$14
AW9R	$371	$76	$170	$618
Total	**$24,794**	**$689**	**$1,528**	**$27,010**

Note: values in $000s; FY23 price level

4.4.2. Existing Without Project Performance

Table 16 shows project performance statistics for the existing WOP condition. Project performance statistics are similar to the FWOP condition.

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Table 16. Existing WOP Performance

Reach	Expected AEP	LTEP 10 Years	LTEP 30 Years	LTEP 50 Years	CNP 2%	CNP 1%	CNP 0.2%
AW1	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW2L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW2R	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW3L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW3R	0.35	0.99	1.00	1.00	0.00	0.00	0.00
AW4	0.26	0.95	1.00	1.00	0.00	0.00	0.00
AW5	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW6	0.14	0.79	0.99	1.00	0.00	0.00	0.00
AW7L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW7R	0.32	0.98	1.00	1.00	0.00	0.00	0.00
AW8L	0.33	0.98	1.00	1.00	0.00	0.00	0.00
AW8R	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW9L	0.01	0.05	0.14	0.22	0.96	0.82	0.49
AW9R	1.00	1.00	1.00	1.00	0.00	0.00	0.00

4.5. Without-Project Equivalent Annual Damages

This section presents equivalent annual damages for the WOP condition. To obtain equivalent annual damages, expected annual damages are interpolated between existing and future years and discounted back to present value in HEC-FDA. As previously noted, existing WOP and FWOP EAD estimates are similar, and therefore equivalent annual damages are near FWOP EAD estimates. Equivalent damages were calculated using the current federal discount rate of 2.5 percent.

Table 17 and Table 18 display equivalent annual damage estimates for structures and contents, and other damage categories. Equivalent annual damages for structures and contents are nearly $66 million. Auto, clean-up, and emergency cost equivalent annual damages exceed $28 million. Total WOP equivalent annual damages exceed $94 million.

Table 17. WOP Equivalent Annual Damages 2.5% (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$16,001	$8,699	$109	$165	$24,974
AW2L	$2,826	$472	$49	$102	$3,450
AW2R	$5,269	$8,995	$246	$273	$14,783
AW3L	$1,284	$265	$3	$225	$1,778
AW3R	$2,311	$533	$132	$25	$3,002
AW4	$2,933	$552	$70	$666	$4,221
AW5	$0	$7	$0	$0	$7
AW6	$664	$397	$45	$0	$1,106
AW7L	$956	$67	$0	$55	$1,077

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AW7R	$633	$5,279	$163	$1,611	$7,686
AW8L	$937	$212	$58	$110	$1,317
AW8R	$111	$651	$0	$14	$776
AW9L	$23	$2	$0	$0	$24
AW9R	$1,411	$247	$0	$19	$1,677
Total	**$35,360**	**$26,377**	**$876**	**$3,265**	**$65,878**

Note: values in $000s; FY23 price level

Table 18. WOP Equivalent Annual Damages 2.5% (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$13,275	$113	$256	$13,645
AW2L	$1,615	$139	$301	$2,055
AW2R	$4,780	$48	$102	$4,931
AW3L	$489	$28	$60	$577
AW3R	$1,224	$45	$95	$1,364
AW4	$2,106	$121	$277	$2,505
AW5	$1	$0	$0	$1
AW6	$339	$16	$34	$389
AW7L	$191	$33	$77	$301
AW7R	$1,319	$33	$76	$1,428
AW8L	$333	$50	$110	$492
AW8R	$127	$7	$16	$150
AW9L	$10	$1	$3	$14
AW9R	$371	$76	$170	$618
Total	**$26,181**	**$710**	**$1,576**	**$28,468**

Note: values in $000s; FY23 price level

5. Other Social Effects WOP Condition

Engineering Regulation 1105-2-100 Appendix D identifies categories that directly relate to the quality of individuals' lives and their communities that may be included in the OSE account, specifically: urban and community impacts; life, health, and safety factors; displacement; long-term productivity; and energy requirements and energy conservation. Selected categories that are relevant to decision making should be reported for each alternative plan.

5.1. Life Safety Analysis

Life loss qualifies as an Other Social Effects (OSE) category. A life safety analysis includes the estimation of the population at risk and associated statistical parameters for life loss. For this analysis, life loss was calculated using LifeSim 2.0.5 for the future without project (FWOP) condition and future with project (FWP) condition for the final array of alternatives. This software uses Monte Carlo simulation to estimate the number of individuals at risk of life loss by probabilistic event for nighttime and daytime populations. Life loss was calculated for each

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frequency event used in the HEC-FDA model. The hydraulic results of the FWOP and FWP conditions were compared to estimate residual life loss after the project is implemented and to assess life safety risk during flood events at various flood frequencies. Inputs, assumptions, modeling results, and average annual life loss calculations are detailed in subsequent sections.

5.1.1. Data Sources and Input Parameters

5.1.1.1. Structure Inventory

The structure inventory was developed from the USACE National Structure Inventory (NSI) 2022 data. The inventory was developed using building footprints, parcel data, CoreLogic data, FEMA Hazards US (HAZUS) data, and census data. The inventory was calibrated in high-risk areas using aerial imagery and flood inundation maps. Population values are representative of 2020 estimates and are based on 2010 census block data and 2020 county data.

Structure placement and structure attributes in the LifeSim models will not exactly match the structure placement and structure attributes used in the HEC-FDA modeling. The number of structures inundated by event and by alternative will vary between the HEC-FDA model and the LifeSim model. NSI 2022 was utilized due to the quality of the population data, which is one of the key elements of the life safety analysis.

5.1.1.2. LifeSim Uncertainty Parameters

The LifeSim software follows a warning and response timeline of events beginning with the identification of the hazard (e.g., overbank flow starts) and ending with the public taking protective action (also known as mobilization). The warning and response timeline in LifeSim follows events that would occur during a flooding emergency. The timeline is shown below in Figure 15; the real-world actions are shown in blue, and the corresponding LifeSim model parameters are shown below in white.

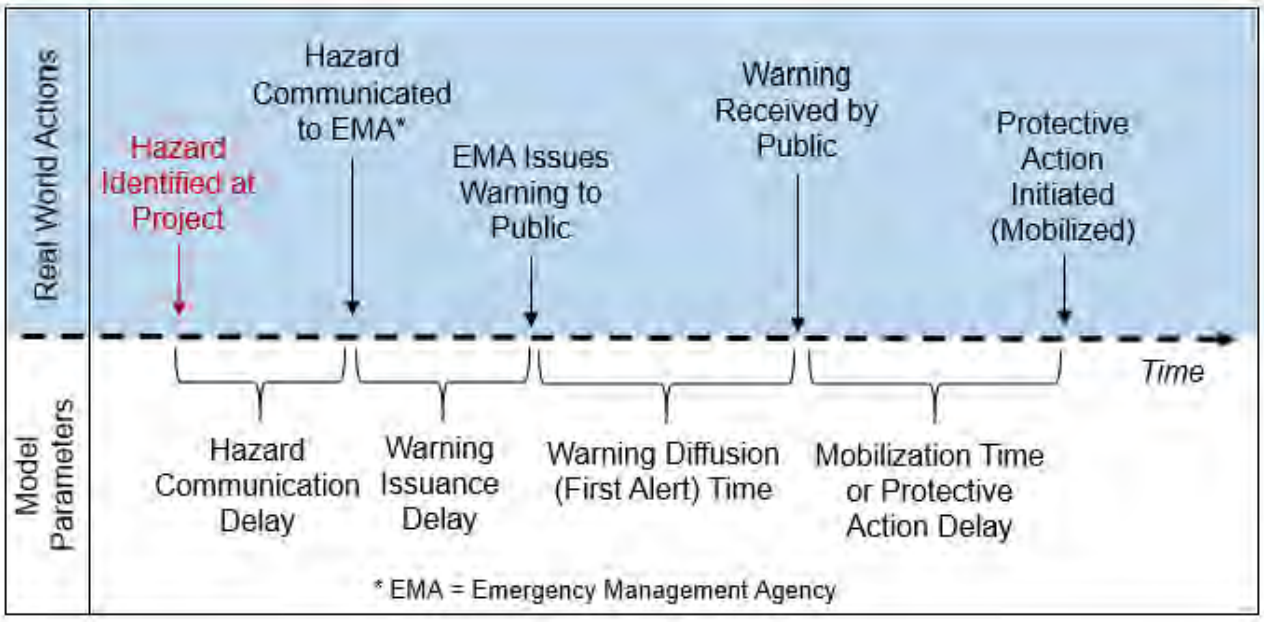

Figure 15. LifeSim Warning and Response Timeline

The definitions of the LifeSim uncertainty parameters are below:

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- Imminent Hazard Identification Time: The time at which a potential hazard is about to occur or is actively occurring and local emergency officials should be alerted so they can begin the warning and evacuation process. This parameter is often referred to as the "warning time".
- Hazard Communication Delay: The time it takes to contact local emergency officials to alert them of the hazard.
- Warning Issuance Delay: The time it takes the local emergency officials to issue a warning/evacuation order, which includes the time it takes to craft a warning message and/or get approval from other authorities to send out the warning message to the public.
- Warning Diffusion Time: The time it takes to disseminate a warning to the public using various communication channels (e.g., reverse 911, route alerting, social media).
- Protective Action Initiation Delay: The time it takes the public to evacuate once they have received a warning.

The study area was divided into four Emergency Planning Zones (EPZ's) due to the unique hydraulic characteristics and hydrologic timing of each area. Each area either floods from a different source or begins flooding at a different time than the other areas. All EPZ's are assigned the same warning duration relative to when flooding begins in that respective area. The Imminent Hazard Identification Times (i.e., warning times) for each EPZ's 2-4 were set relative to the hazard occurrence time of EPZ 1. The EPZ's are shown in Figure 16 below.

The Imminent Hazard Identification Times were determined through discussion with the hydrologic engineer. All AEP events are characteristic of flash flooding, and it is anticipated that there would be minimal forecasting or warning to the population to evacuate. The warning times reflect the flashy nature of the system. Warning times were extended for the lower frequency events starting at the 1% AEP event since these events would be forecasted further in advance than the higher frequency events. The warning times are displayed in Table 19.

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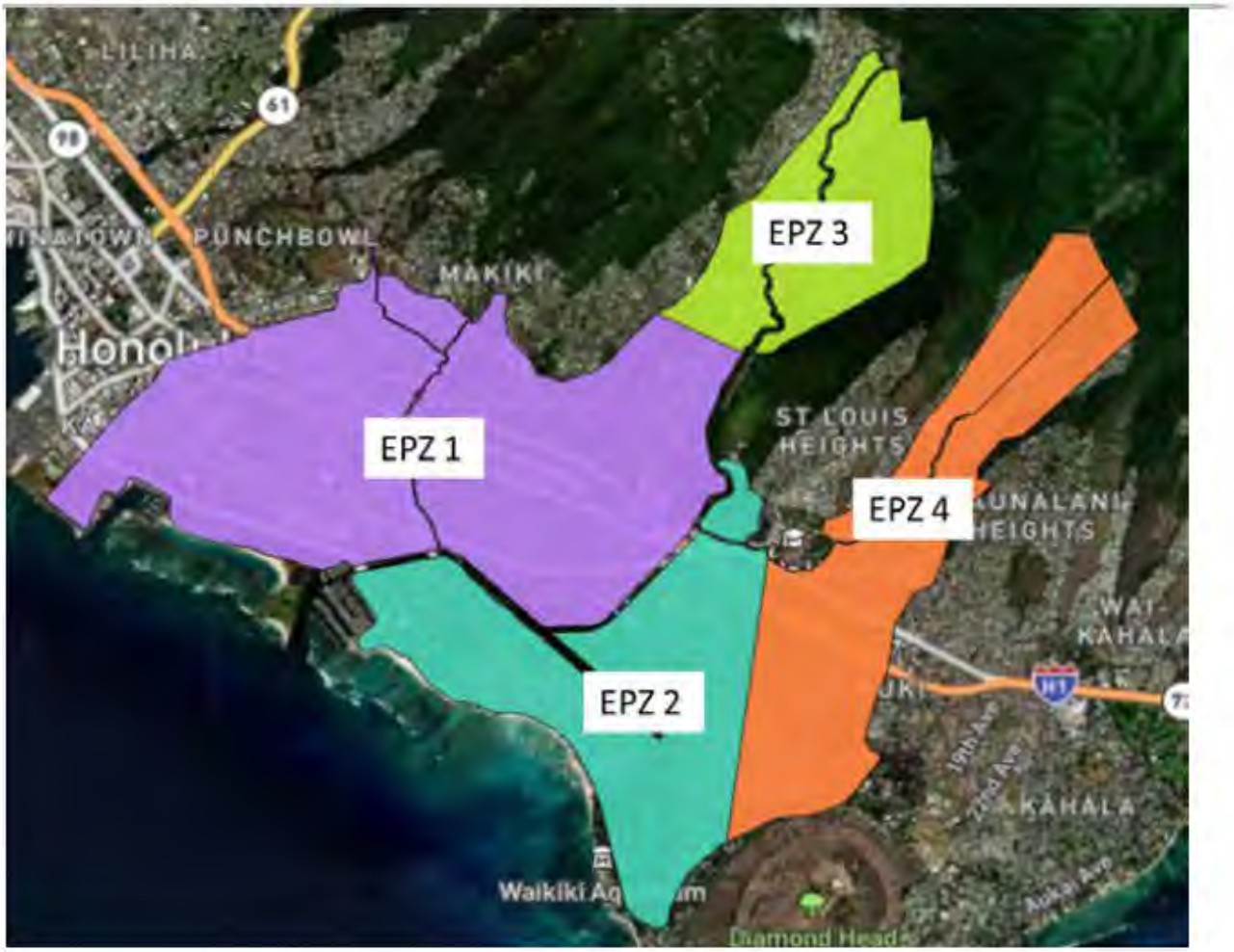

Figure 16. LifeSim Emergency Planning Zones

Table 19. Relative Warning Times, Uniform Distribution

Event	Min Warning Time (Hours)	Max Warning Time (Hours)
0.2% AEP	-4	0
0.5% AEP	-4	0
1% AEP	-4	0
2% AEP	-4	0
5% AEP	-2	0
10% AEP	-2	0
20% AEP	-2	0
50% AEP	-2	0

The uncertainty parameters in LifeSim, including Warning Issuance Delay, the Warning Diffusion curves, and the Protective Action Initiation (PAI) curve, utilize the preset Unknown curves. The Hazard Communication Delay was set to a uniform distribution of 0.01 to 0.5 hours. This LifeSim modeling method follows the MMC-MCX FY23 Standard Operating Procedures for consequence modeling, which is appropriate to use when there is limited information available

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regarding local emergency action planning and risk awareness. These curves allow for significant uncertainty regarding how quickly a warning would be disseminated to the public and what percentage of the public would take protective action. For each event, 1,000 Monte Carlo iterations were simulated. The LifeSim curves used in the Ala Wai model are displayed below.

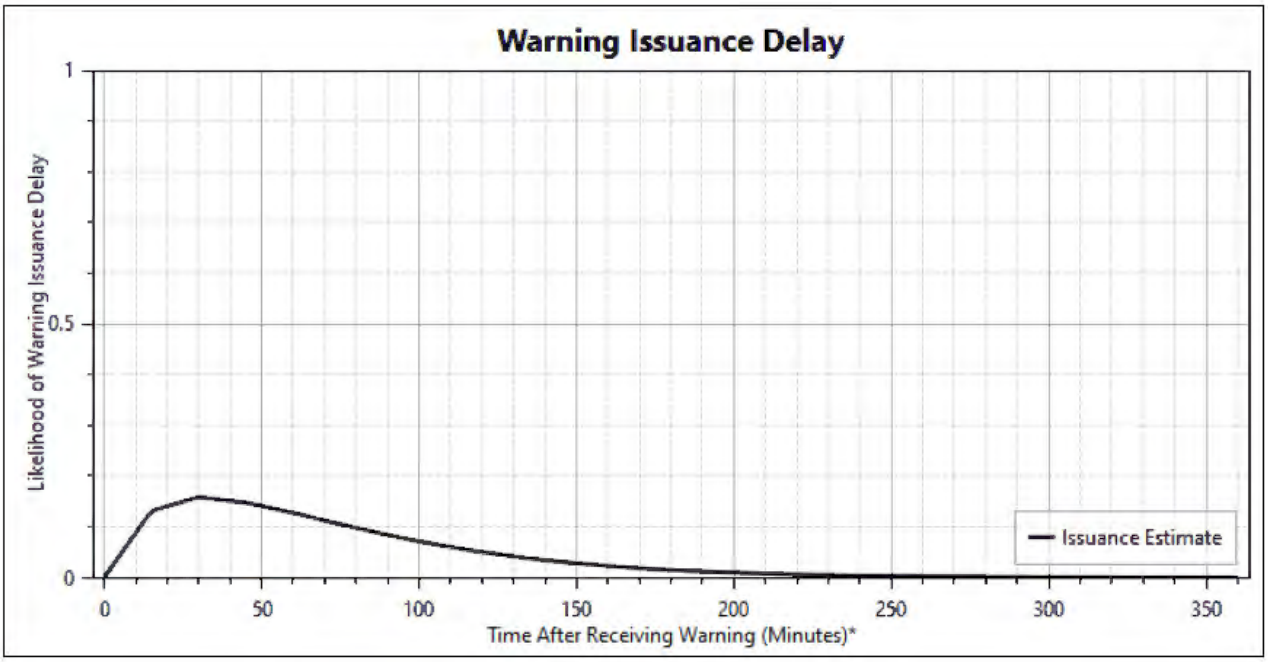

Figure 17. Unknown Warning Issuance Delay Curve

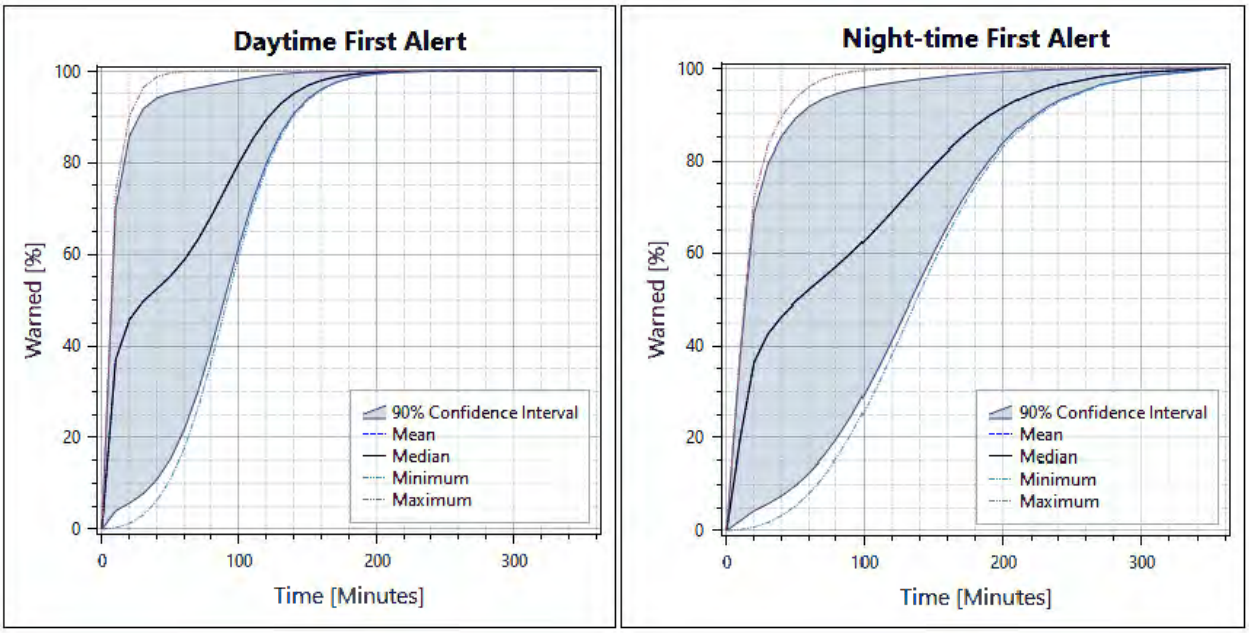

Figure 18. Unknown Warning Diffusion Curve

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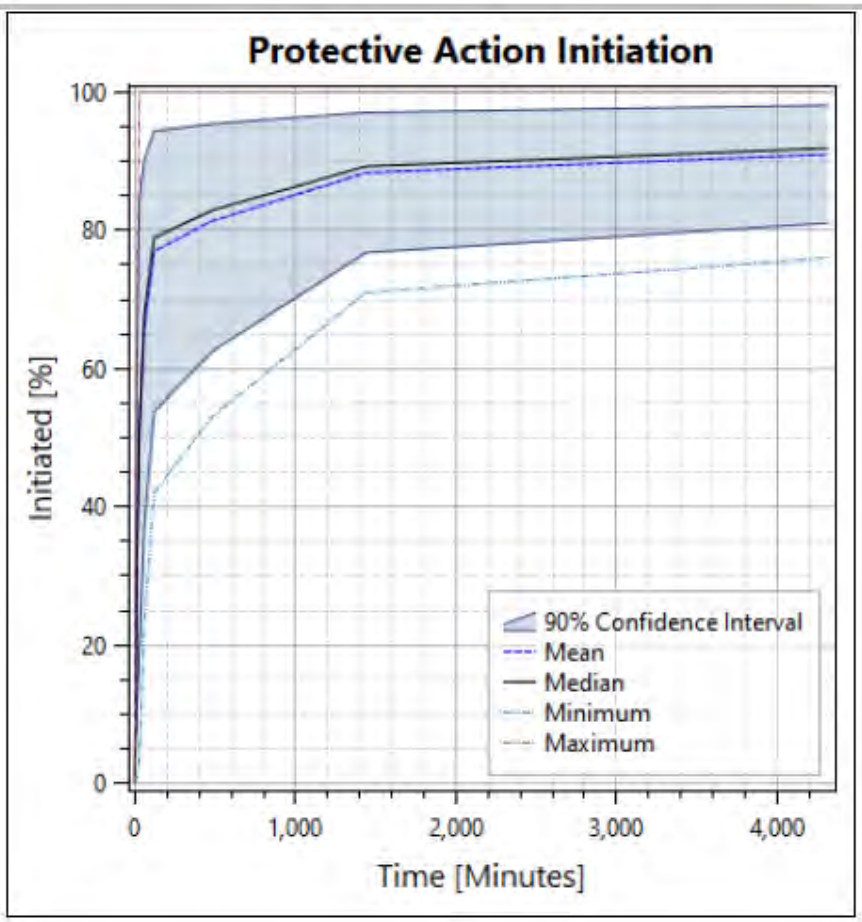

Figure 19. Unknown/Perception: Unknown warning PAI Curve

5.1.2. Ala Wai Life Safety Risk

The three major streams modeled in the Ala Wai watershed are the Makiki, Manoa, and Palolo streams. The Manoa and Palolo streams join to form the Manoa-Palolo Canal. The Manoa-Palolo Canal, Makiki Stream, and three low-lying drainage areas empty into the Ala Wai Canal. The HEC-RAS modeling utilized unsteady flow with 1D modeling in the stream channels and 2D modeling in the overbank extents. This allows for depths, velocities, and arrival times to be generated and imported into the LifeSim software. The modeling extent covers major streams and tributaries of the watershed.

The Ala Wai LifeSim model includes FWOP hydraulic conditions and FWP hydraulic conditions for Alternatives 1, 2B, and 5.3. The neighborhoods who experience life loss under the FWOP condition are shown in Figure 20.

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Figure 20. Communities with Expected Life Loss

5.1.2.1. FWOP Life Safety Risk

Table 20 shows the FWOP life safety results for Ala Wai, including the the number of structures inundated, PAR, average life loss, average depth on structures, and average velocity on structures. As shown in Table 2, each event inundates several structures, and depths and velocities are significant enough to cause fatalities on average starting at the 5% AEP event. The 0.2% AEP event results in the highest flood depths, which causes daytime and nighttime average life loss to increase to 6 and 5, respectively.

Communities expected to experience life loss include Waikiki, Ala Moana, Kakaako, Pawaa, Makiki, McCully-Moiliili, Manoa, Palolo, and Kapahulu. Both the University of Hawaii at Manoa and Hokulani Elementary School sampled life loss. The maximum depth and velocity at the university are 14.5 ft and 0.9 ft/s. The maximum depth and velocity at the elementary school are 5.2 ft and 1.1 ft/s. The maximum depth and velocity of all inundated structures are 14.6 ft and 16.2 ft/s.

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Both Waikiki and McCully-Moiliili experience much of the life loss, and McCully-Moiliili has been identified as a low-income area. The average depth and velocity of structures with life loss in Waikiki are 2.3 ft and 0.5 ft/s. The average depth and velocity of structures with life loss in McCully-Moiliili are 3.0 ft and 0.8 ft/s. The average depth and velocity of structures with life loss around the elementary school are 6.8 ft and 4.0 ft/s.

Table 20. Ala Wai FWOP Life Safety Risk by AEP Event

Hydraulic Scenario	Structures Inundated	Population at Risk		Average Life Loss		Max Life Loss		Average Depth (ft)	Average Velocity (ft/s)
		Day	Night	Day	Night	Day	Night		
0.2% AEP (500yr)	5,518	62,268	58,149	6	5	23	19	2.02	1.34
0.5% AEP (200yr)	5,060	58,026	54,109	3	3	15	19	1.75	1.23
1% AEP (100yr)	4,640	51,576	50,149	2	1	10	11	1.49	1.15
2% AEP (50yr)	4,065	44,333	44,939	1	1	7	5	1.27	1.03
5% AEP (20yr)	2,910	29,475	31,359	1	1	5	5	0.97	0.89
10% AEP (10yr)	1,691	15,810	17,509	0	0	4	5	0.81	0.84
20% AEP (5yr)	760	7,088	6,927	0	0	5	3	0.74	0.89
50% AEP (2yr)	121	790	1,050	0	0	0	3	0.44	0.37

Figure 21 shows the average nighttime life loss for the 0.2% AEP event. The heat map indicates whether life loss occurred during any of the 1,000 sample iterations. Green portions of the heat map indicate that life loss occurred in that area for a few iterations. Yellow, orange, or red portions of the heat map indicate that life loss occurred in that area for several iterations.

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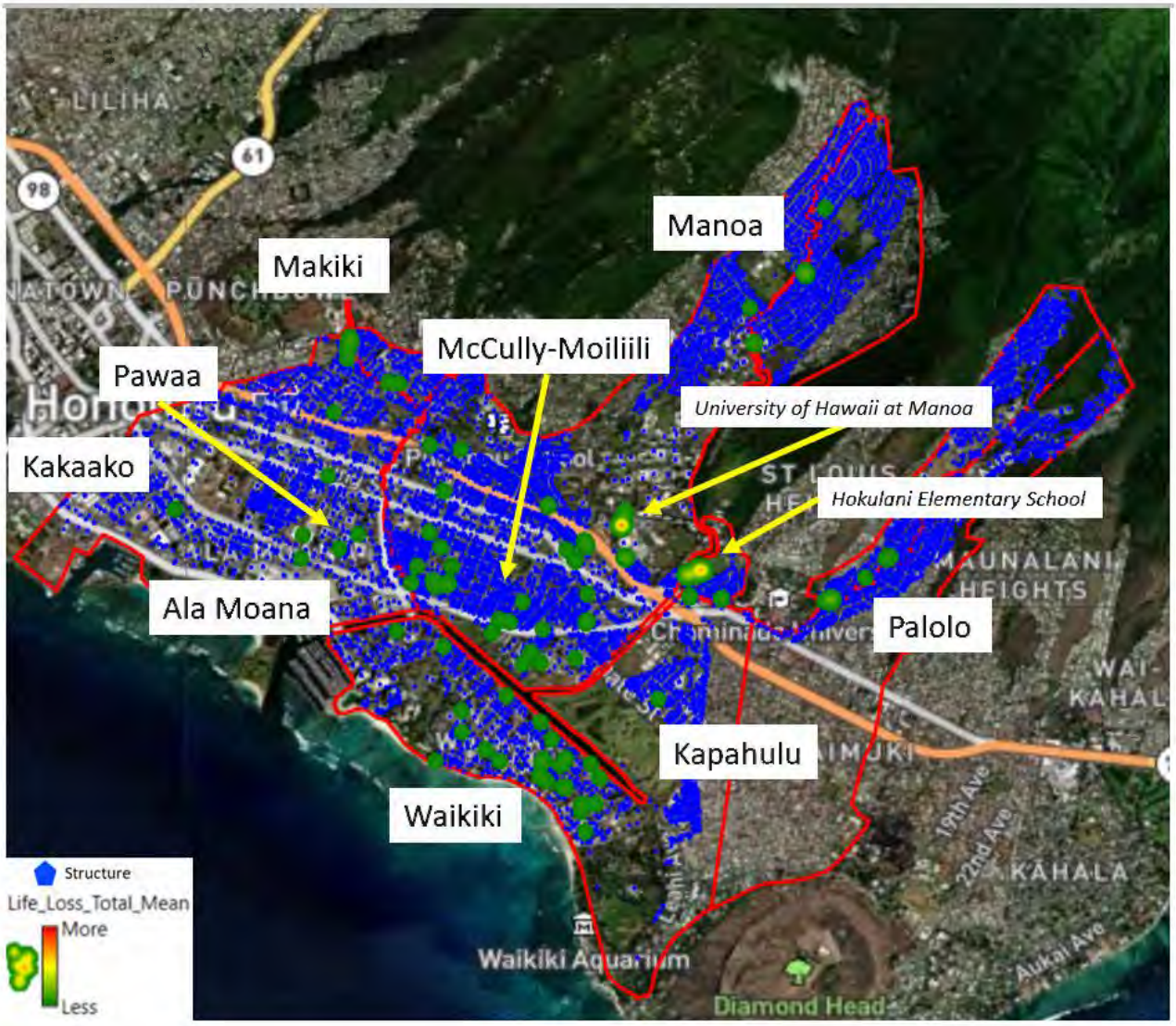

Figure 21. FWOP 0.2% AEP Average Night Life Loss Heat Map

5.1.2.2. FWOP Expected Annual Life Loss

The Risk Management Center (RMC) TotalRisk 1.0 software was used to estimate Expected Annual Life Loss (EALL) from the LifeSim outputs. RMC-TotalRisk 1.0 considers the full range of life loss uncertainty results from LifeSim, including daytime and nighttime results, and uses Monte Carlo simulation to calculate the average of all sampled distributions. The EALL calculations do not include hydrologic and hydraulic uncertainty like damage estimates do.

Table 21 shows that EALL for the FWOP condition is 0.09. Under the without project condition, life loss occurs only at very low frequency events, and average annual life loss is near zero.

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Table 21. FWOP EALL

Scenario	Expected Annual Life Loss
FWOP	0.0491

5.2. Tourism and Recreation

The study area includes Ala Moana and Waikiki beaches which are frequented by residents and tourists and provide land access to some of the most famous surf breaks on Oahu. Beach and ocean related recreation is a central part of the community and is the primary reason visitors frequent the island. Beaches provide recreational, cultural, and commercial value to the economy, and provide the local ecosystem with vital habitats. Recreational activities include walking, running, swimming, bird watching, whale watching, surfing, diving, snorkeling, kayaking, windsurfing, and canoeing. Beaches in the study area are freely accessible to the public, and visitor spending provides significant economic value to Honolulu and the State of Hawaii. Table 21 shows visitor count and expenditures for 2019, prior to COVID-19 mandates being adopted, and for 2021, the latest year full data is available (note major COVID-19 mandates that restricted travel were still in place in 2021).

Tourism data from prior to and during the COVID-19 pandemic shows that an external shock causing decreased tourism would result in less spending in the region, which would negatively impact the local economy. In 2019, the number of yearly visitors to Oahu by air was 6.2 million. In 2020 with COVID-19 mandates in place, this number decreased to 1.5 million, and visitors from U.S. markets spent approximately $1,400 per person per trip in 2020 dollars. Domestic tourism spending decreased from about $8 billion in 2019 to $2 billion in 2020 as a result of the COVID-19 pandemic. Per visitor per trip spending for U.S. market air travelers for Oahu as of November 2022 was $1,800. The significant economic impact of decreased tourism during 2020 due to the COVID-19 pandemic provides insight into the economic impacts of potential decreased tourism if significant flooding were to occur near Ala Moana and Waikiki.

Table 22. Tourism Data for the Island of Oahu (Honolulu County)

Category	2021 YTD	2019 YTD	Percent Change
Total Expenditures (Millions of $)	$5,660	$8,140	-30.5
Visitor Arrivals (Air)	3,330,948	6,154,248	-45.9
Average Daily Census	73,923	114,596	-35.5

Source: Hawai'i Department of Business, Economic Development & Tourism

Figure 15 shows how disruptions to tourism, caused by the COVID-19 pandemic, resulted in high unemployment in urban Honolulu. In March 2020, there was a clear drop in employment of roughly 100,000 individuals in the area, which corresponded with travel restrictions for tourists taking effect. The number of individuals employed in the leisure and hospitality industry decreased from 76,000 to 38,000 from February 2020 to April 2020 in urban Honolulu. During this same time period, the number of unemployed individuals increased from 9,000 to 82,000.

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Over half of the number of unemployed individuals in urban Honolulu during the initial COVID-19 mandates came from the leisure and hospitality industry. This data shows that tourism and recreation account for a major portion of economic activity in the study area, and that tourism-driven economic activity is sensitive to external shocks.

In the absence of a federal project, inundation in the study area, particularly near access points to beaches, harbors, and the hotel zone of Waikiki, could negatively impact tourism and local recreation. If a future storm event were to have a major negative impact on tourism, the impact on the local economy would be significant.

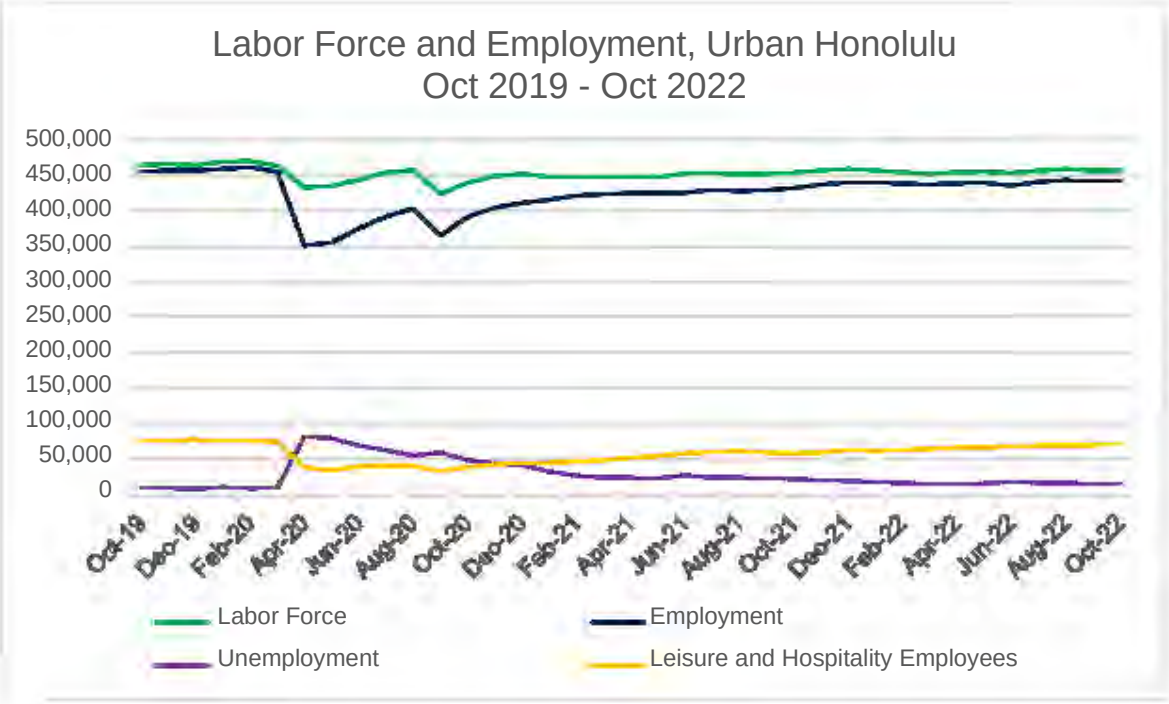

Figure 22. Labor Force and Employment

Source: data.bls.gov/timeseries

5.3. Social Vulnerability

Socially vulnerable populations have characteristics which may result in their being impacted more negatively than other populations, or the population on average. The presence of socially vulnerable populations was evaluated during the formulation of alternative plans using census data and the CDC's Social Vulnerability Index presented in Figure 8 of Section 2.2. Social Vulnerability Index scores are highest in portions of reaches AW2R, AW3L, AW3R, and AW9R and lowest in reaches AW8L and AW8R. Apart from reaches AW8R and AW8L, all reaches in the study area contain some census tracts with moderate to high social vulnerability scores, including scores ranging from 0.5 to above 0.8. In the absence of a federal project, these socially vulnerable communities will continue to be susceptible to flood risk.

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6. With-Project Alternatives Analysis

6.1. With-Project Analysis Overview

To evaluate each alternative plan, alternatives were modeled in HEC-FDA for each plan and year. Equivalent annual damages for the WOP condition were compared to the with-project equivalent annual damages for each alternative to estimate damages reduced, or benefits of each alternative plan. Alternatives were modeled for three structural plans in FDA and comprise the final array of alternatives: Alternative 1, Alternative 2b, and Alternative 5.3.

Separately, a nonstructural only plan was evaluated using FWOP FDA outputs and a nonstructural workbook developed by USACE Omaha District. The result for the nonstructural only plan resulted in lower net benefits than the structural alternatives and was eliminated from the final array. Following the TSP milestone, the PDT analyzed whether combining nonstructural measures in some reaches with the structural TSP plan would be feasible. It was determined that nonstructural measures would only be feasible in reaches that also benefited from the structural plan, and the structural plan had higher overall net benefits. Reaches not benefitting from the structural plan include reaches AW5, AW8L, AW8R, and AW9L. These reaches had nonviable BCRs for nonstructural measures. Notably, these reaches had much lower FWOP damages than other reaches in the study area.

6.2. Description of the Final Array of Alternatives

This section describes the final array of alternatives, which includes three structural alternatives that were modeled in HEC-FDA. These alternatives were compared to the WOP condition, or the no-action plan in order to estimate benefits. Under the no-action plan, structures would be subject to flood risk, resulting in economic damages as outlined in Section 4.

6.2.1. Alternative 1

Alternative 1 was formulated to maximize flood storage throughout the basin and includes the following measures: Kanaha floodwall and Maikiki Park detention basin, Manoa Park detention basin, Woodlawn Drive floodwall, Koaki Road floodwall, Kaimuki High School floodwall, and the Ala Wai Golf Course detention basin.

The Kanaha floodwall would be placed along Kanaha Ditch and measure 6 feet in height along the right bank. The Maikiki Park detention basin would measures 450 feet by 250 feet and provide approximately 21.6 ac-ft of storage. The Manoa Park detention basin would be 700 feet by 600 feet and provide approximately 54.1 ac-ft of storage. The Woodlawn Drive floodwall would be constructed along the right bank of the Manoa Stream and would be approximately 6 feet in height. This floodwall protects the area west and south of the Manoa Stream at Woodland Drive and prevents overland flooding that moves south to the University of Hawaii. The Koali Road floodwall would be constructed along the left bank of the Manoa Stream to contain floodwaters that leave the channel at the Kanewai Community Park and along Koali Road. The floodwall would be a maximum height of 6 feet. The Koali Road floodwall is necessary to mitigate for increased discharge from the Woodlawn Drive floodwall. The Kaimuki High School floodwall would be approximately 5 ft in height and prevent inundation in residential areas east of Kaimuki High School. The Alai Wai Golf Course Detention area would place an inline structure on the Palolo Stream that includes five culverts that pass normal flows and divert high flows to the golf course detention area, with berms surrounding the golf course on the north

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and east perimeters. Detailed specifications for these measures are included in the H&H Appendix.

6.2.2. Alternative 2b

Alternative 2b was designed to maximize conveyance of floodwaters through the main channels in the watershed. This alternative includes the Kanaha floodwall and Makiki District Park detention basin, Woodlawn Drive floodwall, Koali Road floodwall, Kaimuki High School floodwall and Ala Wai Canal floodwall.

The Ala Wai Canal floodwall extends on the left bank from the most upstream end of the Ala Wai Canal back to the mouth of the canal. The right bank of the floodwall extends from the right bank of the Manoa-Palolo Canal near Lunalilo Parkway to the confluence with the Ala Wai Canal and continues along the right bank of the Ala Wai Canal to the mouth of the canal. Detailed specifications for this measure are included in the H&H Appendix.

6.2.3. Alternative 5.3

Alternative 5.3 is a more detailed version of Alternative 5, which was presented at the TSP Meeting and initially included the Kanaha floodwall and Makiki District Park detention area, Manoa District Park detention area, Woodlawn Drive floodwall, Koali Road floodwall, Ala Wai Canal Floodwall with Kaimuki High School Floodwall and Ala Wai Golf Course detention area. After initial modeling in RAS and FDA showed induced water surface elevations and damages from the Makiki and Manoa detention areas, and the Kanaha floodwall wasn't economically justified, the Makiki District Park detention area, Kanaha floodwall, and Manoa District Park detention area were removed from the alternative and the alternative was re-modeled in RAS and FDA prior to the selection of the Alternative as the TSP. Note that the Kanaha floodwall and Makiki detention area needed to be justified by using only damages from downstream of the river station that met the 800 cfs discharge requirement, which means that damages in 3R and 3L were excluded when evaluating whether to retain these measures. Alternative 5.3 was achieved by refining floodwall alignments and increasing the berm height around the Ala Wai Golf Course detention area. Several iterations of this alternative were modeled between the selection of the TSP and the release of the Draft Report to optimize project performance, including floodwalls along Makiki between Reaches 2R and 2L, and several different levee heights. Ultimately, Alternative 5.3 represents the version which optimized project performance.

6.3. With-Project Annual Damages and Benefit Summaries

This section displays the with-project damages and benefits for the final array of alternatives. Residual damages that occur with each alternative plan in place are also displayed in this section.

6.3.1. Alternative 1 With-Project EAD

Expected annual damages for the WP and FWP conditions are the basis for calculating equivalent annual damages and benefits. With-project EAD are presented in this section.

Table 23 and Table 24 display WP EAD for Alternative 1 under existing conditions. Damages to structures and contents are approximately $46 million, while damages from vehicles, clean-up costs, and emergency costs are approximately $21 million.

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Table 23. Alternative 1 WP EAD Existing Condition (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$7,908	$5,985	$83	$102	$14,079
AW2L	$3,130	$521	$60	$116	$3,826
AW2R	$5,022	$9,618	$250	$269	$15,159
AW3L	$1,358	$237	$2	$233	$1,829
AW3R	$4	$4	$1	$0	$9
AW4	$4,156	$675	$77	$1,496	$6,404
AW5	$0	$6	$0	$0	$6
AW6	$335	$221	$30	$0	$587
AW7L	$88	$7	$0	$54	$148
AW7R	$131	$175	$2	$63	$370
AW8L	$1,037	$222	$65	$121	$1,445
AW8R	$160	$639	$0	$11	$810
AW9L	$23	$2	$0	$0	$24
AW9R	$1,399	$247	$0	$19	$1,665
Total	**$24,751**	**$18,559**	**$569**	**$2,484**	**$46,362**

Note: values in $000s; FY23 price level

Table 24. Alternative 1 WP EAD Existing Condition (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$7,704	$58	$134	$7,896
AW2L	$1,682	$144	$309	$2,135
AW2R	$4,787	$39	$84	$4,910
AW3L	$527	$28	$64	$620
AW3R	$3	$0	$0	$3
AW4	$3,001	$188	$422	$3,611
AW5	$0	$0	$0	$0
AW6	$194	$8	$17	$219
AW7L	$15	$4	$8	$26
AW7R	$115	$6	$9	$130
AW8L	$351	$55	$122	$528
AW8R	$139	$10	$23	$172
AW9L	$10	$1	$3	$14
AW9R	$368	$76	$169	$613
Total	**$18,897**	**$617**	**$1,363**	**$20,877**

Note: values in $000s; FY23 price level

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Table 25 and Table 26 display WP EAD for Alternative 1 under the future condition. Total EAD for the future condition is $68 million. The difference between existing and future EAD for Alternative 1 is approximately $700,000.

Table 25. Alternative 1 WP EAD Future Condition (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$9,006	$6,336	$84	$102	$15,528
AW2L	$2,908	$527	$32	$116	$3,584
AW2R	$4,656	$9,227	$248	$264	$14,395
AW3L	$966	$170	$6	$142	$1,283
AW3R	$6	$5	$0	$1	$13
AW4	$4,550	$658	$76	$1,803	$7,087
AW5	$0	$8	$0	$0	$8
AW6	$345	$220	$32	$0	$597
AW7L	$87	$7	$0	$53	$147
AW7R	$119	$139	$1	$61	$321
AW8L	$883	$220	$65	$121	$1,289
AW8R	$163	$644	$0	$12	$818
AW9L	$20	$2	$0	$0	$22
AW9R	$1,333	$230	$0	$11	$1,573
Total	**$25,042**	**$18,393**	**$545**	**$2,686**	**$46,666**

Note: values in $000s; FY23 price level

Table 26. Alternative 1 WP EAD Future Condition (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$8,313	$66	$149	$8,527
AW2L	$1,691	$145	$314	$2,150
AW2R	$4,443	$37	$79	$4,559
AW3L	$369	$20	$45	$434
AW3R	$4	$0	$0	$5
AW4	$3,312	$210	$469	$3,992
AW5	$1	$0	$0	$1
AW6	$198	$8	$18	$223
AW7L	$15	$4	$7	$26
AW7R	$101	$5	$9	$115
AW8L	$323	$46	$103	$472
AW8R	$140	$10	$23	$173
AW9L	$9	$1	$3	$12
AW9R	$347	$73	$161	$581
Total	**$19,264**	**$626**	**$1,380**	**$21,270**

Note: values in $000s; FY23 price level

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6.3.2. Alternative 1 Equivalent Annual Benefits

Equivalent annual benefits are calculated as the difference between equivalent annual WOP and WP damages for each alternative. Since EAD for existing and future conditions are similar, equivalent annual with-project damages are similar to EAD estimates. Table 27 displays equivalent annual benefits for Alternative 1 by reach. Implementing this alternative results in equivalent annual benefits of nearly $27 million. Reach AW1 experiences the largest reduction in damages, while nearly $4 million of damages are induced in reach AW4.

Table 27. Alternative 1 Equivalent Annual Benefits 2.5%

Reach	Structure and Contents	Other Damages	Total
AW1	$10,330	$5,503	$15,833
AW2L	-$282	-$86	-$368
AW2R	-$79	$158	$79
AW3L	$161	$29	$191
AW3R	$2,991	$1,360	$4,351
AW4	-$2,449	-$1,255	-$3,704
AW5	$0	$1	$1
AW6	$515	$168	$684
AW7L	$929	$275	$1,204
AW7R	$7,335	$1,304	$8,639
AW8L	-$68	-$14	-$81
AW8R	-$37	-$22	-$59
AW9L	$1	$1	$1
AW9R	$48	$17	$65
Total	**$19,397**	**$7,438**	**$26,835**

Note: values in $000s; FY23 price level

6.3.3. Alternative 2b With-Project EAD

Table 28 and Table 29 display WP EAD for Alternative 2b under the existing condition, which is approximately $37 million for structures and contents and $14 million for other damages. Total WP EAD is just over $50 million.

Table 28. Alternative 2b WP EAD Existing Condition (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$757	$545	$7	$17	$1,327
AW2L	$1,656	$306	$17	$50	$2,029
AW2R	$8,427	$13,460	$436	$395	$22,717
AW3L	$1,245	$180	$19	$155	$1,599
AW3R	$152	$77	$16	$8	$253
AW4	$1,898	$286	$33	$308	$2,525
AW5	$1	$22	$0	$0	$22

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AW6	$1,178	$550	$82	$1	$1,810
AW7L	$102	$8	$0	$59	$169
AW7R	$124	$185	$3	$73	$385
AW8L	$981	$243	$73	$135	$1,433
AW8R	$114	$651	$0	$13	$778
AW9L	$23	$2	$0	$0	$24
AW9R	$1,401	$247	$0	$19	$1,667
Total	**$18,059**	**$16,761**	**$686**	**$1,232**	**$36,737**

Note: values in $000s; FY23 price level

Table 29. Alternative 2b WP EAD Existing Condition (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$755	$5	$12	$772
AW2L	$740	$63	$136	$939
AW2R	$7,821	$64	$139	$8,024
AW3L	$453	$26	$55	$534
AW3R	$96	$3	$6	$105
AW4	$1,249	$71	$169	$1,489
AW5	$2	$0	$0	$2
AW6	$590	$28	$54	$672
AW7L	$18	$5	$9	$31
AW7R	$109	$6	$11	$125
AW8L	$347	$52	$115	$514
AW8R	$128	$7	$16	$151
AW9L	$10	$1	$3	$14
AW9R	$369	$76	$169	$613
Total	**$12,686**	**$406**	**$894**	**$13,986**

Note: values in $000s; FY23 price level

Table 30 and Table 31 display WP EAD under the future condition for Alternative 2b, which is similar to the existing condition estimates.

Table 30. Alternative 2b WP EAD Future Condition (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$745	$534	$7	$17	$1,303
AW2L	$1,680	$328	$16	$54	$2,079
AW2R	$8,249	$14,298	$468	$427	$23,442
AW3L	$1,057	$144	$16	$97	$1,315
AW3R	$78	$43	$1	$6	$127
AW4	$2,043	$274	$36	$326	$2,681
AW5	$0	$23	$0	$0	$24
AW6	$1,214	$564	$83	$1	$1,863

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AW7L	$105	$8	$0	$58	$171
AW7R	$128	$84	$0	$76	$287
AW8L	$819	$243	$74	$137	$1,273
AW8R	$106	$654	$0	$12	$772
AW9L	$20	$2	$0	$0	$22
AW9R	$1,339	$230	$0	$11	$1,580
Total	**$17,585**	**$17,429**	**$701**	**$1,221**	**$36,936**

Note: values in $000s; FY23 price level

Table 31. Alternative 2b WP EAD Future Condition (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$742	$5	$12	$759
AW2L	$813	$68	$147	$1,028
AW2R	$8,114	$62	$136	$8,312
AW3L	$357	$18	$39	$415
AW3R	$49	$1	$3	$53
AW4	$1,346	$77	$183	$1,605
AW5	$2	$0	$0	$2
AW6	$608	$29	$56	$692
AW7L	$18	$5	$9	$32
AW7R	$88	$6	$11	$105
AW8L	$313	$43	$95	$450
AW8R	$124	$7	$15	$146
AW9L	$9	$1	$3	$12
AW9R	$348	$73	$162	$583
Total	**$12,929**	**$394**	**$871**	**$14,194**

Note: values in $000s; FY23 price level

6.3.4. Alternative 2b Equivalent Annual Benefits

Equivalent annual damages for Alternative 2b are nearly the same as WP EAD since there is very little difference in existing and future condition EAD. Equivalent annual damages for Alternative 2b are subtracted from WOP damages to obtain equivalent annual benefits, which are shown in Table 32. Equivalent annual benefits for Alternative 2b are approximately $43 million. This alternative results in induced damages of over $11 million in reach AW2R.

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Table 32. Alternative 2b Equivalent Annual Benefits 2.5%

Reach	Structure and Contents	Other Damages	Total
AW1	$23,657	$12,878	$36,535
AW2L	$1,402	$1,082	$2,483
AW2R	-$8,216	-$3,206	-$11,422
AW3L	$290	$89	$379
AW3R	$2,798	$1,279	$4,077
AW4	$1,636	$970	$2,606
AW5	-$16	-$1	-$17
AW6	-$725	-$291	-$1,016
AW7L	$908	$270	$1,177
AW7R	$7,339	$1,311	$8,650
AW8L	-$54	$3	-$51
AW8R	$0	$1	$1
AW9L	$1	$1	$2
AW9R	$44	$16	$60
Total	**$29,063**	**$14,401**	**$43,464**

Note: values in $000s; FY23 price level

6.3.5. Alternative 5.3 With-Project EAD

Table 33 and Table 34 display WP EAD for Alternative 5.3 under the existing condition, which totals approximately $42 million.

Table 35 and Table 36 display WP EAD for the future condition, which is approximately the same as the existing condition. Alternative 5.3 results in significantly lower WP EAD than Alternative 1 or Alternative 2b.

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Table 33. Alternative 5.3 WP EAD Existing Condition (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$237	$35	$0	$6	$278
AW2L	$2,721	$451	$48	$91	$3,311
AW2R	$5,490	$9,315	$251	$284	$15,341
AW3L	$1,278	$198	$4	$177	$1,657
AW3R	$2,312	$526	$176	$26	$3,040
AW4	$1,348	$250	$30	$190	$1,819
AW5	$0	$0	$0	$0	$0
AW6	$296	$273	$73	$0	$643
AW7L	$94	$7	$0	$65	$166
AW7R	$112	$126	$1	$59	$300
AW8L	$940	$241	$73	$134	$1,388
AW8R	$111	$653	$0	$14	$778
AW9L	$23	$2	$0	$0	$24
AW9R	$1,430	$247	$0	$19	$1,696
Total	**$16,392**	**$12,325**	**$656**	**$1,066**	**$30,439**

Note: values in $000s; FY23 price level

Table 34. Alternative 5.3 WP EAD Existing Condition (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$71	$1	$2	$75
AW2L	$1,544	$132	$282	$1,958
AW2R	$4,793	$51	$109	$4,953
AW3L	$473	$27	$59	$559
AW3R	$1,224	$45	$95	$1,363
AW4	$912	$52	$122	$1,086
AW5	$0	$0	$0	$0
AW6	$192	$6	$13	$211
AW7L	$16	$4	$8	$29
AW7R	$92	$5	$9	$106
AW8L	$335	$50	$110	$495
AW8R	$126	$7	$16	$150
AW9L	$10	$1	$3	$14
AW9R	$374	$78	$173	$625
Total	**$10,162**	**$460**	**$1,002**	**$11,624**

Note: values in $000s; FY23 price level

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Table 35. Alternative 5.3 WP EAD Future Condition (Structures and Contents)

Reach	Residential	Commercial	Industrial	Public	Total
AW1	$250	$35	$0	$6	$291
AW2L	$2,704	$469	$46	$94	$3,314
AW2R	$5,257	$9,359	$251	$285	$15,152
AW3L	$1,277	$198	$4	$177	$1,656
AW3R	$2,315	$526	$172	$26	$3,039
AW4	$1,435	$261	$32	$201	$1,930
AW5	$0	$0	$0	$0	$0
AW6	$302	$277	$73	$0	$652
AW7L	$95	$7	$0	$65	$167
AW7R	$112	$126	$1	$59	$299
AW8L	$940	$241	$73	$134	$1,388
AW8R	$111	$653	$0	$14	$778
AW9L	$23	$2	$0	$0	$24
AW9R	$1,430	$247	$0	$19	$1,696
Total	**$16,250**	**$12,402**	**$652**	**$1,081**	**$30,385**

Note: values in $000s; FY23 price level

Table 36. Alternative 5.3 WP EAD Future Condition (Other Categories)

Reach	Auto	Clean-Up	Emergency	Total
AW1	$75	$1	$2	$79
AW2L	$1,538	$130	$278	$1,945
AW2R	$4,736	$49	$105	$4,889
AW3L	$473	$27	$59	$559
AW3R	$1,226	$45	$95	$1,365
AW4	$970	$55	$130	$1,155
AW5	$0	$0	$0	$0
AW6	$195	$6	$14	$215
AW7L	$16	$4	$8	$29
AW7R	$92	$5	$9	$106
AW8L	$335	$50	$110	$495
AW8R	$126	$7	$16	$150
AW9L	$10	$1	$3	$14
AW9R	$374	$78	$173	$625
Total	**$10,165**	**$459**	**$1,002**	**$11,626**

Note: values in $000s; FY23 price level

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6.3.6. Alternative 5.3 Equivalent Annual Benefits

Equivalent annual benefits for Alternative 5.3 are displayed in Table 37 and are approximately $50 million. Induced damages are significantly reduced under this alternative, and as a result, benefits are higher than Alternative 2b.

Table 37. Alternative 5.3 Equivalent Annual Benefits 2.5%

Reach	Structure and Contents	Other Damages	Total
AW1	$24,691	$13,568	$38,259
AW2L	$138	$102	$240
AW2R	-$484	$3	-$481
AW3L	$121	$17	$139
AW3R	-$38	$0	-$38
AW4	$2,359	$1,392	$3,751
AW5	$7	$1	$8
AW6	$460	$176	$636
AW7L	$911	$272	$1,183
AW7R	$7,387	$1,322	$8,709
AW8L	-$71	-$3	-$75
AW8R	$0	$0	$0
AW9L	$0	$0	$0
AW9R	-$18	-$7	-$26
Total	**$35,462**	**$16,843**	**$52,303**

Note: values in $000s; FY23 price levels

6.3.7. Residual Equivalent Annual Damages

The following tables present residual equivalent annual damages, or the damages that are expected to occur with the project in place, for each alternative in the final array.

Table 38 shows that equivalent annual damages with Alternative 1 in place are approximately $67 million. Equivalent annual damages with Alternative 2b in place are presented in Table 39, and are approximately $50 million. Table 40 displays equivalent annual damages with Alternative 5.3 in place, which are approximately $42 million.

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Table 38. Alternative 1 Residual Equivalent Annual Damages

Reach	Structure and Contents	Other Damages	Total
AW1	$14,643	$8,142	$22,785
AW2L	$3,732	$2,141	$5,873
AW2R	$14,862	$4,773	$19,635
AW3L	$1,617	$547	$2,164
AW3R	$10	$4	$14
AW4	$6,670	$3,759	$10,429
AW5	$7	$1	$8
AW6	$591	$221	$811
AW7L	$148	$26	$174
AW7R	$351	$124	$476
AW8L	$1,384	$506	$1,890
AW8R	$813	$172	$985
AW9L	$23	$13	$37
AW9R	$1,629	$600	$2,230
Total	**$46,480**	**$21,030**	**$67,511**

Note: values in $000s; FY23 price level

Table 39. Alternative 2b Residual Equivalent Annual Damages

Reach	Structure and Contents	Other Damages	Total
AW1	$1,317	$767	$2,084
AW2L	$2,048	$974	$3,022
AW2R	$22,999	$8,136	$31,136
AW3L	$1,488	$488	$1,976
AW3R	$204	$85	$289
AW4	$2,585	$1,534	$4,120
AW5	$23	$2	$25
AW6	$1,831	$680	$2,511
AW7L	$170	$31	$201
AW7R	$347	$117	$465
AW8L	$1,370	$489	$1,859
AW8R	$775	$149	$925
AW9L	$23	$13	$37
AW9R	$1,633	$602	$2,234
Total	**$36,815**	**$14,067**	**$50,882**

Note: values in $000s; FY23 price level

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Table 40. Alternative 5.3 Residual Equivalent Annual Damages

Reach	Structure and Contents	Other Damages	Total
AW1	$283	$76	$360
AW2L	$3,312	$1,953	$5,265
AW2R	$15,267	$4,928	$20,195
AW3L	$1,656	$559	$2,216
AW3R	$3,039	$1,364	$4,403
AW4	$1,862	$1,113	$2,975
AW5	$0	$0	$0
AW6	$646	$213	$859
AW7L	$167	$29	$195
AW7R	$300	$106	$406
AW8L	$1,388	$495	$1,883
AW8R	$778	$150	$927
AW9L	$24	$14	$38
AW9R	$1,696	$625	$2,321
Total	**$30,418**	**$11,625**	**$42,043**

Note: values in $000s; FY23 price level

6.4. Other Social Effects With-Project Condition

This section summarizes the OSE categories for the final array of alternatives, which include life safety risk, tourism and recreation, and social vulnerability.

6.4.1. Life Safety

6.4.1.1. Alternative 1 Life Safety Risk

Table 41 summarizes LifeSim results for Alternative 1. Structures are inundated at each AEP event, but depths and velocities are not significant enough to cause fatalities until the 1% AEP event. The least frequent event results in the highest flood depths, which causes both daytime and nighttime average life loss to increase.

Like the FWOP, communities that experience life loss with Alternative 1 in place include Waikiki, Ala Moana, Pawaa, Makiki, McCully-Moiliili, Manoa, Palolo, and Kapahulu. Life loss is still sampled at Hokulani Elementary School, but the maximum depth and velocity is 3.0 ft and 0.5 ft/s (compared to 5.2 ft and 1.1 ft/s for the FWOP). Maximum depth and velocity of all inundated structures is 12.6 ft and 17.3 ft/s.

Waikiki, McCully-Moiliili, and Hokulani Elementary School experience a large portion of WP life loss. The average depth and velocity of structures with life loss in Waikiki are 2.4 ft and 0.5 ft/s. The average depth and velocity of structures with life loss in McCully-Moiliili is 4.1 ft and 0.9 ft/s. The average depth and velocity of structures with life loss around the elementary school is 5.0 ft and 0.9 ft/s.

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With Alternative 1 in place, life loss is reduced slightly. Alternative 1 inundates fewer structures than the FWOP condition for all events except the 50% AEP and the 20% AEP events. Life loss is not present until the 1% AEP event, instead of the 5% AEP event for the FWOP condition.

Table 41. Alternative 1 Life Safety Risk by AEP Event

Hydraulic Scenario	Structures Inundated	Population at Risk		Average Life Loss		Max Life Loss		Average Depth (ft)	Average Velocity (ft/s)
		Day	Night	Day	Night	Day	Night		
0.2% AEP (500yr)	5,422	61,688	59,541	4	4	19	21	2.25	1.29
0.5% AEP (200yr)	4,930	55,795	54,133	1	1	11	7	1.87	1.18
1% AEP (100yr)	4,305	48,996	48,750	0	1	6	7	1.59	1.10
2% AEP (50yr)	3,265	34,015	36,443	0	0	3	4	1.30	1.07
5% AEP (20yr)	2,156	17,290	22,042	0	0	3	3	1.04	0.98
10% AEP (10yr)	1,446	10,653	13,878	0	0	3	3	0.85	0.90
20% AEP (5yr)	778	5,655	5,730	0	0	3	3	0.72	0.87
50% AEP (2yr)	205	3,348	1,900	0	0	1	1	0.47	0.50

Figure 23 shows the average nighttime life loss for Alternative 1 for the 0.2% AEP event. The heat map indicates whether life loss occurred within these areas during any of the 1,000 sample iterations. Green portions of the heat map indicate life loss occurred in that area for a few

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iterations and yellow, orange, or red portions of the heat map indicate life loss occurred for several iterations.

Figure 23. Alternative 1 0.2% AEP Event Average Night Life Loss Heat Map

6.4.1.2. Alternative 2b Life Safety Risk

Table 42 displays the LifeSim results for Alternative 2b. While structures are inundated at each event, depths and velocities are not significant enough to cause fatalities until the 0.5% AEP event. For the same event, daytime and nighttime average life loss is one.

Like the FWOP condition, life loss was sampled for the communities of Waikiki, Ala Moana, Kakaako, Pawaa, Makiki, McCully-Moiliili, Manoa, Palolo, and Kapahulu. Life loss is sampled at Hokulani Elementary School, where the maximum depth and velocity is 3.2 ft and 0.4 ft/s (compared to 5.2 ft and 1.1 ft/s for the FWOP). Maximum depth and velocity of all inundated structures is 10.9 ft and 17.3 ft/s.

Similar to the FWOP condition and Alternative 1, Waikiki and McCully-Moiliili experience life loss under Alternative 2b. The Pawaa-Ala Moana-Kakaako area and the area near Hokulani Elementary School also experience life loss. The average depth and velocity of structures with

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life loss in Waikiki is 1.5 ft and 0.5 ft/s. The average depth and velocity of structures with life loss in the McCully-Moiliili area is 4.5 ft and 1.0 ft/s. The average depth and velocity of structures with life loss in the Pawaa-Ala Moana-Kakaako areas is 1.6 ft and 0.5 ft/s. The average depth and velocity of structures with life loss near the elementary school is 6.5 ft and 2.1 ft/s.

Average life loss is lower for Alternative 2b than for the FWOP condition, although Alternative 2b generally has slightly higher depths and velocities. Alternative 2b inundates fewer structures for all events, and average life loss is not sampled until the 0.5% AEP whereas it is sampled at the 5% AEP event for the FWOP condition.

Table 42. Alternative 2b Life Safety Risk by AEP Event

Hydraulic Scenario	Structures Inundated	Population at Risk		Average Life Loss		Max Life Loss		Average Depth (ft)	Average Velocity (ft/s)
		Day	Night	Day	Night	Day	Night		
0.2% AEP (500yr)	4,954	52,741	49,439	4	3	27	37	2.31	1.27
0.5% AEP (200yr)	4,367	44,640	43,174	1	1	9	6	1.93	1.17
1% AEP (100yr)	3,593	35,112	35,772	0	0	7	4	1.54	1.13
2% AEP (50yr)	2,649	23,876	23,575	0	0	5	5	1.18	1.01
5% AEP (20yr)	1,217	9,410	10,326	0	0	3	3	0.91	1.07
10% AEP (10yr)	744	4,693	6,063	0	0	3	3	0.85	1.09
20% AEP (5yr)	406	2,467	2,837	0	0	0	3	0.80	1.06
50% AEP (2yr)	81	360	617	0	0	0	0	0.60	0.57

Figure 24 shows the average nighttime life loss for Alternative 2b during the 0.2% AEP event. The heat map indicates whether life loss occurred during any of the 1,000 iterations. Green portions of the heat map indicate life loss occurred in that area for a few iterations and yellow, orange, or red portions of the heat map show life loss occurred in that area for several iterations.

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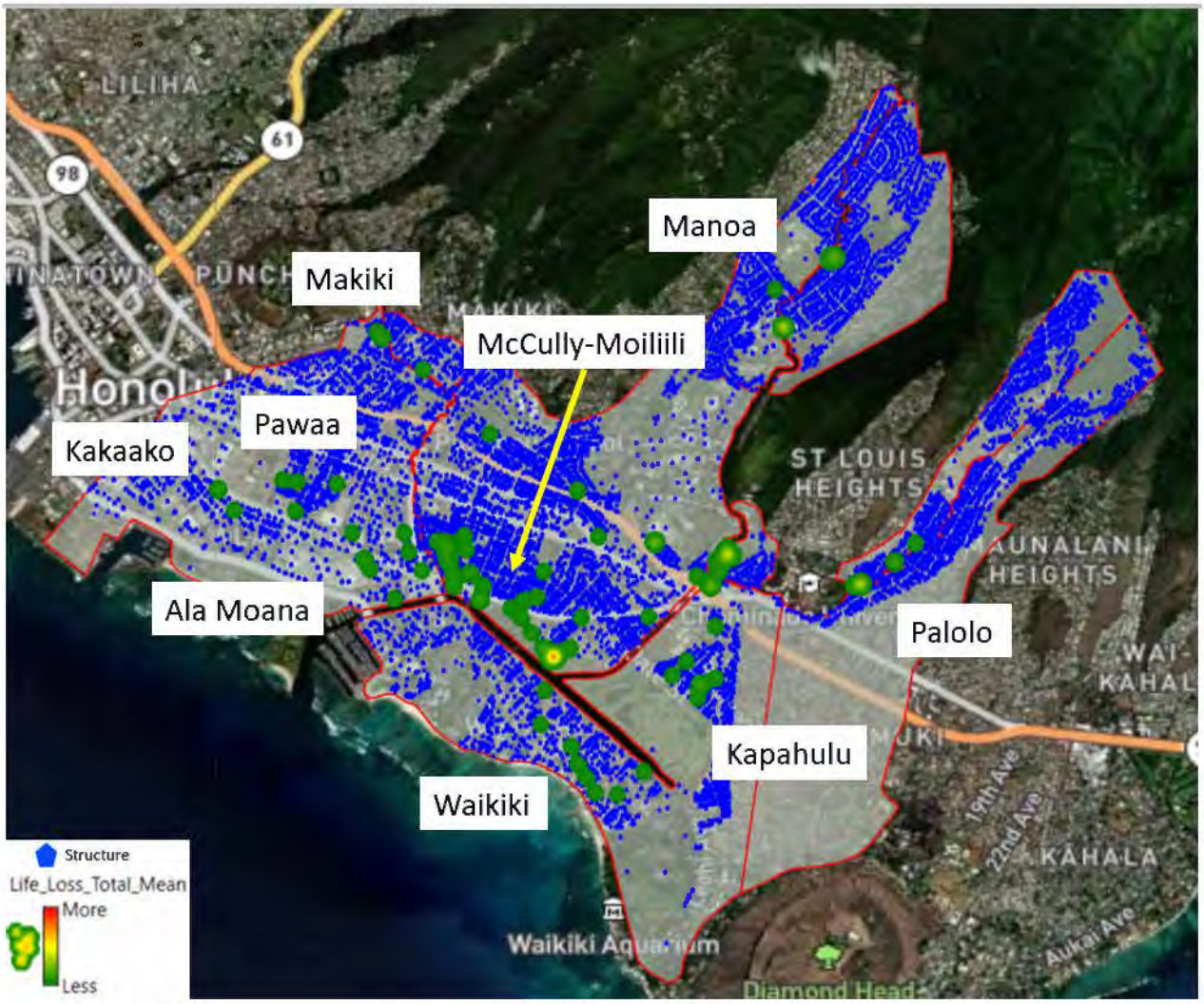

Figure 24. Alternative 2b 0.2% AEP Event Average Night Life Loss Heat Map

6.4.1.3. Alternative 5.3 Life Safety Risk

Table 43 shows the LifeSim results for Alternative 5.3. Several structures are inundated at each AEP event but on average, depths and velocities are not significant enough to cause fatalities until the 0.5% AEP event. The 0.2% AEP event results in the highest flood depths, which causes daytime and nighttime average life loss to increase to 3 and 3, respectively.

Like the FWOP condition, communities with life loss include Ala Moana, Pawaa, Makiki, McCully-Moiliili, Manoa, and Palolo. Significantly less life loss was sampled in Waikiki, and no life loss was sampled in Kakaako. Life loss was not sampled at Hokulani Elementary School; however, it was sampled in 2 structures near the school. The maximum depth and velocity at these structures is 7.5 ft and 2.2 ft/s. Maximum depth and velocity of all inundated structures is 14.6 ft and 16.2 ft/s.

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McCully-Moiliili experiences most of the life loss for Alternative 5.3. The average depth and velocity of structures with life loss in the McCully-Moiliili area is 3.9 ft and 0.8 ft/s. The average depth and velocity of structures with life loss near the elementary school is 7.5 ft and 1.4 ft/s.

Average life loss is lower in Alternative 5.3 than the FWOP condition, and Alternative 5.3 has slightly lower average depths for the 0.5%, 1%, 2%, 5%, 20%, and 50% AEP events. Average velocities are slightly higher than the FWOP condition, due to increased conveyance. Alternative 5.3 inundates fewer structures than the FWOP condition for all events, and average life loss is not sampled until the 0.5% AEP event.

Table 43. Alternative 5.3 Life Safety Risk by AEP Event

Hydraulic Scenario	Structures Inundated	Population at Risk		Average Life Loss		Max Life Loss		Average Depth (ft)	Average Velocity (ft/s)
		Day	Night	Day	Night	Day	Night		
0.2% AEP (500yr)	4,366	39,840	39,696	3	3	20	33	2.16	1.42
0.5% AEP (200yr)	3,633	31,927	31,330	1	1	7	9	1.63	1.34
1% AEP (100yr)	3,041	25,477	24,983	0	0	5	4	1.29	1.27
2% AEP (50yr)	2,392	20,684	18,801	0	0	4	4	1.09	1.19
5% AEP (20yr)	1,575	11,356	11,585	0	0	3	3	0.95	1.11
10% AEP (10yr)	1,047	5,567	7,952	0	0	3	2	0.83	1.03
20% AEP (5yr)	580	2,148	3,447	0	0	2	2	0.69	0.94
50% AEP (2yr)	89	321	641	0	0	0	0	0.37	0.45

Figure 25 shows the average nighttime life loss for Alternative 2b during the 0.2% AEP event. The heat map indicates whether life loss occurred during any of the 1,000 iterations. Green portions of the heat map indicate life loss occurred in that area for a few iterations and yellow, orange, or red portions of the heat map show life loss occurred in that area for several iterations.

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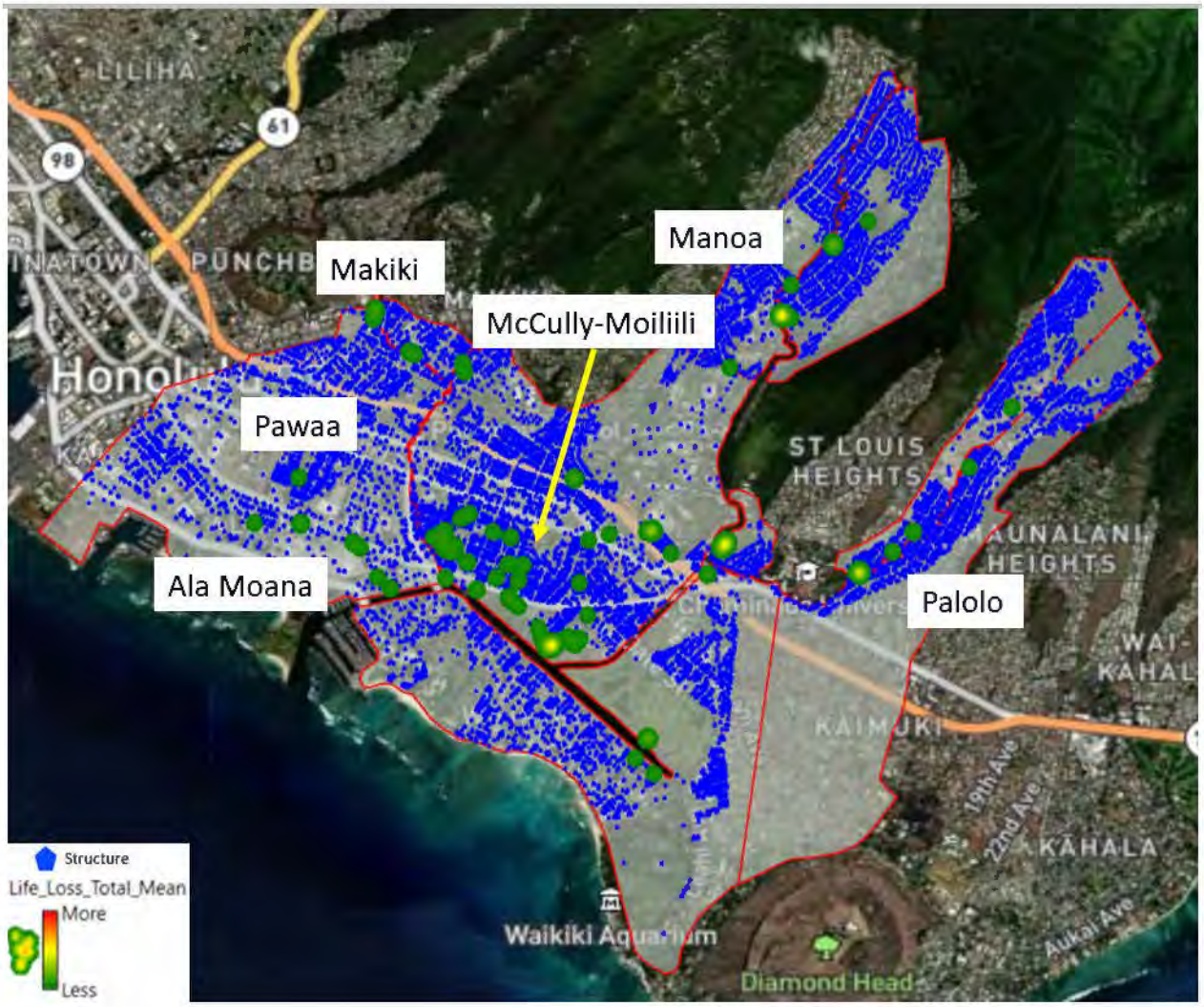

Figure 25. Alternative 5.3 0.2% AEP Average Daytime Life Loss Heat Map

6.4.1.4. Expected Annual Life Loss Estimates

For each alternative, the Risk Management Center (RMC)-TotalRisk 1.0 software, which utilizes Monte Carlo simulation, was used to estimate Expected Annual Life Loss (EALL). RMC-TotalRisk 1.0 considers the full range of life loss uncertainty results from LifeSim, including both daytime and nighttime results. The EALL computation in RMC-TotalRisk 1.0 is similar to the HEC-FDA computation of expected annual damages. The EALL calculation doesn't include hydrologic or hydraulic uncertainty.

Table 44 displays EALL estimates for the final array of alternatives. Alternative 1 and Alternative 5.3 slightly reduce EALL, while Alternative 2b induces EALL.

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Table 44. Expected Annual Life Loss Estimates

Scenario	Expected Annual Life Loss	Expected Annual Life Loss Reduced
FWOP	0.0491	-
Alternative 1	0.0302	**0.0189**
Alternative 2b	0.0737	**-0.0246**
Alternative 5.3	0.0450	**0.0041**

6.4.2. Tourism and Recreation With-Project Condition

For all three alternatives, negative impacts to tourism and recreation caused by flooding under the WOP condition as presented in Section 5.2 would be reduced. Alternative 1 still has significant residual flooding for the 0.2% AEP event in reach AW1, which is the reach with the most hotels and beach access. Alternative 2b has less residual flooding in reach AW1 than Alternative 1. Alternative 5.3 has the least residual flooding for the 0.2% AEP event in reach AW1, and nearly eliminates equivalent annual damages in this reach. Alternative 5.3 also results in the highest reduction in flooding in reach AW2R. Of the Alternatives in the final array, Alternative 5.3 has the most positive impact on tourism and recreation, and would minimize disruptions to tourism and recreation and associated economic impacts detailed in Section 5.2.

6.4.3. Social Vulnerability With-Project Condition

Social Vulnerability Index scores are highest in portions of reaches AW2R, AW3L, AW3R, and AW9R. Apart from reaches AW8R and AW8L, all reaches in the study area contain some census tracts with moderate to high social vulnerability scores, including scores ranging from 0.5 to above 0.8. Alternative 5.3 results in the greatest reduction in damages in reaches AW2R and AW9R. Alternative 2b significantly induces damages in reach AW2R. Measures that reduced damages in AW3L and AW3R were removed from Alternative 5.3 because they induced damages and did not meet the 800 cfs requirement. Alternative 5.3 provides the greatest benefit to socially vulnerable census tracts in the study area.

6.5. Regional Economic Development

The RED account registers changes in the distribution of regional economic activity that results from each alternative plan. Evaluations of regional effects are carried out using nationally consistent projections of income, employment, output, and population.

To evaluate RED, the USACE Regional Economic System (RECONS) model was used. RECONS is a USACE-certified regional economic model designed to provide accurate and defensible estimates of regional economic impacts and contributions associated with USACE projects, programs, and infrastructure. Regional economic impacts and contributions are measured as economic output, jobs, income, and value added. Estimates are provided simultaneously for three levels of geographic impact area: local, state, and national. RECONS is an input/output (IO) model that uses IMPLAN data, which is comprehensive economic data gathered from government agencies and the private sector. Within RECONS, the Civil Works Spending Module was used to estimate local, state, and national impacts. For this study, the generic area used was Honolulu County, the business line selected was Flood Risk Management, and the work activity selected was Flood Risk Management Construction. Since RECONS is an IO model, construction dollars must be spent for an impact to occur. IO models

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assume that there is a relationship between the volume of output of an industry and the volume of various inputs used to produce that output. The impact of construction dollars on the economy more broadly is based on the multiplier effect, or the proportional amount of increase in final income that results from project spending. Therefore, only WP conditions are analyzed. In the absence of the project, it is likely that RED would be negatively impacted by flood events.

The economic impacts presented below exclude IDC since this portion of project costs are not spent within the region. Purchases of land are similarly excluded since this cost is considered a transfer from one individual to another. Results are presented for each alternative in this section in FY23 price levels.

6.5.1. Alternative 1 RED

Table 43 displays RECONS output for Alternative 1. This alternative would result in nearly 1,400 full time jobs in the local economy, and in over 3,500 nationwide. Total labor income in the U.S. would be over $251 million, and value added would exceed $330 million.

Table 45. Alternative 1 Regional Economic Impact

Area	Jobs*	Labor Income	Value Added
Local			
Direct Impact	1,384	$116,355,133	$115,081,247
Secondary Impact	1,384	$43,994,713	$79,079,193
Total Impact	1,384	$160,349,846	$194,160,439
State			
Direct Impact	1,468	$116,619,304	$115,263,492
Secondary Impact	729	$44,773,262	$80,911,346
Total Impact	2,197	$161,392,565	$196,174,838
US			
Direct Impact	1,824	$135,729,196	$132,787,686
Secondary Impact	1,704	$115,518,850	$197,796,545
Total Impact	3,528	$251,248,046	$330,584,231

* Jobs are presented in full-time equivalence (FTE)

6.5.2. Alternative 2b RED

Table 44 displays RECONS output for Alternative 2b. It is estimated that the project would create over 5,000 local jobs and nearly 9,000 jobs nationally. Total labor income in the U.S. would exceed $636 million, and value added would be nearly $837 million. Since the cost of Alternative 2b is higher than Alternative 1, Alternative 2b would have a greater regional economic impact.

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Table 46. Alternative 2b Regional Economic Impact

Area	Jobs*	Labor Income	Value Added
Local			
Direct Impact	3,503	$294,565,103	$291,340,128
Secondary Impact	1,771	$111,377,185	$200,197,189
Total Impact	5,273	$405,942,288	$491,537,317
State			
Direct Impact	3,717	$295,233,879	$291,801,502
Secondary Impact	1,845	$113,348,163	$204,835,476
Total Impact	5,562	$408,582,041	$496,636,978
US			
Direct Impact	4,618	$343,612,557	$336,165,819
Secondary Impact	4,313	$292,447,966	$500,742,495
Total Impact	8,931	$636,060,523	$836,908,315

* Jobs are presented in full-time equivalence (FTE)

6.5.3. Alternative 5.3 RED

Table 45 displays RECONS output for Alternative 5.3. It is estimated that this alternative would create approximately 8,000 jobs locally and over 13,000 jobs nationally. Total national labor income from the project would be nearly $950 million and value added nationally would exceed $1.2 million.

Table 47. Alternative 5.3 Regional Economic Impact

Area	Jobs*	Labor Income	Value Added
Local			
Direct Impact	5,128	$439,031,743	$434,225,109
Secondary Impact	2,591	$166,001,061	$298,381,988
Total Impact	7,719	$605,032,804	$732,607,097
State			
Direct Impact	5,442	$440,028,513	$434,912,760
Secondary Impact	2,699	$168,938,686	$305,295,077
Total Impact	8,141	$608,967,199	$740,207,837
US			
Direct Impact	6,759	$512,134,052	$501,035,133
Secondary Impact	6,311	$435,876,276	$746,326,867
Total Impact	13,070	$948,010,328	$1,247,361,999

* Jobs are presented in full-time equivalence (FTE)

6.6. Nonstructural Alternative 6

In accordance with *USACE Policy Directive – Comprehensive Documentation of Benefits in Decision Document* issued 5 January 2021, a nonstructural plan that includes modified floodplain management practices was considered during the plan formulation process. The

nonstructural plan was identified by using HEC-FDA FWOP condition depths and damages, and aggregating structures by the reach and floodplain extent that had positive net benefits with nonstructural measures in place. The resulting plan consists of floodproofing 1,501 structures and elevating 43 structures in reaches AW1, AW2R, and AW7R above the 1% AEP flood stage. For reaches AW1 and AW2R, benefits were maximized when structures were aggregated using the 1% AEP flood extent. The 2% AEP event was used to aggregate structures in AW7R. Reaches not included in Alternative 6 did not have positive average annual net benefits. Table 48 displays the summary of measure for the nonstructural plan.

Table 48. Alternative 6 Nonstructural Measures Summary

Category	Reach AW1	Reach AW2R	Reach AW7R	Total
Number of Structures Elevated	8	32	3	43
Number of Structures Floodproofed	945	510	46	1,501
Total Number of Structures	953	542	49	1,544
Target Stage	1% AEP	1% AEP	1% AEP	n/a
Structure Aggregation Level (Floodplain)	1% AEP	1% AEP	2% AEP	n/a

7. Benefit Cost Analysis

7.1. Final Array Costs

Costs were prepared by cost engineering for each alternative in the final array. Interest during construction (IDC) was calculated for a six-year period of construction using an interest rate of 2.5 percent. Costs are shown in FY23 price levels and annual costs reflect a project life cycle of 50 years at the current discount rate of 2.5 percent.

Table 46 displays project costs for each alternative in the final array at the time of TSP selection. Total project first costs are $235 million for Alternative 1, $528 million for Alternative 2b, and $449 million for Alternative 5 at 2.5 percent. Annual costs including operation and maintenance are $9 million for Alternative 1, $20 million for Alternative 2b, and nearly $30 million for Alternative 5 at 2.5 percent.

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Table 49. Final Array Costs by Alternative 2.5%

Category	Alternative 1	Alternative 2b	Alternative 5
Construction Cost	$163,572	$414,099	$374,790
Lands and Damages	$29,770	$8,711	$28,779
Planning, Engineering, and Design	$30,261	$76,608	$69,336
Construction Management	$11,450	$28,987	$26,235
Total Project First Costs	$235,053	$528,405	$499,140
Interest During Construction	$18,044	$40,564	$38,318
Total Gross Investment	$253,097	$568,969	$537,458
Annual Cost of Total Gross Investment	$8,924	$20,061	$18,950
Annual OMRR&R	$169	$208	$249
Average Annual Cost	**$9,093**	**$20,269**	**$19,199**

Note: values in $000s; FY23 price level

7.2. Final Array Benefit-Cost Analysis

Equivalent average annual benefits, the BCR, and net NED benefits are calculated during the evaluation process to identify the NED plan, or the plan which maximizes net NED benefits. Net benefits are calculated by subtracting average annual costs from average annual benefits and represent the contribution of the plan to national economic output. The BCR informs the economic feasibility of a project, and is an important metric used in decision making. A project is considered economically feasible if it has positive net benefits and a BCR of 1.0 or greater. Average annual costs and benefits, annual net benefits, and the BCR are presented in this section for the final array of alternatives.

Table 47 presents the benefit-cost comparison at a discount rate of 2.5 percent for the final array that was used to identify a Tentatively Selected Plan, and therefore includes Alternative 5, which is differentiated from Alternative 5.3. Alternative 5 results in $33.1 million in net NED benefits. The BCR for Alternative 5 is 2.7. Alternatives 1 and 2b result in $17.7 million and $23 million in net NED benefits, respectively.

Table 51 displays the benefit-cost summary for Alternative 6 by reach. Total first costs are $520 million. Average annual net benefits are $14 million, and the BCR is 1.8.

Alternative 5 is the NED plan and the Tentatively Selected Plan. It maximizes net NED benefits, OSE benefits in terms of life loss reduction, and RED benefits.

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Table 50. Final Array Benefit-Cost Comparison 2.5%

Category	Alternative 1	Alternative 2b	Alternative 5
Equivalent Average Annual Benefits	$26,835	$43,464	$52,303
Average Annual Costs	$9,093	$20,269	$19,199
Net Annual Benefits	**$17,743**	**$23,195**	**$33,104**
Benefit to Cost Ratio	**3.0**	**2.1**	**2.7**

Note: values in $000s; FY23 price level

Table 51. Alternative 6 Benefit-Cost Summary 2.5%

Category	Reach AW1	Reach AW2R	Reach AW7R	Total
Average Annual Benefits	$16,481	$10,498	$5,388	$32,367
Total First Costs	$321,484	$179,231	$19,583	$520,298
Average Annual Costs	$11,335	$6,319	$690	$18,344
Net Annual Benefits	**$5,146**	**$4,179**	**$4,698**	**$14,023**
BCR	**1.5**	**1.7**	**7.8**	**1.8**

7.3. Tentatively Selected Plan Benefit-Cost Analysis

After the TSP was identified, the plan was optimized to reduce uncertainty in engineering modeling and real estate assumptions, and to reduce induced damages. As a result, floodwall alignments were updated in the H&H modeling, and the berm at the Ala Wai Golf Course detention basin was increased to allow for greater storage capacity, resulting in lower induced damages in Reaches 2R and 2L. The updated TSP was named Alternative 5.3. For a comprehensive summary of measures modeled in HEC-RAS for different iterations of the TSP, please see Appendix B of this report.

Table 48 displays updated costs for the optimized TSP, Alternative 5.3. Total project first costs are $775 million, and the average annual cost is $29.8 million at a 2.5 percent discount rate.

Table 52. TSP Cost Summary 2.5%

Category	Alternative 5.3
Construction Cost	$570,904
Lands and Damages	$58,089
Planning, Engineering, and Design	$105,617
Construction Management	$39,963
Total Project First Costs	$774,574
Interest During Construction	$59,462
Total Gross Investment	$834,036
Annual Cost of Total Gross Investment	$29,406
Annual OMRR&R	$359
Average Annual Cost	**$29,765**

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Note: values in $000s; FY23 price levels

Table 49 shows average annual net benefits for the TSP, which are $22.5 million. The BCR for the TSP is 1.8 at a discount rate of 2.5 percent.

Table 53. TSP Benefit-Cost Summary 2.5%

Category	Alternative 5.3
Equivalent Average Annual Benefits	$52,303
Average Annual Costs	$29,765
Net Annual Benefits	**$22,537**
Benefit to Cost Ratio	**1.8**

Note: values in $000s; FY23 price levels

7.3.1. Tentatively Selected Plan Benefit and Cost Distributions

This section displays the distribution of equivalent annual damage reduced for the TSP. At a discount rate of 2.5 percent, there is a 75 percent chance that damages reduced will exceed $30 million and a 25 percent chance that damages reduced will exceed $69 million.

Table 54. TSP Equivalent Annual Damage Reduced Distribution 2.5%

Reach	Without Project	With Project	Damage Reduced	Probability Damage Reduced Exceeds Indicated Value		
				0.75	0.5	0.25
AW1	$38,619	$360	$38,259	$21,115	$34,779	$51,516
AW2L	$5,505	$5,265	$240	$168	$258	$312
AW2R	$19,714	$20,195	-$481	-$854	-$395	-$71
AW3L	$2,354	$2,216	$139	$54	$116	$190
AW3R	$4,365	$4,403	-$38	-$49	-$35	-$22
AW4	$6,725	$2,975	$3,751	$2,902	$4,126	$4,910
AW5	$8	$0	$8	$2	$5	$11
AW6	$1,495	$859	$636	$356	$601	$862
AW7L	$1,378	$195	$1,183	$975	$1,202	$1,379
AW7R	$9,114	$406	$8,709	$6,216	$8,315	$10,668
AW8L	$1,809	$1,883	-$75	-$100	-$73	-$49
AW8R	$926	$927	-$1	-$2	-$2	-$1
AW9L	$38	$38	$0	$0	$0	$0
AW9R	$2,295	$2,321	-$26	-$31	-$26	-$21
Total	**$94,346**	**$42,043**	**$52,303**	**$30,751**	**$48,871**	**$69,687**

Table 49 shows the distribution of benefits and costs for the TSP calculated at 2.5 percent. Note that costs are static and benefit distributions are calculated in HEC-FDA. There is a 75 percent

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chance that the BCR exceeds 1.0, a 50 percent chance that the BCR exceeds 1.6, and a 25 percent chance that the BCR exceeds 2.3.

Table 55. TSP Benefit-Cost Distribution 2.5%

Category		Probability Indicated Value is Exceeded		
		0.75	0.50	0.25
Average Equivalent Annual Benefits	$52,303	$30,751	$48,871	$69,687
Average Annual Costs	$29,765	$29,765	$29,765	$29,765
Net Annual Benefits	$22,537	$986	$19,106	$39,921
Benefit-Cost Ratio	**1.8**	**1.0**	**1.6**	**2.3**

7.4. Tentatively Selected Plan Project Performance and Damages by Event

Based on the analysis presented in the preceding sections, Alternative 5.3 maximizes net NED benefits, and maximizes positive impacts to OSE categories. This section presents project performance and event-based damages for the TSP.

7.4.1. With-Project Performance Tentatively Selected Plan

This section presents project performance for the TSP existing and future conditions. Table 50 presents project performance for the existing condition and shows that the probability of flooding in any given year is decreased significantly for reaches AW1, AW7L, AW7R, and AW9R with the project in place, compared to the without-project performance statistics. The long-term exceedance probability is also reduced in these reaches. The conditional non-exceedance probability, or probability that no flooding occurs given the occurrence of an event of the listed probability, increases in these same reaches.

Table 50 shows that future with-project performance statistics are nearly identical to the existing project performance statistics.

Table 56. Existing With-Project Performance Tentatively Selected Plan

Reach	Expected AEP	LTEP 10 Years	LTEP 30 Years	LTEP 50 Years	CNP 2%	CNP 1%	CNP 0.2%
AW1	0.01	0.05	0.15	0.23	0.97	0.81	0.50
AW2L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW2R	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW3L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW3R	0.35	0.99	1.00	1.00	0.00	0.00	0.00
AW4	0.03	0.26	0.59	0.78	0.39	0.20	0.04
AW5	0.00	0.01	0.03	0.05	1.00	1.00	0.99
AW6	0.16	0.83	1.00	1.00	0.00	0.00	0.00
AW7L	0.02	0.17	0.42	0.60	0.61	0.34	0.14
AW7R	0.01	0.10	0.27	0.41	0.83	0.58	0.28
AW8L	0.33	0.98	1.00	1.00	0.00	0.00	0.00
AW8R	1.00	1.00	1.00	1.00	0.00	0.00	0.00

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AW9L	0.01	0.05	0.14	0.22	0.96	0.82	0.49
AW9R	1.00	1.00	1.00	1.00	0.00	0.00	0.00

Table 57. Future With-Project Performance Tentatively Selected Plan

Reach	Expected AEP	LTEP 10 Years	LTEP 30 Years	LTEP 50 Years	CNP 2%	CNP 1%	CNP 0.2%
AW1	0.01	0.06	0.16	0.26	0.95	0.79	0.47
AW2L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW2R	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW3L	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW3R	0.34	0.98	1.00	1.00	0.00	0.00	0.00
AW4	0.03	0.28	0.63	0.81	0.34	0.17	0.03
AW5	0.00	0.01	0.02	0.04	1.00	1.00	0.99
AW6	0.16	0.83	1.00	1.00	0.00	0.00	0.00
AW7L	0.02	0.17	0.42	0.60	0.61	0.34	0.14
AW7R	0.01	0.10	0.27	0.41	0.83	0.58	0.28
AW8L	0.33	0.98	1.00	1.00	0.00	0.00	0.00
AW8R	1.00	1.00	1.00	1.00	0.00	0.00	0.00
AW9L	0.01	0.05	0.14	0.22	0.96	0.82	0.49
AW9R	1.00	1.00	1.00	1.00	0.00	0.00	0.00

7.4.2. TSP Residual Damages by AEP Event

Table 51 displays damages by event with the TSP in place for the future condition. With the TSP in place, damages are reduced in most reaches at the 10% AEP event. Approximately 1,200 structures experience a reduction in flooding at the 0.2% AEP event in reach AW1.

Table 58. EAD by Flood Event Future Condition

Reach	10% AEP Structures	10% AEP Damages	2% AEP Structures	2% AEP Damages	1% AEP Structures	1% AEP Damages	0.2% AEP Structures	0.2% AEP Damages
AW1	1	$51	1	$194	1	$222	77	$269
AW2L	108	$12,651	180	$22,169	200	$25,757	313	$47,607
AW2R	153	$46,227	448	$123,310	579	$159,592	765	$216,501
AW3L	18	$6,562	93	$19,973	124	$25,934	185	$41,150
AW3R	43	$8,979	86	$32,964	101	$38,988	128	$47,534
AW4	3	$39	86	$10,474	281	$32,883	632	$78,348
AW5	0	$0	1	$350	1	$1,781	3	$2,647
AW6	1	$1	18	$7,518	22	$12,079	90	$15,278
AW7L	0	$0	1	$516	3	$2,310	54	$5,203
AW7R	2	$92	15	$2,035	38	$9,284	65	$15,376
AW8L	58	$4,889	110	$11,227	126	$14,361	144	$17,848

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AW8R	5	$805	36	$3,282	44	$5,085	54	$6,614
AW9L	3	$255	12	$1,010	24	$2,075	31	$3,325
AW9R	28	$3,012	56	$9,416	64	$11,983	80	$15,183
Total	**423**	**$83,564**	**1,143**	**$244,439**	**1,608**	**$342,333**	**2,621**	**$512,885**

Note: Damages to structures and contents shown in $000; FY 23 PL

7.5. Induced Flooding

This section describes impacts from potential induced flooding and describes a mitigation solution. All induced flooding structure counts presented in this section exclude structures with less than 0.5 feet of induced water surface elevation (WSE) to account for model noise (grid cells with no true WSE change sometimes had a small decimal WSE change between with and without-project), and to acknowledge that there is uncertainty in first floor elevations and WSE.

7.5.1. Expected Induced Flooding Impacts

With the TSP in place, WSE would be induced slightly for certain events and reaches. Equivalent annual benefits shown as negative values in Table 37 indicate reaches where the reach FWOP EAD is less than the reach EAD with the TSP in place. Induced flooding generally occurs in areas that are flooding under the FWOP condition, and the additional water surface induced by the project is minimal for frequent events and larger for the least frequent events. Table 59 shows that the most frequent event at which a structure with no FWOP flooding becomes flooded is the 10% AEP event. There are 21 structures (out of nearly 6,000 in the floodplain) that have induced WSE at the 1% AEP event that don't experience FWOP flooding.

Table 59. Structure Count with Induced WSE and no FWOP Flooding

Damage Reach	AEP Event							
	50%	20%	10%	5%	2%	1%	0.5%	0.2%
AW1	0	0	0	1	0	0	0	0
AW2L	0	0	0	0	0	0	0	1
AW2R	0	0	0	0	6	10	6	2
AW3L	0	0	0	0	0	0	0	0
AW3R	0	0	0	0	0	0	0	0
AW4	0	0	0	0	3	3	2	6
AW5	0	0	0	0	0	1	1	1
AW6	0	0	0	10	3	1	1	0
AW7L	0	0	0	0	0	1	0	4
AW7R	0	0	1	2	0	5	6	2
AW8L	0	0	0	0	0	0	0	0
AW8R	0	0	0	0	0	0	0	0
AW9L	0	0	0	0	0	0	0	0
AW9R	0	0	0	0	0	0	0	0
Total	0	0	1	13	12	21	16	16

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Table 60 and Table 61 show the number of structures with induced flooding by occupancy type for the 1% AEP and 5% AEP events, respectively. For the 1% AEP event, there are 70 structures with induced flooding. For the 5% AEP event, there are 48 structures with induced flooding.

Table 60. Structure Count Induced Flooding 1% AEP

Reach	RES	COM	IND	PUB	Total
AW1	0	1	0	0	1
AW2L	0	1	0	0	1
AW2R	13	18	2	2	35
AW3L	0	0	0	0	0
AW3R	0	0	0	0	0
AW4	4	0	0	0	4
AW5	0	1	0	0	1
AW6	4	4	1	0	9
AW7L	0	0	0	1	1
AW7R	5	4	0	1	10
AW8L	1	3	2	2	8
AW8R	0	0	0	0	0
AW9L	0	0	0	0	0
AW9R	0	0	0	0	0
Total	**27**	**32**	**5**	**6**	**70**

Table 61. Structure Count Induced Flooding 5% AEP

Reach	RES	COM	IND	PUB	Total
AW1	0	1	0	0	1
AW2L	0	1	0	0	1
AW2R	3	16	2	1	22
AW3L	0	0	0	0	0
AW3R	0	0	0	0	0
AW4	1	0	0	0	1
AW5	0	0	0	0	0
AW6	3	7	0	0	10
AW7L	0	0	0	0	0
AW7R	5	0	0	0	5
AW8L	1	3	2	2	8
AW8R	0	0	0	0	0
AW9L	0	0	0	0	0
AW9R	0	0	0	0	0
Total	**13**	**28**	**4**	**3**	**48**

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7.5.2. Induced Flooding Mitigation

To address induced flooding, nonstructural measures could be implemented to prevent additional damage to structures. Single-family residential structures that are one or two story with no basement are recommended to be elevated. Commercial Structures are recommended to be dry floodproofed, and hotels and multi-family (apartment) structures are recommended to be wet floodproofed by evacuating the first floor. Table 62 displays the summary for mitigation measures for the 1% AEP event. No structures that are recommended for dry floodproofing have flood depths greater than four feet.

Table 62. Nonstructural Induced Flooding Mitigation 1% AEP

Reach	Elevate	Dry Floodproof	Evacuate First Floor & Wet Floodproof	Total
AW1	0	1	0	1
AW2L	0	0	1	1
AW2R	3	22	10	35
AW3L	0	0	0	0
AW3R	0	0	0	0
AW4	3	0	1	4
AW5	0	1	0	1
AW6	2	5	2	9
AW7L	0	1	0	1
AW7R	3	5	2	10
AW8L	1	7	0	8
AW8R	0	0	0	0
AW9L	0	0	0	0
AW9R	0	0	0	0
Total	**12**	**42**	**16**	**70**

7.5.3. Benefit-Cost Analysis with Nonstructural Mitigation

The estimated nonstructural mitigation costs for the 70 structures would total $300 million. Table 63 shows that total first costs for the TSP with nonstructural mitigation included would be nearly $1.1 billion and the average annual cost would be around $40 million.

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Table 63. TSP Cost Summary with Nonstructural Mitigation

Category	Alternative 5.3
Construction Cost	$570,904
Lands and Damages	$58,089
Planning, Engineering, and Design	$105,617
Construction Management	$39,963
Nonstructural Mitigation	$300,000
Total Project First Costs	$1,074,573
Interest During Construction	$60,390
Total Gross Investment	$1,134,963
Annual Cost of Total Gross Investment	$40,017
Annual OMRR&R	$359
Average Annual Cost	**$40,376**

Note: Values in $000s; FY23 price levels

Table 64 shows the benefit cost ratio with the nonstructural mitigation in place. Equivalent annual benefits increase to $58 million and net benefits are $17.8 million. The BCR is 1.44.

Table 64. TSP Benefit-Cost Ratio

Category	Alternative 5.3 with nonstructural mitigation
Equivalent Average Annual Benefits	$58,252
Average Annual Costs	$40,376
Net Annual Benefits	**$17,876**
Benefit to Cost Ratio	**1.44**

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General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix D — Geotechnical Investigation

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Executive Summary

The geology of the watershed is very complex, primarily due to the volcanic history and transitory depositional nature of the alluvial and marine soil deposits on the island. Unconsolidated deposits that are highly compressible are common throughout the project area. Some areas also include consolidated deposits (less compressible), while other areas include rock or rock-type deposits, such as coral (marine), tuff (volcanic ash), or basalt (volcanic lava flows) sometimes interbedded with the unconsolidated and consolidated deposits.

Limited boring information was available. The assumptions regarding subsurface conditions were based on the limited boring information, as well as nearby water wells when available. While subsurface conditions were assumed for the purposes of this report, it is critical to understand that the assumptions made herein are preliminary in nature and for feasibility purposes (proof-of-concept) only.

There is insufficient boring coverage at every measure location to develop detailed recommendations suitable for design purposes. Borings and laboratory testing to investigate the actual soil and rock conditions at each specific feature location will be required to refine or develop further designs. There is considerable risk that the subsurface conditions will vary from those assumed for the purposes of this report due to the limited boring information available, although it is believed that there was sufficient information available to confirm that the proposed general solutions are feasible (e.g., levees, I-wall, and macropile-supported L-walls). The details of those solutions will likely change from those presented here once actual soil and rock data is available (e.g., I-wall embedment depths may change, macropile lengths and diameters may change, or levee side slopes may increase or decrease).

I-walls are planned in areas away from the stream channels where the potential for erosion is low (e.g., at detention basin areas away from the streams). Planned I-walls are 6 feet tall with sheet pile (PZ22) embedment depths of 18 feet below grade where the surrounding grades are relatively flat or 24 feet below grade where the ground surface in front of the wall slopes down at 3H:1V. All sheet piles are equipped with driving shoes due to the possibility of boulders, cobbles, and other obstructions.

Along stream channels, macropile-supported L-walls are planned. The L-walls will be 6 to 9 feet tall (6 feet in most locations / 9 feet at Ala Golf Course near the canal) with a 12- to 13-foot-wide base supported on cased macropiles. Specifically, the macropiles are assumed to be 40 to 50 feet long and 16 to 18 inches in diameter with a 14-to 16-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles are assumed to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 3V:1H to reduce lateral movement of the monolith. All reinforcing steel is assumed to be stainless steel or epoxy coated since the macropiles are a permanent installation.

Levees (berms) are only planned at the Ala Wai Golf Course where the severe space constraints that exist at all the other measure sites are less restrictive. The levees are 6 to 9 feet tall with a 12-foot-wide crown, and 3H:1V side slopes. The levee will include an inspection trench. The 9-foot walls are located in the lower regions of the site closer to the Ala Wai Canal.

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1. Project Information

The Honolulu/Waikiki Beach area has experienced repeated damage from flooding of the Manoa, Palolo, and Makiki streams, all of which drain to the Ala Wai Canal, which outlets directly to Mamala Bay (Pacific Ocean). The Ala Wai Canal is a 2-mile-long waterway constructed in 1928 to drain extensive coastal wetlands, allowing development of the Waikiki District.

The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Ko'olau Mountains to the nearshore waters of Mamala Bay (Figure 1-1). The Palolo stream includes the Pukele and Waiomao tributary streams; and the Makiki stream includes the Kanaha tributary stream.

Figure 1-1: Overview of Ala Wai Watershed

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The headwaters for all these streams are in steep mountainous terrain where intense rainfall occurs. The streams also collect surface water from the extensive urban development concentrated in the main valleys and the lower elevations of the watershed. Due to the nature of the events and the characteristics of the drainage basins, flood events tend to develop and dissipate quickly. Floodwaters generally are up and down in approximately 3 to 4 hours on all the streams and approximately 10 to 12 hours on the Ala Wai Canal.

The two main problems identified for this project were the economic damages and elevated life risk resulting from riverine flooding along the Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal.

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2. Purpose

The purpose of this general reevaluation report and environmental assessment is to develop and analyze alternatives designed to reduce the on-going flood risks throughout the Ala Wai watershed for site-specific selected storm frequencies (instead of a 100-year event at all locations), including a no action plan, as well as various combinations of structural, non-structural, and natural and nature-based measures.

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3. Alternatives Considered

The team developed an array of individual measures that were then combined into alternatives that accomplished flood risk reduction through similar objectives (referred to as cornerstones for the purposes of the report). These cornerstone alternatives included the following:

- Alternative 1 – Storage Cornerstone.
- Alternative 2 – Conveyance Cornerstone.
- Alternative 3 – Tunnel Cornerstone.
- Alternative 4 – Natural- and Nature-Based Cornerstone.
- Alternative 5 – Hybrid Cornerstone.

The team elected to move forward with the following three alternatives for further evaluation based on the effectiveness of the alternatives to reduce flood events: Alternative 1, Alternative 2B, and Alternative 5. Each of these alternatives are comprised of various individual measures. Table 3-1 includes a list of the individual measures within the three alternatives that incorporate geotechnical components. Many of the individual measures are shared across multiple alternatives. Other measures, such as non-structural measures, may be included in these alternatives, but these other measures are not listed in Table 3-1 as there are no geotechnical components requiring further discussion or development in the Geotechnical Appendix. The preliminary alignments considered during the alternative consideration for each of the measures are shown in Figure 3-1 and Figure 3-2.

Table 3-1: Alternative Summary

Measure	Alternative 1	Alternative 2B	Alternative 5
Kanaha Floodwall (Figure 3-1)	X	X	X
Makiki District Park Detention (Figure 3-1)	X	X	X
Manoa Valley District Park Detention (Figure 3-1)	X		X
Woodlawn Drive Floodwall (Figure 3-1)	X	X	X
Koali Road Floodwall (Figure 3-1)	X	X	X
Kaimuki High School Floodwall (Figure 3-2)	X		
Ala Wai Golf Course Detention (Figure 3-2)	X		X
Ala Wai Canal Floodwall (Figure 3-2)		X	X
Ala Wai Canal Floodwall with Kaimuki Extension (Figure 3-2)		X	X

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Figure 3-1: Kanaha, Makiki, Koali, Manoa, and Woodlawn Measures

Figure 3-2: Ala Wai Area Measures for Alternates 1, 2B, and 5

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Table 3-2 includes a brief summary of the main design features associates with each individual measure during the alternative consideration phase of the project.

Table 3-2: Alternative Feature Summary

Measure	Structure Type[1]	Maximum Wall Height	Total Wall Length[1]	Maximum Excavation Depth	Number of Road Closures[2]	Number of Drainage Structures[2,3]
Kanaha Floodwall	L-wall on Macropiles	6 ft	2,200 ft	--	5	--
Makiki District Park Detention	I-wall	6 ft	1,200 lf	6 to 10 ft	--	2
Manoa Valley District Park Detention	I-wall	6 ft	1,580 ft	6 to 8 ft	--	2
Woodlawn Drive Floodwall	L-wall on Macropiles	6 ft	1,625 ft	--	1	--
Koali Road Floodwall	L-wall on Macropiles	6 ft	2,485 ft	--	2	2
Kaimuki High School Floodwall (Alt 1 – ties into golf course berm)	L-wall on Macropiles[4] (1,700 ft) / I-wall (2,700 ft)	6 ft	4,400 ft	--	0 to 2	--
Ala Wai Golf Course Detention[5]	Berm	6 ft	5,640 to 10,665 ft	--	0 to 2	3
Ala Wai Canal Floodwall (Alt 2B / Alt 5)	L-wall on Macropiles[4] (20,005 / 19,960 ft) / I-wall (4,740 / 4,180 ft)	6 ft	24,745 / 24,140 ft	--	9 to 12	6 to 14
Kaimuki Extension of Ala Wai Canal Floodwall (Alt 2B / Alt 5)	L-wall on Macropiles[4] (1,030 / 1,800 ft) / I-wall (2,330 / 1,460 ft)	6 ft	3,260 / 3,660 ft	--	--	--
Makiki Floodwall[5]	U-wall on Macropiles[6]	6 ft	883 ft	--	4	1

[1] Berms to be 6 feet tall and have side slopes of 3H:1V with a 12-foot crown. I-walls to be 6 feet tall and have 18-foot of sheet pile (PZ22) embedment where the surrounding ground is flat and 24-foot of sheet pile embedment (PZ22) where the ground in front of the wall slopes down 3H:1V. L-walls to be 6 feet tall with a 12-foot-wide base supported on 16-inch diameter by 40 feet long cased macropiles with a 14-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 3V:1H.

[2] The length of the measure and the number of road closures and drainage structures may vary because of slight alignment changes between the alternatives.

[3] Indicates the number of inlet and outlet structures.

[4] The L-wall on Macropiles will be used adjacent to the stream (where erosion is more of a concern) or adjacent or nearby to the existing canal wall where damaging to the existing wall is a concern while the I-wall will be used in areas away from the stream (i.e., where there is flat ground) or away from the existing canal wall.

[5] An in-stream diversion/weir will be included in Alternative 1.

[6] The Makiki Floodwall was added during the evaluation of Alternative 5.2 but removed in Alternative 5.3 due to the induced damages created by its addition.

[6] U-walls assumed to extend 6 feet above existing Makiki canal walls/surrounding ground surface and be similar to L-walls, with the exception of the following changes: the base thickness is reduced; the base width will vary to match the existing channel width; and all macropiles assumed vertical (no batter).

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4. Tentatively Selected Plan (TSP)

The array of alternatives previously presented in Table 3-2 were evaluated by the team based on cost-benefit ratio (BCR) and net benefits. Based on that evaluation, Alternative 5 (Hybrid Cornerstone) was selected for further evaluation, development, and optimization into the TSP based on subsequent incremental benefits and induced damages analyses. For the TSP, some measures were eliminated (e.g., they could not be justified incrementally); the alignment of others were adjusted for optimization; and one measure was added to reduce induced damage considerations. Table 4-1 includes a summary of the features included in the TSP, which was designated as Alternative 5.2.

Table 4-1: TSP Feature Summary (Alternative 5.2)

Measure	Structure Type[1]	Maximum Height	Total Length	Number of Road Closures	Number of Drainage Structures[2]	Number of Flapgates[2]
Woodlawn Drive Floodwall	L-wall on Macropiles	6 ft	1,270 ft	1	--	--
Koali Road Floodwall	L-wall on Macropiles	6 ft	2,510 ft	2	2	2
Ala Wai Golf Course Detention	Berm (8,315 ft) L-wall on Macropiles[3] (1,861 ft)	6-9 ft	10,176 ft	1	5	5
Ala Wai Canal Floodwall[4]	J-wall on Macropiles[3] (17,125 ft) L-wall on Macropiles[3] (4,069 ft) Tieback I-Wall[3] (1,658 ft)	6 ft	22,852 ft	11	14	59

[1] Berms assumed to be 6 to 9 feet tall and have side slopes of 3H:1V with a 12-foot crown. Taller berms planned at lower elevations of the Ala Wai Golf Course along the Ala Wai Canal.
L-walls assumed to be 6 feet tall (except at Ala Wai Golf Course) with a 12-foot-wide X 40-inch-thick base supported on 16-inch diameter by 40 feet long cased macropiles with a 14-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar.
L-walls at the Ala Wai Golf Course assumed to be 9 feet tall with a 13-foot-wide X 44-inch-thick base supported on 18-inch diameter by 50 feet long cased macropiles with a 16-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 6V:1H
J-wall assumed to be the same design as 6-foot L-walls (i.e., same width, macropiles configuration, etc.), except the wall will include a 3-foot-tall concrete wall on the heel, with the 3-foot-deep area created between the front and rear walls backfilled with soil to create an elevated walkway along the Ala Wai Canal.
Tieback I-wall assumed to be toed into rock or extended 15 feet below the stream level using press-in technology (similar to the Giken Method) with PZ30 sheet piles and 50-foot-long angled ties at 7 feet on-center with a continuous HP12X53 waler located 6 feet below the streambank crest.

[2] Indicates the number of assumed outlet structures. It is assumed that existing storm drains larger than 36 inches will require a drainage structure (and positive closure). Smaller sizes may require drainage structures during future design phases.

[3] J-wall on Macropiles assumed to be used primarily along the Ala Wai Canal (but also along the north side of the Manoa-Palolo to Date Street). L-wall on Macropiles assumed to be used adjacent to streams where visibility of the canal is not a major consideration and where erosion is more of a concern, while the I-wall assumed to be used in areas away from streams where there is flat ground and erosion is not a concern; however, there are no I-walls in the TSP (see explanation in one of bullet points below). The Tieback I-Wall assumed where space limitations and vibrations are major considerations and prevent the use of the other wall types (i.e., specifically planned on the north side of Manoa-Palolo Stream from Date Street to Kapiolani Boulevard).

[4] The floodwall around the canal also accounts for four canoe closure structures.
The Ala Wai Canal measure for the TSP is a combination of the floodwalls along the Ala Wai Canal and along the Manoa-Palolo (including at Kaimuki High School).

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The primary changes from the Alternative 5 selected and described in Section 3 to the TSP presented in this section and report (Alternative 5.3) were the following:

- Removal of the Kanaha Floodwall and the two detention basins (Makiki and Manoa) from consideration due to insufficient incremental benefits.
- Conversion of all the L-wall along the main Ala Wai Canal to a J-wall to create an elevated 3-foot-tall walking path combined with a 3-foot-tall wall behind the existing canal wall. The 6-foot wall was deemed an unacceptable barrier to a cultural resource (the Ala Wai Canal). The elevated walkway created by the J-wall restored visual connection with the Ala Wai Canal (a major concern of the local residents), while also significantly reducing some of the safety concerns expressed with a 6-foot-tall wall with limited access between the canal and the nearby streets (i.e., the ability to get from the water side to the land side of the wall quickly due to only having limited wall penetrations for doors and gates in consideration of the short duration and minimal notice of flood events). In addition, the additional dead load created by the elevated 3-foot-tall walkway will help reduce lateral deflection of the pile cap, which will reduce potential impacts on the existing (sensitive) canal wall.
- Conversion of the L-wall along the north bank of the Manoa-Palolo Stream from Date Street to Kapiolani Boulevard (which is considered part of the Ala Wai Canal Floodwall alignment) to a press-in, tieback I-wall due to insufficient space to construct the originally planned L-wall. The press-in I-wall, using technology similar to the Giken Method, requires less footprint for construction (equipment rides along installed sheet pile) and permanently (I-wall only requires 2 to 3 feet versus 12 feet for wide L-wall). In addition, the press-in technology allows sheet pile to be pushed hydraulically, instead of driven, reducing vibration concerns for nearby structures.
- Conversion of the I-walls originally planned around the Kaimuki High School playing fields to L-walls for simplicity and continuity of the system (e.g., to avoid transition points since limited length of I-wall necessary and reduce the types of floodwalls used).
- Extension of the Koali Road from the pedestrian bridge at Kaluawaa Street to St. Louis Drive due to lower ground elevations than originally assumed.
- Taking of 2/3 structures (one residential structure, one commercial structure, and one small structure of indeterminate origin) immediately north of Kapiolani Boulevard due to their proximity to Manoa-Palolo and the inability to construct a flood reduction system between the structures and the creek without permanent construction into the creek (and permanently impinging creek flow, which would cause damages upstream) and the inability to safely construct a wall around the structures (thereby excluding them from flood reduction system) due to the required sightlines at the intersection and the limited space for appropriate wall set-back from the street.
- Increase in wall/levee heights at the Ala Wai Golf Course to increase detention volume.

The proposed alignments for each measure included in the TSP are included in Figure 4-1. Zoomed in views of the individual alignments are included in Figure 4-2 to Figure 4-4 for further reference. The types of risk reduction for each measure are shown in Figure 4-5.

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Figure 4-1: Tentatively Selected Plan (Alternative 5.3) Alignments

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Figure 4-2: Ala Wai Canal and Golf Course TSP Alignments

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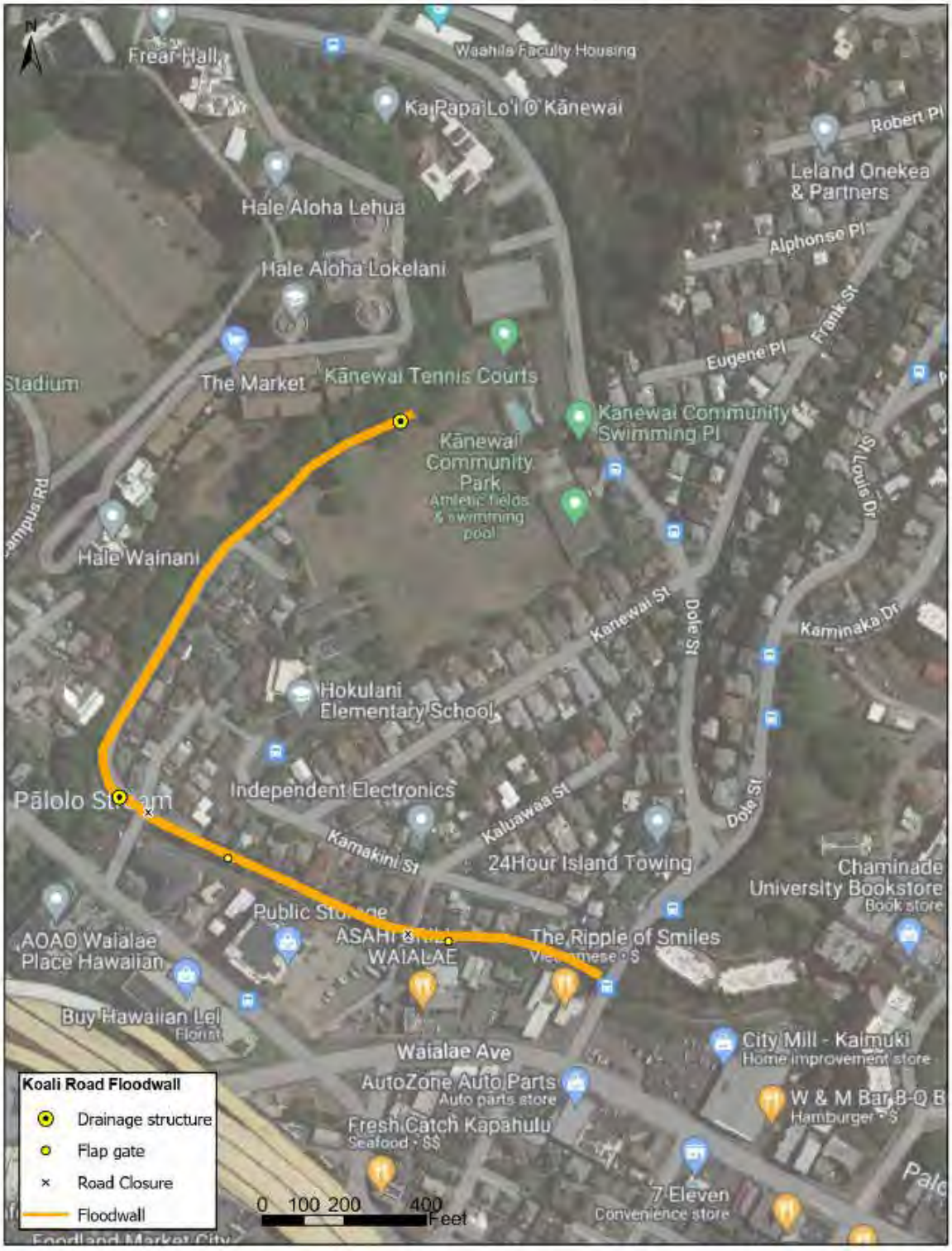

Figure 4-3: Koali TSP Alignment

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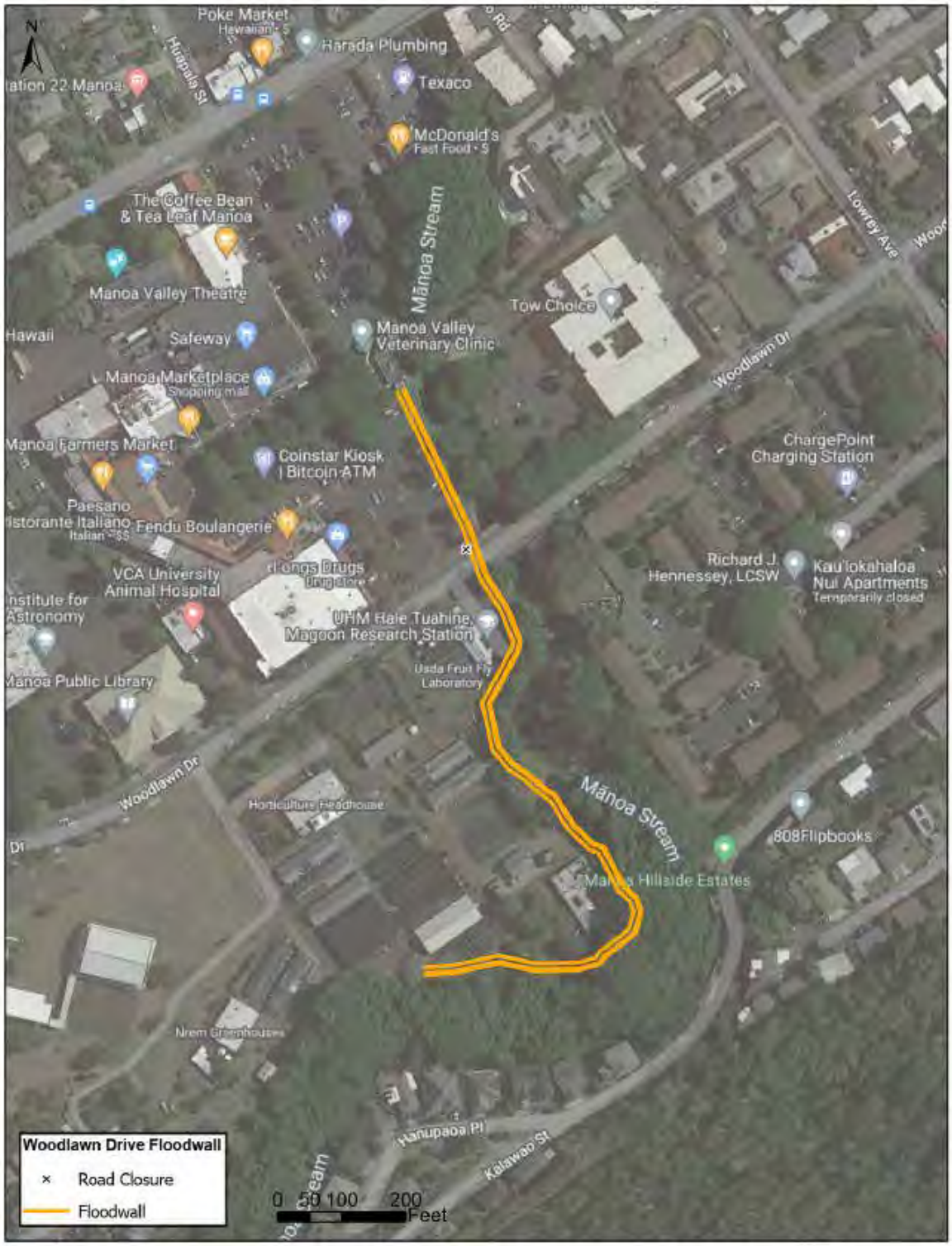

Figure 4-4: Woodlawn TSP Alignment

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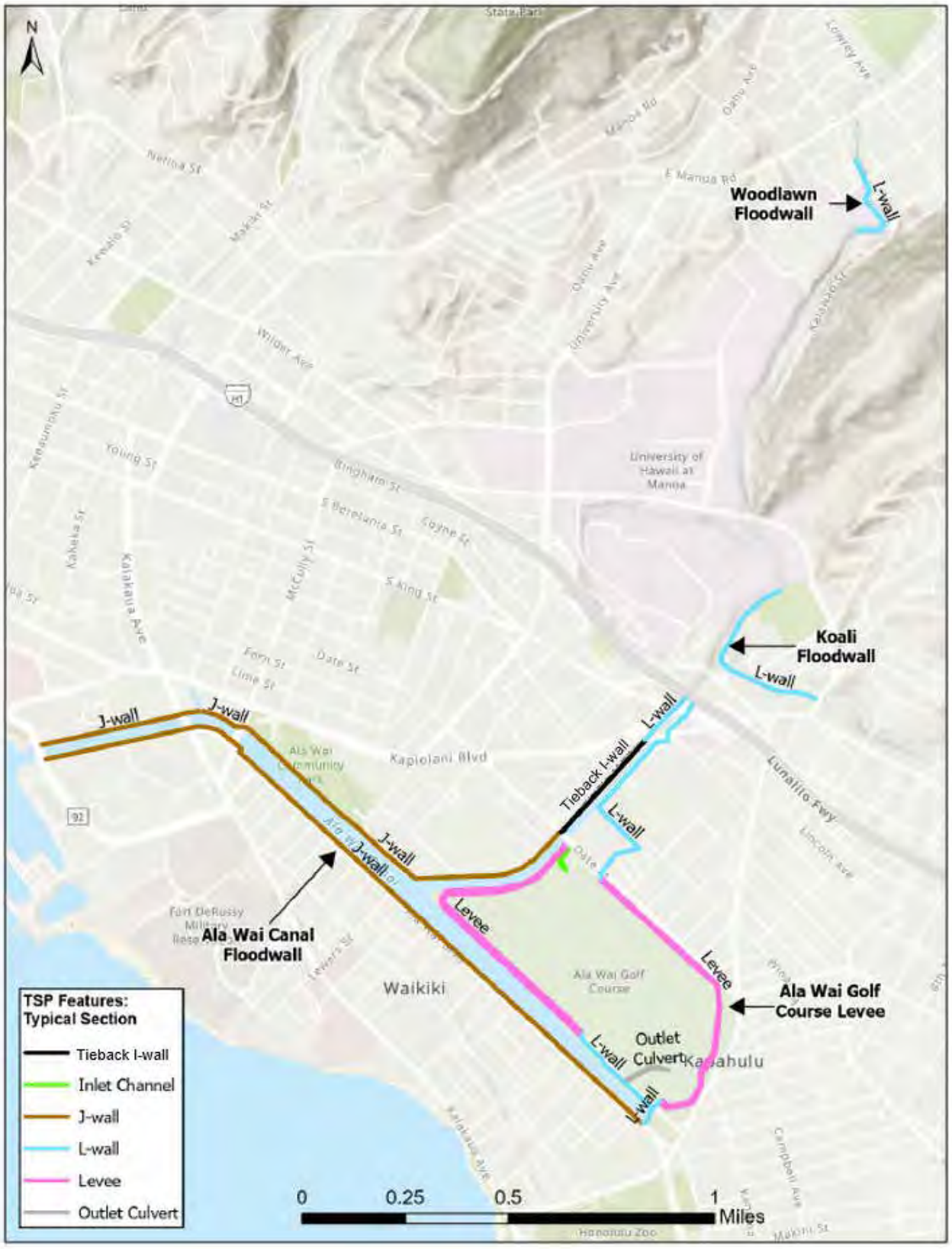

Figure 4-5: Risk Reduction Types (Walls and/or Levees) for Each Measure

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5. General Geology

5.1. Overview

The following general geology description for the project area was provided in the Interim Final Report for the Feasibility Study with Integrated Environmental Impact Statement, prepared by USACE, dated May 2017 (USACE, 2017b):

> The Ala Wai Watershed lies on the southern slope of the Koʻolau volcano, the younger and more easterly of two shield volcanoes that built the island of Oʻahu. Much of the eastern side of the Koʻolau volcanic shield has been removed through erosion and structural collapse; the remnants form the Koʻolau Mountain Range.
>
> The Koʻolau Mountain Range has been deeply dissected by erosional forces, resulting in gullies and gulches separated by steep ridges. Tributary streams generally originate in the upper elevations of the watershed and join to form single master streams (such as Manoa Stream), converging in deep and wide valleys.
>
> Alluvial soil from the ridges and mountainous areas has been gradually removed by sheet erosion and transported to the lower valley floor by surface runoff, accumulating as thick alluvial sequences.
>
> The Honolulu coastal plain, which generally extends from Pearl Harbor to Koko Head, is comprised of interlayered terrigenous *(material eroded from land)* and marine sediments and calcareous materials, as well as volcanic deposits produced by rejuvenated-stage volcanism (Stearns, 1939).

The geology of the watershed is very complex, primarily due to the volcanic history and transitory depositional nature of the soil deposits on the island. For example, volcanic eruptions resulted in lava flows or ash ejection from a vent. These volcanic deposits often were irregular in both lateral and vertical extent. In some locations, the volcanic activity impacted surface water flow or soil deposition. Soil deposits were influenced by stream flow and erosion, marine activities (e.g., rise and fall of sea levels), and backwater influences. For example, alluvium is interlayered with coral reef deposits and other marine sediments; and these deposits may be interlayered with volcanic-related sediments or rocks. In addition, a large portion of the coastal plain within the project site reportedly is fill. The fill is largely underlain by younger, underconsolidated alluvium, marsh, and lagoonal deposits. A general overview of the geology of the Ala Wai watershed is shown in Figure 5-1.

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Figure 5-1: Geology of Ala Wai Watershed

Listed below are the mapped geologic units identified below the individual measures based on the Geologic Map of the State of Hawai'i:

- (Holocene) Alluvium.
- Calcareous Reef Rock and Marine Sediment (Pleistocene).
- (Holocene) Fill.
- Lava Flows (Ko'olau Basalt).
- Lava Flows (Tantalus Peak and Sugar Loaf Vents).
- Lava Flows.
- Tuff.

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More detailed discussion of the mapped geologic units underlying the individual measures is provided in Section 0 where details regarding the individual measures are provided. The geologic information presented in Section 0 was obtained from the Geologic Map of the State of Hawai'i (USGS, 2007).

5.2. Engineering Properties & Construction Considerations

The following sections include a general discussion of the engineering properties and construction implications associated with each identified unit based on information provided in Sue Finstick's 1998 report entitled "Project Completion Report for Subsurface Geology and Hydrogeology of Downtown Honolulu: Engineering and Environmental Implications, Phases I and II", referred to herein as the Finstick Report.

Discussion of the Coralline Debris, Coral Ledges, Cinders, and Residual Soils/Weathered Volcanics deposits also is included since these deposits are present along the Ala Wai Canal and may be penetrated or relied upon for support of the planned macropiles. These units were not specifically identified or differentiated on the Geologic Map of the State of Hawai'i.

5.2.1. (Holocene) Alluvium

The Finstick Report stated the following regarding the engineering properties of the (Holocene) Alluvium:

> (The alluvium is) "a fairly heterogeneous unit, with variable engineering properties … alluvial deposits almost always include abundant cinders … Consolidation values reported are variable but tend to be high, indicating that this unit can be compressible. … Underconsolidated alluvial deposits are often found at shallower elevations, are more recent, and are characterized by low strength and high plasticity. …

The Finstick Report stated the following regarding the implications for construction in the (Holocene) Alluvium:

> Alluvial deposits are fairly heterogeneous, but in general, this subsurface unit is easy to excavate. The only difficulty in excavation would be caused by abundant boulders, but these occur in localized areas only. Alluvial deposits can be underconsolidated and compressible … In general, it is better to bypass this unit and utilize a deeper, more competent foundation-bearing layer, such as basalt or a coral ledge. However, this is often not possible … Friction piles, which derive their resistance from skin friction or adhesion, driven to the deeper and more consolidated alluvial deposits, can be used in these circumstances. However, the successful use of friction piles requires a thorough site investigation, combined with good judgment and experience …

Further, the Finstick Report stated "The slopewash alluvium, found at the *mauka* edge of the study area at higher elevations, is generally only a few feet thick. In boring logs this material may be referred to as "adobe." … The adobe found in the slopewash alluvium at higher elevations is highly compressible and should be excavated prior to construction." *Mauka* means "inland, upland, toward the mountain", which for that study meant the northern edge of the study area. The study area for the Finstick Report was bounded by Kalihi Stream to the west, Highway 1 to the north, Kalakaua Avenue and Atkinson Drive to the east, and the Pacific Ocean to the south.

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5.2.2. Tuff

The Finstick Report stated the following regarding the occurrence of Tuff:

> …It is generally found just below the cinders. …

The Finstick Report stated the following regarding the engineering properties of Tuff:

> In general, tuff is a hard, competent rock, with high strength and low compressibility. … The average rock quality designation was only 36%, which classifies it as "poor," although values were logged as high as 88%, which is in the category of "good." … Compressibility is generally not a factor for tuff in an unweathered state; however, weathered tuff may be moderately compressible.

The Finstick Report stated the following regarding the ease of construction in Tuff:

> Ease of excavation, as well as the overall strength of the tuff, depends upon the degree of weathering and fracturing and the amount of cementation within the unit. In the unweathered state, tuff is hard and strong, making it difficult to excavate. Weathered and fractured tuff is easier to excavate but may cause problems if used as a foundation-bearing layer due its softer and weaker nature. The top few feet of a tuff unit is often highly weathered … Open excavations generally do not need bracing, and the low permeability of tuff means that dewatering the unit is not difficult.
>
> A detailed site investigation is necessary to reveal the quality of the tuff at a specific location. In addition, information on the degree of weathering, fracturing, and cementation, as well as total thickness of the unit and any variations in thickness at the site, is needed to determine the foundation design.

5.2.3. Basalt

The Finstick Report stated the following regarding the occurrence of Basalt:

> Within the study area, there are at least four different basalt lava flows that date from the Honolulu Volcanic Series post-erosional or rejuvenation period. No boring logs examined for this study mentioned boreholes deep enough to reveal the much older Ko'olau basalt. Both ʻaʻā and pahoehoe flows were encountered in the subsurface; however, the logs made no attempt to distinguish between the two types of flows. All four of the Honolulu Volcanic Series basalt lava flows are generally oriented perpendicular to the shoreline.

ʻAʻā are lava flows that have a rough rubbly surface composed of broken lava blocks called clinkers. Pāhoehoe is basaltic lava that has a smooth, hummocky, or ropy surface.

The Finstick Report stated the following regarding the engineering properties of Basalt:

> Blow counts are high for basalt and are often recorded as blows per inches or fraction of a foot rather than as blows per foot … compressive strengths are also high. … Ferrall (1976) quoted compressive strengths for dense unweathered basalt as high as 30,000 pounds per square inch (4,320,000 pounds per square foot) for the Waikiki-Mo'ili'ili-Kaka'ako area. In this study strength values were found as high as 25,840 pounds per square inch (3,720,960 pounds per square foot), averaging over 17,000 pounds per

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> square inch (2,456,868 pounds per square foot). Rock quality designations reported in the boring logs range from 17% to 100%, averaging 59%, which puts it in the category of "fair." However, this includes measurements taken from ʻaʻā clinker and weathered zones at the top and sides of the flow. The interior of the flow is more dense and is characterized by the higher values. Basalt is not compressible. … Reports surveyed for this study recorded allowable pile-bearing capacities of 100 to 200 tons per pile for l6.5-inch or l8-inch octagonal piles. Ferrall (1976) also reported allowable pile capacities of up to 200 tons per pile for the Waikiki-Mo'ili'ili-Kaka'ako area.

The Finstick Report stated the following regarding the ease of construction in Basalt:

> Excavation of basalt is difficult, as it is the hardest and strongest unit found in the subsurface of the study area. It is an excellent foundation-bearing material. Shallow footings can be used in areas where the basalt is at or near ground surface. For basalt found at depth, piles are often used to support structures bearing on the basalt. Piles used in the study area range from 40 to 130 feet long. When designing, it is recommended that the possibility of the presence of compressible material below the lava be considered, as settlement could occur. Predrilling through overlying materials such as coral may be necessary when placing piles to basalt. An adequate site investigation must be performed to determine the thickness of the lava flow in any area. The presence of weathered layers, lava tubes, abundant vesicles, and ʻaʻā clinker layers may decrease the strength of the basalt and should be considered when designing structures for construction on basalt.

5.2.4. Residual Soils / Weathered Volcanics

The Finstick Report stated the following regarding the occurrence of Residual Soils or Weathered Volcanics:

> Residual soil or weathered volcanics comprise the weathered or decomposed uppermost surface of tuff and basalt deposits. This material is generally only a few feet to about 10 feet thick. It overlies unweathered tuff and basalt in the study area. It often includes weathered ʻaʻā clinker and mottled orange-brown clayey silt with basalt gravel and cobbles, such that it is probably an alluvial soil that formed on top of the volcanics. This unit grades down to the unweathered volcanic material with depth.

The Finstick Report stated the following regarding the engineering properties of Residual Soils or Weathered Volcanics:

> Blow counts, strengths, and dry densities for weathered volcanics tend to be comparable to or lower than those of their unweathered counterpart. The residual soils exhibit engineering characteristics similar to those of alluvium. This unit may be moderately compressible when compared to the unweathered volcanic material found below it. …

The Finstick Report stated the following regarding the ease of construction in Residual Soils or Weathered Volcanics:

> In general, weathered volcanics have characteristics similar to, but usually weaker and softer than, those of their unweathered counterparts. Therefore, excavation of this material is easier. However, its use as a foundation-bearing layer is not advised. Since

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this material is generally only a few feet thick and overlies denser and more competent tuff or basalt, bypassing it and utilizing the unweathered volcanic material as the foundation-bearing layer is usually not a problem.

5.2.5. Coralline Debris

The Finstick Report stated the following regarding the occurrence of the Coralline Debris:

> In general, coralline debris is found paralleling the coast and extending up former stream valleys. It is often found above and below coral ledges, intermixed with alluvial deposits, and within lagoonal layers. The thickness of this unit is extremely variable, ranging from lenses as thin as 1 foot to thick sequences of 50 feet or more. The thicker deposits are often found interlayered with alluvial deposits … Coralline debris consists primarily of silty calcareous sand and gravel. …

The Finstick Report stated the following regarding the engineering properties of the Coralline Debris:

> The engineering properties of coralline debris depend to a large extent upon its degree of cementation. … The rock quality designation for coralline debris is highly variable but averages only 17%, which puts it in the category of "very poor." … Compressive strengths for coralline debris are also variable, again reflecting the degree of cementation as well as the intermixing of coralline debris with other subsurface units. … no generalizations can be made about compressibility of this unit. However, it can be assumed that if intermixed with compressible alluvial deposits or lagoonal materials, coralline debris can undergo significant consolidation. …

The Finstick Report stated the following regarding the ease of construction in the Coralline Debris:

> The ease of excavation of coralline debris depends on the degree of cementation, as this material may be weakly cemented and relatively soft or well-cemented and hard. The degree of cementation, thickness, and intermixing with soft materials also determines the suitability of this material as a foundation-bearing layer. There can be rather extreme variations in the degree of cementation within a lens of coralline debris, and this can vary abruptly in both the horizontal and vertical directions within a deposit. Each site needs to be carefully examined for the degree of cementation, strength, and compressibility of this material. Reports surveyed for this study recommend using shallow or mat foundations for low-rise structures and piles for high-rise buildings.

5.2.6. Coral Ledges

The Finstick Report stated the following regarding the occurrence of the Coral Ledges:

> The -30 coral ledge is defined as that hard and dense ledge first encountered between elevations of -30 and -50 feet. In the study area, it is as thin as 3 feet and as thick as 35 feet, averaging about 15 feet thick. It parallels the shoreline and is the most seaward ledge coral mapped. It is also more prevalent in the eastern part of the study area than toward the western side.

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Massive ledge coral first encountered between elevations of -15 and -29 feet is classified as the -15 coral ledge. The thickness is variable, ranging from 2 to 30 feet and averaging about 12 feet. This coral ledge also parallels the coast and is located just inland of the -30 coral ledge. It is also primarily found in the eastern part of the study area.

Ferrall (1976) referred to coral found as high as +10 feet as part of the +5 ledge. Therefore, for this study, the +5 coral ledge is defined as that ledge first encountered between elevations of +10 and -10 feet. This ledge, which also parallels the shoreline, is found inland of the -15 coral ledge. The thickness is highly variable, ranging from about 1 to 42 feet and averaging 15 feet. It appears in the subsurface as a band from the eastern part of the study area clear through to the western part. In the eastern part of the study area, it is found as far *mauka* as the H-l Freeway in some places. Toward the western side of the study area, it is located closer to the shoreline.

The Finstick Report stated the following regarding the engineering properties of the Coral Ledges:

The coral ledges are characterized by some of the highest blow counts of any material in the study area. Their compressive strengths … are also high … Their rock quality designations vary from 0% to 100%, indicating a wide range in in situ rock quality, but the averages fall between "poor" and "good." No consolidation values were recorded for coral ledges in the reports surveyed for this study. … Allowable pile-bearing capacities found in reports used for this study ranged from 40 to 200 tons per pile. Ferrall (1976) reported the use of pile capacities between 40 and 100 tons per pile and concluded that pile capacities up to 100 tons per pile were acceptable on the coral ledges in the Waikiki area. However, he also stated that this figure may be too high in some cases, due to excessive settlement beneath and within the coral for loads this high. Therefore, the use of pile-bearing capacities as high as 200 tons per pile found in this study may be questionable.

Although coral ledges are among the hardest and strongest of the subsurface units within the study area, there are a number of problems associated with the use of coral ledges as foundation bearing layers. The most common are inconsistent thickness, areal extent, and hardness. Ledge coral at a site can vary from only a few feet to more than 10 feet in thickness, and it often has solution cavities that may be partially filled with soft sand. The degree of cementation and the amount of fracturing are also highly variable, both in the vertical and lateral directions. Often, the only distinction between ledge coral and coralline debris is the degree of cementation, which is reflected in blow counts. Therefore, there are probably many instances of ledge coral being misidentified as coralline debris and vice versa. However, for the purposes of this study, ledge coral is defined as that hard and dense coral characterized by blow counts of over 50 blows per foot (Dames & Moore system, 140-pound weight falling from a height of 30 inches), a rock core recovery of over 50%, and a rock quality designation of over 40%. In the consultants' reports surveyed for this study, this was the most common definition used to classify coral ledge.

… It is obvious that although the coral ledge is in general a hard and dense unit, there can be many irregularities in the strength of this material. Only a thorough site

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investigation can reveal the various irregularities so that the foundation can be properly designed.

The Finstick Report stated the following regarding the ease of construction in the Coral Ledges:

> The ease of excavation depends on the degree of cementation and fracturing of the coral ledge. In general, this material has enough in situ strength to allow excavation without bracing the sides of the excavation pit. Uncemented material may slough off into the excavation pit. If hard and well-cemented, excavation may be difficult.
>
> One of the problems associated with using the coral ledge as a foundation-bearing layer is the presence of cavities. If the cavities are filled with soft sand, the ledge may be compressible, resulting in differential settlement of the foundation. Piles driven into these cavities may fall through and thus not bear any of the weight of the foundation. Therefore, the coral ledge may need to be probed to delineate these cavities; if present, the cavities may require infilling with concrete or cement grout prior to construction at the site. For well-cemented, dense coral ledges without cavities, settlement is generally not an issue. Dewatering of coral ledges may be difficult due to their relatively high hydraulic conductivity.
>
> For low-rise structures, shallow foundations such as spread, mat, or continuous footings have been used on the coral ledges at or near ground surface. For high-rise buildings, end-bearing piles have been used on the coral ledges. Short piles (less than25 feet) with low allowable bearing capacities (50 tons per pile) have been used on the +5 coral ledge.
>
> Because of the variation in thickness and degree of cementation, many of the site reports examined recommend bypassing the upper coral ledge and using deeper coral ledges as the foundation-bearing stratum for piles. This requires predrilling through the upper coral ledge in order to place end-bearing piles on the lower ledges. …

5.2.7. Cinders

The Finstick Report stated the following regarding the occurrence of Cinders:

> Black cinders, although widespread in the study area, are primarily located in the east-central part, between Pi'ikoi Street on the east and Nu'uanu Avenue on the west, within the Kaka'ako and downtown Honolulu districts. Cinder deposits in the study area are generally located below the fill and alluvial topsoil layer. They are also located below the lagoonal materials in regions where such sediments occur.
>
> However, they are often found above the coral ledges. Cinders are of variable thickness, ranging from 0.5 to 55 feet, but averaging between 5 and 10 feet in the study area. The thicker deposits, which occur toward the *mauka* side of the study area, are found as reworked cinders within the old alluvial channels …

The Finstick Report stated the following regarding the engineering properties of Cinders:

> There is a great range in blow counts for cinders, reflecting the degree of compaction and cementation of the deposits. In some locations, the Tantalus/Roundtop cinders are still in a loose, uncompacted condition. In other locations, the cinders have been

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> compressed and cemented to a hard and dense state. … Values for strengths vary widely, again reflecting the degree of cementation as well as intermixing with other subsurface units, especially alluvial deposits. … In general, consolidation is low for cinders. However, when uncemented and uncompacted and when intermixed with compressible materials such as unconsolidated alluvial deposits or lagoonal deposits, cinders can be expected to undergo settlement.

The Finstick Report stated the following regarding the ease of construction in Cinders:

> Ease of excavation of cinders depends on the degree of cementation. In general, this material is easy to excavate and can be a good source of clean, stable backfill. The use of cinders as a foundation-bearing layer is usually not recommended, due to the loose, uncompacted nature of much of this material. In particular, when cinders are found intermixed with alluvial deposits or lagoonal materials, consolidation and the resulting settlement of the structure must be considered. … friction piles, as suggested for alluvial deposits, that derive their resistance from skin friction or adhesion. … For excavations requiring dewatering, this unit may cause problems, as it is permeable and therefore will be difficult to dewater.

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6. General Subsurface Conditions

In general, there was no boring or water well information regarding the specific subsurface conditions at half of the measure locations (4 out of 8) considered in the alternative array. At the remaining alternative array measure locations (4 out of 8), there were borings in the general vicinity of the measures, but not necessarily at the specific measure locations. As such, at these locations some reasonable conclusions could be made about the general soil conditions in the area of those proposed measures; however, in no case was the boring coverage considered sufficient for design purposes. It is important to note that due to the natural variability in the subsurface conditions resulting from the complex geology and the insufficient boring coverage, there is considerable risk that the subsurface conditions will vary from those assumed for the purposes of this report.

The following is an example of where boring coverage existed but was not necessarily along a specific measure alignment: There were borings for an auditorium addition at Kaimuki High School (Hardin-Lawson Associates, 1976) and for a maintenance facility at the Ala Wai Golf Course (Fewell Geotechnical Engineering, 1993). The borings for both of these projects were located in the general vicinity of the proposed Kaimuki High School Floodwall (Figure 6-1). Most of the borings generally were 200 feet or more from the proposed alignment. In addition, the borings provided coverage for less than a quarter of the proposed alignment. Furthermore, the subsurface conditions varied in the borings between the high school and golf course (e.g., coralline deposits encountered in maintenance facility borings, but not the auditorium borings) and even between the borings at the individual sites (e.g., 80 feet of alluvial deposits encountered in most borings at the auditorium, but a rock shelf encountered at 45 feet in one boring). In both cases though, surface deposits consisted of low shear strength, highly compressible soils.

Figure 6-1: Kaimuki High School Floodwall & Nearby Borings

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The assumed subsurface conditions provided for the individual measures detailed in Section 0 were obtained from nearby borings or wells, if available, and from the nearest borings or wells in similar geology for measures where there was no nearby subsurface information. However, as noted previously, the subsurface conditions were found to vary significantly over short distances (e.g., depth to rock varied, soil types varied, and consistency/density varied), emphasizing the need for borings to confirm preliminary design assumptions and to further refine the design during the design phase. Similarly, caution regarding assumptions related to subsurface conditions in absence of sufficient boring data and coverage is warranted.

For the purposes of this report, due to the variability in subsurface layering and the apparent wide-spread presence of soft and loose deposits, designs were evaluated assuming all surface soils were comprised of highly compressible layers with poor support characteristics. The surface soils likely are comprised of intermixed and interbedded fine and coarse-grained soils, including some (e.g., consolidated deposits) that are higher quality than assumed for the purposes of this report. For the purposes of this report and because the actual soil layers are unknown, designs were evaluated assuming the presence of soft fine-grained soils throughout the soil column or loose coarse-grained deposits throughout the soil column, with the most conservative resulting design selected for the feasibility phase of the work. In other words, I-walls and macropiles for L-walls were designed for soft clays or loose sands throughout the entire soil column. The greatest embedment depth and diameter/sizing resulting from each design condition was selected.

It is noted that design parameters selected for these preliminary analyses were, at best, loosely based on available laboratory testing, which was very limited. Design parameters were assumed and assigned based on the concept that the soil column generally was expected to be comprised of highly compressible soils with poor support characteristics. The design was based on the assumed values summarized in Table 6-1. It will be important that sufficient laboratory testing be conducted during the design phase to determine actual soil and strength characteristics. The assumed soil parameters summarized in Table 6-1 are considered conservative and generally are lower than those reported in the Finstick Report and the other site-specific geotechnical reports listed in Section 12.

Table 6-1: Assumed Soil Parameters

Soil Types	Unit Weight (pcf)	Effective Friction Angle f ' (degrees)	Effective Cohesion c' (psf)	Total Friction Angle f (degrees)	Total Cohesion c (psf)
Soft Clay	100	20	100	0	500
Loose Sand	100	30	0	30	0

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7. Geotechnical Concerns

7.1. Lack of Subsurface Information

As described in more detail in Section 0, very little to no specific boring/subsurface information was available for the particular measure sites for this project. Due to the natural variability in the subsurface conditions resulting from the complex geology and insufficient boring coverage, there is considerable risk that the subsurface conditions will vary from those assumed for the purposes of this report.

The subsurface conditions assumed for the purposes of this report were based on the conditions encountered in the closest available borings and wells deemed appropriate for these purposes (instead of actual boring information along the proposed alignment). As such, borings must be advanced at suitable spacings and depths to better determine actual subsurface conditions for design or purposes beyond feasibility purposes.

It will be important that the borings identify the characteristics (strength, cementation, continuity, etc.) of any rock-like deposits encountered (e.g., coral, lava, tuff, etc.) due to the irregular nature of these deposits, especially if macropiles are end-bearing on the formation.

7.2. Soft, Loose, Compressible Deposits

One common theme in many of the borings from nearby sites was the presence of soft or loose alluvial, marine, or lagoonal deposits. These deposits often were encountered near the ground surface and well within anticipated foundation influence zones. In addition, these soil deposits often were thick.

Soft or loose soils tend to have low strength, resulting in low strength parameters that often control the design. In addition to low strength, these soils tend to be highly compressible, resulting in total and differential settlement concerns that must be included in the design. Furthermore, these soils tend to make the construction process more difficult and costly (e.g., a construction platform of granular soils may be required for surface stability; flatter excavation slopes may be required for safety; or installation of an improved zone directly below foundations may be required). The presence of these types of deposits undoubtedly will impact the proposed design and construction at most, if not all, the sites.

7.3. Boulders & Obstructions

Some of the geologic formations include large boulders, lava flows, or other hard-to-penetrate layers (e.g., cobbles or gravel) that will complicate installation of deep foundations because they come “obstructions” to advancement of deep foundation elements, such as macropiles and sheet piles. This is one of the reasons that macropiles are the preferred foundation type and is also why it is recommended that sheet piles be fitted with driving shoes. This concern likely will impact the proposed construction at most, if not all, the sites.

7.4. Groundwater

Shallow groundwater (often from 1 to 3 feet below existing grades) was common in the area of the Ala Wai Canal and Ala Wai Golf Course and may be encountered at other sites. Shallow groundwater often complicates construction, requiring special excavation and stabilization

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measures. In addition, cut slopes typically are cut flatter where groundwater is encountered. The presence of shallow groundwater is expected to significantly impact construction in the Ala Wai Canal and Ala Wai Golf Course area due to the expected difficulty dewatering excavations.

Groundwater, if encountered, may be challenging to address in some of the geologic formations underlying the site, such as the Coral Ledges and Cinders due to the porosity of the formations.

Artesian conditions are a known problem in the Honolulu area. The artesian conditions typically are associated with aquifers expected to be below the construction depths for this project. However, due to the complex geology and artesian conditions in localized areas, it will be important that future exploration plans and studies at least include evaluation of the possibility of artesian conditions, especially since artesian conditions can be detrimental to the proposed construction if not properly addressed in design (e.g., water may seepage upwards continuously along sheet piles or macropiles).

7.5. Mo'ili'ili Karst

There is an area known as Mo'ili'ili Karst in Honolulu. The area generally is centered near University Avenue and S. King Street as shown in Figure 7-1. This area is known to have caves, which have impacted foundation installations in the area and caused surface subsidence (to a lesser degree). The karst activity likely is associated with the calcareous reef rock, which reportedly is at relatively shallow depths in this area. While several of the proposed measures are located nearby (Koali Road Floodwall, Kaimuki High School Floodwall, Ala Wai Golf Course, and Ala Wai Canal Floodwall as shown in Figure 7-1), none of the proposed measures are expected to be impacted by Mo'ili'ili Karst or other karst activity.

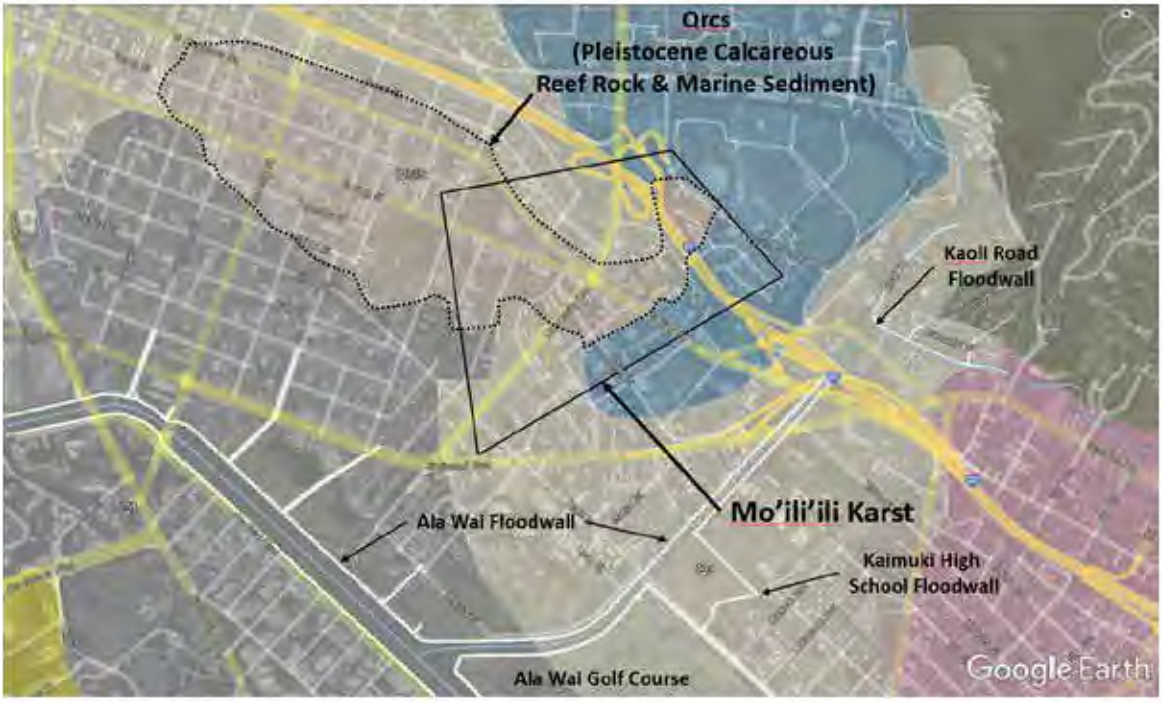

Figure 7-1: Mo'ili'ili Karst

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8. Structural Features

The following structural feature types were included in the alternative array analysis: I-walls, L-walls, J-walls, U-wall, Press-In/Tieback I-walls, levees, and detention basins. Additional information on each of these features is provided in the following sections.

8.1. I-Walls

I-walls generally were assumed when walls were needed to create storage basins, while L-walls were assumed when walls were located adjacent to streams due to concerns about erosion removing the soil in front of the I-wall that may be necessary to provide lateral resistance. I-walls also were considered where the wall was located far enough away from the stream that bank erosion was not a concern. The “short” section of I-wall that had been planned around the playing fields at Kaimuki High School was converted to L-wall for simplicity of design (e.g., avoid transition and reduce the type of walls used). No I-walls were included in the TSP.

EM 1110-2-6066 (USACE, 2011) states that “I-walls shall be used only in instances where other flood barrier types are impractical.” For this project, I-walls were only used where space constraints were not conducive to other wall types. These other wall types require more real estate or the relocation of utilities. In addition, EM 1110-2-6066 requires the minimum wall embedment on natural (or flat) ground, be twice the stick-up wall height or 10 feet, whichever is greater, or 2.5 times the stick-up wall height on the protected side on levees (or sloped) ground or 10 feet, whichever is greater. Furthermore, EM 1110-2-6066 states the maximum unsupported stem height for new I-walls constructed on existing levees (or sloped ground) or in soft soils be limited to 6 feet. This height is limited to 4 feet on levees in the newer EM 1110-2-2502 published in 2022.

According to Table 9.4 of EM 1110-2-2502 (USACE, 2022a), the maximum allowable I-wall height varies based on the undrained soil strength and the load category as shown as in Figure 8-1. Based on this table, the maximum wall weight for the soft clays assumed to be present on-site (undrained strength, s_u = 500 psf) is 5.5 feet using linear interpolation between an undrained strength of 300 and 1,500 psf and a “usual” load category. The maximum height selected for structural features for this project was 6 feet based on a combination of hydraulic needs, the limitations associated with the use of I-walls, the maximum height perceived to be acceptable to residents, and expected space constraints. Additional hydrology and hydraulic (H&H) analysis will be required to refine the wall height. Refer to the H&H Appendix for more information on the H&H assumptions. It is noted that the assumed undrained strength for the on-site soils likely is conservative, such that a 6-foot wall is expected to be feasible once soil borings and laboratory testing are conducted.

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Table 9.4
Maximum Wall Heights for Deformation Control of Cantilever Pile Walls Used for Floodwalls, Dam Walls, and Dam Crest Walls

Load Category	Foundation Type: Sand $\phi' \geq 32.5$, $D_r \geq 0.50$	Soft Clay $s_u \leq 300$ psf	Stiff Clay $s_u \geq 1,500$ psf	Wall on Earthen Levee Embankment
Usual	7 ft. (2.1 m)	5 ft. (1.5 m)	8 ft. (2.4 m)	4 ft. (1.2 m)
Unusual	9 ft. (2.7 m)	7 ft. (2.1 m)	12 ft. (3.7 m)	4 ft. (1.2 m)
Extreme	11 ft. (3.4 m)	8 ft. (2.4 m)	15 ft. (4.6 m)	4 ft. (1.2 m)

Notes:

(a) D_r = relative density

(b) The heights in the table are the distance from the elevation of the top of wall to the ground surface on the landside of the wall, as shown in Figure 9.12.

(c) Linear interpolation is permitted for clay strengths between those shown, but extrapolation is not permitted.

(d) Limited data has been developed for deformation of walls on levees. Walls on levees with heights greater than 4 ft. (1.2 m) as shown in Figure 9.12 require analysis by full numeric analysis methods.

(e) For layered soils, the engineer will base the maximum height on the predominant soil type resulting in the lowest water height for deformation control. The soil type used is determined by the soil on the landside of the wall extending from the ground surface to the elevation of maximum net passive pressure from the CWALSHT or CI-WALL analysis. Questionable sections will require analysis by full numeric analysis methods.

(f) Walls founded in soils with properties outside the range of soils in the table must be analyzed with full numeric analysis methods.

Usual loads are normal loads that are routinely experienced.

Unusual loads are rare, but likely during the service life of a structure.

Extreme loads are possible, but unlikely during the service life of a structure.

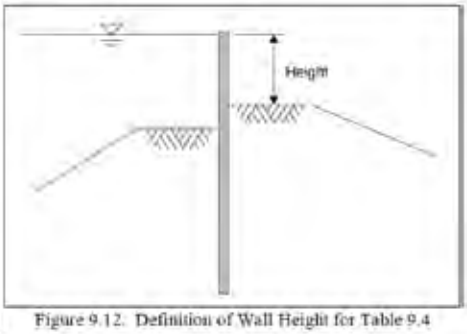

Figure 9.12. Definition of Wall Height for Table 9.4

Figure 8-1: Maximum I-Wall Heights per EM 1110-2-2502 (USACE, 2022a)

The required embedment depth was calculated for two conditions: level ground (Manoa Valley District Park Detention) and 3H:1V sloped ground on the water side of the wall (Makiki District Park Detention). In addition, embedment in all clay or all sand deposits was evaluated. In summary, CI Wall was used to calculate the minimum embedment depth for these two ground surface conditions (level and sloped ground) and these two subsurface conditions (clay and sand). However, since the walls are only loaded with water a maximum of 2 to 3 days, only the “Quick Case” (Total Stresses) was evaluated in CI Wall.

Since CI Wall assumes a horizontal ground surface in front of the wall, the strength parameters were reduced an amount such that the calculated passive earth pressure mimicked the expected reduced earth pressure associated with a sloping ground surface 5 feet from the face of the wall (essentially resulted in reducing the effective friction angle 6 degrees for a 3H:1V slope in front of the wall). See Figure 8-2 below for reference.

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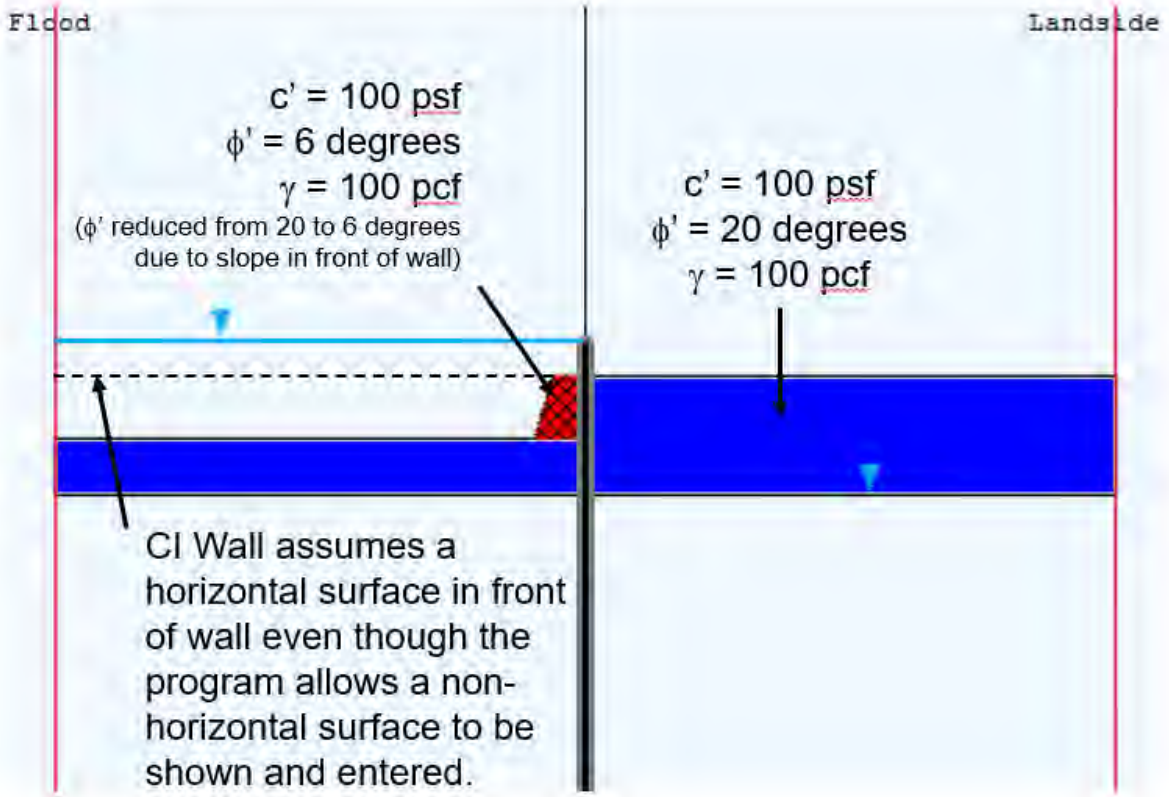

Figure 8-2: I-Wall Assumed Strength Parameters Reduced for Slope in Front of Wall

The structural engineer also checked embedment depths using CWALSHT. Refer to the Structural Appendix for CWALSHT calculations. The embedment depths calculated by CWALSHT were greater than those calculated using CI Wall, so the embedment depths for CWALSHT were used. The calculated embedment depths seem high for the stick-up height (3H on flat ground and 4H on sloped ground) and should be re-evaluated once actual subsurface and loading data is available during the design phase.

Based on the CWALSHT calculations, for a 6-foot wall stick-up height, the required depth of embedment was 18 feet for a horizontal ground surface (or 3H, which is greater than the required minimum of 10 feet or 2H, whichever was greater, provided in EM 1110-2-6066). For a 6-foot wall stick-up height, the required depth of embedment was 24 feet for a sloped ground surface (or 4H, which is greater than the required minimum of 10 feet or 2.5H, whichever was greater, provided in EM 1110-2-6066). The proposed I-wall configurations are shown in Figure 8-3.

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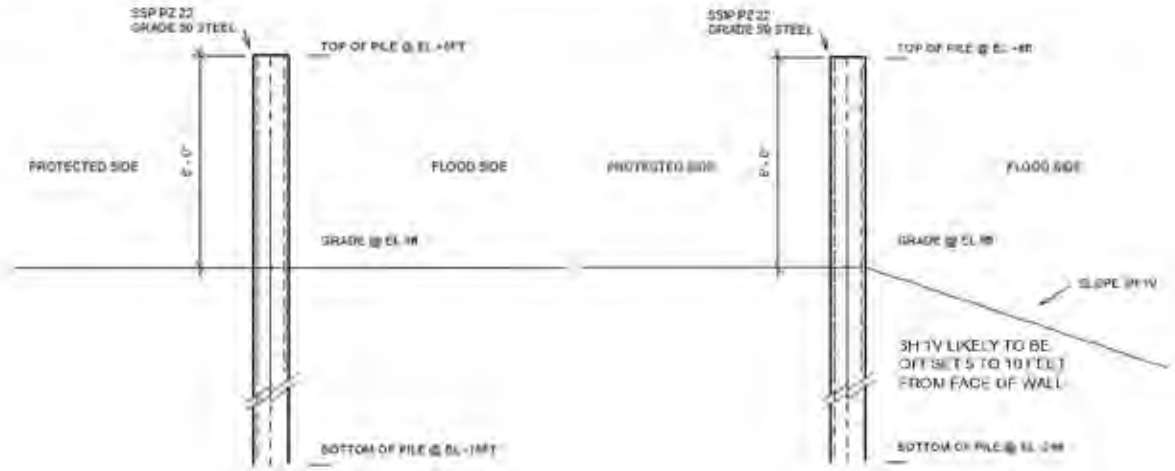

Figure 8-3: Proposed I-Wall Configurations

It is assumed that all sheet piles will be fitted with pointed driving shoes similar to that shown in Figure 8-4 to penetrate the boulders, hard layers, and other obstructions that are assumed to be present wherever I-walls are planned.

Figure 8-4: Example Sheet Pile Driving Shoe

No toe drains were assumed for the I-walls because of the flashy nature of the floodwaters. The water is only expected to be stored in the detention basins where I-walls are planned for a maximum of 2 to 3 days, which is not expected to be a sufficient period of time for seepage at the landside to develop given the expected fines content of the soil deposits (even the sand deposits).

8.2. L-Wall on Macropiles

L-walls were assumed when walls were located adjacent to the stream due to their enhanced stability against erosion as compared to I-walls, while I-walls were assumed when walls were used to create storage basins.

Macropiles, which are similar to micropiles in materials and installation methods but larger in diameter (micropiles typically are less than 12 inches in diameter), were selected over other foundation types, such as driven piles, drilled piers, stone columns, etc., for the following reasons:

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1. Macropiles can provide both the necessary lateral and vertical capacity required and can be socketed into rock, coral, or dense layers to provide higher capacities, if necessary.
2. Macropiles are able to penetrate boulders, layers of coral or lava, and other obstructions with relative ease.
3. The installation process generally is less disruptive than other viable foundation systems (e.g., generally less noise and vibrations), which is an important consideration given the development and population density of the various measure sites.
4. Macropiles can be installed with smaller equipment, which is better able to accommodate the severe space limitations, including low overhead considerations.
5. Macropiles can be battered to increase lateral load capacity, if needed.
6. Cased macropiles increase lateral capacity and are better able to accommodate difficult soil/rock/drilling conditions.

For design purposes, the height of all walls was assumed to be 6 feet or less, except at the lower elevations of the Ala Wai Golf Course where 9-foot walls were planned. The base width of the L-wall was assumed to be 12 feet (6-foot) or 13 feet (9-foot) based on information provided by the structural engineer, while the base thickness was assumed to be 3 foot 4 inches (6-foot) or 3 foot 8 inches (9-foot). Refer to the Structural Appendix for information on the assumed wall design and configuration development.

Based on information provided by the structural engineer from an Ensoft Group analysis conducted by the structural engineer, the maximum vertical load (compression and uplift) on an individual macropile is expected to be on the order of 49 kips with the maximum lateral load on the order of 10 kips for 6-foot walls and 76 kips and 40 kips, respectively, for 9-foot walls. The calculated pile deflection was approximately 0.2 inch for the 6-foot walls and 0.8 inches for the 9-foot walls, both of which are within acceptable ranges.

Per Andrew Brengola in “Micropiles – Versatile Foundation Alternative for Challenging Projects” (Structure Magazine, 2005), “The lateral load capacity of vertical micropiles is generally between 5 and 15 tons; however, this resistance can be increased by battering the piles.” In other words, vertical (not battered) micropiles are capable of providing 10 to 30 kips laterally (5 to 15 tons), the low end of which is what is expected to be required for the predominant wall type for this project (6-foot walls). Furthermore, the capacity cited by Brengola is based on micropiles “generally less than 12 inches” whereas the piles for this project are 16 and 18 inches in diameter for 6-foot and 9-foot walls. As such, the lateral capacity will be greater than the 10 to 30 kips previously cited for smaller diameter micropiles; and it was concluded that macropiles are capable of providing the necessary lateral capacity for this project. Furthermore, for this project, the back row was assumed to be battered, which both reduces the expected deflection in the soft soils assumed to be present and increases the lateral capacity of the macropile. The Group analysis described previously also confirms the feasibility of achieving the required lateral capacity with the proposed macropile configuration.

Table 5-3 of the Micropile Design and Construction, Reference Manual (FHWA, 2005) was used to estimate the grout-to-ground ultimate bond strength used to calculate the uplift/compressive capacity of the macropiles. A copy of this table is provided in Figure 8-5. The compression and uplift capacities in macropiles are assumed to be the same. End-bearing was conservatively ignored for macropiles in compression. It was assumed “soft, medium plastic, silt and clay with some sand” was present along the full length of the macropile for this project, which is a

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conservative assumption. The grout-to-ground ultimate bond strength for these types of soils is 5 to 10 psi for Type A micropiles (i.e., grout delivered under gravity instead of pressure) per Figure 8-5. The deposits likely will not be soft throughout the full length, such that the low end of 5 psi for grout-to-ground ultimate bond strength likely is a conservative assumption. In addition, sand layers, with an estimated grout-to-ground ultimate bond strength of 10 to 21 psi per Figure 8-5, also may be present, thereby further increasing the grout-to-ground ultimate bond strength. Since a casing will be used, grout likely will be delivered under pressure, which provides a higher upper bound on the grout-to-ground ultimate bond strength. According to the FHWA reference manual, use of the lower end of the values provided in Figure 8-5 is recommended when soft/loose or high plasticity deposits are expected, which they are for this project.

Soil / Rock Description	Grout-to-Ground Bond Ultimate Strengths, kPa (psi)			
	Type A	Type B	Type C	Type D
Silt & Clay (some sand) (soft, medium plastic)	35-70 (5-10)	35-95 (5-14)	50-120 (5-17.5)	50-145 (5-21)
Silt & Clay (some sand) (stiff, dense to very dense)	50-120 (5-17.5)	70-190 (10-27.5)	95-190 (14-27.5)	95-190 (14-27.5)
Sand (some silt) (fine, loose-medium dense)	70-145 (10-21)	70-190 (10-27.5)	95-190 (14-27.5)	95- 240 (14-35)
Sand (some silt, gravel) (fine-coarse, med.-very dense)	95-215 (14-31)	120-360 (17.5-52)	145-360 (21-52)	145-385 (21-56)
Gravel (some sand) (medium-very dense)	95-265 (14-38.5)	120-360 (17.5-52)	145-360 (21-52)	145-385 (21-56)
Glacial Till (silt, sand, gravel) (medium-very dense, cemented)	95-190 (14-27.5)	95-310 (14-45)	120-310 (17.5-45)	120-335 (17.5-48.5)
Soft Shales (fresh-moderate fracturing, little to no weathering)	205-550 (30-80)	N/A	N/A	N/A
Slates and Hard Shales (fresh-moderate fracturing, little to no weathering)	515-1,380 (75-200)	N/A	N/A	N/A
Limestone (fresh-moderate fracturing, little to no weathering)	1,035-2,070 (150-300)	N/A	N/A	N/A
Sandstone (fresh-moderate fracturing, little to no weathering)	520-1,725 (75.5-250)	N/A	N/A	N/A
Granite and Basalt (fresh-moderate fracturing, little to no weathering)	1,380-4,200 (200-609)	N/A	N/A	N/A

Type A: Gravity grout only
Type B: Pressure grouted through the casing during casing withdrawal
Type C: Primary grout placed under gravity head, then one phase of secondary "global" pressure grouting
Type D: Primary grout placed under gravity head, then one or more phases of secondary "global" pressure grouting

Figure 8-5: Typical Micropile Grout-to-Ground Bond Strengths (FHWA, 2005)

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Using a grout-to-ground ultimate bond strength of 5 psi, a diameter of 16 inches (14-inch diameter casing plus 1 inch of cover), a length of 40 feet, and a factor of safety of 2, the calculated allowable capacity in compression and uplift is 60 kips (= PI * 16 in * 40 ft * 12 in/ft * 5 psi / 1000 lbs/kips / FS of 2 = 60 kips), which is greater than the 49 kips expected to be needed, for the 6-foot walls. Using a similar approach, the calculated allowable capacity in compression and uplift is 85 kips for an 18-inch diameter macropile 50 feet long, which is greater than the 76 kips expected to be needed, for the 9-foot walls. No reduction was applied to the capacity due to group effects since the macropiles are spaced at least three diameters apart. Refer to Figure 8-6 for capacity calculations for various macropile diameters at selected lengths. This figure shows that a 12 to 14-inch macropile 40 feet long should be capable of providing the required 49 kips required for 6-foot walls. However, a 16-inch macropile is assumed because of concerns about lateral deflections of smaller diameter macropiles/micropiles given the lack of sufficient soil data and the known presence of soft and loose surface soils. A similar process was used when selecting an 18-inch macropile for the 9-foot walls.

Diameter (in)	Pile Length (ft)	Minimum Grout-to-Ground Bond Ultimate Strength (psi)	Maximum Grout-to-Ground Bond Ultimate Strength (psi)[1]	Minimum Ultimate Vertical Capacity (kips)	Maximum Ultimate Vertical Capacity (kips)	Factor of Safety	Minimum Allowable Vertical Capacity (kips)[2]	Maximum Allowable Vertical Capacity (kips)
12	40	5	7.5	90	136	2	45	68
14	40	5	7.5	106	158	2	53	79
16	40	5	7.5	121	181	2	60	90
18	40	5	7.5	136	204	2	68	102
12	50	5	7.5	113	170	2	57	85
14	50	5	7.5	132	198	2	66	99
16	50	5	7.5	151	226	2	75	113
18	50	5	7.5	170	254	2	85	127

1 - Maximum values were limited to no greater than the average value for the bond strength (i.e., the middle of reported range of 5-10 psi in FHWA table) due to unknowns associated with the soils.
2 - Lower bound values were considered most likely due to loose granular materials and medium to high plasticity cohesive materials

Figure 8-6: Allowable Compressive/Uplift Capacity for Macropiles

The macropile for this project was assumed to be a cased macropile. Specifically, the macropiles were assumed to be 40 feet long and 16 inches in diameter with a 14-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar for 6-foot walls and 50 feet long and 18 inches in diameter with a 16-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar for 9-foot walls. The macropiles were assumed to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 3V:1H. All reinforcing steel was assumed to be stainless steel or epoxy coated since the macropiles are a permanent installation. It was assumed that the bending resistance in the pile created by the lateral loading can be accommodated by the 14-inch to 16-inch permanent full-length casing. For budgetary purposes (and due to deflection concerns), it was assumed that the back row of macropiles will be installed at a batter of 6V:1H while the front row will be vertical. The general proposed configuration of the 6-foot and 9-foot L-walls is provided in Figure 8-7 and Figure 8-8, respectively.

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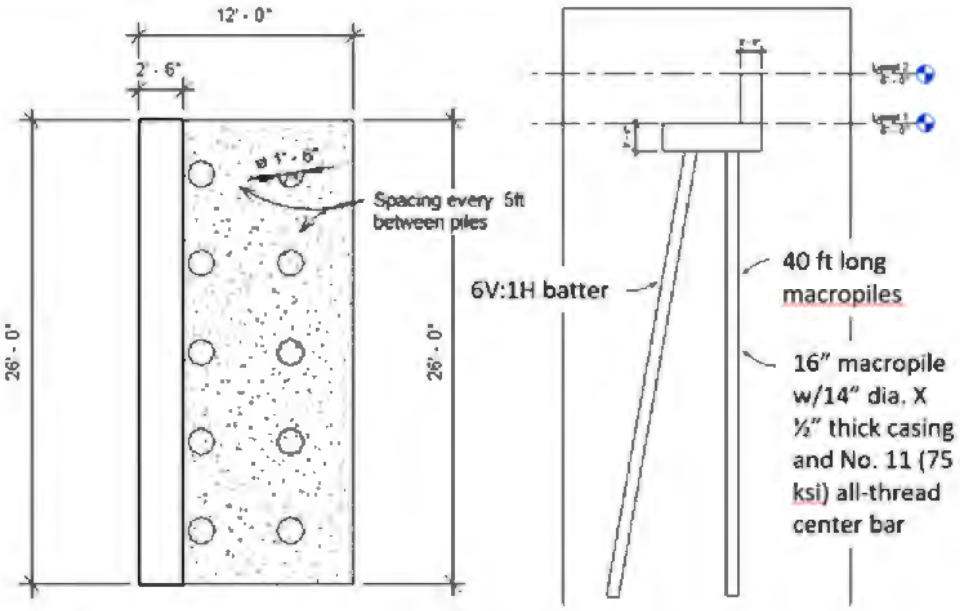

Figure 8-7: Proposed 6-Foot L-Wall Layout

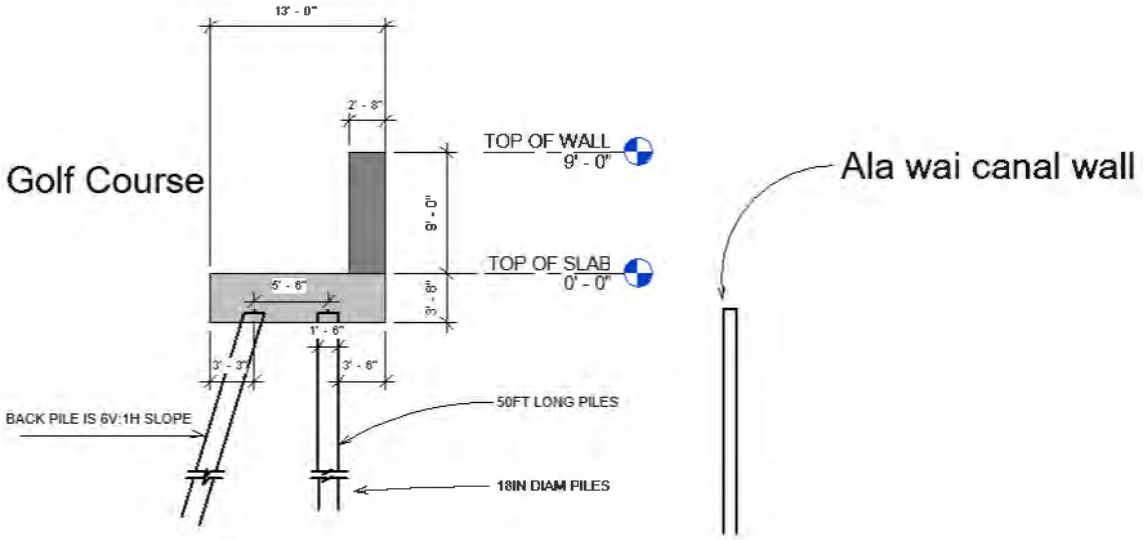

Figure 8-8: Proposed 9-Foot L-Wall Layout

The macropile design developed for this project was compared to the micropiles piles developed for an L-wall design associated with the Ala Wai Canal Wall Repair (Geolabs, 2017) for reasonableness. The micropiles for that project were assumed to consist of a cased micropile system as described below:

> Based on the subsurface conditions encountered at the project site, we recommend using a cased micropile system with a grout bulb diameter of at least 7 inches to support the new retaining wall. The micropiles should be spaced at 3 feet on-centers or greater. The permanent casing for the cased micropile system should have an inside diameter (ID) of at least 7 inches. The minimum thickness of the permanent casing should be about 0.375 inches. A reinforcing steel bar consisting of a Grade 75 No. 11 all-thread reinforcing bar with a cross-sectional area of 1.56 square inches may be considered.

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Since the micropiles are used in a permanent application, epoxy coated or stainless steel bars should be used.

In general, while the Geolabs L-wall and the L-wall for this project were for different purposes and have different loading, the expected magnitude of the loading was assumed to be similar. The Geolabs micropile was designed for a 7-foot-tall retaining wall on the canal retaining earthen backfill while most of the L-walls for this project will retain only water and be limited to 6 feet tall. The water only loading should create less demand on the wall as compared to a combination of soil and water. A larger diameter “micropile” (or macropile) for this project was deemed reasonable due to the many unknowns associated with subsurface conditions and because the spacing was increased to 5 feet on-center from 3 feet on-center. The casing wall thickness was increased to provide higher moment capacity and a stiffer element to help deflection. A higher number of smaller-diameter macropiles were assumed to be similar in costs than fewer larger-diameter macropiles based on discussion with the cost estimator.

No sheet piles were assumed to be necessary below L-walls given the transient nature of expected floodwaters. Based on information provided by the H&H engineer, floodwaters generally are up and down in approximately 3 to 4 hours on all the streams and approximately 10 to 12 hours on the Ala Wai Canal, likely an insufficient time to develop seepage at the landside.

Additional subsurface information and development of actual loads will be necessary to better refine the assumed design provided above.

8.3. J-Wall on Macropiles

J-walls were assumed where visual connection with the Ala Wai Canal needed to be maintained for pedestrians (i.e., along the Ala Wai Canal). Other configurations, such a levee/I-wall configuration or a backfilled I-wall, were considered. However, the team selected the J-wall primarily due to concerns about imparting new loading on the existing sensitive, historic canal walls either through creating surcharge loading from the levee or lateral deflection from the sheet pile associated with I-walls. The existing canal walls reportedly already show signs of tilting and settlement under current conditions. In addition, there were vibration concerns associated with the installation of the sheet pile, unless a more expensive hydraulic push method is used. Replacement of the existing canal walls was deemed unacceptable due to the historic significance of the walls, the reported environmental contamination of the canal, and the ownership of the walls (i.e., anything inside the existing canal walls reportedly was owned and operated by an entity other than the planned Sponsor, which created project complications).

For the purposes of this report, the J-wall was assumed to have the same design as the L-wall, with the same wall thickness, foundation width, and macropiles configuration. The general assumed configuration of the J-wall is provided in Figure 8-9. The only difference between the J-wall and the L-wall is the addition of a 3-foot concrete wall on the heel (landside) of the foundation to create an elevated platform for construction of a sidewalk. The purpose of the rear wall and backfill would be to effectively convert the 6-foot floodwall on the waterside to a 3-foot wall so that pedestrians along the Ala Wai Canal can maintain visual connection with the canal (in addition to not being “trapped” on the waterside of the wall until the next closure). It is assumed that drainage for the sidewalk backfill will be provided.

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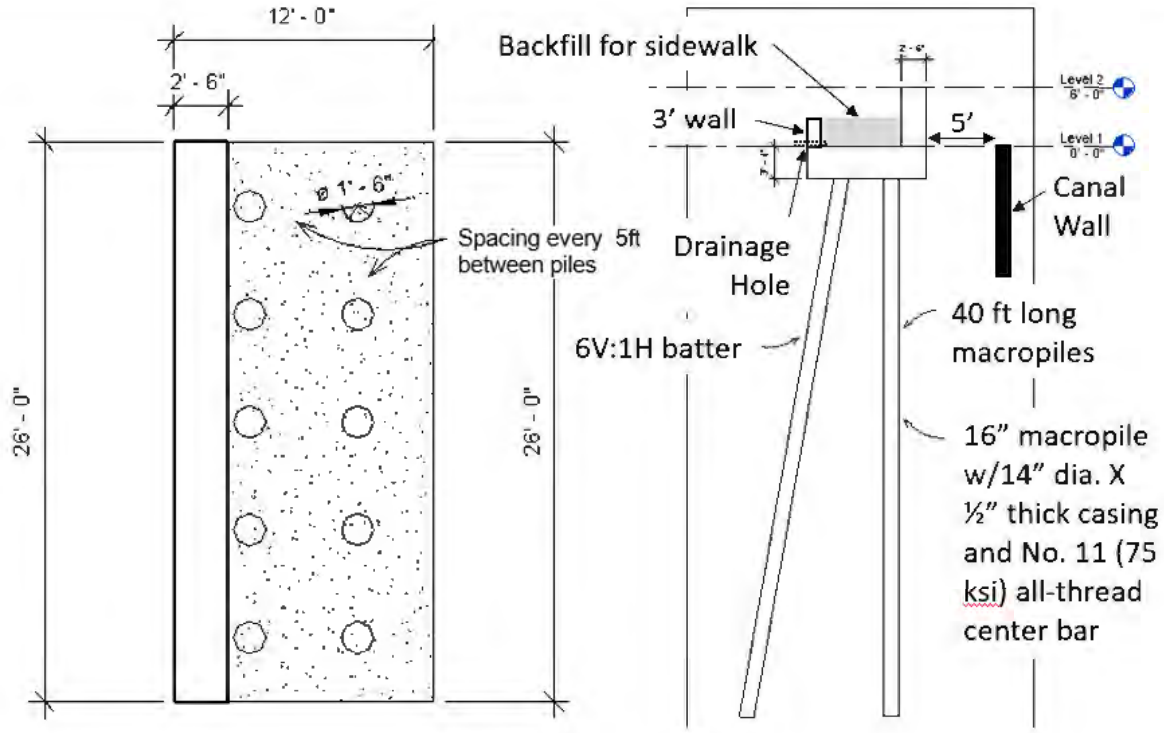

Figure 8-9: Proposed J-Wall Layout

8.4. U-Wall on Macropiles

A U-wall (i.e., two L-walls facing one another) was assumed along Makiki from the Ala Wai Canal to Fern Street. The Makiki Floodwall was eliminated from the TSP due to induced damages.

The U-wall was assumed to be similar to two L-walls (as described in Section 8.2) facing each other, with the exception of the following changes: base thickness reduced from 40 inches to 30 inches; the base width varied to match the existing channel width; and all macropiles vertical (no batter). The wall will be constructed within the walls of the existing drainage channel with the new wall bottom matching the existing drainage channel bottom. The new wall will extend 6 feet above the existing canal walls/surrounding ground surface. The area between the existing and new concrete walls will be backfilled (concrete assumed for budgetary purposes). The general concept of the proposed U-wall is shown in Figure 8-10.

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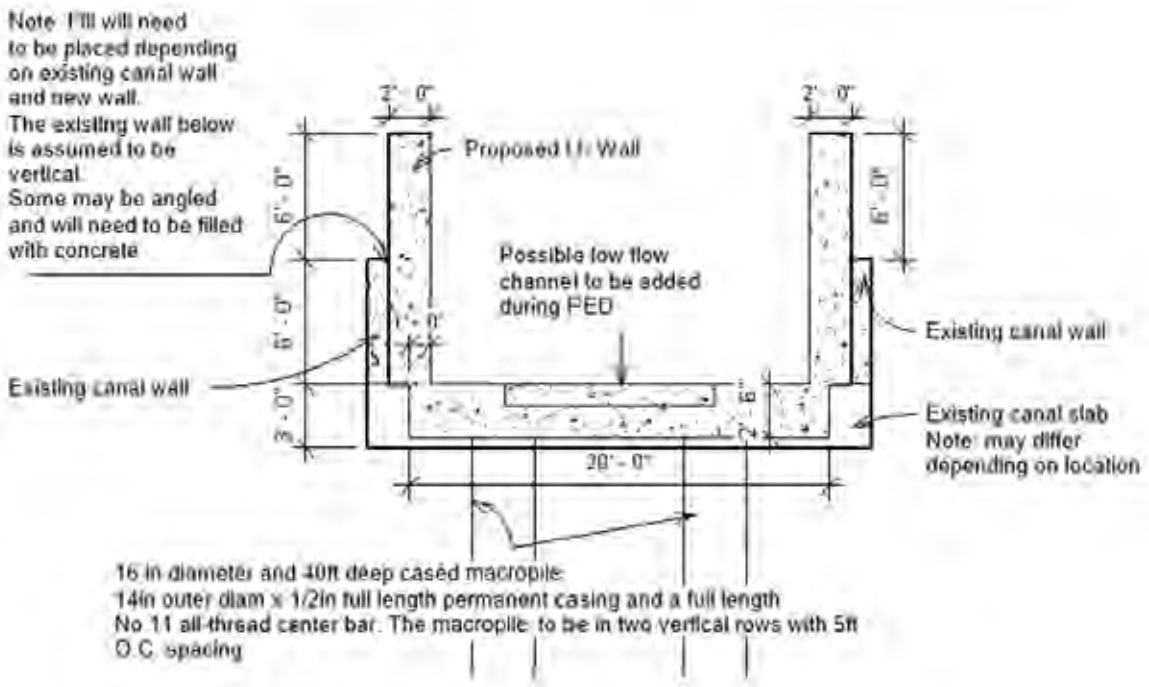

Figure 8-10: Proposed U-Wall Layout

The proposed wall design assumes that all the existing walls are similar to the limited as-built drawings provided for review by the City of Honolulu, which show rubble masonry walls with a concrete bottom as shown in Figure 8-10. This assumption will need to be confirmed during design. A concrete bottom may not be present in all locations. Where not present, stabilization of the creek channel bottom with granular fill to facilitate construction may be necessary. In addition, a condition survey of the existing walls and bottom should be conducted during the design phase to help inform construction and the length of existing wall that be exposed at one time.

To maintain the integrity of the support for the construction adjacent to the canal provided by the existing walls, the new construction will have to be constructed in stages with only short sections constructed at one time, with construction on adjacent panels delayed until support is restored at the excavated panel. As an example, the bottom slab for the new wall could be excavated in 10-foot sections, with no more than one 10-foot section excavated in a 50-foot section. Slabs could be constructed in a “leapfrog” fashion until a continuous new bottom is constructed. Having to limit construction to short stretches will increase construction costs and require additional time.

It is assumed that the macropiles would be installed through the existing concrete slab, where present, possibly by pre-coring through the slab. A sonotube, or other bond break mechanism, would have to be placed between the existing slab and macropile (to facilitate future demolition of the existing slab).

8.5. Tieback I-Walls

Due to access constraints (specifically insufficient distance between the existing streambank and the existing structures for construction of the planned L-wall), the planned L-wall along the

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west bank of the Manoa-Palolo Stream from Date Street to Kapiolani Boulevard was converted to a tieback I-wall for the TSP. The location of this wall is shown in Figure 8-11. Figure 8-11 shows the close proximity of the existing structures.

Figure 8-11: Location of Tieback I-Wall

The general assumed concept of the planned tieback I-wall is depicted in in Figure 8-12. The details for this wall were developed based on general past experience with similar wall types, with the general reasonableness confirmed with preliminary calculations by the structural engineer. Refer to the Structural Appendix for preliminary calculations conducted for this wall. For the purposes of this report, the I-wall was assumed to be a PZ30 sheet pile that would be toed into rock (rock exposed in some locations along the stream) or would extend 15 feet below the bottom of the stream. The bottom of the sheet pile must be capable of providing lateral resistance and must be “restrained” by toeing into the rock or penetration below the stream bottom (i.e., to achieve restraint through cantilevering action). The tieback would serve to anchor the top of the sheet pile. In addition, the existing sloped streambank also would provide lateral resistance (confinement) for the sheet pile. However, due to the steep nature of that slope, it was assumed that the lateral resistance provided by the steep streambank would be insufficient and use of an anchor would be required. For budgetary purposes, tiebacks were assumed to be located 6 feet below the crest of the streambank, 50 feet long, and 7 feet on-center with an HP12X53 continuous waler.

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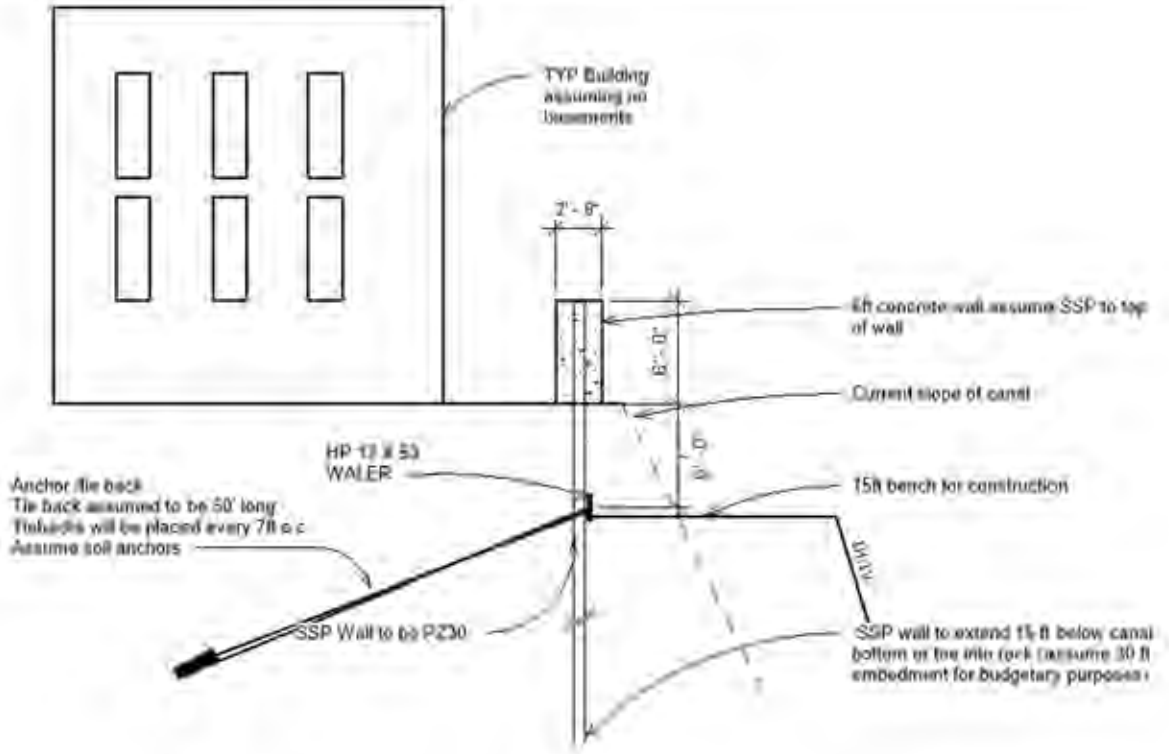

Figure 8-12: Proposed Tieback I-Wall Layout

Due to the extremely close proximity of the existing structures, it was assumed that the sheet piles would be installed using the press-in method, similar to the Giken Method. The press-in method involves equipment that hydraulically pushes the sheet pile into the ground, instead of driving the sheet pile, thereby significantly reducing the vibrations concerns associated with driving sheet pile. In addition, this method is specifically designed for tight access locations, with the sheet pile installer riding along installed sheet piles, such that existing structures can be as little as 5 feet away. Furthermore, this sheet pile can be advanced into rock (toed into rock) using the auger advancer, which reportedly is capable of penetrating hard rock.

A bench constructed in the stream will be required for the tieback installation. For planning purposes, it is assumed this bench will be 15 feet wide and constructed of rock, with the rock sloped 1H:1V into the stream. It is assumed that this bench would serve dual purposes: first as a bench for installation of the anchor and second as a bench to facilitate construction of the sheet pile wall (e.g., placement of the power pack associated with the press-in method). Preliminary plans include using a crane situated across the stream to provide the sheet pile for installation (Figure 8-13). It may be possible for this work to be staged from the bench to eliminate the crane. However, the bench may have to be wider to achieve this. These details regarding construction will be further developed during the design phase.

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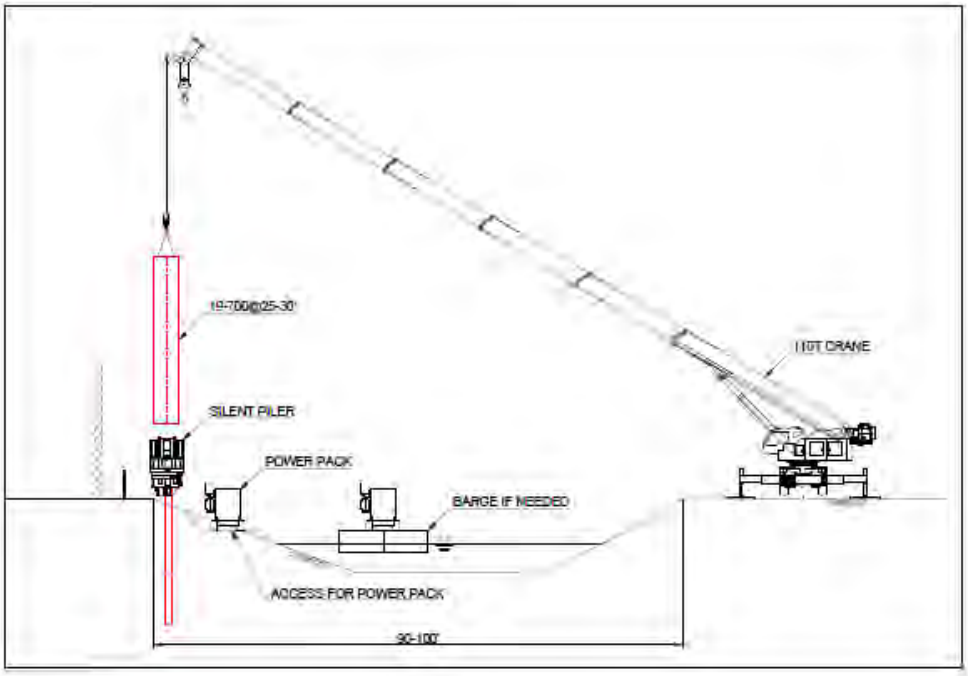

Figure 8-13: Preliminary Installation Process

There were concerns that the planned sheet pile may impede the flow of possible shallow groundwater in the area. Borings that will be advanced during the design phase will help better determine how much of a concern groundwater may be in this area. It is noted that no widespread groundwater was observed to be seeping into the stream from the banks. However, localized seeps were observed. It is assumed that the groundwater concerns can be addressed during design by designing the wall for hydrostatic pressures, providing a drainage system directly behind the wall for some depth below the existing ground surface (say 5 feet), or providing drainage through the sheet pile wall where known seeps are identified.

8.6. Levee

As with the walls, the levees were limited to heights of 6 feet, except at the lower elevations of the Ala Wai Golf Course where 9-foot levees were planned. Per EM 1110-2-1913, Section 6-2 (USACE, 2000), the minimum levee section shall have a crown width of at least 10 feet and a side slope flatter than or equal to 2H:1V. EM 1110-2-1913 is in the process of being updated. According to the draft version of EM 1110-2-1913 (USACE, 2022b), minimum crown widths of 10 to 12 feet are commonly used, depending primarily on roadway requirements and potential emergency response. Where there is a need to drive on the levee crown during flood events (expected to the case for this project), a minimum 12-foot crown width is recommended. Side slopes flatter than or equal to 2H:1V are accepted as the steepest slopes that can be easily constructed while ensuring stability of any riprap layers, while side slopes of 3H:1V are considered the steepest slopes that can be traversed by mowing equipment.

For the purposes of this project, side slopes were assumed to be 3H:1V, which generally is considered a “safe” side slope for the vast majority of subsurface conditions for shorter levees, especially when the water is not expected to be on the levee for extended periods (2 to 3 days at most) and the levees are limited to maximum heights of 6 to 9 feet. A typical proposed levee

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cross-section is provided in Figure 8-14. In addition, the natural slopes along streambanks in the project vicinity, many of which are well in excess of 6 to 9 feet high, are much steeper than 3H:1V, so it is expected that a slope of 3H:1V comprised of compacted fill will be similarly stable. For this project, having maintainable grass slopes (i.e., 3H:1V or flatter) was considered desirable. A minimum crown width of 12 feet was assumed for vehicle access.

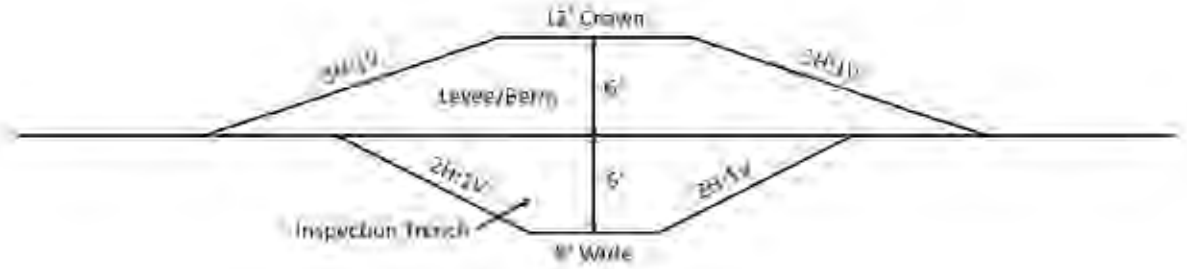

Figure 8-14: Typical Levee Cross-Section

Due to space constraints, the use of levees is expected to be limited to the Ala Wai Golf Course. Settlement estimates for existing soils were provided in the geotechnical reports for two nearby projects. According to the Foundation Investigation for the Kaimuki High School Auditorium (Hardin-Lawson Associates, 1976), 8 inches of settlement was projected for 6 feet of areal fill. According to the Subsurface Investigation Report for the Ala Wai Maintenance Facility at the Ala Wai Golf Course (Fewell Geotechnical Engineering, 1993), 3 inches of settlement would be expected for 6 feet of areal fill. Due to the lack of boring coverage for this project, the foundation soils conservatively were assumed to settle 8 inches under the weight of the planned 6-foot levee. According to EM 1110-2-1913, Section 6-9 (USACE, 2000), common allowances for settlement of compacted fill are 0 to 5 percent. Assuming 5 percent consolidation of new fill, the estimated settlement of the compacted levee is 4 to 5 inches (= 0.05 * 6 to 9 feet * 12 inches/feet = 3.6 to 5.4 inches, say 4 to 5 inches). As a result, the total overbuild for a 6 to 9-foot levee was assumed to be on the order of 12 inches (8 inches in the foundation soils and 4 to 5 inches in the new fill).

The levee will include an inspection trench to expose or intercept any undesirable near-surface foundation features such as old drain tile, active or abandoned water or sewer lines or other utilities, animal burrows, buried logs, pockets of unsuitable material, or other debris. Inspection of the exploration trench also allows the design engineers to assess the near-surface foundation conditions directly beneath the levee. For the purposes of this report, the inspection trench will be 6 feet deep and 8 feet wide with assumed 2H:1V side slopes. The side slopes were flattened to 2H:1V due to soft soils and shallow groundwater concerns. Due to shallow groundwater and the limited height of the levee, consideration can be given to reducing the inspection trench depth to 3 feet and flatten the cut side slopes from 2H:1V to 1H:1V once soil borings are conducted and the groundwater and upper soil conditions are better understood.

No toe drains were assumed for the levees because of the flashy nature of the floodwaters. The water is only expected to be stored in the detention basins for a maximum of 2 to 3 days.

8.7. Detention Basin

Detention basin sizes and depths were determined based on the hydraulic needs of the system and the available land. Detention basin sidewalls were assumed to be 3H:1V, which generally is

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considered a “safe” side slope for the vast majority of subsurface conditions. No analysis was conducted. The natural slopes along streambanks in the project vicinity, many of which are well in excess of 6 feet high, are much steeper than 3H:1V, so it is expected that a slope of 3H:1V comprised of compacted fill will be similarly stable. It is noted that no detention basins were included in the TSP.

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9. Individual Measures

This section includes a brief description of the general site conditions, the geology, the assumed subsurface conditions, and any additional comments for the individual measures, beyond the geotechnical concerns identified in Section 7.

No recommendations were developed for the closure structures at roadway crossings or the inlet/outlet drainage structures associated with the individual measures, since the details of these structure types reportedly were not necessary for the purposes of this feasibility study. Instead, the cost estimator indicated that a lump sum typically was assigned for the costs of these structures and only a physical count of the structures was necessary.

The summaries on the individual measures provided below were developed during the alternative array evaluation. As a result, the alignments shown are for the alternative array evaluation, not the TSP evaluation. However, the alignment differences between the alternative array evaluation and the TSP are not significantly different and do not have any significant impact on the information included in the following sections. Refer to Section 4 for the proposed layouts for the TSP. In addition, summaries for all measures in the 3 alternative arrays considered, not just those in the TSP, are included below.

9.1. Kanaha Floodwall

9.1.1. General Description

The Kanaha Floodwall tentatively will consist of an L-wall founded on macropiles. The floodwall will be located on the south side of the existing Kanaha Stream. The floodwall is located in a heavily populated area. Existing development, including single-family homes, multi-family homes, and high-rise buildings, is located immediately on either side of the stream. Refer to Figure 9-1 for typical examples of the existing conditions at selected locations along the stream (wall to be located on left side of stream/ditch shown in photos). The existing ditch bottom and walls are lined, typically with concrete along the bottom and mortared lava rock/concrete rubble masonry (also referred to as CRM) walls.

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Figure 9-1: Existing Kanaha Ditch at Selected Intersections

9.1.2. Geology

According to the geologic map, the Kanaha Floodwall is underlain both by Tuff (eastern 740 feet) and (Holocene) Alluvium (remaining 1,460 feet) as shown in Figure 9-2.

Figure 9-2: Kanaha Floodwall Mapped Geology

According to the geologic map, the Alluvium is comprised of unconsolidated deposits of silt, sand, and gravel along streams and in valley bottoms. In some areas, the Alluvium grades

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upslope to talus and colluvium. Where information is lacking, Alluvium may include deposits more appropriately assigned to older alluvium by virtue of greater consolidation or topographic settings not at grade with modern drainages.

According to the geologic map, the Tuff is bedded black cindery ash and lapilli (rock fragments from 2 to 64 mm in diameter (0.1 to 2.5 inches) ejected from a volcano) ejected during strombolian eruptions. Tuff blankets large areas southwest of vents, likely owing to the position of vents on high ridges and subsequent deflection of eruptive plume by trade winds.

The primary difference between these two formations is that the alluvial deposits are unconsolidated (soft, compressible, poor quality) while the (weathered) tuff deposits typically are better quality and likely suitable for developing much higher macropile capacities over shorter lengths.

9.1.3. Assumed Subsurface Conditions

There was no soil boring information in the immediate vicinity of the Kanaha Floodwall. As a result, subsurface information from nearby borings and wells in similar geologic formations was used to inform the assumed subsurface conditions at the site. The nearby borings and wells used to develop the assumed subsurface conditions are shown in Figure 9-3. These sources were on the order of 0.2 to 0.5 mile away from the site. Since there were no “nearby” borings in the Alluvium, borings from the Kaimuki High School Auditorium, generally on order of 1.6 miles southeast of the planned Kanaha Floodwall, were used to inform the general conditions in the Alluvium.

Figure 9-3: Kanaha Floodwall Nearby Borings & Wells

The assumed subsurface conditions for this site were predominantly based on the subsurface information encountered in the nearest wells (1883 Liholio Street and 1899 Nehoa Street);

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however, the alluvial deposits were assumed to be thicker as the distance away from the contact between the Tuff and Alluvium increased.

For planning and budgeting purposes for the portion of the floodwall mapped in the Tuff (740 feet), 15 to 25 feet of compressible deposits (Alluvium) overlying 30 to 55 feet of cinders (Tuff) was assumed. For the portion of the floodwall mapped in the Alluvium (1,460 feet), 25 to 40 feet of compressible deposits (Alluvium) overlying cinders (Tuff) was assumed. The Alluvium was assumed to be comprised of generally soft to loose, compressible soil deposits, while the cinders were assumed to be dense (difficult drilling to rock drilling) based on information contained within the Preliminary Soil Investigation for the Makiki Cliffs Condominium Proposed Forty-Story Highrise on Green Street (H. Patel, 1974). These borings were designed as the "Green & Ernst" borings for this project.

Groundwater was assumed to be below expected mass excavation depths for the L-wall, but above the tip of the planned macropiles. However, trapped water may be encountered in the soils behind the existing retaining walls lining the ditch.

9.1.4. Additional Comments

The wall must be designed to minimize lateral load transfer to the existing walls. In general, the direction of loading was expected to be away from the exposed height of the existing walls. In addition, macropiles were battered to help reduce lateral movement of the proposed wall.

The wall will be located as close as possible to the existing ditch to minimize land acquisition and disruption to the existing property owners. However, the cost estimate should account for the inefficiency created by the tight access considerations. For example, macropiles likely will have to be installed in batches, instead of all at one time, because once the macropiles are installed access to wall areas past the recently installed macropiles will be difficult (i.e., wall to occupy 12 feet of the 12 to 15-foot access path so it not possible to drive over area once macropiles are installed). In other words, the macropile contractor will do their work for a section followed by the concrete contractor, with this process repeating until the entire wall length is completed. This limitation will create higher costs, requiring multiple mobilizations and an extended construction schedule for the different construction crews (e.g., the macropile and concrete contractors). Alternatively, instead of staggering the construction schedule, consideration could be given to installing all the macropiles but temporarily backfilling around the macropiles to create an access road above them, with the temporary backfill re-excavated with the remaining wall construction.

9.2. Makiki District Park Detention

9.2.1. General Description

The Makiki District Park detention basin tentatively will consist of a 6- to 10-foot-deep detention basin with 3H:1V side slopes and 6-foot tall I-wall around the basin perimeter. The detention basin is located in a very gently sloping (5 to 7 feet of fall over approximately 500 feet), open grass field of Makiki District Park. The existing conditions, along with the planned detention basin, are shown in Figure 9-4.

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Figure 9-4: Makiki District Park Existing Conditions

9.2.2. Geology

According to the geologic map, the Makiki District Park detention basin is underlain by (Holocene) Alluvium as shown in Figure 9-5. The Alluvium is comprised of unconsolidated deposits of silt, sand, and gravel along streams and in valley bottoms. In some areas, the Alluvium grades upslope to talus and colluvium. Where information is lacking, Alluvium may include deposits more appropriately assigned to older alluvium by virtue of greater consolidation or topographic settings not at grade with modern drainages.

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Figure 9-5: Makiki District Park Detention Mapped Geology

9.2.3. Assumed Subsurface Conditions

There was no soil boring information in the vicinity of the Makiki District Park Detention. As a result, the assumed subsurface conditions were based on information from nearby wells to determine the assumed general layering. The nearby wells used to develop the assumed subsurface conditions are shown in Figure 9-6. These sources were on the order of 0.2 to 0.3 mile away from the site. Since there were no “nearby” borings in the Alluvium, borings from the Kaimuki High School Auditorium, generally on order of 1.7 miles southeast of the planned Makiki District Park Detention, were used to inform the general conditions in the Alluvium.

Figure 9-6: Makiki District Park Nearby Borings & Wells

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The assumed subsurface conditions for this site were predominantly based on the subsurface information encountered in the nearest wells (1883 Liholio Street, 1899 Nehoa Street, and 1938 Berentania and Keeaumoku Street as shown in Figure 9-6); however, the alluvial deposits were assumed to be thicker as the distance away from the contact between the Tuff and Alluvium increased.

Alluvial-type deposits were encountered in the upper 16 to 25 feet of the three nearest wells. The alluvial-type deposits were underlain by “black sand” or “cinders”, which was interpreted to be the Tuff described in Section 9.1.2. The black sand/cinders varied from 30 to 55 feet thick in the two northernmost wells (Liholio and Nehoa) and thinned to 5 feet thick in the southernmost well (St. Berentania). The cinders in the southernmost well were underlain by 5 feet of coral, which was underlain by 5 feet of black rock, which was underlain by 17 feet of coral. It is noted that all 3 wells were located in the mapped Tuff or near the mapped Tuff/Alluvium interface. Since the site was located further away from the interface between the two different geologic formations and appeared to be located along the general alignment of the old alluvial stream flow, the depth of alluvial deposits was assumed to be thicker than indicated in the wells.

For planning and budgeting purposes, the Alluvium was assumed to be on the order of at least 25 to 30 feet thick. The Alluvium was assumed to be comprised of generally soft to loose, compressible soil deposits that can be penetrated by the sheet pile provided the sheet pile tip is properly accessorized with a driving shoe to penetrate boulders or other obstructions in the Alluvium.

Groundwater was assumed to be below expected mass excavation depths of 6 to 10 feet planned for the detention basin.

9.2.4. Additional Comments

The Alluvium was assumed to have sufficient depth to permit the driving of sheet piles for the planned I-wall embedment of 24 feet. If the Tuff is encountered at shallower depths than assumed, issues with driving may be encountered. Confirming the depth of the Tuff will be critical during future studies to confirm the viability of the assumed wall configuration. If Tuff is encountered at shallower depths, a macropile-supported L-wall may be more appropriate for the subsurface conditions.

It was assumed cut slopes in the Alluvium will be stable on 3H:1V since slopes steeper than the planned cut slopes were observed in these deposits elsewhere within the city.

It was assumed the I-wall will be set back off the cut slope at least 5 to 10 feet to alleviate the potential loading of the slope resulting from passive pressures below the point of rotation of the embedded sheet pile.

9.3. Manoa Valley District Park Detention

9.3.1. General Description

The Manoa Valley District Park detention basin tentatively will consist of detention basin that will include 6- to 8-foot-deep cuts at the high (north) end of the site and 6-foot I-walls at the low (south) end of the site. The detention basin is located in the area of 4 playing fields that gently

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slope to the south (15 feet of fall over approximately 850 feet) at Manoa Valley District Park. The existing conditions, along with the planned detention area, are shown in Figure 9-7.

Figure 9-7: Manoa Valley District Park Existing Conditions

9.3.2. Geology

According to the geologic map, the Manoa Valley District Park Detention is underlain by (Holocene) Alluvium as shown in Figure 9-8. According to the geologic map, the Alluvium is comprised of unconsolidated deposits of silt, sand, and gravel along streams and in valley bottoms. In some areas, the Alluvium grades upslope to talus and colluvium. Where information is lacking, Alluvium may include deposits more appropriately assigned to older alluvium by virtue of greater consolidation or topographic settings not at grade with modern drainages.

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Figure 9-8: Manoa Valley District Park Detention Mapped Geology

9.3.3. Assumed Subsurface Conditions

There was no soil boring or well information in the vicinity of the Manoa Valley District Park Detention located within the same geologic formation as the site (Figure 9-9). The nearest borings (0.2 to 0.6 mile) and wells (1.2 miles) were located in different geologic formations, such that the conditions encountered at those locations were not considered similar to the site. The closest borings in the same geologic formation as the site were those associated with the Kaimuki High School Auditorium, which was located 1.9 miles south-southwest of the site. As a result, borings from the Kaimuki High School Auditorium were used to inform the general conditions in the Alluvium.

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Figure 9-9: Manoa Valley District Park Nearby Borings & Wells

For planning and budgeting purposes, the Alluvium was assumed to be deep enough (greater than 50 feet) to control the design of the flood reduction measures. The Alluvium was assumed to be comprised of generally soft to loose, compressible soil deposits that can be penetrated by the sheet pile provided the sheet pile tip is properly accessorized with a driving shoe to penetrate boulders or other obstructions in the Alluvium.

Groundwater was assumed to be sufficiently below expected mass excavation depths of 6 to 8 feet planned for the detention basin to not impact the planned construction.

9.3.4. Additional Comments

It was assumed cut slopes in the Alluvium will be stable on 3H:1V since slopes steeper than the planned cut slopes were observed in these deposits elsewhere within the city.

It was assumed that the ground will be sufficiently flat around the I-wall locations, such that assuming a horizontal, not sloped, ground surface was reasonable.

9.4. Woodlawn Drive Floodwall

9.4.1. General Description

The Woodlawn Drive Floodwall tentatively will consist of a 6-foot-tall L-wall founded on macropiles. The floodwall is located on the west side of Manoa Stream. The floodwall to the north of Woodlawn Bridge is located in a grass area adjacent to a shopping center parking lot. The floodwall to the south of Woodlawn Bridge is located on University of Hawaii property for greenhouses and other agricultural activities. The existing conditions are shown in Figure 9-10. Views from Woodlawn Bridge looking upstream and downstream are shown in Figure 9-11.

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Figure 9-10: Woodlawn Drive Floodwall

Figure 9-11: Looking Upstream (Top) and Downstream (Bottom) from Woodlawn Drive Floodwall

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9.4.2. Geology

According to the geologic map, the Woodlawn Drive Floodwall is underlain by two different types of lava flows as shown in Figure 9-12. However, as shown in Figure 9-12, both Holocene Alluvium and Older Alluvium are mapped in very close proximity to the proposed floodwall. Overburden soils at the floodwall appeared to be comprised of (Holocene or Older) Alluvium, instead of soils weathered from the lava flows, based on nearby borings. However, the rock formations that underlie the Alluvium appear to be related to the lava flows.

Figure 9-12: Woodlawn Drive Floodwall Geology

According to the geologic map, the lava flows associated with the Ko'olau Basalt (versus deposits from the Tantalus Peak and Sugar Loaf vents) are mapped on the southern three-quarters of the floodwall. These deposits are comprised of ʻaʻā (60 percent) and pāhoehoe, which is thought to be more abundant near the crest of the Koʻolau Range.

The lava flows from the Tantalus Peak and Sugar Loaf vents are mapped on the northern one-quarter of the floodwall. No additional description of these geologic deposits was provided on the geologic map.

The Older Alluvium is comprised of consolidated sand and gravel, some of it sufficiently lithified to warrant the designation "conglomerate." It is chiefly well rounded and moderately sorted, but includes minor, poorly sorted colluvial deposits. It forms terrace deposits and thick valley fills now being incised by modern drainages.

The (Holocene) Alluvium is comprised of unconsolidated deposits of silt, sand, and gravel along streams and in valley bottoms. In some areas, the Alluvium grades upslope to talus and colluvium. Where information is lacking, Alluvium may include deposits more appropriately assigned to older alluvium by virtue of greater consolidation or topographic settings not at grade with modern drainages.

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9.4.3. Assumed Subsurface Conditions

Soil test borings from two nearby projects were located in the immediate vicinity of the northern half of the floodwall, while no soil test borings or water wells were located near the southern half of the floodwall. The two nearby projects were the Manoa Marketplace Foundation Investigation (Dames & Moore, 1973) and the Manoa Stream Improvements Soils Investigation (Hirata & Associates, 2016b). Refer to Figure 9-13 for the location of these nearby borings. The subsurface information from these nearby borings was used to inform the assumed subsurface conditions for the proposed floodwall.

Figure 9-13: Woodlawn Drive Floodwall Nearby Borings & Wells

In the Manoa Stream Improvement borings (B-series in Figure 9-13), the surface soils were classified as stiff to medium stiff, dark brown to grayish brown clayey silt, extending to depths ranging from about 7.5 to 12.5 feet. Firm conditions were encountered at deeper sections in two borings (B1 and B4). Underlying the clayey silt were dense to medium dense granular soils consisting of mottled brown silty gravel and dark brown to grayish brown silty sand, extending to the maximum depths drilled (between 19.0 and 20.5 feet below existing grades). A loose section of silty sand was encountered between depths of about 7.5 to 14 feet in one boring. Cobbles and boulders were encountered within the granular soils. Groundwater was encountered at depths ranging from about 8 to 13 feet below existing grade. A generalized subsurface cross-section that includes the Woodlawn Bridge borings is provided in Figure 9-14. The approximate location of the cross-section is shown in Figure 9-13.

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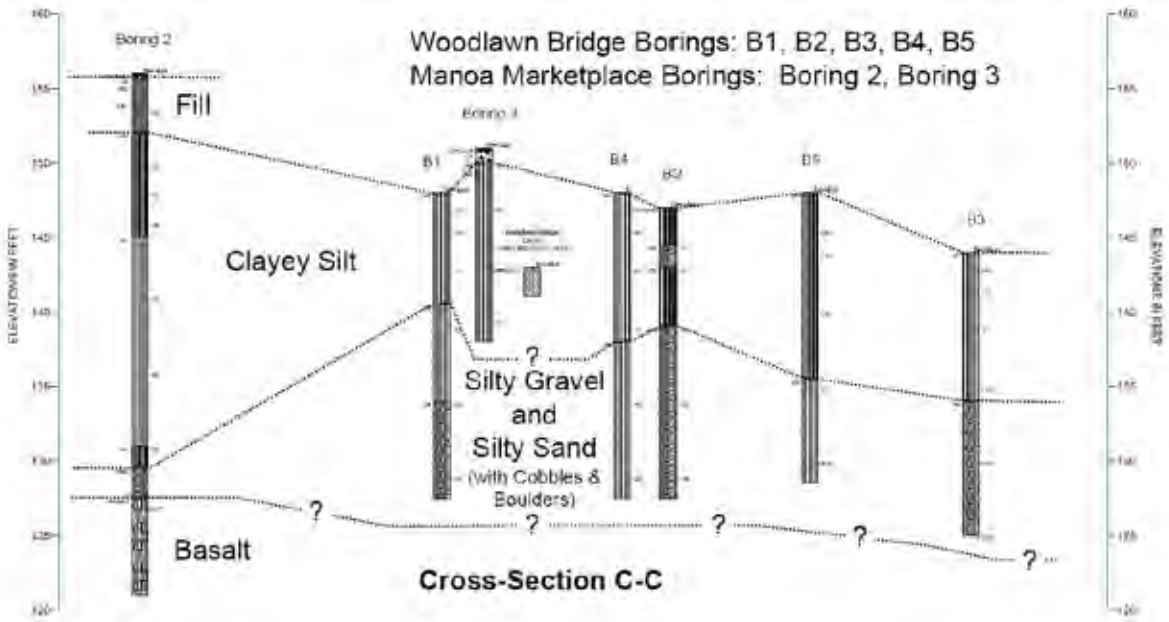

Figure 9-14: Cross-Section C-C Based on Woodlawn Bridge Borings

For the Manoa Marketplace borings (Boring and Test Pit-series in Figure 9-13), the borings disclosed generally similar conditions throughout the borings for that project. Approximately 3 to 8 feet of heterogeneous fill was encountered at the surface. The fill consisted of soft to stiff clayey silt to silty clay and loose to medium dense silty sands and gravel. The fill contained varying amounts of boulders, debris, and organic matter. The silts and clays varied from slightly to highly expansive. The fill was underlain by a clayey silt zone that was 5 to 20 feet thick. The silt was underlain by sand and gravel-sized cinder material and decomposed basalt and basalt boulders in a silt matrix. Groundwater was only encountered in one boring (Boring 2) at a depth of 19 feet (EL 136 feet MSL). The generalized subsurface cross-sections provided in the Foundation Investigation are included in Figure 9-15. The approximate location of these cross-sections is shown in Figure 9-13.

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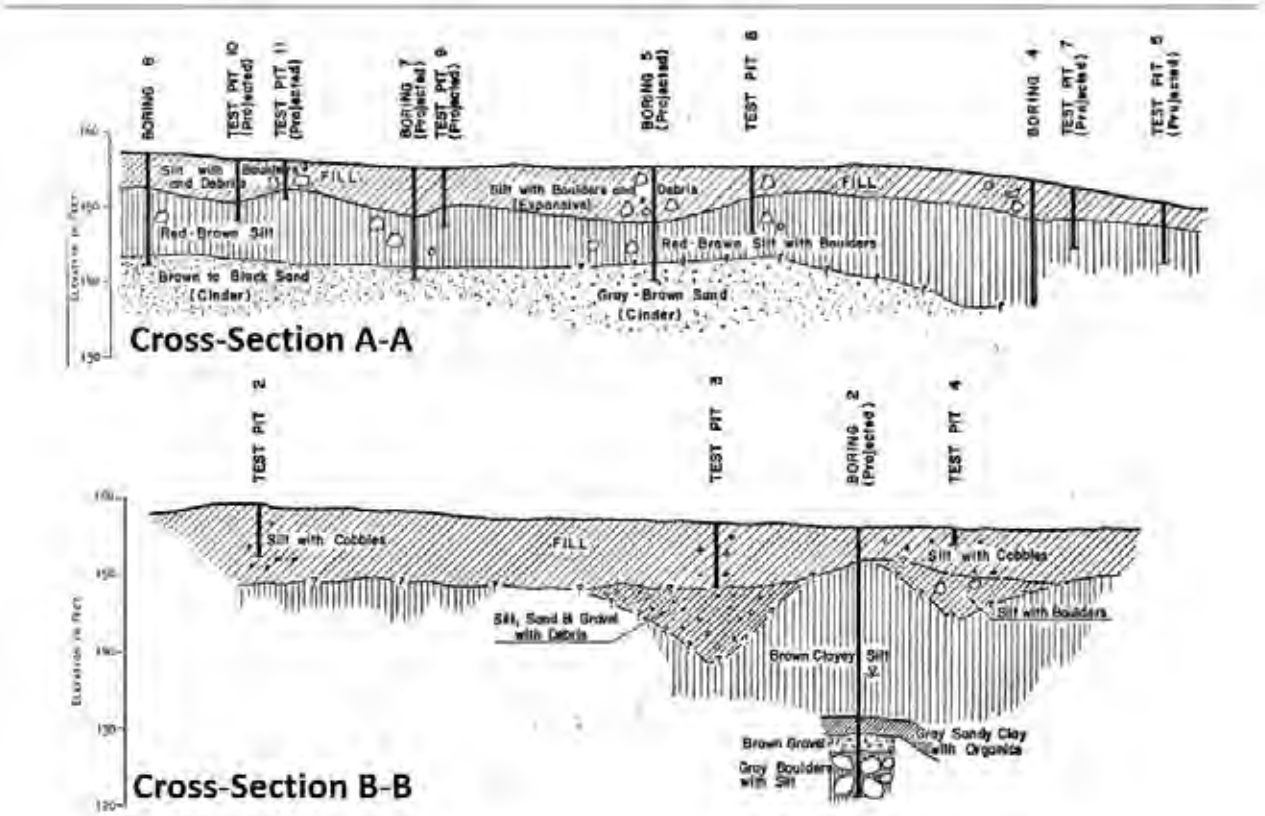

Figure 9-15: Cross-Sections from Manoa Marketplace Foundation Investigation

Lava flows from the Tantalus Peak and Sugar Loaf vents were mapped under approximately the eastern 410 feet of the proposed floodwall. The subsurface conditions in the area of this geologic formation generally were expected to be consistent with the subsurface conditions depicted in Cross-Section A-A of Figure 9-15. However, based on the conditions encountered in the available borings mapped within this formation and closest to Manoa Stream (e.g., Boring 2 and Boring 3 from the Manoa Marketplace borings and borings B1 and B4 of the Woodlawn Bridge borings), the subsurface conditions in the area of this mapped formation near the creek appeared to be more consistent with the areas mapped as lava flows associated with the Ko'olau Basalt (i.e., the subsurface conditions depicted in Cross-Section C-C included in Figure 9-14).

Based on the above paragraph, for planning and budgeting purposes, the conditions along this entire measure alignment were assumed similar to those depicted in Cross-Section C-C (Figure 9-14). As such, 25 feet of overburden soils comprised of clayey silt, silty sand, and silty gravel (i.e., soil) over 15 feet of basalt (rock) were assumed, with difficult drilling assumed below 11 feet.

Groundwater was assumed to be below expected mass excavation depths for the L-wall, although it may be encountered above the tip of the planned macropiles.

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9.4.4. Additional Comments

The wall must be designed to minimize lateral load transfer to the grout-filled riprapped streambanks. In general, the direction of loading is expected to be away from the riprap. In addition, macropiles are battered to help reduce lateral movement of the proposed wall.

9.5. Koali Road Floodwall

9.5.1. General Description

The Koali Road Floodwall tentatively will consist of a 6-foot-tall L-wall founded on macropiles. The western leg of this “L-shaped” floodwall is located along Manoa Stream, while the southern leg of floodwall is located along Palolo Stream. The Koali Road Floodwall is shown in Figure 9-16 and is located in a residential area with little to no real estate available to accommodate the wall construction, creating severe space limitations.

Figure 9-16: Koali Road Floodwall

Specifically, along the Manoa section, there was only 12 to 15 feet available between existing residential buildings and an existing CRM wall that extended to the base of the stream as shown in Figure 9-17. An access road occupied most, if not all, of the 12 to 15-foot distance. In addition, there was a waterline that traversed the eastern side of the access road. An overhead electric line restricting overhead space traversed the other side of the access road. Ideally, construction will not impact the CRM wall since it is relatively new construction (which would also help keep construction out of the stream channel). The streambed generally was on the order of about 10 feet below the roadway but was up to about 15 feet below the roadway in the southern portion of this section. Rock was exposed in the stream bottom in the southern portion of the section along Manoa. The section also included some waterfalls due to the aggressive drop in elevation at some locations. The section along Manoa dropped over 10 to 15 feet from

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north to south. At the confluence of the Manoa and Palolo Streams, there was approximately 15 to 20 feet of difference between the road elevation and the stream elevation, and rock appeared to drop off quickly in that area.

Figure 9-17: Existing Walls at Manoa & Palolo Streams. Waterfall at Manoa.

The Palolo section of the planned L-wall was located in the backyards of houses along Kamakini Street where the distance between the existing canal wall and the residential structures generally was on the order of 20 to 25 feet but as close as 5 to 12 feet. The existing canal wall (Figure 9-17) included a concrete wall and concrete bottom and generally was on the order of 10 feet deep along most of the section but was as little as approximately 5 to 6 feet at the eastern end of the proposed floodwall (i.e., the section along Palolo generally drops 5 feet or less from east to west). No information was available on the design or construction of the existing concrete canal walls and bottom, which meant raising the wall without modification to the underlying structure was an extremely unlikely solution. Since disturbance to these walls was not desirable, current plans include the proposed wall being offset directly behind the existing walls. A sewer line traversed the backyards, which also limits the proposed wall location or requires relocation of the utility (relocation planned). There was an overhead electric line restricting overhead space for at least part of the proposed alignment along Palolo Stream.

9.5.2. Geology

According to the geologic map, the Koali Road Floodwall is underlain mostly by (Holocene) Alluvium as shown in Figure 9-18, except for the far eastern end of the section along Palolo Stream, which is underlain by Lava Flows. The mapped (Holocene) Alluvium is surrounded by various types of lava flows. Furthermore, basalt consistent with lava flows was exposed at the stream bottom for the southern portion along Manoa (except near the confluence of Manoa and Palolo Streams), as well as across (to the north of) Dole Street from Kanewai Community Park, which is located at the north end of the planned floodwall.

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Figure 9-18: Koali Road Floodwall Geology

According to the geologic map, the Alluvium is comprised of unconsolidated deposits of silt, sand, and gravel along streams and in valley bottoms. In some areas, the Alluvium grades upslope to talus and colluvium. Where information is lacking, Alluvium may include deposits more appropriately assigned to older alluvium by virtue of greater consolidation or topographic settings not at grade with modern drainages.

The Lava Flow mapped at the eastern end of the Palolo section consists of columnar jointed massive lava and flows typically described as ‘a‘ā. ‘A‘ā are lava flows that have a rough rubbly surface composed of broken lava blocks called clinkers. The Lava Flow thickness reportedly generally varies from 15 to 30 meters (49 to 98 feet) where well exposed. Some flows (for example, Kalihi and Pali) contain lherzolite (ultramafic igneous rock) xenoliths (a piece of rock trapped in another type of rock)**.**

9.5.3. Assumed Subsurface Conditions

There were no borings along the proposed floodwall alignment; although, there was one set of borings from the Part A and Parts B & C Soils Investigations at Kanewai Park (Hirata & Associates, 2011a and 2011b, respectively) as shown in Figure 9-19. There was one water well nearby with subsurface information (1883 Waialae Road and Manoa), and two other nearby water wells that did not include subsurface information (1895 Kanewai Park and 1884 Booth Estate). The subsurface information from these nearby borings and one well, as well as site observations regarding rock outcrops, was used to inform the assumed subsurface conditions for the proposed floodwall.

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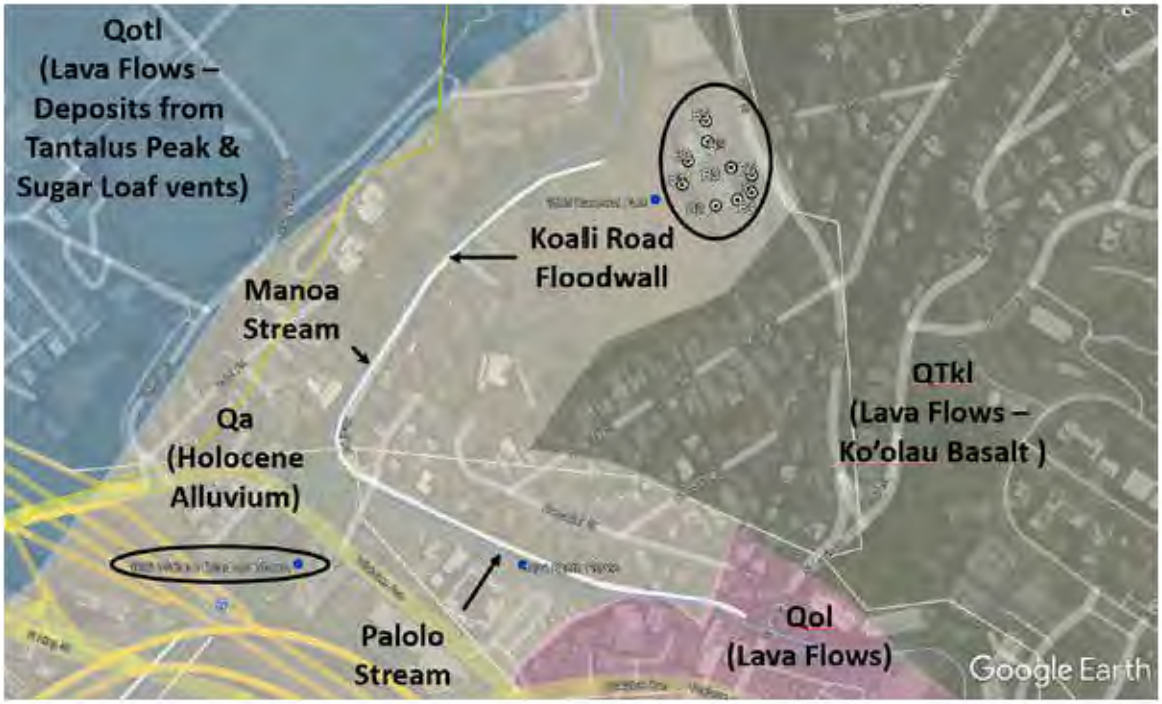

Figure 9-19: Koali Road Floodwall Nearby Borings & Wells

Approximately 5 to 7 feet of high plasticity, clayey (MH) silt fill was encountered at the surface of most of the Kanewai Park borings. The upper elevations of the site had clearly been filled to achieve current grades, as evidenced by a tall CRM wall. The fill was underlain by a thin layer (typically 5 feet or less) of naturally occurring high plasticity, medium stiff to stiff, clayey (MH) silt. The clayey silt transitioned into clay silt that included cobble and boulders. The cobbles and boulders required coring techniques to penetrate in some borings, while the layer could be penetrated with augers in other borings. The cobbly/bouldery soil generally extended to boring termination depths that varied from 14 to 29 feet. A photo of the base of an overexcavation into the cobbly/boulder soil that was included as part of a construction field report, dated September 19, 2013, attached to the Parts B & C Soils Investigations at Kanewai Park is included in Figure 9-20. Medium hard to hard, moderately fractured, moderately weathered basalt was encountered in one boring (boring B9). This boring was located near Dole Street, where a lava flow (basalt) rock outcrop was observed across the street from the park as shown in Figure 9-21.

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Figure 9-20: Kanewai Park Excavation

Figure 9-21: Outcrop Across Dole Street from Kanewai Park

In the 1883 Waialae Road and Manoa water well, 30 feet of soil followed by 5 feet of “boulders” followed by 15 feet of clay followed by 18 feet of “boulders” followed by 38 feet of clay followed by 40 feet of coral was encountered. The soil deposits in the upper 30 feet were not characterized while the lower 40 feet (coral) was characterized as consolidated marine sediments laid down by several different stands of the sea. The remaining deposits were characterized as consolidated and partly consolidated older alluvium, ancient talus and landslide deposits, and marine sediments, except for the first 5 feet of boulders that also were classified as possible unconsolidated marine deposits.

Based on all the above information, for planning and budgeting purposes, the following subsurface conditions were assumed:

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1. The subsurface conditions at the northern end of the section along the Manoa Stream to the northern termination of Koali Road (approximately 515 feet) were assumed to consist of 29 feet of cobbly/bouldery medium stiff to stiff clay deposits (soil with difficult drilling) over sound basalt (rock) transitioning to 10 to 15 feet of cobbly/bouldery medium stiff to stiff clay deposits (soil with difficult drilling) over sound basalt (rock) at the northern termination of Koali Road. For macropile budgeting purposes, 515 linear feet of cobbly/boulder (soil with difficult drilling) over 11 feet of basalt (rock) were assumed.
2. From the northern termination of Koali Road to the bend at Koali Road (approximately 555 feet), the subsurface conditions were assumed to consist of 10 to 15 feet of cobbly/bouldery medium stiff to stiff clay deposits (soil with difficult drilling) over sound basalt (rock). It is expected that the macropiles in this section likely be shorter than the assumed 40-foot length due to the solid rock observed at the stream bottom. However, for macropile budgeting purposes, 555 linear feet of 30 feet of cobbly/boulder deposits (soil with difficult drilling) and 10 feet of basalt (rock) were assumed.
3. From the bend at Koali Road to the eastern termination point at Palolo Stream (approximately 1,415 feet), the subsurface conditions were assumed to consist of 30 feet of soil (with difficult drilling) followed by 5 feet of “boulders” (drilled as rock/soil difficult drilling) followed by 15 feet of clay (with difficult drilling). For macropile budgeting purposes, 1,415 linear feet of 35 feet of cobbly/boulder deposits (soil with difficult drilling) and 5 feet of basalt (rock) were assumed.

9.5.4. Additional Comments

The floodwall was located in a residential area with extremely tight access considerations, as well as low overhead and underground utility considerations, including a water line along Manoa and a sewer along Palolo. The cost estimate and real estate considerations should reflect the relocation of these utilities. In addition, the cost estimate should account for the inefficiency created by the tight access considerations. For example, macropiles likely will have to be installed in batches, instead of all at one time, because once the macropiles are installed access to wall areas past the recently installed macropiles will be difficult (i.e., wall to occupy 12 feet of the 12 to 15-foot access path so it not possible to drive over area once macropiles are installed). In other words, the macropile contractor will do their work for a section followed by the concrete contractor, with this process repeating until the entire wall length is completed. This limitation will create higher costs, requiring multiple mobilizations and an extended construction schedule for the different construction crews (e.g., the macropile and concrete contractors). Alternatively, instead of staggering the construction schedule, consideration could be given to installing all the macropiles but temporarily backfilling around the macropiles to create an access road above them, with the temporary backfill re-excavated with the remaining wall construction. Furthermore, some staging in the adjacent canal during dry periods may be necessary. Due to the severe space restrictions, construction will be difficult, expensive, time-consuming, and likely require innovative solutions.

The wall must be designed to minimize lateral load transfer to the existing CRM and concrete walls. In general, the direction of loading was expected to be away from the existing features. In addition, macropiles were battered to help reduce lateral movement of the wall.

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One structure was identified within the footprint of this proposed floodwall. The impacted structure is shown in Figure 9-22 and was located between the pedestrian bridge at Kaluawaa Street and the termination of the floodwall at St. Louis Drive.

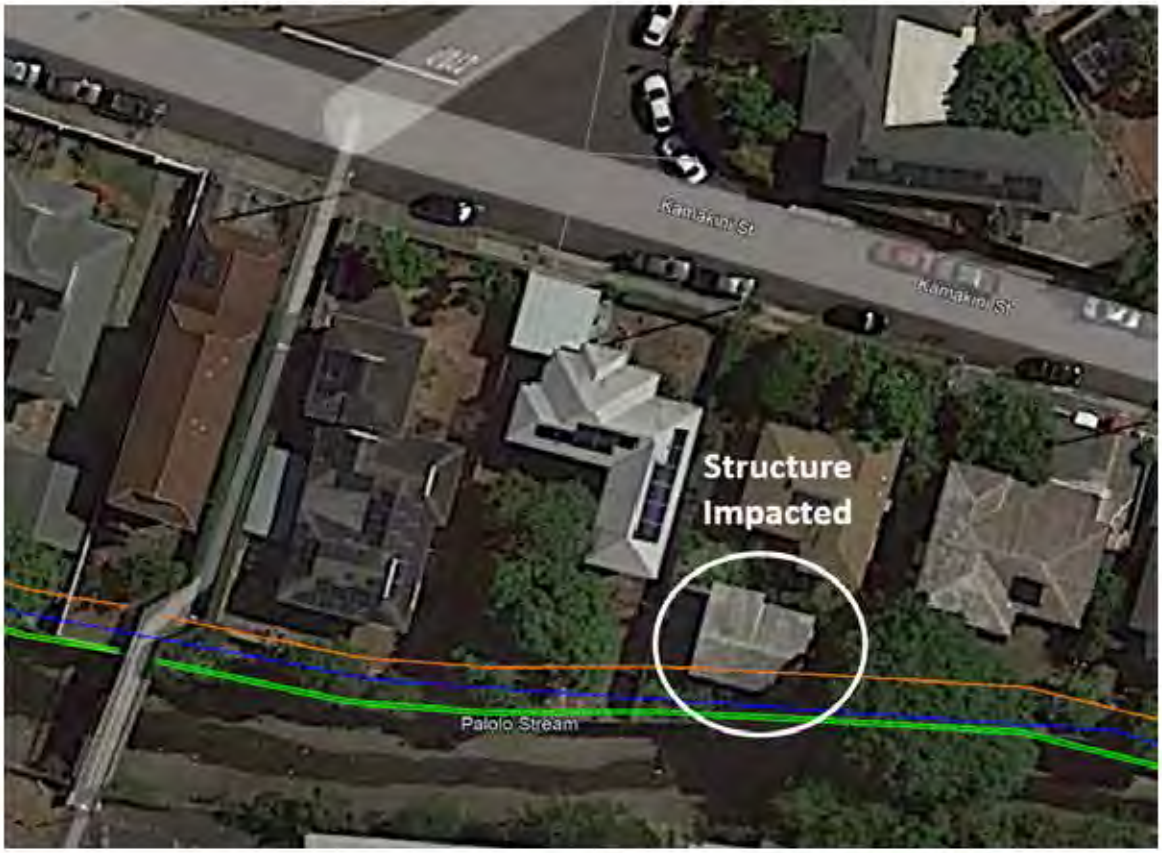

Figure 9-22: Impacted Structure on Kamakini Street on Koali Floodwall

It may be possible to avoid demolition of this structure during the design phase with a creative wall design in the local area; however, more evaluation and analysis than feasible during this phase of the project is required to evaluate the feasibility of this possibility. One possible solution would be to design the floodwall for this 30-foot distance to span where the structure is located and distribute the load to specially designed abutment structures on each side. Alternatively, a different wall configuration with a smaller footprint may be possible in the area, with some of the load distributed to specially designed abutment structures on each side. It is also possible that a smaller wall footprint may be possible in this area, because the required wall height may be less since it is near the termination of the wall. This area will need to be evaluated again once actual survey data is available so that the ground elevations and location structures are better understood.

No details on the existing Palolo canal wall design or construction were available at the time of this report. In addition, an accurate survey of existing features (e.g., building locations) and ground surface elevations was not available. As a result, there is a risk of complications during the design and construction phases if actual conditions vary from those assumed. These complications could increase costs or make the planned approach unviable, thereby requiring development of a new approach.

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9.6. Kaimuki High School Floodwall (and Extension)

9.6.1. Aerial photo showing the Makiki District Park Detention Basin (grass field).General Description

The Kaimuki High School Floodwall tentatively will consist of a combination of 6-foot-tall L-wall founded on macropiles along the stream and 6-foot tall I-wall away from stream flow (for the alternative array evaluation only – this I-wall section of wall was converted to an L-wall for the TSP). The floodwall will encompass the area of the track, a playing field, and an open grass field as shown in Figure 9-23. The area was relatively flat and generally sloped to the northeast.

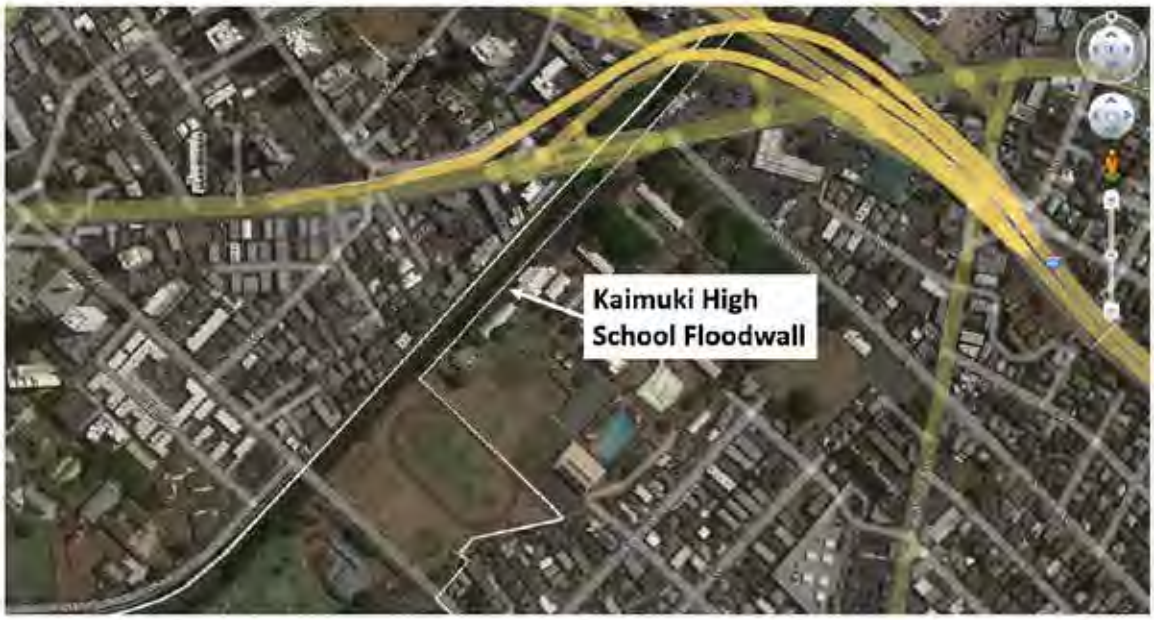

Figure 9-23: Kaimuki High School Floodwall (Alternate 5 Configuration Shown)

9.6.2. Geology

According to the geologic map, the Kaimuki High School Floodwall is underlain by (Holocene) Alluvium as shown in Figure 9-24.

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Figure 9-24: Kaimuki High School Geology

According to the geologic map, the Alluvium is comprised of unconsolidated deposits of silt, sand, and gravel along streams and in valley bottoms. In some areas, the Alluvium grades upslope to talus and colluvium. Where information is lacking, Alluvium may include deposits more appropriately assigned to older alluvium by virtue of greater consolidation or topographic settings not at grade with modern drainages.

9.6.3. Assumed Subsurface Conditions

There were no borings along the proposed floodwall alignment; however, there were several soil test borings and water wells within approximately 350 to 500 feet of proposed alignment as shown in Figure 9-25. As a result, the subsurface information from these nearby borings and wells was used to inform the assumed subsurface conditions for the proposed floodwall.

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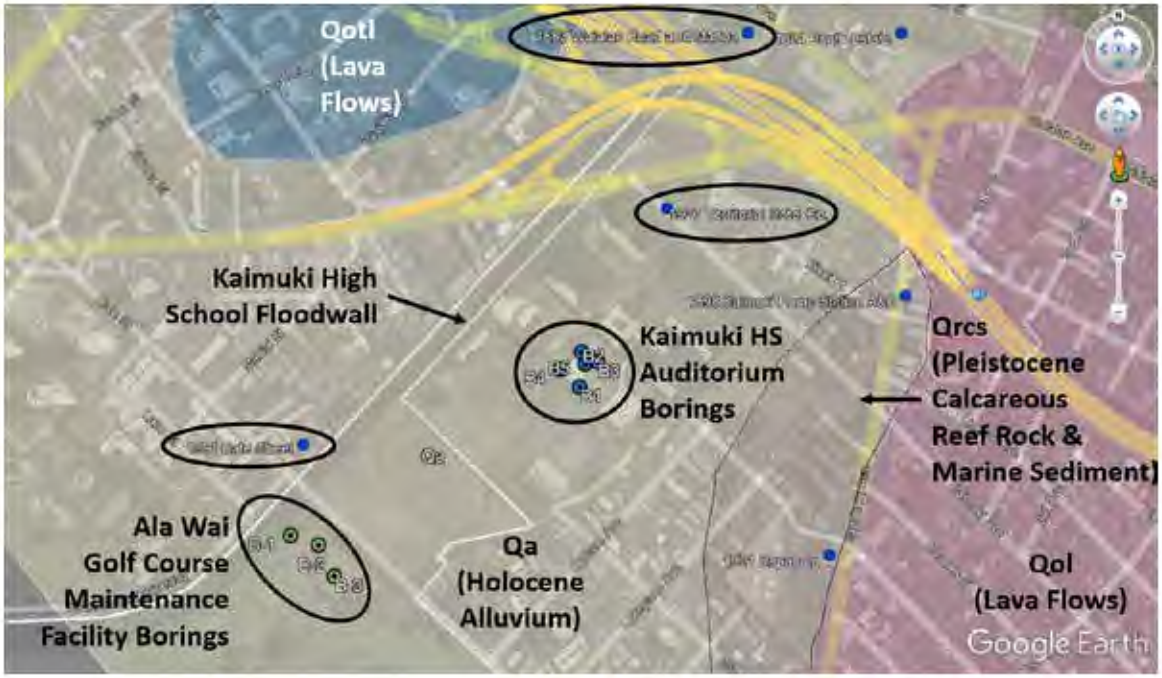

Figure 9-25: Kaimuki High School Nearby Borings & Wells

Approximately 3 to 6 feet of fill over approximately 80 feet of soft, compressible alluvial and estuary deposits were encountered in the borings advance for the Kaimuki High School Auditorium (Hardin-Lawson Associates, 1976). A hard coral ledge was encountered 45 feet below grade in the boring further from the proposed wall (boring B3) while basalt rock was encountered 78 to 87 feet below the ground surface in other borings. The old Manoa-Palolo Channel traversed the general area of the proposed floodwall as shown in Figure 9-29. The deeper borings may have been located in the old drainage channel. Eight (8) inches of settlement was predicted for 6 feet of new fill placement due to the soft soils at the Auditorium project. Octagonal, precast, prestressed concrete driven piles 16.5-inch in diameter and bearing in the coral ledge were recommended for heavier auditorium loads due to the soft soils and large anticipated settlements. These piles were estimated to be 110 feet long in the old drainage channel and 50 to 60 feet long where the rock ledge was shallower. Groundwater reportedly stabilized at EL 3 feet MSL.

The apparent coral ledge reported in the Auditorium borings also was visible during the site reconnaissance (March 2022) at the bottom of the southern/western portion of the Manoa-Palolo Stream along which part of the floodwall ran. These visual observations of rock at the stream bottom seemed to be confirmed by the subsurface conditions reported for the 1881 Date Street well where 19 feet of unconsolidated marine deposits and consolidated and partly consolidated older alluvium, ancient talus and landslide deposits, and marine sediments (11 feet of “soil”, 3 feet of “fine gravel”, and 5 feet of gravel) overlying 15 feet of coral deposits was reported.

The soil test borings for the Ala Wai Golf Course Maintenance Facility (Fewell Geotechnical Engineering, 1993) also encountered coral deposits, with 10 feet of coralline detritus reported in one boring 20 feet below grade. The soils over the coralline detritus reportedly were comprised of a thin layer of alluvial deposits underlain by lagoonal deposits. According to the Maintenance

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Facility geotechnical report, “the lagoon deposits and coral detritus consisted (of) loose to very loose silty sands and gravel. These soils possess low shear strengths and are highly compressible.” Groundwater was encountered at EL 0 to 1 feet MSL. The subsurface investigation report reported “the loose to very loose lagoon deposits and coral detritus are highly compressible and can result in large settlements under large areal loading or heavy, concentrated loads” and “estimated settlements of up to 3 inches would normally be anticipated under the planned 6-foot-thick areal fill.”

In the Territorial Hotel water well, located in the northern section of the proposed floodwall, 70 feet of clay, reported to be unconsolidated marine deposits or consolidated/unconsolidated older alluvium, ancient talus and landslide deposits, and marine sediments, was encountered.

In the 1883 Waialae Road and Manoa water well, 30 feet of soil followed by 5 feet of “boulders” followed by 15 feet of clay followed by 18 feet of “boulders” followed by 38 feet of clay followed by 40 feet of coral was encountered. The soil deposits in the upper 30 feet were not characterized while the lower 40 feet (coral) was characterized as consolidated marine sediments laid down by several different stand of the sea. The remaining deposits were characterized as consolidated and partly consolidated older alluvium, ancient talus and landslide deposits, and marine sediments, except for the first 5 feet of boulders that also were classified as possible unconsolidated marine deposits.

Groundwater was assumed to be consistent with the conditions encountered in the Kaimuki High School borings. Groundwater reportedly stabilized at EL 3 feet MSL in these borings, while ground surface elevations at the time of that report varied from EL 14.8 to 16.1 feet. Based on this information, groundwater is expected to be below typical excavation levels, but above the tip of macropiles.

Based on the available information, the Manoa-Palolo Stream used to be located further east of the current location and was slowly eroding in a westerly direction; and a coral ledge approximately 20 feet below existing grades appeared to be located along the existing Manoa-Palolo Stream channel. For planning and budgeting purposes, the following subsurface conditions were assumed:

1. The subsurface conditions in the immediate vicinity of the stream channel (i.e., for the L-walls with macropiles) were assumed to consist of 20 feet of soil and 20 feet of coral (rock/difficult drilling).
2. The subsurface conditions away from the stream channel (i.e., for the I-walls) were assumed to consist of 40 feet of soil, with the lower 20 feet consisting of difficult driving. The upper 20 feet was assumed to be comprised of generally soft to loose, compressible soil deposits that can be penetrated by the sheet pile provided the sheet pile tip is properly accessorized with a driving shoe to penetrate boulders or other obstructions.

9.6.4. Additional Comments

The depth to rock or a hard layer was assumed to be sufficient that the planned 18-foot of sheet pile embedment for the I-wall can be achieved. However, borings will be necessary to confirm this assumption. The L-wall with macropiles may have to be extended to areas where rock is too shallow to permit driving of the sheet piles.

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9.7. Ala Wai Golf Course Detention

9.7.1. General Description

The Ala Wai Golf Course Detention tentatively will consist of a 6- to 9-foot-tall levee (berm), with 9-foot L-walls along Ala Wai Canal. The levee will encompass the existing Ala Wai Golf Course, which primarily included open grass fields and isolated and dispersed wooded/overgrown areas associated with the golf course. The area was relatively flat and generally sloped to the south, toward the Ala Wai Canal. The existing conditions, along with the planned detention area, are shown in Figure 9-26. Please note the change in levee configuration and the addition of an L-wall section for the TSP as shown in Figure 4-2.

Figure 9-26: Ala Wai Golf Course Detention

9.7.2. Geology

According to the geologic map, the northern portion of the Ala Wai Golf Course Detention is underlain by (Holocene) Alluvium while the southern portion is underlain by (Holocene) Fill, and the eastern edge is underlain by Calcareous Reef Rock and Marine Sediment (Pleistocene) as shown in Figure 9-27.

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Figure 9-27: Ala Wai Golf Course Detention Geology

According to the geologic map, the Alluvium is comprised of unconsolidated deposits of silt, sand, and gravel along streams and in valley bottoms. In some areas, the Alluvium grades upslope to talus and colluvium. Where information is lacking, Alluvium may include deposits more appropriately assigned to older alluvium by virtue of greater consolidation or topographic settings not at grade with modern drainages.

The (Holocene) Fill is comprised of man-made fill forming piers and harbor breakwaters along the coastline.

The (Pleistocene) Calcareous Reef Rock and Marine Sediment is comprised chiefly of emerged coral reefs but includes finely laminated lagoonal limestone. The reefs consist of coral heads and coralline algae cemented by a lime matrix.

9.7.3. Assumed Subsurface Conditions

There were numerous borings located at the golf course as summarized in the following reports: Subsurface Investigation Report: Ala Wai Maintenance Facility (Fewell Geotechnical Engineering, 1993); Geotechnical Engineering Report, Proposed Clubhouse (C.W. Associates, 1987a); Geotechnical Engineering Report, New Floodlights (C.W. Associates, 1987b); Geotechnical Engineering Exploration, Net Poles (C.W. Associates, 1990); and Foundation Investigation, Irrigation Pump House (Hirata & Associates, 2002). However, the borings were concentrated in two areas: the northern corner and the eastern portion of the site, both areas where there were existing structures. Refer to Figure 9-28 for the location of borings at this measure site. Large portions of the golf course have no boring coverage as shown in Figure 9-28.

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Figure 9-28: Ala Wai Golf Course Detention Nearby Borings & Wells

This particular site had a very complex set of geologic conditions due to the proximity to the ocean, which resulted in multiple coral ledges, and old channels from all the streams on the island that discharged to the ocean. The old stream channels eroded the other geologic formations and deposited alluvial soils in the eroded channels. The approximate location of some of these old, eroded channel features and coral ledges are depicted in Figure 9-29. Because of the complex geologic history of this measure site and the limited available borings, only broad subsurface assumptions at this measure site were made, with the recognition that the conditions in other locations may vary significant from those assumed.

Figure 9-29: Old Channels, Coral Ledges & Coral Depths

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It was assumed that coral deposits generally were present between approximately 5 and 30 feet below existing grades, except where the old drainage channels were located. The coral deposits were assumed to be overlain by very soft, very loose, highly compressible soils. In the historical eroded channels, these highly compressible deposits may easily extend 50 feet or more below existing grades. The levee construction will be most impacted by the near surface soil deposits. Depending on how soft the existing surface soils are, some subgrade stabilization (e.g., lime or cement stabilization) may be required to construct the levee.

Groundwater was assumed to be at EL 0 to 1 foot MSL, which was approximately 2 to 3 feet below existing grades along the Ala Wai Canal transitioning to approximately 10 feet below existing grades at the higher elevations of the site furthest away from the Ala Wai Canal.

9.7.4. Additional Comments

The eastern end of this measure site was underlain by the calcareous reef rock that is believed to be the source of the Mo'ili'ili Karst, which has been known to impact deep foundation installations and cause surface subsidence to a lesser degree. There are no known issues with this particular formation in the area, even though it is at shallow depth. The formation is shallower in this area as compared to the established area of known Mo'ili'ili Karst. In addition, stable groundwater is very shallow due to its proximity to the ocean. The major factor that triggers karst development is the high rates of downward water movement and the dissolution associated with the heavy rainfall. The shallow groundwater limits the depth path of this infiltrating rainwater. Regardless, this concern should not be eliminated from consideration until additional site reconnaissance and data gathering are conducted and borings are advanced during the design phase.

9.8. Ala Wai Canal Floodwall

9.8.1. General Description

The Ala Wai Canal Floodwall tentatively consisted of a combination 6-foot-tall L-wall founded on macropiles (along the stream) and 6-foot tall I-wall (away from stream flow) for the alternative array. For the TSP, a J-wall along the Ala Wai Canal and a tieback I-wall along the Manoa-Palolo Stream between Date Street and Kapiolani Boulevard are planned.

This measure will encompass both sides of the Ala Wai Canal, the Ala Wai Golf Course, some of the Kaimuki High School playing fields, and the Manoa-Palolo Stream from the Ala Wai Canal to Highway 1 as shown in Figure 9-30. The Ala Wai Canal Floodwall also requires implementation of the Kaimuki High School Floodwall and Ala Wai Golf Course Detention. Refer to Section 9.6 and Section 9.7, respectively, for additional information regarding the subsurface information in these areas. The discussion in this section is limited to the Ala Wai Floodwall exclusive of the Kaimuki High School Floodwall and the Ala Wai Golf Course Detention conditions, except where additional comments due to changes in the approach are applicable (e.g., I-wall originally planned for this measure during the alternative array analysis but converted to levee for the TSP at the Ala Wai Golf Course).

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Figure 9-30: Ala Wai Canal Floodwall

9.8.2. Geology

According to the geologic map, the Ala Wai Canal Floodwall is underlain by (Holocene) Fill or (Holocene) Alluvium, except at the far eastern end of the Ala Wai Golf Course, which is underlain by Calcareous Reef Rock and Marine Sediment (Pleistocene) as shown in Figure 9-31.

Figure 9-31: Ala Wai Canal Floodwall Geology

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According to the geologic map, the Alluvium is comprised of unconsolidated deposits of silt, sand, and gravel along streams and in valley bottoms. In some areas, the Alluvium grades upslope to talus and colluvium. Where information is lacking, Alluvium may include deposits more appropriately assigned to older alluvium by virtue of greater consolidation or topographic settings not at grade with modern drainages.

The (Holocene) Fill is comprised of man-made fill forming piers and harbor breakwaters along coastline. Based on the subsurface conditions encountered in the borings in the area, it appears the fill is underlain by compressible lagoonal or alluvial deposits.

The Calcareous Reef Rock and Marine Sediment (Pleistocene) is comprised chiefly of emerged coral reefs but includes finely laminated lagoonal limestone. The reefs consist of coral heads and coralline algae cemented by a lime matrix.

9.8.3. Assumed Subsurface Conditions

In addition to the borings associated with Ala Wai Golf Course described in Section 9.7.3, borings from the following reports also were located along the proposed Ala Wai Canal Floodwall alignment: Soils Investigation, New Playcourts, Ala Wai Neighborhood Park (Hirata & Associates, Inc., 2004); Ala Wai Canal Wall Repairs (Geolabs, 2017 and 2018); Updated Interim Geotechnical Memorandum Foundation Recommendations, Ala Wai Pedestrian Bridge (YKE, 2020); Foundation Investigation: Proposed Waikiki Banyan Square Project Kuhio Avenue at Kanekapolei Street (Dames & Moore, 1981); Subsurface Geology of Waikiki, Moiliili, and Kakaako with Engineering Application, Master Thesis (Ferrall, 1976); Foundation Investigation, Proposed Flood Light Poles, Ala Wai Park (Dames & Moore, 1974); and Project Completion Report for Subsurface Geology and Hydrogeology of Downtown Honolulu: Engineering and Environmental Implications, Phases I and II (Finstick, 1998). Refer to Figure 9-32 for the location of borings at the site. Large portions of the alignment have no boring coverage as shown in Figure 9-32.

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Figure 9-32: Ala Wai Canal Floodwall Nearby Borings & Wells

This particular site has a very complex set of geologic conditions due to the proximity to the ocean, which resulted in multiple coral ledges, and old channels from all the streams on the island that discharged to the ocean that eroded other geologic formations and deposited alluvial soils in the eroded channels. Some of these known features are depicted in Figure 9-33. Because of complex geologic history of the site and the limited available borings, only broad subsurface assumptions at this measure site were made.

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Figure 9-33: Old Channels, Coral Ledges & Coral Depths

The conditions in the nearby borings and wells varied, but it generally appeared that compressible deposits overlying a coral ledge were encountered, with the coral ledge generally encountered 20 to 30 feet below existing grades, consistent with the coral ledge reported in the Master Thesis entitled “Subsurface Geology of Waikiki” (Ferrall, 1976). The coral ledge appeared to be missing where old drainage channels were located.

Based on this information, for planning and budgeting purposes, 30 feet of soil drilling and 10 feet of rock (coral) drilling were assumed for the macropiles. Discussion of the I-walls associated with this measure are discussed further in Section 9.8.4. These I-walls likely will be converted to levee. Refer to Section 9.7.3 for appropriate subsurface assumptions regarding the levee at the Ala Wai Golf Course.

Groundwater was assumed to be at EL 0 to 1 foot MSL, which was approximately 2 to 3 feet below existing grades along the Ala Wai Canal and deeper as existing grades increased heading north away from the ocean.

9.8.4. Additional Comments

For the alternative array evaluation, I-wall was assumed along the eastern and northern perimeter of the Ala Wai Golf Course Detention. However, due to the shallow rock in this area, the I-wall was converted to levee for the TSP. If real estate considerations become problematic during the design phase, then the levee in those areas will be converted to L-wall with macropiles.

There were no details on the existing canal wall design or construction available at the time of this report. As a result, there is a risk of complications during the design and construction phases if actual conditions vary from those assumed. These complications could increase costs or make the planned approach unviable, thereby requiring development of a new approach.

The depth to rock along the Manoa-Palolo in the vicinity of the Kaimuki High School will impact the design of the tieback I-wall. Borings will be required in this area to better understanding the depth to rock along this section and the potential implications on the tieback I-wall design. In addition, construction of the tieback I-wall is expected to be expensive and difficult given the tight space restrictions and limited working areas. Flexible and innovative solutions may be required to successfully implement construction.

Shallow rock will be a factor for the J-walls and L-walls planned at the east end of the Ala Wai Canal. Rock is exposed along both the north and south canal faces. Shallow rock could impact the easternmost 1,000 to 1,500 feet of the walls in this area. Additional borings are necessary to better understand the potential impact and extents of the shallow rock.

The eastern end of this measure site was underlain by the calcareous reef rock that is believed to be the source of the Mo’ili’ili Karst, which has been known to impact deep foundation installations and cause surface subsidence to a lesser degree. There are no known issues with this particular formation in the area, even though it is at shallow depth. The formation is shallower in this area as compared to the established area of known Mo’ili’ili Karst. In addition, stable groundwater is very shallow due to its proximity to the ocean. The major factor that triggers karst development is the high rates of downward water movement and the dissolution

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associated with the heavy rainfall. The shallow groundwater limits the depth path of this infiltrating rainwater. Regardless, this concern should not be eliminated from consideration until additional site reconnaissance and data gathering are conducted and borings are advanced during the design phase.

9.9. Ala Wai Canal Floodwall (with Kaimuki Extension)

This measure is a combination of the Ala Wai Canal Floodwall and the Kaimuki High school floodwall. As a result, refer to Section 9.8 for information on the Ala Wai Canal Floodwall and Section 9.6 for information on the Kaimuki High School Floodwall.

9.10. Makiki Floodwall

9.10.1. General Description

The Makiki Floodwall tentatively will consist of a U-wall founded on macropiles. The floodwall will be located on both sides and the bottom of the existing Makiki Stream, starting at the termination of the culvert under Fern Street heading toward the Ala Wai Canal.

The floodwall is located in a heavily populated area. Existing development, including single-family homes, multi-family homes, high-rise buildings, and commercial development, is located immediately adjacent to either side of the stream. The existing conditions, along with the planned floodwall location, are shown in Figure 9-34.

Figure 9-34: Makiki Floodwall

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The current stream bottom is a mix of concrete and unimproved ("natural") conditions based on on-site observations and cross-sections provided of an upstream area. Unfortunately, no cross-sections are available for the proposed floodwall area. In the proposed floodwall area, the stream bottom is obscured by the backwater from the Ala Wai Canal, making direct observation impossible. The existing walls along the stream seem to match the depicted cross-section and generally are comprised of mortared lava rock/concrete rubble masonry (CRM) walls.

9.10.2. Geology

According to the geologic map, the Makiki Floodwall is underlain by (Holocene) Fill as shown in Figure 9-35.

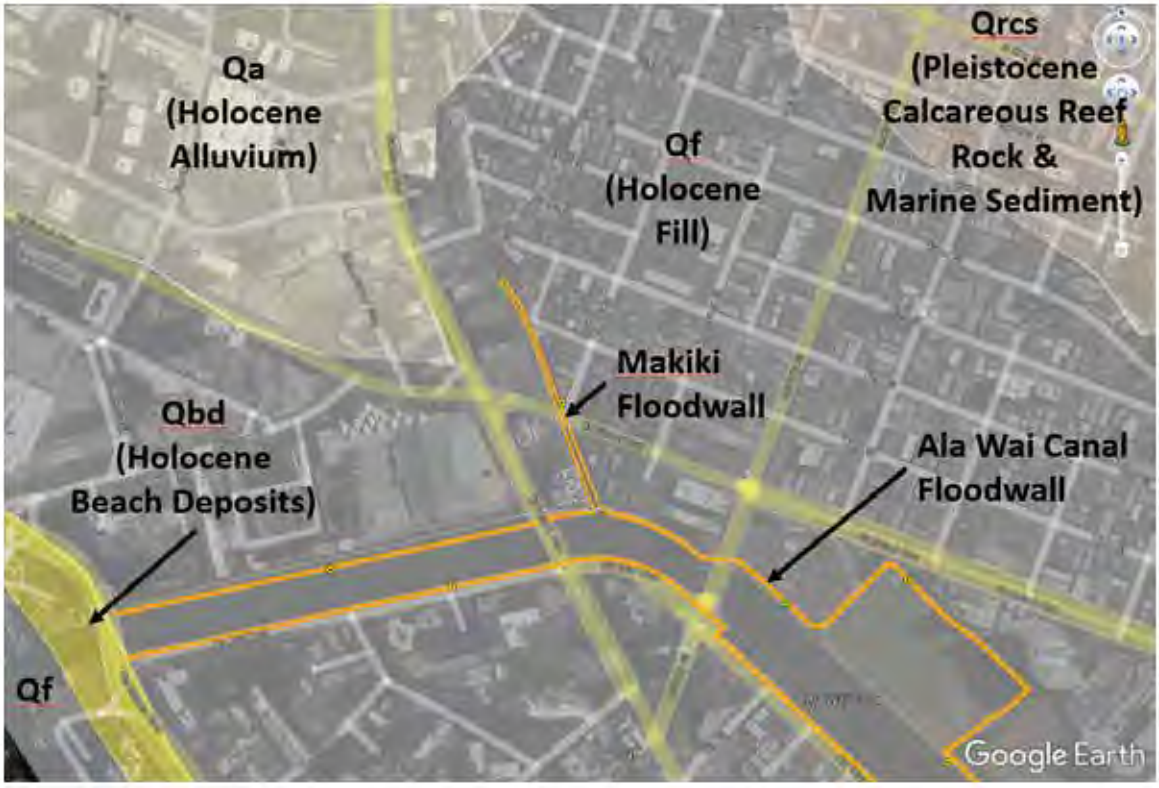

Figure 9-35: Makiki Floodwall Mapped Geology

According to the geologic map, the (Holocene) Fill is comprised of man-made fill forming piers and harbor breakwaters along coastline. Based on the subsurface conditions encountered along the Ala Wai Canal, it appears the fill, if encountered, probably is underlain by compressible lagoonal or alluvial deposits. The lagoonal and alluvial deposits generally are expected to be comprised of unconsolidated deposits of silt, sand, and gravel.

9.10.3. Assumed Subsurface Conditions

There was no soil boring or well information in the immediate vicinity of the Makiki Floodwall. However, there was on one boring (B-201) located approximately 300 feet southeast (upstream) of the confluence of Makiki Stream and the Ala Wai Canal. In addition, there was a water well (referred to as 1883 King Street and Kalakaua Avenue) located approximately 0.4 mile upstream (north) of the proposed floodwall alignment. Refer to Figure 9-36 for the location of

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this boring and well in relation to the proposed floodwall alignment. No subsurface information regarding the well located approximately 0.4 mile east of the proposed floodwall (referred to as 1967 Kewalo Basin) was located.

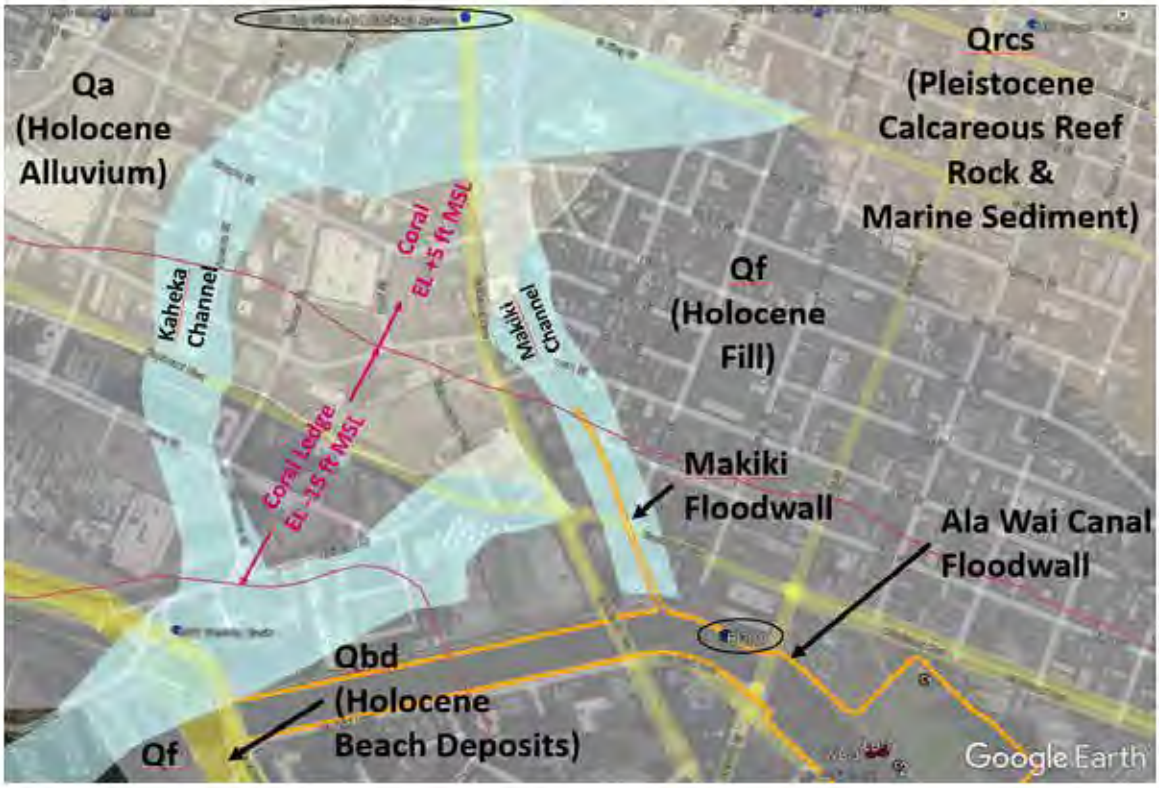

Figure 9-36: Makiki Floodwall Old Channels/Nearby Borings & Wells

Unconsolidated marine deposits were encountered in the upper 60 feet of the nearby water well to the north. The unconsolidated marine deposits were underlain by 30 feet of coral deposits. The nearest boring (boring B-201) extended to a depth of 52.5 feet (Ala Wai Canal Wall Repairs, Geolabs, 2018). The upper 6 feet of deposits were comprised of fill. The fill generally was underlain by coralline deposits intermixed and interlayered with lagoonal and alluvial deposits of various consistencies (e.g., soft to stiff, very loose to dense). A coralline layer overlying a coral layer was encountered from approximately 24 to 32 feet below grade, and a limestone layer was encountered from approximately 39 to 42 feet below grade.

The soil conditions at this proposed floodwall likely are controlled by the erosional and depositional nature of the Makiki Stream but also may be complicated by the proximity to the ocean where multiple coral ledges and old channels from all the streams on the island that discharged to the ocean may exist. Some of these coral ledges and old channels are depicted in Figure 9-36.

Because of complex geologic history of the site and the limited available borings, only broad subsurface assumptions at this measure site were made. For planning and budgeting purposes, unconsolidated marine deposits were assumed to be present to depth of at least 60 feet. It is assumed that the coral ledge in the area of the stream has been eroded away.

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Groundwater was assumed to be at the ground surface since the proposed alignment is located in the backwater area of the Ala Wai Canal, where the ground surface is covered by at least several feet of creek water most of the time.

9.10.4. Additional Comments

To facilitate construction of the planned wall, significant ground improvement may be required in areas where the bottom of the stream is not comprised of concrete due to the likely soft, saturated nature of the creek bottom deposits. A concrete bottom is expected to be located in isolated areas since concrete appeared to have placed only at erosional areas of concern. It is anticipated that ground improvement would consist of the placement of a layer of granular material to bridge the soft soils. Depending on the quality of the soils at the creek bottom, some removal may be required to achieve adequate stabilization. However, removal near the existing walls should be limited due to concerns regarding destabilizing existing wall foundations or their bearing soils.

Due to the close proximity of structures to the existing canal walls, destabilization of the existing wall foundations is a significant concern and limitation during construction, because the structures behind the wall could be damaged if the existing canal wall loses its support system. As a result, the proposed wall will have to be constructed in short sections. For example, excavation for the new wall foundation (the top of which would correspond to the existing creek bottom) would be constructed in sections not more than 10 feet long at one time to maintain stability of existing canal walls, with no more than one 10-foot section excavated in a 50-foot section. Foundation slabs would then be constructed in a “leapfrog” fashion until a continuous new bottom is constructed.

There were no details on the existing wall design or construction available at the time of this report. In addition, an accurate survey of existing feature (e.g., building locations) and ground surface elevations was not available. As a result, there is a risk of complications during the design and construction phases if actual conditions vary from those assumed. These complications could increase costs or make the planned approach unviable, thereby requiring development of a new approach.

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10. Other Considerations

10.1.1. Load Testing

Loading testing of piles and anchors typically is separated into two categories: verification testing, which is testing generally conducted prior to full-scale production to confirm that design assumptions are appropriate, and proof testing, which is testing conducted to confirm that the production process remains consistent. Verification testing typically is conducted to higher loads than proof testing (e.g., 2 to 2.5 times the design load versus 1.25 to 1.5 times the design load).

Load testing of both macropiles and tieback anchors will be required. The frequency of load testing is dependent on many factors including, but not limited to, the type of project, the complexity of subsurface conditions, the likelihood of unknown/anomalous conditions, availability of previous pile test data, and level of experience with the pile type in similar subsurface conditions. The frequency of testing should be established during the design phase, but the following was recommended for budgeting purposes in the feasibility phase:

- Verification testing of 0.5% of the total macropiles.
- Proof testing of 2 percent of the total macropiles – On large projects, verification testing typically is recommended for at least 1 percent of the production piles. For projects where a single pile failure could be detrimental to the overlying structure (such as a bridge where redundant pier supports are not included in the design), verification testing is recommended for at least 5 percent of production piles. A testing frequency reduced from 5 percent was deemed reasonable, since the piles are part of a continuous wall where a single pile is unlikely to adversely affect the overall performance of the structure. However, a testing frequency higher than the 1 percent assumed for a typical project was deemed appropriate for this stage of planning, since both vertical and lateral load testing may be required (but this will not be known until the design phase).
- Verification testing on the first 2 to 3 tieback anchors and 4 percent of the remaining anchors – The testing frequency for a typical project is 2 percent of the remaining anchors. The increase in testing frequency recommended is because it is assumed that the subsurface conditions will not be well-defined due to limited boring accessibility.
- Proof testing of every tieback – Tiebacks are one of the few structural systems where every member typically is tested before placing them into service.

10.1.2. Pre-Condition Surveys

This project is located in a highly developed area where construction will occur very close to existing structures. Pre-condition surveys should be expected since existing structures likely will be in or near the influence zone of the construction, especially at the tieback I-wall. Recommendations regarding where and when to conduct pre-condition surveys should be developed during the design phase once the final design details are known.

10.1.3. Monitoring Surveys

For reasons similar to those provided for the pre-condition surveys, monitoring of vibrations and noise should be expected, especially at the tieback I-wall. Recommendations regarding where and when to install monitoring equipment and what type should be developed during the design phase once the final design details are known.

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11. Future Exploration

There is insufficient boring coverage for design purposes at the proposed measure locations. There is considerable risk that the subsurface conditions will vary from those assumed for the purposes of this report due to this lack of information. There is the potential for there to be significant changes in the design features (e.g., to the size and length of foundation system to even the type of foundation system) once the actual subsurface conditions are determined.

Borings and laboratory testing to investigate the actual soil and rock conditions at each specific feature location are required to confirm the design assumptions for this report and to further refine designs for design purposes. It will be important that the borings identify the characteristics (strength, cementation, continuity, etc.) of any rock-like deposits encountered (e.g., coral, lava, tuff, etc.) due to the irregular nature of these deposits, especially if macropiles are end-bearing on these rock-like deposits. Borings should be regularly and closely spaced due to the natural variation in the soil and rock deposits in the project area.

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12. Risks

Among the numerous risks involved in this sizable project, the following major geotechnical considerations were identified:

1. The lack of subsurface information (borings) at planned feature locations – The type, size, and other important design features of foundation elements (e.g., pile spacing, pile reinforcing, or pile length) are based on assumed subsurface conditions. If those conditions vary from those assumed, significant changes to the foundation types and overall design may result, up to including requiring a change in planned foundation approach, especially if conditions are worse than assumed or if rock is shallower than expected. These changes could have significant cost impacts.

2. The severe space (both lateral and overhead) limitations – Several features have severe space limitations due to existing structures being in very close proximity to the planned features (e.g., Koali Road, Makiki, and Manoa-Palolo from Date Street to Kapiolani Floodwalls). These limitations restrict the available footprint for foundations, which impacted foundation approaches, but are more likely to severely limit the feasible approaches to construction. Creative approaches to some aspects of construction will be required to address these limitations, such as using small cranes for the work or working from the adjacent canals. These severe space limitations are expected to increase construction costs significantly, while also requiring extended construction schedules.

3. The lack of design and construction information on structures nearby or immediately adjacent to planned features (e.g., Ala Wai Canal walls, Makiki Stream walls, Palolo canal walls, structures along the Koali Floodwall, structures at the tieback I-wall, etc.) – No details on the existing canal walls design or construction were available at the time of this report. In addition, an accurate survey of existing features (e.g., building locations) and ground surface elevations was not available. As a result, there is a risk of complications during the design and construction phases if actual conditions vary from those assumed as the details regarding these existing features may impact the proposed structures. These complications could increase costs or make the planned approach unviable, thereby requiring development of a new approach.

4. Existing utilities – The project site is located in a heavily developed areas with extensive utilities that will impact design and construction. Increased costs are associated with existing utilities due to both accommodating them during design and working around them during construction. As a result, identifying the location, type, depth, and size of these utilities is critical for the design phase so their full impact is better understood. Despite best efforts, identification of all utilities that will impact the design and construction of a project of this size and complexity during the feasibility (and even the design) phase is nearly impossible. Utilities likely will be identified during future work that will impact either design or construction.

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US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix E — Civil Design

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Report Status: Draft, November 2023

Executive Summary

The study is the General Reevaluation Report with Integrated Supplemental Environmental Impact Statement for the Ala Wai Canal. The Ala Wai Watershed has previously overtopped the Canal and flooded downtown Waikiki multiple times since 1965. Waikiki is the most important economic driver for the state, accounting for approximately 7% of the gross state product and 7% of all civilian jobs in the state. The flood characterization in the basin can be divided into three distinct areas: Mānoa, Pālolo and Makīkī valleys with fast moving water (velocities capable of moving vehicles and large debris) and localized overland flooding. Using these three distinct areas the technical team came up with measures and alternatives to present to the vertical team. After 6-8 months of screening measures that were purposed internally and ideas from the local people of Oahu, the technical team narrowed down the measures and alternatives from upwards to 150 measures to four alternatives utilizing 8 measures. There where number factors that went into screening a measure, from practicality, the projected cost of a measure, and any large-scale utility relocation. The Civil project delivery team (PDT) members main roles and responsibilities for this project were identifying existing utilities, constructability of a measure, preliminary grading, and calculating quantities.

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1.0 Introduction

1.1. General Description

The Ala Wai Watershed is located on the island of O'ahu, which has undergone major land-use changes in the past 100 years. Since 1950 the resident population of the island has more than doubled. Honolulu, the capital city located on the island of O'ahu, is now considered the most densely population city in the Nation. Urbanization on O'ahu has been accompanied by substantial alterations to stream systems, including changes in water quality, instream habitat, riparian habitat, and the introduction of nonnative species. An extensive study conducted in the 1970s, showed that 57 percent of the streams on the island of O'ahu had been channelized, 58 percent had water exported from them, and all had roads crossing over them. Modifications of the stream ecosystems have been most severe at the lower elevations where urban growth is greatest. Artificially straightened reaches with concrete-lined flat-bottomed channels and revetted reinforced banks are common in the urban areas of the study. Such modifications are commonly accompanied by removal of riparian vegetative cover, and a reduction in substrate complexity.

The Honolulu/Waikiki Beach area has experienced repeated damage from flooding of the Manoa, Palolo, and Makiki streams, all of which drain to the Ala Wai Canal, which then outlets directly to Mamala Bay and to the Pacific Ocean. The Ala Wai Canal is a 2-mile-long waterway constructed in 1928 to drain extensive coastal wetlands, thus allowing development of the Waikiki District.

The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Ko'olau Mountains to the nearshore waters of Mamala Bay see figure 1. The Palolo stream includes the Pukele and Waiomao tributary streams; and the Makiki stream includes the Kanaha tributary stream. The headwaters for all these streams are in steep mountainous terrain where intense rainfall occurs. The streams also collect surface water from the extensive urban development concentrated in the main valleys and the lower elevations of the watershed.

The two main problems identified for this project were the economic damages and elevated life risk resulting from riverine flooding along the Makiki, Manoa, and Palolo streams and the interplay between riverine and storm surge flooding along the Ala Wai Canal. The Technical team narrowed down over 150 measures to combat the flood problem and selected 4 design alternatives with one as the tentatively selected plan (TSP). Please see table 1 below. The purpose of this appendix is to evaluate the civil and site design considerations, quantities development and related construction considerations for each proposed flood risk measure.

1.2. Survey

Available survey data was provided by contract W9128A-15-D-0006 awarded to Sam O. Hirota Inc. Deliverables included CAD files and DTM surfaces that included 1 ft contours, utilities and property lines. Horizontal datum is based on Hawaii State Plane Coordinate System (U.S. Survey Feet), Zone 3, NAD 83 (PA11), Epoch 2010. Vertical Datum is based on Mean Sea Level (MSL), Local Tidal Datum (U.S. Survey Feet). This survey only covered the Ala Wai Golf Course Detention and portions of Ala Wai Canal Floodwall. Other survey information was provided by Honolulu GIS and Openroads Designer aerial imagery.

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Figure 1 - Ala Wai Water Shed

Measure	Alternative 1	Alternative 2B	Alternative 5	Alternative 5.3 TSP
Makiki District Park Detention	X	X	X	
Manoa Valley District Park Detention	X		X	
Ala Wai Golf Course Detention (TSP)	X		X	**X**
Ala Wai Canal Floodwall (TSP)		X	X	**X**
Kanaha Floodwall	X	X	X	
Kaoli Road Floodwall (TSP)	X	X	X	**X**
Woodlawn Drive Floodwall (TSP)	X	X	X	**X**

Table 1 - Alternative

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2.0 Non-TSP Measures

2.1. Makiki District Park Detention

2.1.1. General Description

The Makiki District Park detention basin tentatively will consist of 6- to 10-foot-deep detention basin with 3H:1V side slopes and 1,200 feet of 6-foot tall I-wall around the basin perimeter. The detention basin will have an approximate 1 percent slope in an open grass field of Makiki District Park. The Makiki park will still be able to be used as an open field after construction. The proposed layout of the planned detention basin, inlet, and outlet are shown in figure 2 below. The proposed Inlet culvert has been modeled as a 20 ft by 4 ft reinforced concrete box (RCB) culvert. The proposed outlet pipe has been modeled as a 5 ft diameter culvert that drains into the Makiki stream after daylighting downstream of the H1 freeway. The total estimated disturbed area is roughly 3.39 acres.

Figure 2 - Makiki District Park Detention

2.1.2. Utilities

According to data publicly available on city and county Honolulu gis application, there are two sanitary sewer lines that are in the proposed project area shown in figure 3. The project area, also referred to as the project footprint, in other parts of this report is the area that would be impacted by construction to implement a project measure or project feature. Both are at a depth well below our proposed excavation of 50 ft above sea level. The diameter of sewer line A is 24

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inches with inverts at 42.08 to 41.3. The diameter of sewer line B is 60 inches with inverts at 9.73 to 8.81. The inlet culvert coming from the Kanaha stream will have to cross over water, gas lines, and a sanitary sewer line. The water and gas line will have to be field verified for their inverts. The Sanitary sewer line that the inlet culvert will cross is 42.79. the proposed culvert will be well above the sanitary sewer line. The proposed outlet culvert leaving the makiki district detention basin will be crossing over water, gas lines, sanitary sewer, and Lunalilo Fwy (H1) line. The water and gas lines will have to be field verified for their inverts to ensure there this no need for relocation.

2.1.3. Staging Area

The staging area for this project can be in the area C shown in figure 3.

2.1.4. Quantities

According to power inroads cut: 21,768.88 cu yd, fill: 1,088.71 cu yd, net: 20,680.17 cu yd (cut). The Makiki district park disposal material could be utilized to construct the proposed Ala wai levee. Material is not suitable for being used as fill, the preconstruction and engineering design (PED) project delivery team (PDT) should work with the city and county to locate a state approved disposal area. One possible location would be the PVT land company that is northwest of the island. Measure will include approximately 2,200 LF of 20 ft x 4 ft reinforce concrete box culvert.

Figure 3 – Makiki District Park

2.2. Manoa Valley District Park Detention

2.2.1. General Description

The Manoa Valley District Park detention basin tentatively will consist of detention basin that will include 6- to 8-foot-deep cuts at the high (north) end of the site and 1,580 feet of 6-foot I-walls at

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the low (south) end of the site. The detention basin will be in 4 playing fields that gently slope to the south approximately 15 feet of fall over 850 feet at Manoa Valley District Park. The existing conditions, along with the planned detention area are shown in Figure 4. The proposed Inlet culvert has been modeled as a 15 ft by 4.5 ft concrete box culvert. The proposed outlet pipe has been modeled as a 2-ft diameter culvert that drains into the downstream of the Manoa. The total estimated disturbed area is roughly 12.39 acres.

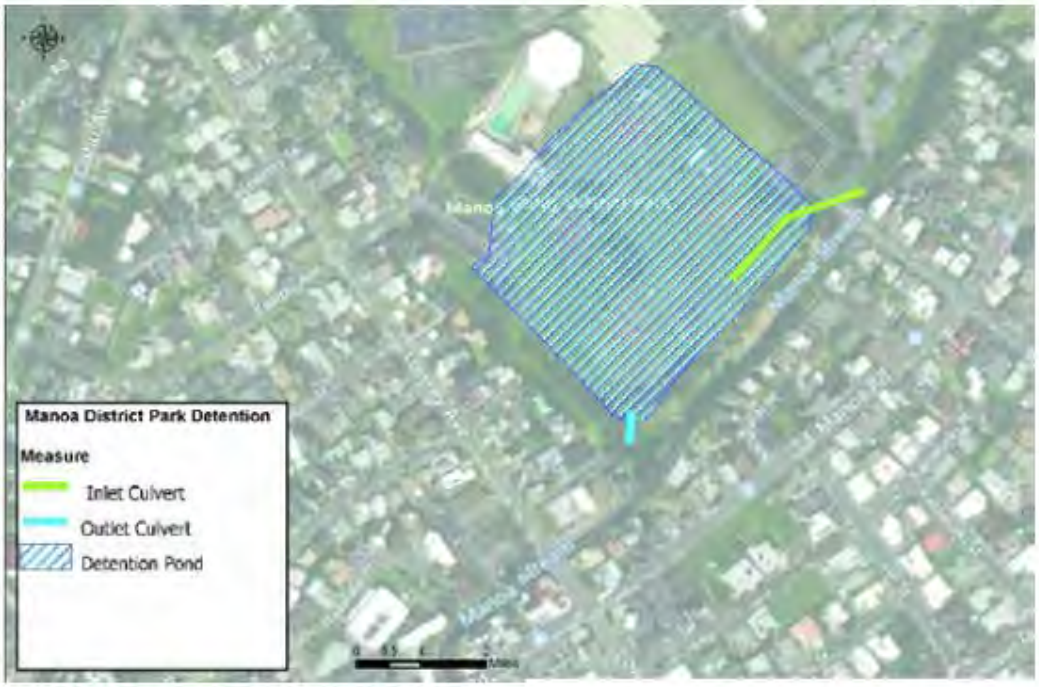

Figure 4 - Manoa District Park Detention

2.2.2. Utilities

According to data publicly available on city and county Honolulu GIS application, there is sanitary sewer main (A) that is running parallel with the proposed project area shown in figure 5. There is also a waterline (B) on the project area, this line would have to be verified by survey to confirm if the waterline would have to be relocated. The proposed inlet and outlet will be above the existing sanitary sewer lines.

2.2.3. Laydown Area

The Laydown area for this project can be in the area C shown in figure 5 below.

2.2.4. Quantities

According to MicroStation power inroads the proposed earthwork site cut: 97,654.73 cu yd, fill: 391.72 cu yd, net: 97,263.02 cu yd (cut). The Manoa district park disposal material could be utilized to construct the proposed Ala wai levee. For some reason the material is not suitable for being used as fill, the preconstruction and engineering design (PED) project delivery team (PDT) should work with the city and county to locate a state approved disposal area. One possible location would be the PVT land company that is northwest of the island.

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Figure 5 - Manoa District Park Detention

2.3. Kanaha Floodwall

2.3.1. General Description

The Kanaha Floodwall tentatively will consist of a 2,200 long, 6-foot-tall L-wall founded on micropiles. The floodwall will be located on the south side of the existing Kanaha Stream. The floodwall is in a heavily populated area. Existing development, including single-family homes, multi-family homes, and high-rise buildings, is located immediately on either side of the stream. The existing ditch walls and bottom are lined, typically with concrete or mortared lava rock/concrete rubble masonry (also referred to as CRM).

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Figure 6 - Kanaha Floodwall

2.3.2. Utilities

According to data publicly available on the city and county GIS database, there are no underground utilities that would affect the Kanaha floodwall.

2.3.3. Laydown Area

The Laydown area for this project will be the same as the Makiki Detention project area C shown in figure 3.

3.0 TSP MEASURES

3.1. Ala Wai Golf Course Detention Basin

3.1.1. Measure Description

The Ala Wai Golf Course Detention Basin will consist of approximately 8,315 linear feet of earthen filled embankment, 240 linear feet of 6-ft L-wall on micro piles (see figure 8), and 1,620 linear feet of 9-ft L-wall on micro piles (see figure 9).

The earthen filled embankment will run along the Manoa-palolo left bank from Date Street to the Ala Wai Canal and then on the right bank of the Ala Wai Canal from Manoa-palolo to the Ala Wai golf course club house. The embankment will also run along the east and north sides of the golf course along Kapahulu Avenue and Date Street. The embankment was aligned to ensure the toe of slope is approximately 15 feet from the stream and canal and crosses known utilities perpendicular to the alignment. The embankment will range from 0 – 9 feet in height with a top of embankment elevation of 12 mean sea level (MSL) and will have 3H:1V side slopes. The

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riverine side of the embankment will be armored with articulated concrete block (ACB) along the Manoa-palolo. An ACB armored spillway approximately 100 feet in length will be located along the Manoa-palolo. The embankment will have a 6 ft deep by 8 ft wide inspection trench. Soil condition of the golf course will require a 2H:1V side slopes of the inspection trench. Aggregate base course access roads are proposed at the top and toes of the embankment. The embankment will be hydroseeded to extend up to 15 feet past each toe. Please see geotechnical appendix for proposed soil condition of the embankment.

The 9-ft high L-wall will run along the Ala Wai canal right bank from the Ala Wai golf course club house to Kapahulu Avenue. The flood wall will be embedded into the embankments at the start and end of the alignment. The top of wall elevation will be set to 12 MSL and will have a maximum height of 9 ft. Please see figure 9 below. One road closure structure will be required at the entrance of the golf course. To maintain storage capacity within the detention basin (2) 12’ X 6’ reinforced concrete boxes (RCB’s) will be extended to the L-wall alignment and will back fill the outlet canal. See structural appendix for detailed cross sections of the wall.

The 6-ft L-wall will start at the end of the Ala Wai Canal Floodwall Measure located at the southeast end of the canal and will run northeast until it intersects with the 12-ft L-wall. See figure 8 below. See structural appendix for detailed cross sections of the wall.

A portion of the existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be used as an inlet location to overflow into the Ala Wai Golf Course Detention Basin. A small inlet channel would be excavated and lined with ACB to improve the flow onto the golf course.

Figure 7 - Ala Wai Golf Course Detention

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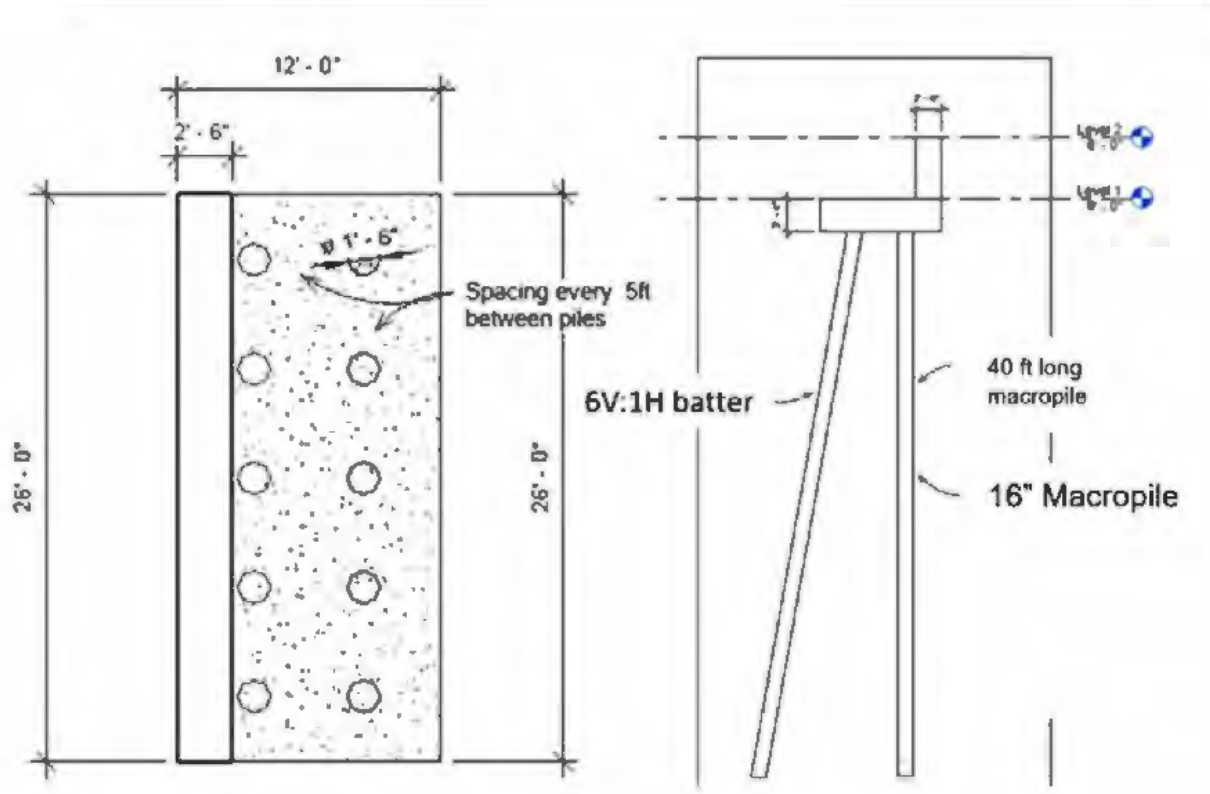

Figure 8 - 6-ft L-wall

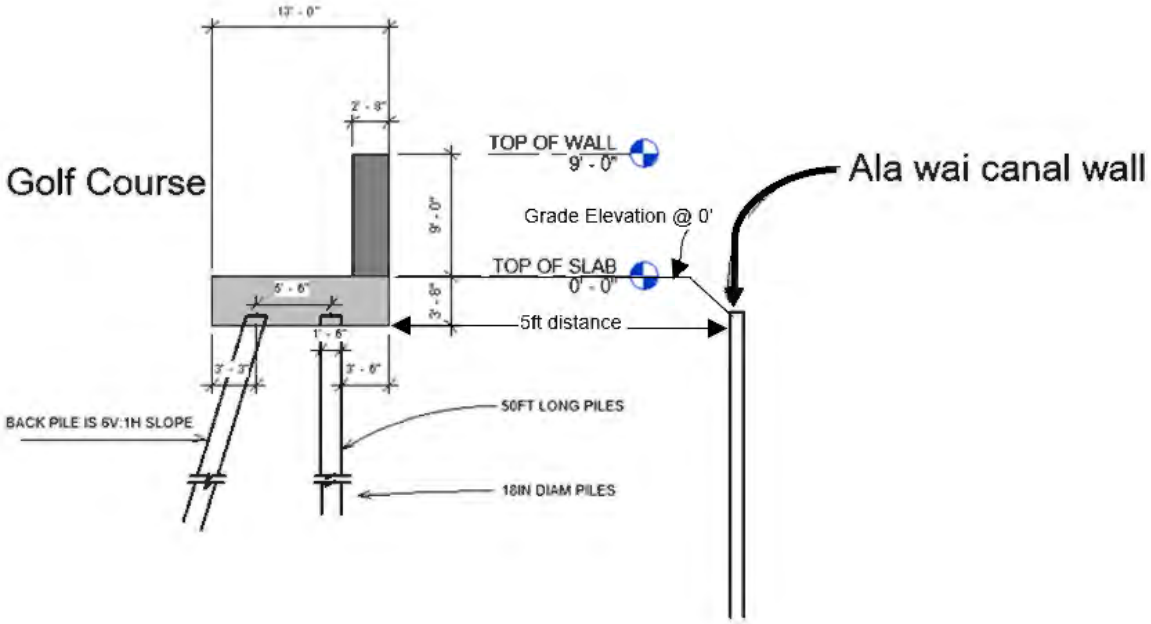

Figure 9 - 9-ft L-wall

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3.1.2. Utilities

Several utilities are conflicting with the proposed project. The project delivery team (PDT) only identified known sewer, water, gas, storm, and power lines within the project area. Utilities within this area were identified based on the Hirtoa survey. Irrigation and communication lines were not identified in the scope of this project. Utilities conflicts were identified when crossing the proposed improvements and assumed 100 LF relocation when crossing the embankment and 60 LF relocation when crossing the flood wall. Storm drains greater than 36 inches were considered to have a drainage structure. Storm drains less than 36 inches were considered to have a flap gate. Table 2 below identifies the number of utility conflicts to be relocated or improved.

Ala Wai Golf Course Detention Basin	
UTILITY	**NO. OF CONFLICTING UTILITIES**
STORM	10
SEWER	4
WATER	2
GAS	2
POWER	6

Table 2 - Ala Wai Golf Course Detention Basin Utilities

3.1.3. Staging Area

The staging area will be established within the Ala Wai golf course.

3.1.4. Quantities

Quantities are based on Openroads Designer commands such as corridor modeler, linear measurement, area measurement, and end area method. Quantities were provided to assist with the cost estimate. Please see cost appendix for detailed cost analysis. Please see calculated quantities for the measure below.

Ala Wai Golf Course Detention Basin		
DESCRIPTION	**QUANTITY**	**UNIT**
DEWATERING	1	LS
CHANNEL DIVERSION/ ENCLOSURE	1	LS
COFFER DAM	1	LS
BRIDGE REPLACEMENT (One lane and walking path)	1	LS
BRIDGE REMOVAL (Pedestrian)	1	LS
LEVEE	8,315	LF
FILL, Levee	90,636	CY
ACB, Levee and Channel	5,833	SY
HYDROSEEDING	15	ACRE
L-WALL (6-ft)	240	LF
CONCRETE, L-WALL (6-ft)	552	CY
L-WALL (9-ft)	1,621	LF
CONCRETE, L-WALL (9-ft)	4,303	CY

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MIRCOPILES	28,828	LF
EXCAVATION, (Channel, Levee, and Wall Foundation)	43,887	CY
ABC, Levee Access Road	4,927	TON
(2) 6'x12' RCB	505	LF
FILL, Channel	7,257	CY
SEWER RELOCATION	400	LF
WATER RELOCATION	120	LF
GAS RELOCATION	120	LF
POWER RELOCATION	600	LF
FLAP GATE	5	EA
DRAINAGE STRUCTURE	5	EA
ROAD CLOSURE STRUCTURE	1	EA
CANOE CLOSURE	1	EA

Table 3 - Ala Wai Golf Course Detention Basin Quantities

3.1.5. Constraints and Preconstruction Engineering Design Considerations

The preconstruction and engineering design (PED) project delivery team (PDT) must work with the local sponsor to establish a borrow site within the island. Due to limited real estate if no borrow site is established it may need to be imported via maritime traffic. Due to hydraulic modeling time constraints the feasibility team did not investigate the 9-ft L-wall being constructed around the (2) 12’ x 6’ RCB outlet canal. A flood wall around the outlet canal would eliminate the need for bridge reconstruction and extending the (2) 12’ x 6’ RCBs. Recommend exploring that option for cost savings.

3.2. Ala Wai Canal Flood Wall

3.2.1. Measure Description

The Ala Wai Canal Flood wall consist of approximately 22,850 linear feet of three wall types, L-wall, J-wall and I-Wall. Civil broke the measure into four sections to manage the size and quantities of the measure. The four sections will be Ala Wai Canal Right Bank, Ala Wai Canal Left Bank, Manoa-Palolo Right Bank, and Kaimuki High School Floodwall. See figure 10 below.

Ala Wai Canal Right Bank consist of approximately 7,400 linear feet of J-wall along the right bank of the Ala Wai Canal from Ala Moana Blvd. to the Manoa-Palolo confluence and along the right bank of Manoa-Palolo from the confluence to Date Street. The J-wall is a 6-ft tall wall with a 3-ft elevated walking path to allow pedestrians to see the canal and stream. The J-wall foundation will be 12-ft wide which rest on top of 40-ft deep mircopiles. The J-wall is aligned to be approximately 5-ft from the existing canal wall. See figure 11 below. See structural and geotechnical appendices for detailed information on the J-wall. There will be three road closure structures at Kalakaua Avenue, McCully Street, and Date Street. There will be three canoe closure structures along this alignment, two at Ala Wai Community Park and one off of Hihiwai Street.

Ala Wai Canal Left Bank consist of approximately 9,730 linear feet of J-wall along the left bank of the Ala Wai Canal from Ala Moana Blvd. to the end of the canal (approximately Ainakea

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Way). There will be two road closure structures at Kalakaua Avenue and McCully Street. The J-wall was aligned to be approximately 5-ft from the existing canal wall.

Manoa-Palolo Right Bank consist of approximately 1,650 linear feet of I-wall along the right bank from Date Street to Kapiolani Blvd. and approximately 670 linear feet of L-wall from Kapionlani Blvd. to Lunalilo Freeway (H1). The I-wall will be a 6-ft tall sheet pile wall encased in concrete at the wall steam and sheet piling driven approximately 30-ft below grade. Sheet piles will have tie backs at 50-ft on center. Due to the proximity to the existing buildings the PDT recommends use a Giken machine to drive the sheet piles. A temporary 15-ft wide bench will be constructed within the stream to allow room for equipment to drive in the tiebacks. The L-wall will be 6-ft in height with a 12-ft wide foundation that rest on top of 40 ft deep micropiles. See figures 8 and 12. See structural and geotechnical appendices for detailed information on the I-wall and L-wall.

Kaimuki High School Floodwall consist of approximately 3,400 linear feet of L-wall starting at the end of the north embankment of the Ala Wai Golf Course Detention Basin and runs northeast through Kiamuki High School and along the left bank of the Manoa-Palolo until it terminates at Lunalilo Freeway (H1) abutment. The measure will have two road closure structures Date Street and Kapionlani Blvd. Alignment was routed to maximum the use of the Kaimuki High School fields and minimize any potential takings if possible.

Figure 10 - Ala Wai Canal Flood Wall

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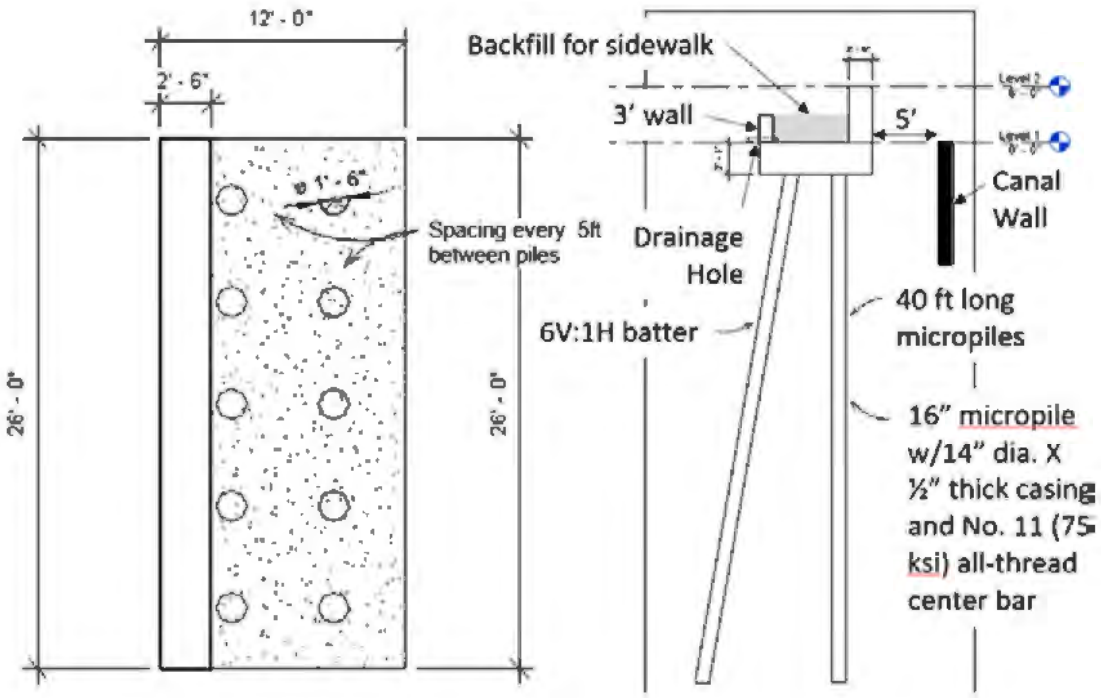

Figure 11 - J-wall

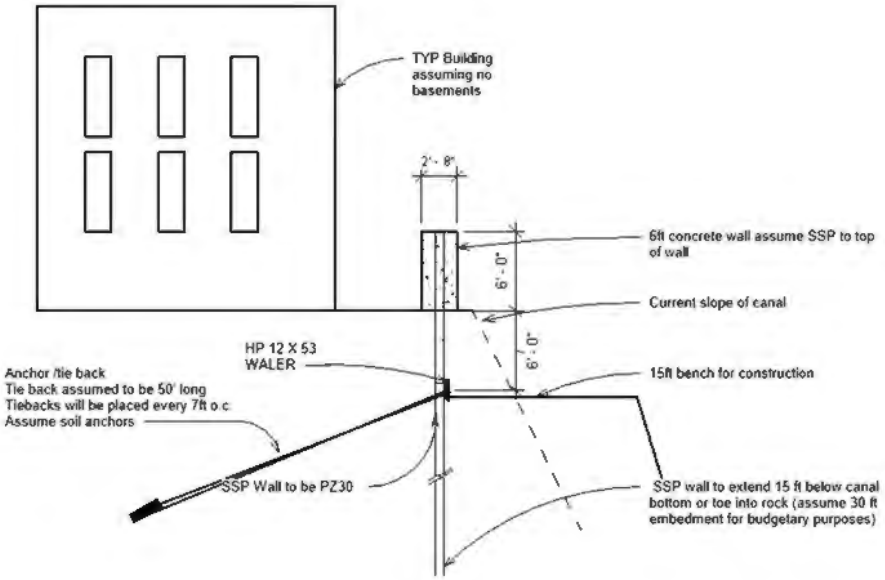

Figure 12 - I-wall

3.2.2. Utilities

Several utilities are conflicting with the proposed measure. The PDT only identified known sewer, water, gas, storm, and power lines within the project area. Utilities within this area were identified based on the Hirtoa survey and GIS information provided by the City of Honolulu. Irrigation and communication lines were not identified in the scope of this project. Utilities

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conflicts were identified when crossing the proposed improvements and assumed 60 LF relocation when crossing the flood wall. There were several underground electrical conduits identified to run directly under and parallel to the proposed structures. The length of conflicting conduits to be relocated is reflected in the quantities. The Storm drains greater than 36 inches were considered to have a drainage structure. Storm drains less than 36 inches were considered to have a flap gate. Table 4 below identifies the number of utility conflicts to be relocated or improved.

Ala Wai Canal Right Bank	
UTILITY	**NO. OF CONFLICTING UTILITIES**
STORM	17
SEWER	14
WATER	8
GAS	3
POWER	21
Ala Wai Canal Left Bank	
UTILITY	**NO. OF CONFLICTING UTILITIES**
STORM	47
SEWER	12
WATER	4
GAS	2
POWER	6
Manoa-Palolo Right Bank	
UTILITY	**NO. OF CONFLICTING UTILITIES**
STORM	4
SEWER	2
WATER	1
GAS	1
POWER	1
Kaimuki High School Floodwall	
UTILITY	**NO. OF CONFLICTING UTILITIES**
STORM	5
SEWER	3
WATER	4
GAS	1
POWER	2

Table 4 - Ala Wai Canal Flood Wall Utilities

3.2.3. Staging Area

Staging area for Ala Wai Canal Right Bank is proposed to be at Ala Wai Community Park. The Staging area for Ala Wai Left Bank is proposed to be at Ala Wai Golf Course or Ala Wai Community Park. Staging area for Manoa-Palolo Right Bank and the Kaimuki High School Floodwall is proposed to be at Kaimuki High School.

3.2.4. Quantities

Quantities are based on Openroads Designer commands such as linear measure, area measure, and end area method. Quantities were provided to assist with the cost estimate. Please see cost appendix for detailed cost analysis. Please see calculated quantities for the measure below.

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Ala Wai Canal Right Bank		
DESCRIPTION	**QUANTITY**	**UNIT**
CONCRETE J-WALL	15,880	CY
CONCRETE J-WALL	7,398	LF
MICROPILES	114,592	LF
CONCRETE, Sidewalk	1,507	CY
FILL, Bathtub	7,535	CY
EXCAVATION, J-Wall Foundation	10,949	CY
SEWER RELOCATION	840	LF
WATER RELOCATION	480	LF
GAS RELOCATION	180	LF
POWER RELOCATION	1,260	LF
FLAP GATE	12	EA
DRAINAGE STRUCTURE	5	EA
ROAD CLOSURE STRUCTURE	2	EA
CANOE CLOSURE	3	EA
Ala Wai Canal Left Bank		
DESCRIPTION	**QUANTITY**	**UNIT**
J-WALL	9,727	LF
CONCRETE, J-WALL	23,463	CY
CONCRETE, Sidewalk	1,982	CY
MICROPILES	150,686	LF
FILL, Bathtub	9,908	CY
EXCAVATION, (J-wall Foundation)	16,978	CY
SEWER RELOCATION	720	LF
WATER RELOCATION	240	LF
GAS RELOCATION	120	LF
POWER RELOCATION	17,577	LF
FLAP GATE	40	EA
DRAINAGE STRUCTURE	7	EA
ROAD CLOSURE STRUCTURE	2	EA
Manoa-Palolo Right Bank		
DESCRIPTION	**QUANTITY**	**UNIT**
I-WALL	1,658	LF
CONCRETE, I -Wall	982	CY
GIKEN SHEET PILES, I-WALL	6,816	SY

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TIE BACK / ANCHOR, I-WALL	11,842	LF
TEMPORARY BENCH FILL, I-WALL	9,210	CY
L-WALL	670	LF
CONCRETE, L-WALL	1,438	CY
EXCAVATION, L-WALL	992	CY
SEWER RELOCATION	120	LF
WATER RELOCATION	60	LF
GAS RELOCATION	60	LF
POWER RELOCATION	60	LF
FLAP GATE	4	EA
DRAINAGE STRUCTURE	-	EA
ROAD CLOSURE STRUCTURE	3	EA
CANOE CLOSURE	-	EA
Kaimuki High School Floodwall		
DESCRIPTION	**QUANTITY**	**UNIT**
CONCRETE L-WALL	3,399	LF
CONCRETE L-WALL	7,821	CY
MIRCOPILES	52,653	LF
EXCAVATION, L-Wall Foundation	5,933	CY
SEWER RELOCATION	180	LF
WATER RELOCATION	1,530	LF
GAS RELOCATION	60	LF
POWER RELOCATION	120	LF
FLAP GATE	3	EA
DRAINAGE STRUCTURE	2	EA
ROAD CLOSURE STRUCTURE	2	EA

Table 5 - Ala Wai Canal Flood Wall Quantities

3.2.5. Constraints and Preconstruction Engineering Design Considerations

Ala Wai Canal Left Bank and Right Bank were aligned to have a 5-ft offset from the existing canal wall per structures and geotechnical recommendations. The City of Honolulu intends to redesign and modify Ala Wai Blvd. The PDT did not have access to the new design therefore it was not accounted for during the study. The PED PDT must coordinate with the City of Honolulu to incorporate the new road design.

Accurate survey data was not made available for Manoa-Palolo Right Bank and Kaimuki High School Floodwall therefore the site alignment is based on aerial imagery provided by Bentley software Openroads Designer. Alignments may vary once accurate topographic surveys are conducted during PED. Utilities for these measures are based on Honolulu GIS information

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therefore locations of the utilities are not to design accuracy which may or may not create more utility conflicts during PED.

Site design of the road closure structures for all measures were not accounted for due to the level of design effort required for this study. The PDT determined that the design of road closure structures would be determined and designed during PED. See the structural appendix for more information on suggested road closure structures.

3.3. Kaoli Road Floodwall

3.3.1. Measure Description

The Kaoli Road Floodwall consists of a 2,510-ft long, 6-foot-tall L-wall founded on micropiles. The western leg of the floodwall is located along the left bank of Manoa Stream, while the southern leg of the floodwall is located along the right bank of Palolo Stream. The Kaoli Road Floodwall is shown in Figure 13 and is in a residential area with little to no real estate available to accommodate the wall construction, creating severe space limitations. Kaoli road will have two road closure structure with one at Kaoli Road and the other at a pedestrian brigde located near Kaluawaa Street.

Figure 13 - Koali Road Floodwall

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3.3.2. Utilities

Several utilities are conflicting with the proposed project. The PDT only identified known sewer, water, gas, storm, and power lines within the project area. Utilities within this area were identified based on GIS information provided by the City of Honolulu. Irrigation and communication lines were not identified in the scope of this project. Utilities conflicts were identified when crossing the proposed improvements and assumed 60 LF relocation when crossing the flood wall. There was a waterline and sewer line identified to run directly under and parallel to the proposed structures. There were also overhead power lines that run parallel to the proposed structure. The length of conflicting infrastructure to be relocated is reflected in the quantities. The Storm drains greater than 36 inches were considered to have a drainage structure. Storm drains less than 36 inches were considered to have a flap gate. Table 6 below identifies the number of utility conflicts to be relocated or improved.

Koali Road Floodwall	
UTILITY	**NO. OF CONFLICTING UTILITIES**
STORM	4
SEWER	1
WATER	2
GAS	1
POWER	1

Table 6 - Koali Road Floodwall Utilities

3.3.3. Staging Area

The staging area for this project is proposed to be at Kanewai Community Park located at the north end of the project area.

3.3.4. Quantities

Quantities are based on Openroads Designer commands such as linear measure, area measure, and end area method. Quantities were provided to assist with the cost estimate. Please see cost appendix for detailed cost analysis. Please see calculated quantities for the measure below.

Koali Road Floodwall		
DESCRIPTION	**QUANTITY**	**UNIT**
CONCRETE L-WALL	2,510	LF
CONCRETE L-WALL	5,109	CY
MIRCOPILES	38,882	LF
EXCAVATION, L-Wall Foundation	3,715	CY
SEWER RELOCATION	1,100	LF
WATER RELOCATION	1,010	LF
GAS RELOCATION	60	LF
POWER RELOCATION	990	LF
FLAP GATE	2	EA
DRAINAGE STRUCTURE	2	EA
ROAD CLOSURE STRUCTURE	2	EA

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Table 7 - Koali Road Floodwall Quantities

3.3.5. Constraints and Preconstruction Engineering Design Considerations

Accurate survey data was not made available for this measure therefore the site alignment is based on aerial imagery provided by Bentley software Openroads Designer. Alignments may vary once accurate topographic surveys are conducted during PED. Utilities for these measures are based on Honolulu GIS information therefore locations of the utilities are not to design accuracy which may or may not create more utility conflicts during PED.

Alignment along the Palolo stream is constrained by the close vicinity of the residential structures. Based on aerial imagery used the PDT believes there is enough room to construct the wall however a detailed accurate land survey is critical for the construction of this measure.

3.4. Woodlawn Drive Floodwall

3.4.1. Measure Description

The Woodlawn Drive Floodwall consists of a 1,270-ft long, 6-foot-tall L-wall founded on micropiles. See figure 14. The floodwall will be located on the west side of Manoa Stream. The floodwall to the north of Woodlawn Bridge is in a grass area adjacent to a shopping center parking lot. The floodwall to the south of Woodlawn Bridge is located on University of Hawaii property for greenhouses and other agricultural activities. The measure will have one road closure structure at Woodlawn Drive.

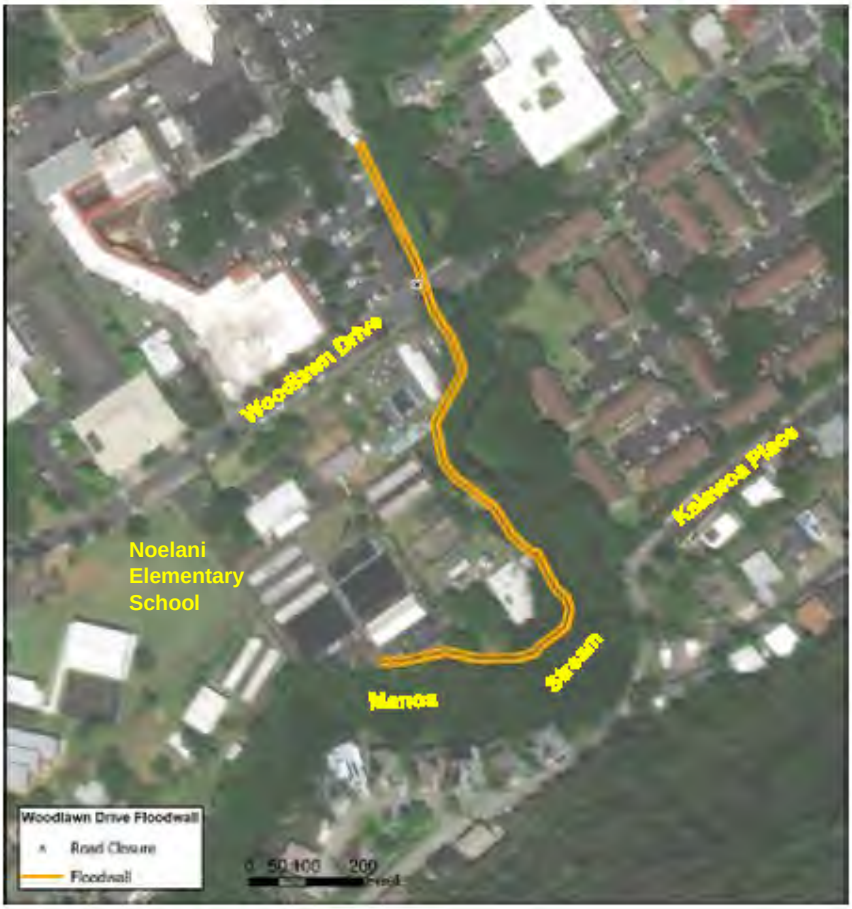

Figure 14 - Woodlawn Drive Floodwall

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3.4.2. Utilities

Several utilities are conflicting with the proposed project. The PDT only identified known sewer, water, gas, storm, and power lines within the project area. Utilities within this area were identified based on GIS information provided by the City of Honolulu. Irrigation and communication lines were not identified in the scope of this project. Utilities conflicts were identified when crossing the proposed improvements and assumed 60 LF relocation when crossing the flood wall. Please see table 8 below for a list of utility conflicts.

Woodlawn Drive Floodwall	
UTILITY	**NO. OF CONFLICTING UTILITIES**
STORM	0
SEWER	4
WATER	1
GAS	0
POWER	No Data

Table 8 - Woodlawn Bridge Floodwall Utilities

3.4.3. Staging Area

The staging area is proposed to be at the Noelani Elementary School.

3.4.4. Quantities

Quantities are based on Openroads Designer commands such as linear measure, area measure, and end area method. Quantities were provided to assist with the cost estimate. Please see cost appendix for detailed cost analysis. Please see calculated quantities for the measure below.

Woodlawn Drive Floodwall		
DESCRIPTION	**QUANTITY**	**UNIT**
CONCRETE L-WALL	1,270	LF
CONCRETE L-WALL	2,586	CY
MIRCOPILES	19,679	LF
EXCAVATION, L-Wall Foundation	1,880	CY
SEWER RELOCATION	240	LF
WATER RELOCATION	60	LF
GAS RELOCATION	-	LF
POWER RELOCATION	No Data	
FLAP GATE	-	EA
DRAINAGE STRUCTURE	-	EA
ROAD CLOSURE STRUCTURE	1	EA

Table 9 - Woodlawn Drive Floodwall Quantities

3.4.5. Constraints and Preconstruction Engineering Design Considerations

Accurate survey data was not made available for this measure therefore the site alignment is based on aerial imagery provided by Bentley software Openroads Designer. Alignments may vary once accurate topographic surveys are conducted during PED. Utilities for these measures are based on Honolulu GIS information therefore locations of the utilities are not to design

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accuracy which may or may not create more utility conflicts during PED. The PDT was not able to obtain information about the presents of power lines within this measure. No visible overhead power lines were observed via google street view however there appears to be an electric vault on the north side of the Woodlawn Drive bridge.

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US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix F — Structural Engineering

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Report Status: Draft, November 2023

Executive Summary

During the feasibility stage the PDT looked at variations of a dozen alternatives. Once selecting an Alternative (5) the PDT further investigated and selected Alternative 5.3 as the Tentatively Selected Plan

The Structural Designs were selected based on standard practice and Engineering Manuals. The restrictions of not having complete boring information, survey, and cross sections were some of the challenged placed on the structural design and engineering judgement played a role on determining what type of wall would be assumed to be adequate for the location it was chosen for.

I-walls were selected in areas where there would be no erosion or slopes near the wall type itself. Selected I-walls are 6 feet tall with sheet pile (PZ22) embedment depths of 18 feet below grade where the surrounding grades are relatively flat; or 24 feet below grade where the ground surface in front of the wall slopes down at 3H:1V.

Along stream channels, macropile-supported L-walls are planned. The L-walls will be 6 to 9 feet tall (6 feet in most locations / 9 feet at Ala Golf Course near the canal) with a 12- to 13-foot-wide base supported on cased macropiles. The macropiles are assumed to be 40 ft for the 6ft tall walls and 50 feet long for the 9ft tall walls. The piles will be 16 to 18 inches in diameter with a 14-to 16-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles will be placed in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 3V:1H to reduce lateral movement of the monolith.

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1. Project Information

The Ala Wai Watershed is located on the southeastern side of the island of Oahu, Hawaii(Figure 1-1) The watershed extends from the Ko'oalua Mountains to the nearshore water of Mamala Bay; including Makiki, Manoa, and Palolo Streams. The streams then flow to the Ala Wai Canal, a 2-mile-long man made waterway constructed in the 1920's to drain extensive coastal wetlands, thus allowing development of the Waikiki District.

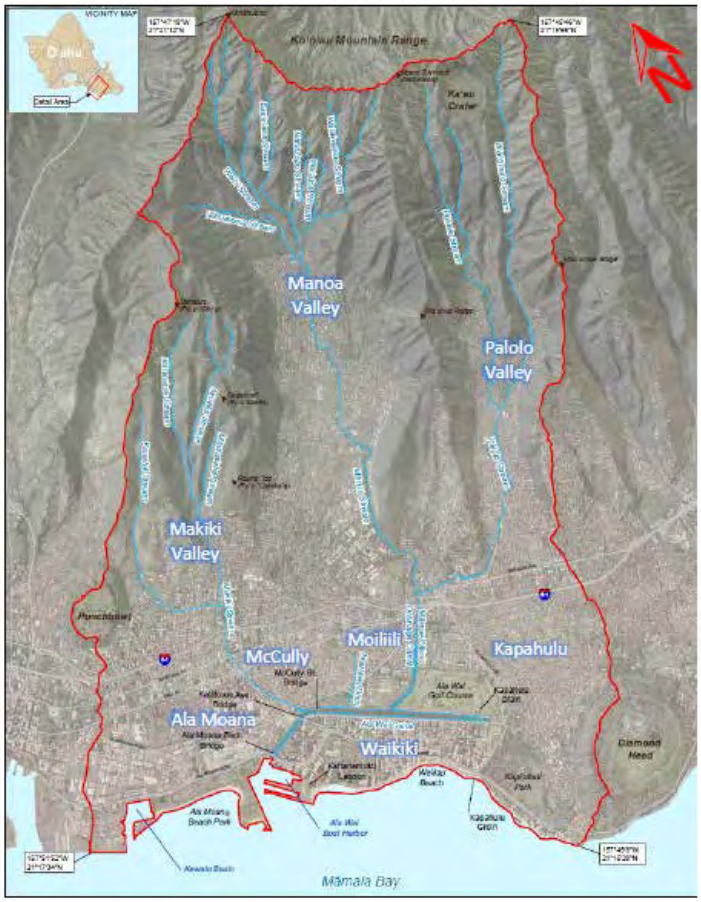

Figure 1-1. Overview of Ala Wai Watershed

2. Purpose

The purpose of this study is to reduce riverine flood risks in the Ala Wai Watershed. The purpose of the Structural Appendix is to construct various options for the floodwalls along the Makiki, Manoa, and Palolo Streams. Flooding has occurred within the watershed on multiple occasions, resulting in recorded property damages and health and safety risks. Analysis conducted in support of this project show that the 1-percent annual chance exceedance (ACE)

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floodplain extends over approximately 1,358 acres of the watershed. The design of various walls throughout the Canal result in various degrees of reduced flooding. More information can be found in the Hydraulics Appendix (Appendix B).

3. Alternatives- GRR Measures

Individual measures were placed together in various arrays to accomplish flood reduction throughout the watershed. The combination of these measures created various alternatives that were then analyzed by H&H to prove that there were benefits and that there was exceptional flood risk reduction. Upon further analyses considering the project objectives and constraints, an array of alternative were developed:

Alternative 1 (Figure 3-1)	Storage Cornerstone
Alternative 2b (Figure 3-2)	Conveyance Cornerstone
Alternative 5 (Figure 3-3)	Hybrid
Alternative 5.3 (Figure 4-1)	Modified Hybrid Tentatively Selected Plan (TSP)

Table 3-1. List of Alternatives for consideration and TSP

Each Alternative is made up of individual measures as shown below:

Measures	Alternative 1	Alternative 2b	Alternative 5
Manoa District Park Multi Purpose Detention Basin	x		x
Manoa-Palolo Canal Floodwalls		x	x
Ala Wai Canal Floodwalls		x	x
Ala Wai Golf Course Multi-purpose Detention Basin	x		x
Makiki District Park Detention Basin	x	x	x
Woodlawn floodwall	x	x	x
Kanaha Floodwall	x	x	x
Koali Rd. Floodwall	x	x	x
Kaimuki Highschool	x	x	x

Table 3-2. Various measures implemented arrays of Alternatives

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Table 3-2 and Table 3-3 provide information on what types of walls were used and explain the various options. The Feature summary below will provide a very concise description of wall type and length of wall for the Alternatives 1, 2b, and 5. The TSP Feature Table is provided in Section 4.

Figure 3-1. Alternative 1: Storage Cornerstone (in Order from left to right: Ala Wai Detention Basin, Koali Rd Floodwall, Kaimuki Floodwall and Makiki Detention Basin, Manoa Detention Basin and woodlawn floodwall)

Figure 3-2. Alternative 2b: Conveyance Cornerstone (in Order from left to right: Ala Wai Floodwall, Koali Rd Floodwall, Kaimuki Floodwall and Makiki Detention Basin, Manoa Detention Basin/Floodwall and Woodlawn Floodwalls)

Figure 3-3.Alternative 5: Hybrid and TSP (in Order from left to right: Ala Wai Hybrid Detention Basin and Floodwall, Koali Rd Floodwall, Kaimuki Floodwall and Makiki Detention Basin, Manoa Detention Basin/Floodwall and Woodlawn Floodwalls)

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Table 3-3: Alternative Feature Summary

Measure	Structure Type[1]	Maximum Wall Height	Total Wall Length[1]	Maximum Excavation Depth	Number of Road Closures[2]	Number of Drainage Structures[2,3]
Kanaha Floodwall	L-wall on Macropiles	6 ft	2,200 ft	--	5	--
Makiki District Park Detention	I-wall	6 ft	1,200 lf	6 to 10 ft	--	2
Manoa Valley District Park Detention	I-wall	6 ft	1,580 ft	6 to 8 ft	--	2
Woodlawn Bridge Floodwall	L-wall on Macropiles	6 ft	1,625 ft	--	1	--
Koali Road Floodwall	L-wall on Macropiles	6 ft	2,485 ft	--	2	2
Kaimuki High School Floodwall (Alt 1 – ties into golf course berm)	L-wall on Macropiles[4] (1,700 ft) / I-wall (2,700 ft)	6 ft	4,400 ft	--	0 to 2	--
Ala Wai Golf Course Detention[5]	Berm	6 ft	5,640 to 10,665 ft	--	0 to 2	3
Ala Wai Canal Floodwall (Alt 2B / Alt 5)	L-wall on Macropiles[4] (20,005 / 19,960 ft) / I-wall (4,740 / 4,180 ft)	6 ft	24,745 / 24,140 ft	--	9 to 12	6 to 14
Kaimuki Extension of Ala Wai Canal Floodwall (Alt 2B / Alt 5)	L-wall on Macropiles[4] (1,030 / 1,800 ft) / I-wall (2,330 / 1,460 ft)	6 ft	3,260 / 3,660 ft	--	--	--
Makiki Floodwall[5]	U-wall on Macropiles[6]	6 ft	883 ft	--	4	1

[1] Berms to be 6 feet tall and have side slopes of 3H:1V with a 12-foot crown. I-walls to be 6 feet tall and have 18-foot of sheet pile (PZ22) embedment where the surrounding ground is flat and 24-foot of sheet pile embedment (PZ22) where the ground in front of the wall slopes down 3H:1V. L-walls to be 6 feet tall with a 12-foot-wide base supported on 16-inch diameter by 40 feet long cased macropiles with a 14-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 3V:1H.

[2] The length of the measure and the number of road closures and drainage structures may vary because of slight alignment changes between the alternatives.

[3] Indicates the number of inlet and outlet structures.

[4] The L-wall on Macropiles will be used adjacent to the stream (where erosion is more of a concern) or adjacent or nearby to the existing canal wall where damaging to the existing wall is a concern while the I-wall will be used in areas away from the stream (i.e., where there is flat ground) or away from the existing canal wall.

[5] An in-stream diversion/weir will be included in Alternative 1.

[6] The Makiki Floodwall was added during the evaluation of Alternative 5.2 but removed in Alternative 5.3 due to the induced damages created by its addition.

[6] U-walls assumed to extend 6 feet above existing Makiki canal walls/surrounding ground surface and be similar to L-walls, with the exception of the following changes: the base thickness is reduced; the base width will vary to match the existing channel width; and all macropiles assumed vertical (no batter).

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4. TSP

Alternative 5 was selected for the TSP. This was completed by developing the Alternatives and completing a cost-benefit ratio and net benefits. It was established that Alternative 5 showed the most cost-effective option and was further investigated. The PDT then developed and optimized Alternative 5 to Alternative 5.1, 5.2, and 5.3. The TSP concluded to be Alternative 5.3 where some measures were eliminated (e.g., they could not be justified incrementally); the alignment of others were adjusted for optimization; and one measure was added to reduce induced damage considerations. Table 4-1 below shows the feature summary included in the TSP:

Table 4-1: TSP Feature Summary (Alternative 5.3)

Measure	Structure Type[1]	Maximum Height	Total Length	Number of Road Closures	Number of Drainage Structures[2]	Number of Flapgates[2]
Woodlawn Drive Floodwall	L-wall on Macropiles	6 ft	1,270 ft	1	--	--
Koali Road Floodwall	L-wall on Macropiles	6 ft	2,510 ft	2	2	2
Ala Wai Golf Course Detention	Berm (8,315 ft) L-wall on Macropiles[3] (1,861 ft)	6-9 ft	10,176 ft	1	5	5
Ala Wai Canal Floodwall[4]	J-wall on Macropiles[3] (17,125 ft) L-wall on Macropiles[3] (4,069 ft) Tieback I-Wall[3] (1,658 ft)	6 ft	22,852 ft	11	14	59

1. Berms assumed to be 6 to 9 feet tall and have side slopes of 3H:1V with a 12-foot crown. Taller berms planned at lower elevations of the Ala Wai Golf Course along the Ala Wai Canal.
   L-walls assumed to be 6 feet tall (except at Ala Wai Golf Course) with a 12-foot-wide X 40-inch-thick base supported on 16-inch diameter by 40 feet long cased macropiles with a 14-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar.
   L-walls at the Ala Wai Golf Course assumed to be 9 feet tall with a 13-foot-wide X 44-inch-thick base supported on 18-inch diameter by 50 feet long cased macropiles with a 16-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 6V:1H
   J-wall assumed to be the same design as 6-foot L-walls (i.e., same width, macropiles configuration, etc.), except the wall will include a 3-foot-tall concrete wall on the heel, with the 3-foot-deep area created between the front and rear walls backfilled with soil to create an elevated walkway along the Ala Wai Canal.
   Tieback I-wall) assumed to be toed into rock or extended 15 feet below the stream level with PZ30 sheet piles and 50-foot-long angled ties at 7 feet on-center with a continuous HP12X53 waler located 6 feet below the streambank crest.
2. Indicates the number of assumed outlet structures. It is assumed that existing storm drains larger than 36 inches will require a drainage structure (and positive closure). Smaller sizes may require drainage structures during future design phases.
3. J-wall on Macropiles assumed to be used primarily along the Ala Wai Canal (but also along the north side of the Manoa-Palolo to Date Street). L-wall on Macropiles assumed to be used adjacent to streams where visibility of the canal is not a major consideration and where erosion is more of a concern, while the I-wall assumed to be used in areas away from streams where there is flat ground and erosion is not a concern; however, there are no I-walls in the TSP (see explanation in one of bullet points below). The Tieback I-Wall assumed where space limitations and vibrations are major considerations and prevent the use of the other wall types (i.e., specifically planned on the north side of Manoa-Palolo Stream from Date Street to Kapiolani Boulevard).
4. The floodwall around the canal also accounts for four canoe closure structures.
   The Ala Wai Canal measure for the TSP is a combination of the floodwalls along the Ala Wai Canal and along the Manoa-Palolo (including at Kaimuki High School).

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The primary changes from the Alternative 5 selected and described in Section 3 to the TSP presented in this section and report (Alternative 5.3) were the following:

Removal of the Kanaha Floodwall and the two detention basins (Makiki and Manoa) from consideration due to insufficient incremental benefits.

Conversion of all the L-wall along the main Ala Wai Canal to a J-wall to create an elevated 3-foot-tall walking path combined with a 3-foot-tall wall behind the existing canal wall. The 6-foot wall was deemed an unacceptable barrier to a cultural resource (the Ala Wai Canal). The elevated walkway created by the J-wall restored visual connection with the Ala Wai Canal (a major concern of the local residents), while also significantly reducing some of the safety concerns expressed with a 6-foot-tall wall with limited access between the canal and the nearby streets (i.e., the ability to get from the water side to the land side of the wall quickly due to only having limited wall penetrations for doors and gates in consideration of the short duration and minimal notice of flood events). In addition, the additional dead load created by the elevated 3-foot-tall walkway will help reduce lateral deflection of the pile cap, which will reduce potential impacts on the existing (sensitive) canal wall.

Conversion of the L-wall along the north bank of the Manoa-Palolo Stream from Date Street to Kapiolani Boulevard (which is considered part of the Ala Wai Canal Floodwall alignment) to a Tieback I-Wall due to insufficient space to construct the originally planned L-wall. The Tieback I-Wall requires less footprint for construction (equipment rides along installed sheet pile) and permanently (I-wall only requires 2 to 3 feet versus 12 feet for wide L-wall). In addition, the Giken technology allows sheet pile to be pushed hydraulically, instead of driven, reducing vibration concerns for nearby structures.

Conversion of the I-walls originally planned around the Kaimuki High School playing fields to L-walls for simplicity and continuity of the system (e.g., to avoid transition points since limited length of I-wall necessary and reduce the types of floodwalls used).

Extension of the Koali Road from the pedestrian bridge at Kaluawaa Street to St. Louis Drive due to lower ground elevations than originally assumed.

Taking of 2/3 structures (one residential structure, one commercial structure, and one small structure of indeterminate origin) immediately north of Kapiolani Boulevard due to their proximity to Manao-Palolo and the inability to construct a flood reduction system between the structures and the creek without permanent construction into the creek (and permanently impinging creek flow, which would cause damages upstream) and the inability to safely construct a wall around the structures (thereby excluding them from flood reduction system) due to the required sightlines at the intersection and the limited space for appropriate wall set-back from the street.

Increase in wall/levee heights at the Ala Wai Golf Course to increase detention volume.

The proposed alignments for each measure included in the TSP are included in Figure 4-1. Zoomed in views of the individual alignments are included in Figure 4-2 to Figure 4-4 for further reference. The types of risk reduction for each measure are shown in Figure 4-5.

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Figure 4-1 Tentatively Selected Plan (Alternative 5.3) Alignments

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Figure 4-2 Ala Wai Canal and Golf Course TSP Alignments

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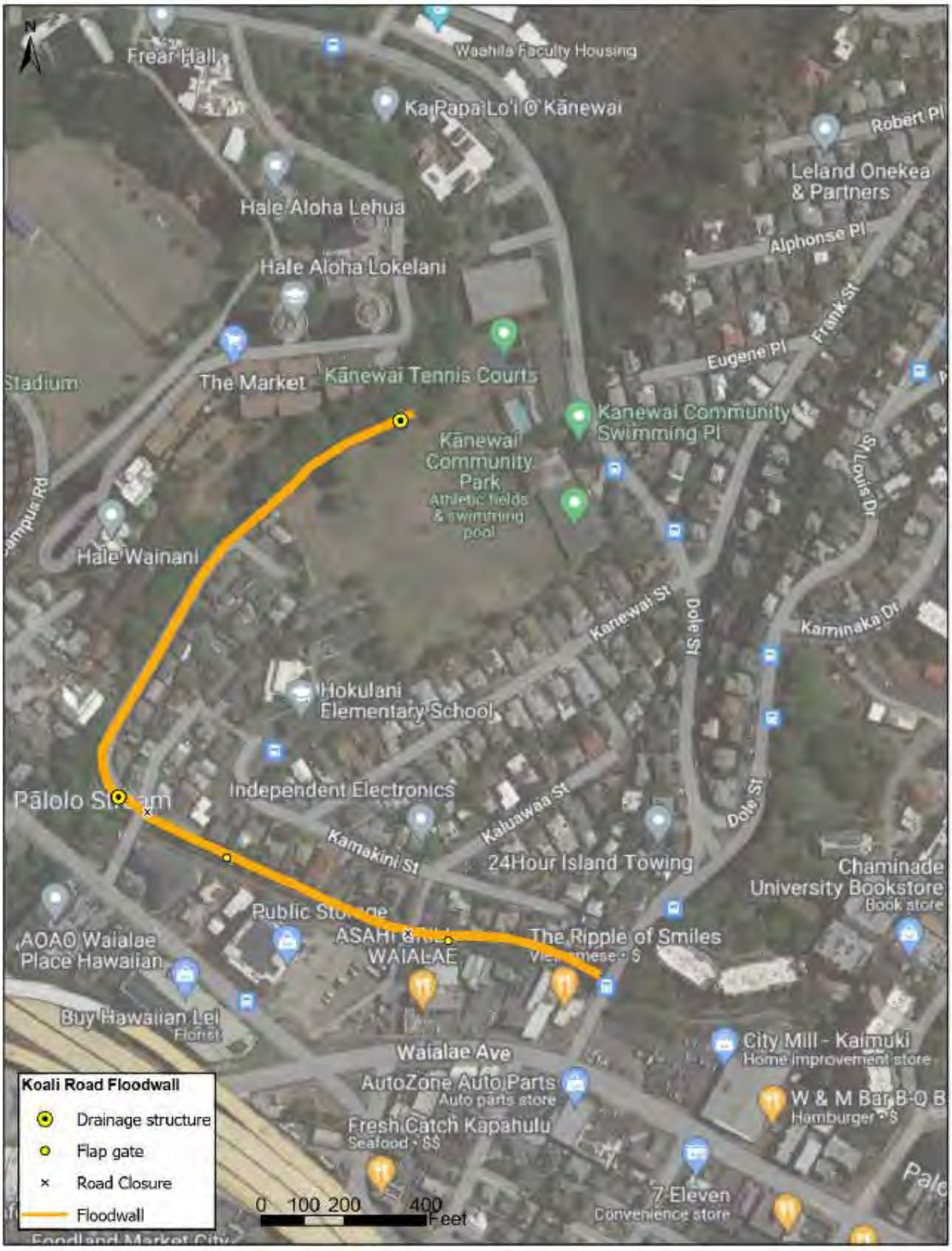

Figure 4-3 Koali Rd TSP

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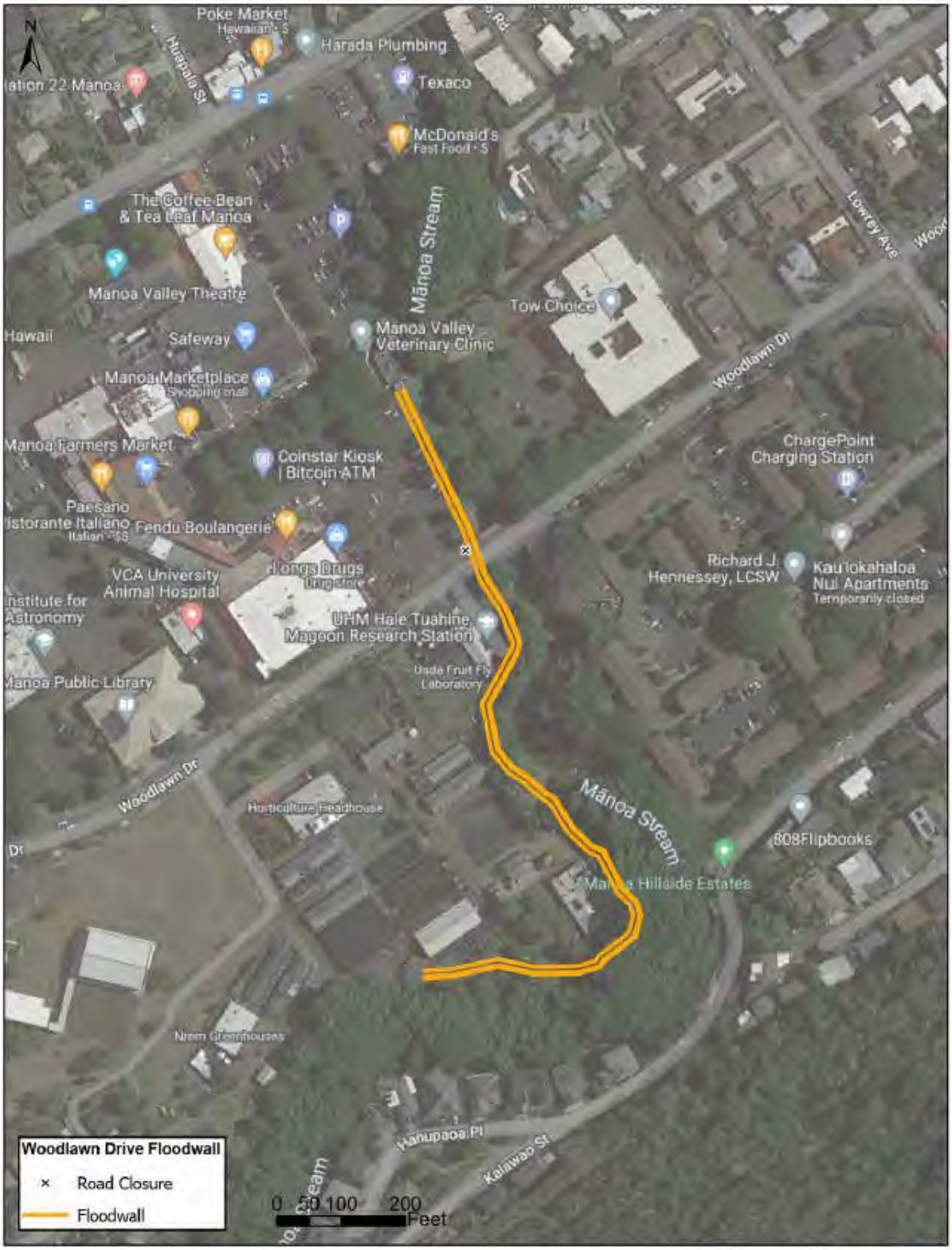

Figure 4-4 Woodlawn TSP Alignment

Figure 4-5 Risk Reduction Types (Walls and/or Levees) for Each Measure

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5. Design Inputs.

Several design assumptions have been investigated and discussed to define the inputs data that were needed to design various wall types. The discussed design inputs included geotechnical data to define soil pressure, and the hydraulic data to define flood elevation. There was no updated survey completed to give exact elevations therefore the design “grade” is noted to be 0ft throughout the project and the top of wall for the wall design is +6ft. For the TSP some Wall heights were heightened to +9ft. Due to no survey data the structural design was based on assumptions and minimal profile information to assume the grade and slope used to determine wall placement in various regions of the project. The floodwall alignment should be evaluated during the design phase for optimum wall profile.

5.1. Soil Conditions

The soil conditions considered where based on the interpretation of the geology in the location. The soil conditions referenced in Attachment 1 of the Structural Appendix were incorporated into the various software used to design Structural Sheet Pile and Macro Piles. The grade height and slopes were assumed by the technical team due to no updated topography/survey.

More information can be found in the Geotechnical Appendix.

5.2. Hydraulic Data

The top of wall design parameter used for the wall designs throughout the project would be +6ft from grade (+9 for Ala Wai Golf Course Parking lot area in TSP) . More information on the hydraulic modeling and data can be provided in Hydraulic Appendix (Appendix B).

6. Assumptions

Due to lack of survey/topography/plans the types of walls were based on the assumed location of the walls. For the Structural Sheet Pile (SSP)/ I Wall there are two different design considerations. The first design assumes that the grade is equal on both side of the design wall. The other design assumption is that the I wall has a 3H:1V slope on one side of the wall. The wall analysis should be optimized during the PED phase with survey data.

Regarding the L-wall design, the slope was assumed by the technical team due to no profile information on multiple locations throughout the floodwall alignment. There could be room for optimization once there is more information on the topography where there is an L-Wall. The preliminary assumption is to design an L-wall where it is adjacent to the canal wall. Whereas the SSP/I-Wall is placed at a minimum of 15’ away from an existing wall or where there is enough soil on either side of the wall.

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7. Wall Types

7.1. SSP/I-walls

Structural Sheet Pile wall, commonly known at as an I-wall, consists of a driven, vibrated, or pushed row of interlocking vertical pile segments to form a continuous wall. For the sake of this report SSP wall and I-wall will be used interchangeably in this report. The wall may extend to the full height with sheet pile (Figure 7-1), or it may be constructed with sheet piling in the embedded depth and a monolithic CIP reinforced concrete wall in the exposed height (Figure 7-1, 7-2). For this design, with the concrete encasement, the SSP will be terminated at the top of wall elevation and should be further evaluated during the design phase to proceed with the optimum wall profile.

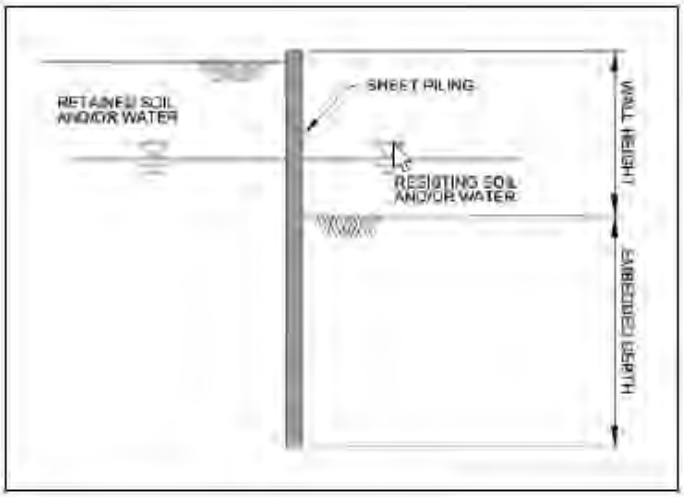

Figure 7-1. Typical Structural Sheet Pile Wall

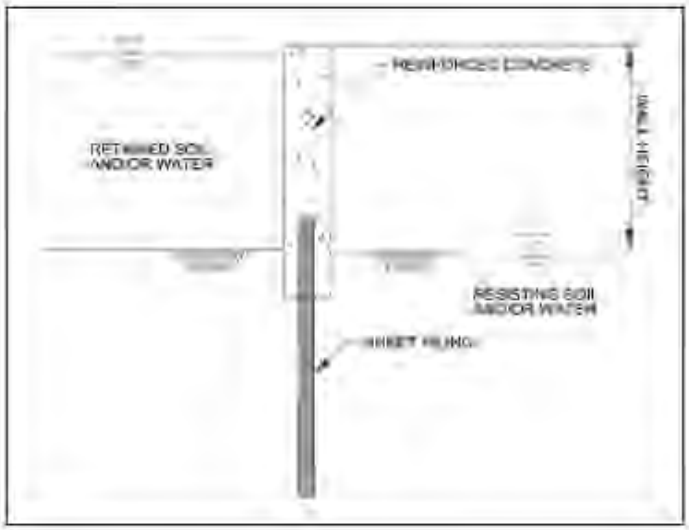

Figure 7-2. Sheet Pile Wall With Concrete Cap

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The analysis and design of a cantilevered SSP (Structural Sheet Pile) wall is based on specification EM 1110-2-2502 “Floodwalls and other Hydraulic Retaining Walls”. Per the guidance walls constructed entirely with sheet piling will have leakage through the interlocks when water is retained above the ground surface. The designer will have to make sure that the interlocks need to be sealed properly above ground and that corrosion protection will need to be considered in the design of the SSP wall. Another option to contain leakage is to place concrete around the SSP at or below the frost line.

For preliminary measures the I -Wall structural design will only consider the SSP wall while the Concrete Design has not been done at this point of the design. For cost purposes the SSP wall will be encased with concrete from grade up to the top of wall elevation. The concrete encased SSP wall should be further evaluated in PED phase to achieve an optimum design. (See Figure 7-3). The reasoning for full depth sheet piling terminating at top of wall with concrete encasement is that it has the advantage of resilience by being able to transfer lateral loads through the sheet pile interlocks. Since the I wall is 6ft tall the typical I wall layout would include a concrete wall with SSP wall embedded due to the height of the wall. During the PED phase there should be further evaluation as to where the cut off the SSP wall should be.

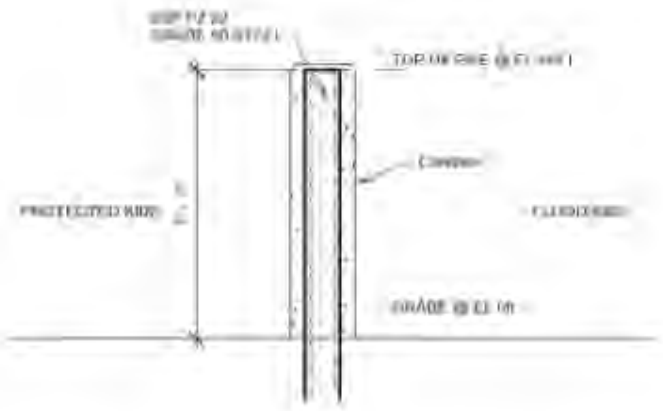

Figure 7-3. Concrete Encased SSP wall

Sheet pile walls are usually lower than 10 ft[1] of exposed height measured on the protected side of the wall. Conditions with soft soils and/or with downward slopes on the resisting side, such as a levee, reduce the overall height of the I-Wall. Because the design is in the feasibility stage it was decided to keep the wall maximum at 6ft due to multiple factors. In previous studies H&H would run a 20yr, 50 yr…and etc and then give the Structural Engineer a wall height. For this study the team determined it would be more beneficial to the project for H&H to run the hydraulic modeling considering a top of wall elevation of 6ft above grade throughout the watershed. The determination of the elevation was based on Figure 7-4 as well as considering other factors such as space constraints and maximum heights acceptable to the community in the area. For preliminary measures the height of 6ft seemed to be reasonable, but with further investigation the height may be reconsidered.

[1] EM 1110-2-2502 “*Floodwalls and other Hydraulic Retaining Walls”*

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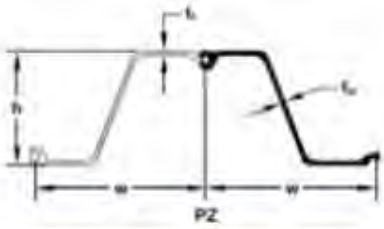
Load Category	Foundation Type			
	Sand	Soft Clay	Stiff Clay	
	$\phi' \geq 32.5$, $D_r \geq 0.50$	$s_u \leq 300$ psf	$s_u \geq 1{,}500$ psf	Wall on Earthen Levee Embankment
Usual	7 ft. (2.1 m)	5 ft. (1.5 m)	8 ft. (2.4 m)	4 ft. (1.2 m)
Unusual	9 ft. (2.7 m)	7 ft. (2.1 m)	12 ft. (3.7 m)	4 ft. (1.2 m)
Extreme	11 ft. (3.4 m)	8 ft. (2.4 m)	15 ft. (4.6 m)	4 ft. (1.2 m)

Figure 7-4. Maximum Wall Heights for Deformation Control of Cantilever Pile Walls Used for Floodwalls, Dam Walls, and Dam Crest Walls

According to EC 1110-2-6066 Design of I-Walls steel sheet piling used for I walls should conform to the Z-shaped hot-rolled Sections produced by various manufacturers. The interlock strength of the hot rolled sheet piling improves integrity during driving and allows forces to the redistributed laterally along the wall at changes in wall alignment, and in weak soil zones. For all the I wall Designs the SSP wall will be a PZ 22 with properties that can be seen in Figure 7-5 below.



SECTION	Width (w)	Height (h)	THICKNESS		Cross Sectional Area	WEIGHT		SECTION MODULUS		Moment of Inertia	COATING AREA	
			Flange	Web		Single Pile	Wall Area	Elastic	Plastic		Both Sides	Wall Surface
PZ 22	22.00	9.0	0.375	0.375	6.47	40.3	22.0	18.1	21.79	84.38	4.48	1.22

Figure 7-5. PZ 22 Section Properties

Please see Appendix 2 for the Structural Analysis.

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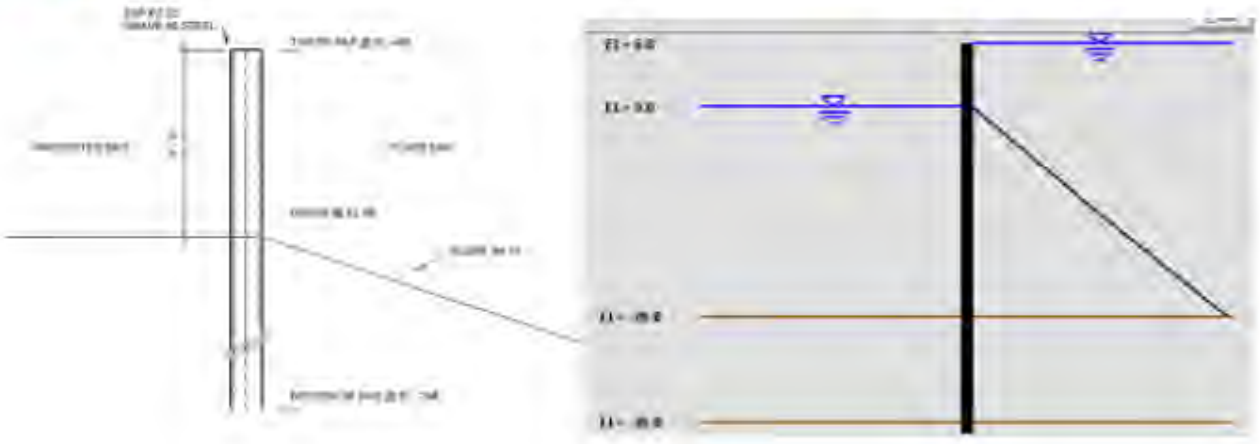

Figure 7-6. SSP Section with 3H:1V slope on Flood Side and CWALSHT Input

Figure 7-7. SSP Section with Grade @ 0ft on Flood Side and Protected Side and CWALSHT Input

Figure 7-6 and Figure 7-7 represent the section views of the two options of the SSP walls. For more information see Individual Measures Section 8. See Appendix 2 for CWALSHT OUTPUTS.

The benefits of I-wall is the ease of installation. The wall can be installed relatively close to existing structures with minimal excavation. in addition, the wall can be installed under wet conditions without the need for dewatering. [however, there will be some dewatering with the concrete installation] The disadvantages of using I walls include limited heights and deflections causing undesirable movement under service loadings.

7.2. L-Walls on Macropiles

According to EM 1110-2-2502 a concrete wall supported by driven piles or drilled shafts can be used when the minimum design requirements (bearing capacity, sliding, resultant location, or

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settlement) cannot be achieved with a shallow-founded wall. It may also be useful if space limitations do not allow the base width required for a shallow-founded wall.

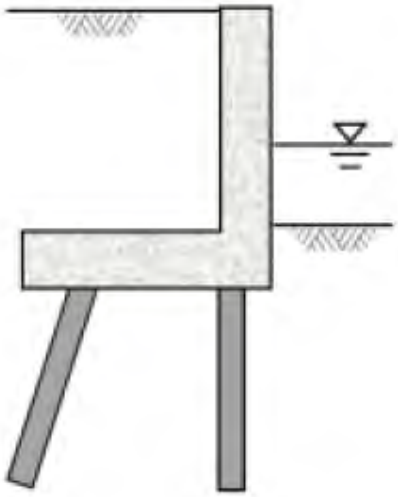

Figure 7-8. Typical L-Wall on Piles

Figure 7-8. shows the typical view of an L-Wall on piles. The wall stem and the deep foundations are designed to resist the induced moment, shear, and axial forces that are transmitted to the stem. There is typically sheet pile cutoff that is used to manage the seepage that occurs when the soil settles and creates a void or a zone of softer soil under the base. At this point of the design there was no sheet pile cut off designed.

The selection of the deep foundation system is a joint decision of the geotechnical and structural engineer that considers the site information and construction limitations. The selection of pile and the design and analysis of the deep foundation system is based on EM 1110-2-2906 and EM 1110-S-2502

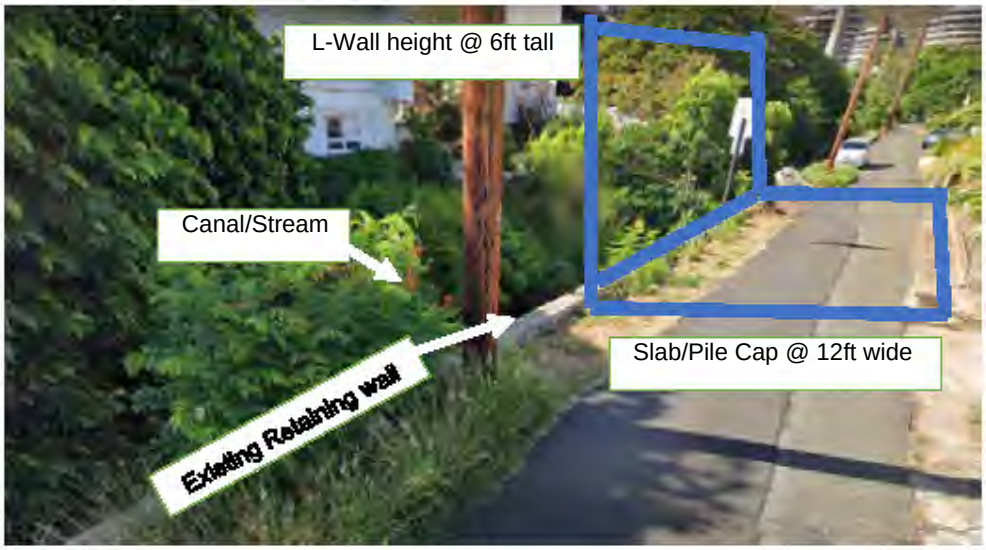

Figure 7-9. Typical L-Wall placement in respect to canal

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Figure 7-9. shows the L wall in proximity to the Canal. The decision to place the L wall adjacent to the stream instead of an I wall is due to the perceived enhanced stability against erosion as compared to I-walls. The top of wall is is at an elevation +6 from grade and the width of the concrete slab is 12 feet which is due to pile spacing based on EM 2502 and based on preliminary assumptions. With further investigation and use of topography/survey/plan views there may be a chance to optimize the width. Note that there should be an offset of 1 ft from the existing wall.

The L-wall will cannot sit directly on the retaining wall and will need to be placed a certain length away from the wall, therefore by moving forward with this design it was important to assume the placement is possible. Due to this space restriction along with other space restrictions such as real estate, overhead restrictions, the implementation of using macro-piles instead of driven piles was determined. Other factors influencing the selection of macropiles includes close pile proximity to existing structures, difficult geologic conditions, and vibration/noise sensitive areas. The drilling and grouting equipment used for macropile installation is relatively small and can be mobilized in restrictive areas that would prohibit the entry of conventional pile-installation equipment.

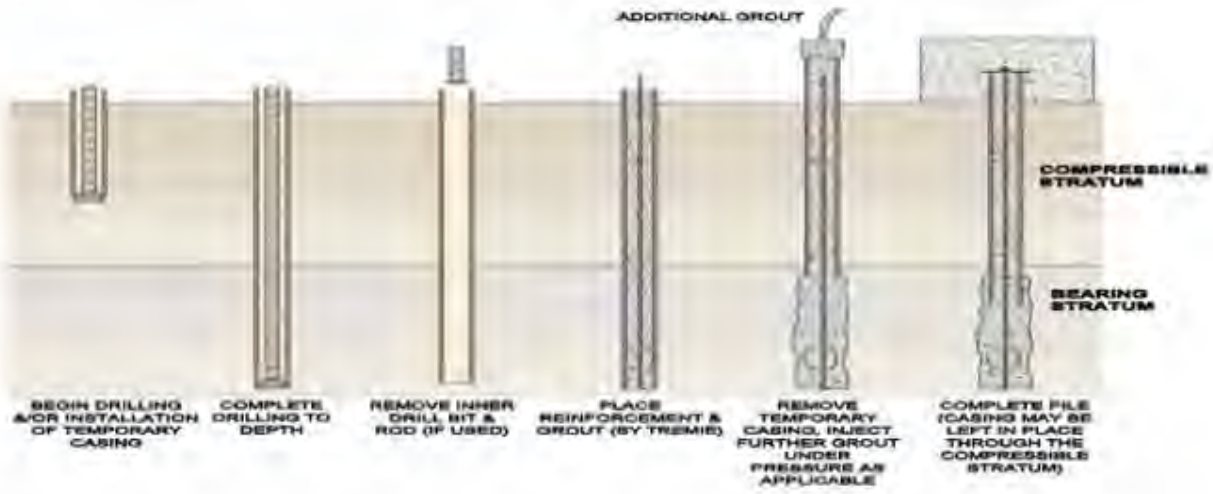

Figure 7-10. Example of Macropile placement[2]

A macropile is a small-diameter, drilled and grouted replacement pile that is typically reinforced[3]. A macropile is constructed by drilling a borehole, placing reinforcement, and grouting the hole. Macropiles are installed by methods that cause minimal disturbance to adjacent structures, soil, and the environment. They can be installed in access- restrictive environments and in all soil types and ground conditions. Macropiles can be installed at any angle below the horizontal using the same type of equipment used for ground anchor and grouting projects. Since the installation procedure causes minimal vibration and noise and can be used in conditions of low headroom, macropiles are often used to underpin existing

[2] Micropile Design and Construction Guidelines FHWA-SA-97-070, 2000
[3] Micropile Design and Construction Guidelines FHWA-SA-97-070, 2000

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structures. Specialized drilling equipment is often required to install the macropiles from within existing basement facilities.

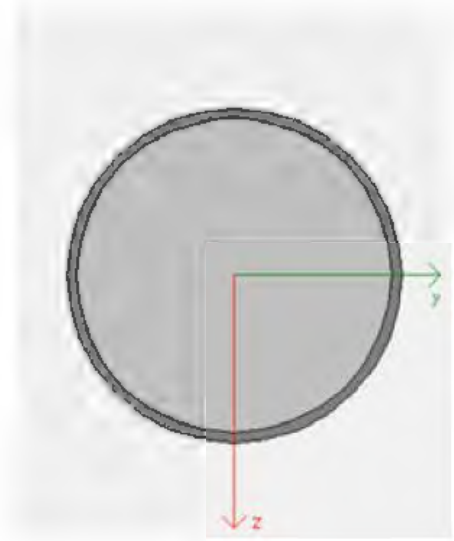

Figure 7-11. Typical Macro-pile cross section

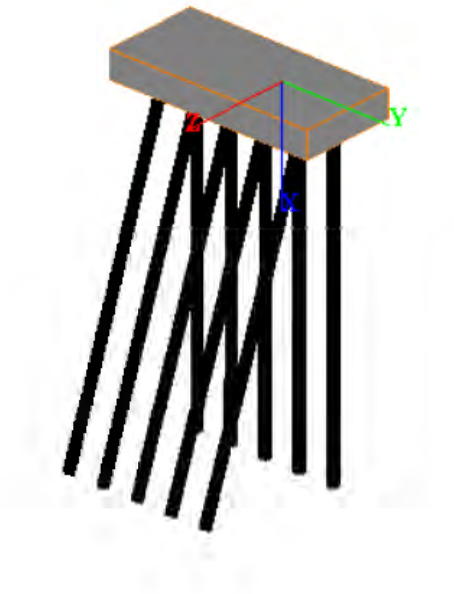

Figure 7-12. Group Ensoft Typical monolith for pile design

The pile design consisted of using the software Ensoft Group. The macropiles consist of a concrete shaft incased in a 16in diameter by ½in thick rounded HSS steel member (See Figure 7-10, 7-13). The ½" thickness of the pile was determined to help with corrosion but can be further investigated in the design phase. The concrete design of the L-wall has not been completed but concrete wall and slab/cap thicknesses were assumed based on engineering

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judgement and minimum requirements as mentioned in EM 2502 (Figure 7-13). To see other structural consideration please refer to Attachment 3.

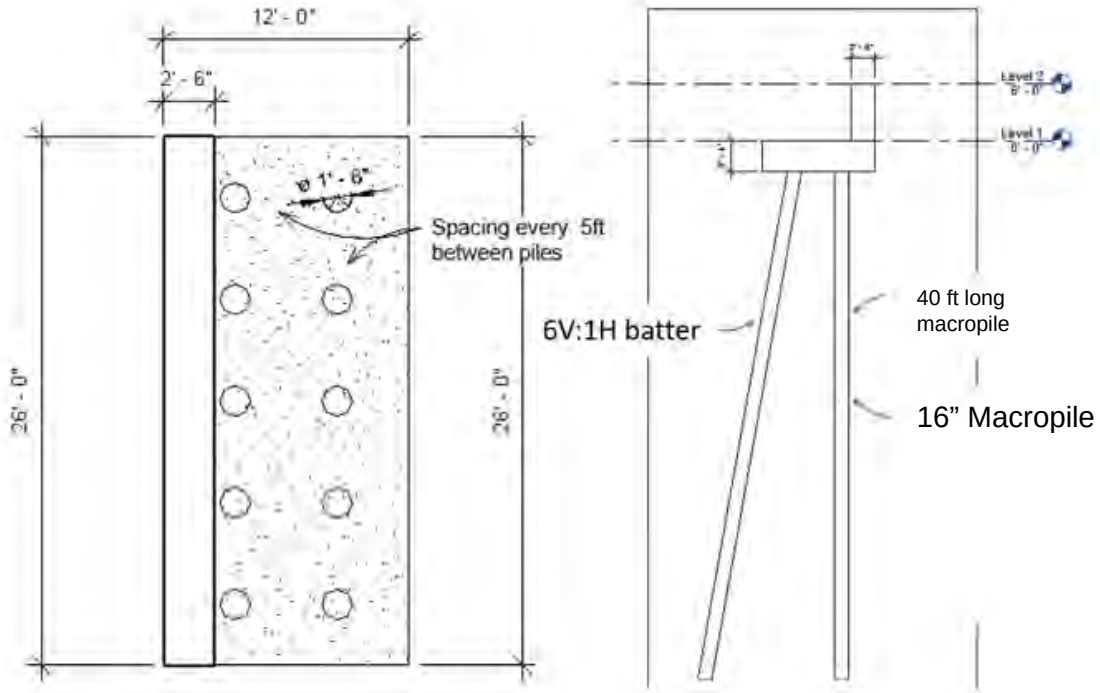

Figure 7-13. Preliminary L-wall on Macropiles Layout

With further investigation concrete may be replaced with grout as shown in Figure 7-10. The method of grouting is generally the most sensitive construction control over grout/ground bond capacity. Grout/ground bond capacity varies directly with the grouting method. The use of drill casing and reinforcement define sub-classifications. Grout/Grout placement can be further investigated in the design phase. For the purposes of the design the assumption of using concrete with f'c of 4000 psi was assumed for the macropile in Ensoft Group.

There are some risks associated with using the L-wall. As can be seen in Figure 7-9. there is limited amount of space and obstructions such as the utility pole. Since without updated topography/survey/plans the proximity of the wall may change and therefore will need to be revaluated.

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7.2.1. L-Wall 9ft tall wall edition to updated TSP

Figure 7-14 Area highlighted above showing L-Wall @ +9 ft

During the optimization of the TSP the observation of increasing the L Wall to +9 ft around the golf course (see Fig 7-14 above) was made in order to appease benefits in the area. The nine ft tall L-Wall will consist of a 2' – 8" thick wall stem and a 3'-8" thick pile cap (slab). The width of the pile cap was determined to be 13ft wide.

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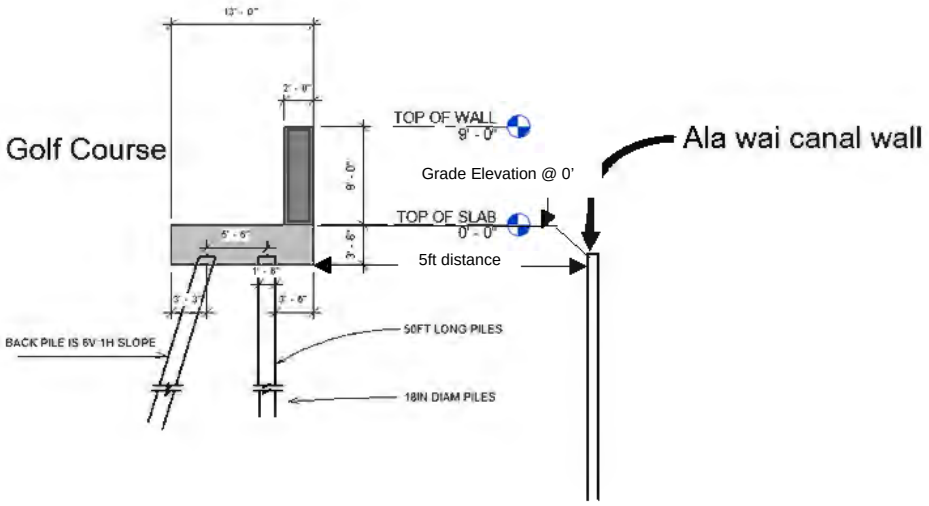

Figure 7-15 Typical Cross Section of +9ft tall L-Wall

The Pile diameter for the 9 ft wall was determined to be 18ft in Diameter and are 50ft long. This increase in diameter was made due to the different loading scenarios that could be presented. The steel pile will will have the same size steel rod and fill such as the 6ft tall wall. Theoretically there should be +6ft of water on the Ala Wai canal side with +9ft of water on the gold course side at the same time. This would conclude to a +3ft difference. This being said a load case scenario was made with +9ft water on the golf course side and +0 ft on the Canal side. This is a very conservative scenario and it should be noted that this load case would have to be further investigated during the PED phase if this wall type is chosen moving forward. During further optimization the wall stem may need to be moved more towards the center and the piles may need to be further optimized.

7.3. “J” Wall Type

The “J” Wall is a modification to the L wall. This Wall type is specifically placed along the Ala Wai Canal for the TSP.

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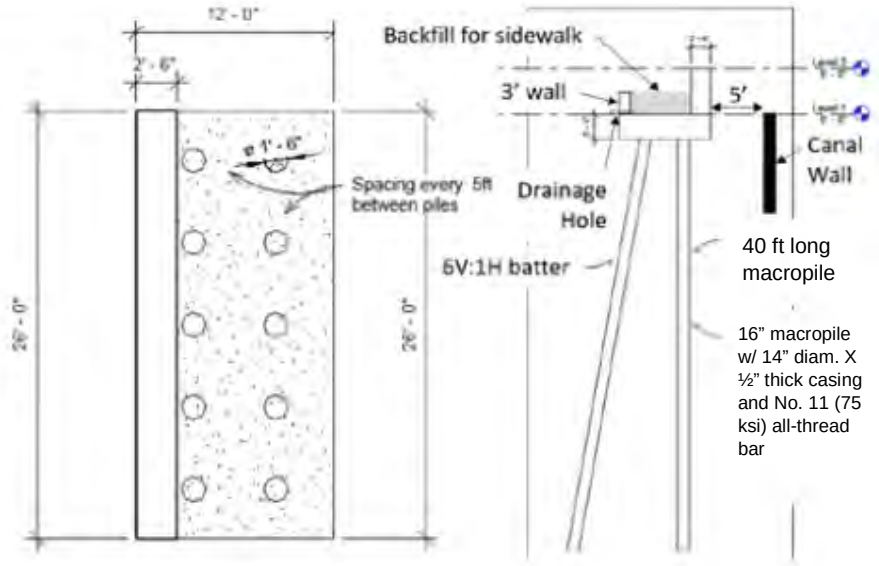

Figure 7-16 J wall Typical Cross section and layout

The J-Wall design is based on the L-wall design. The difference between the two is that there is 3' wall (as seen on Fig 7-16) on the end of the pile cap to place fill in. The purpose of this is to elevate the grade from 0 to +3ft. It is assumed that pedestrians can walk on top of the 3' fill in order to give visibility into the canal and not block visibility. Due to engineering judgement it is assumed it will be feasible if the L-Wall is feasible.

7.4. Tieback I-Wall

To further develop the TSP the implementation of an anchor wall design was considered due to the unique area and restraints presented. Along the Manoa-Palolo Stream from Date Street to Kapiolani Boulevard tall buildings were situated very close to proposed alignment. This led to an obstacle on evaluating wall type and feasibility. The typical I wall design was not ideal due to the sharp slope from where the alignment would be set to the canal. Due to minimum real estate and buildings close to the alignment a Tieback I-Wall was considered.

Figure 7-17 Ariel of canal and buildings in close vicinity (blue line)

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As seen above (Fig 7-17) the area where the TieBack I-Wall was to be implemented is close to the building. The constructability of the wall would be achieved by the “Giken Method” of drilling and the the wall would be anchored. The Anchorage/tie back was assumed to be 50’ long and placed every 7 ft o.c. The anchors were assumed to be soil anchors and they would be place 6 ft below grade and attached to a HP 12 X 53 waler. The concrete portion of the wall would be 6ft tall encasing the SSP (PZ 30) and is assumed to be 2’ 8”. This The anchorage would be able to be achieved due to the buildings assuming to have no basements. For more information of the wall please see below (Fig 7-18).

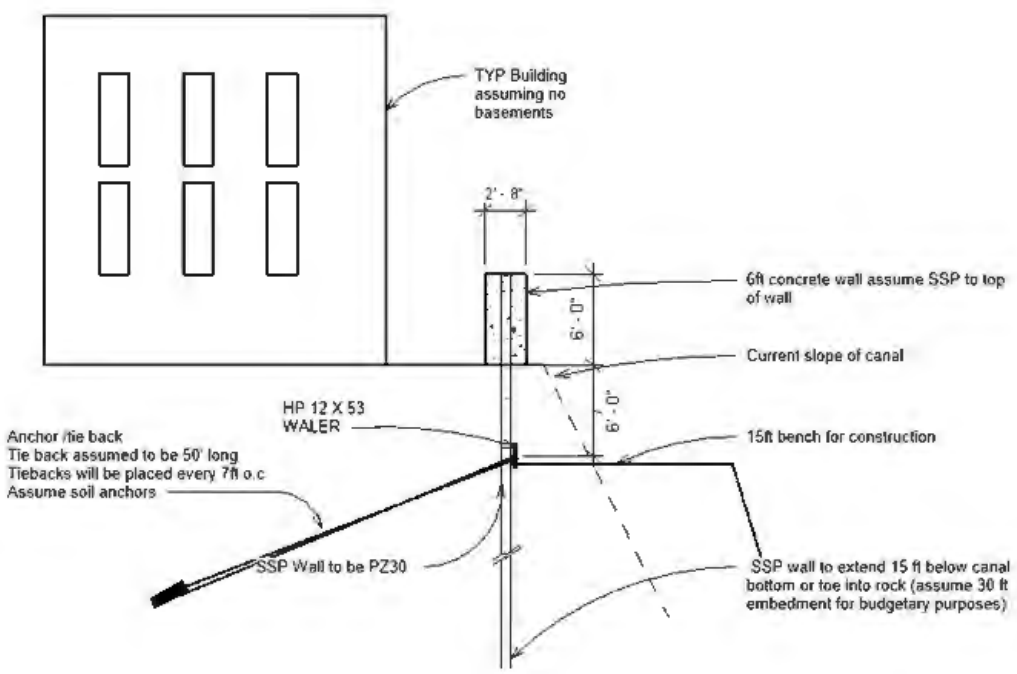

Figure 7-18 Tie-Back I Wall

The design of the wall is based on engineering judgement and past projects. Since there are many unknowns such as elevation difference between top of canal and bottom of canal, and slope there will need to be much investigation and survey needed to confirm this design is feasible. The constructability of this wall should be further investigated during the PED phase due to the possibility of not being able to drive the SSP wall due to the proximity of the buildings.

7.5. “U” Wall Type (Eliminated from TSP)

The “U” Wall was to be located along from the Ala Wai Canal to Fern Street. Due to not being able to build on top of existing walls the design would consist of designing within the extents of the canal. As can be seen on Figure 7-19, there are areas of the canal that had a natural bottom. The as-built drawings presented to the PDT from the City of Honolulu showed a concrete slab, which conflicted with other areas of the canal shown below on Figure 7-19. Due

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to this conflict the approach to design a u-shaped wall with macropiles was determined to consider all possible existing conditions of the canal.

Figure 7-19 View of Canal from Fern Street.

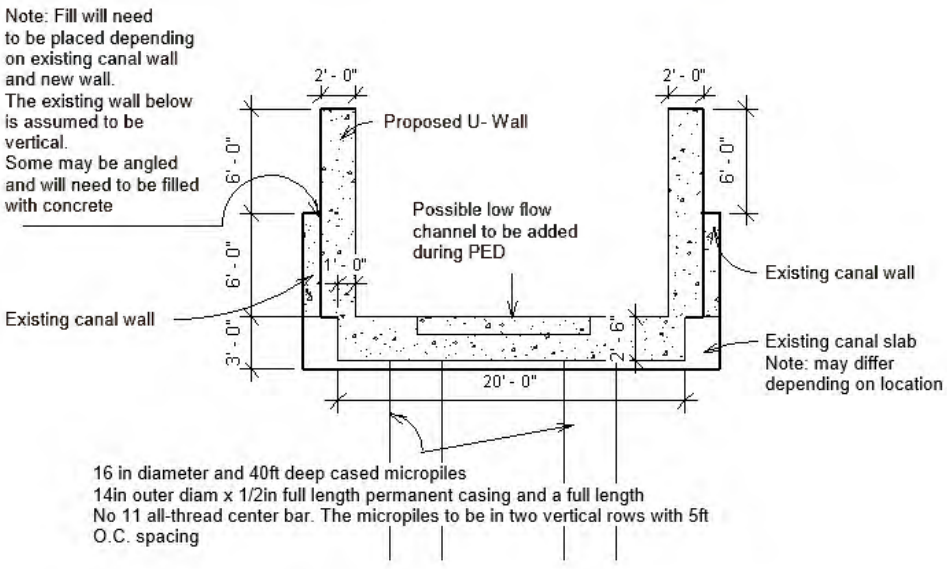

Figure 7-20 Typical Cross Section of "U" Wall

As seen on Figure 7-20 the design of the U-Wall would consist of placing cast in place concrete against the existing walls and designing a cast-in-place slab connected to macropiles. There is a possibility of not implementing macropiles, but that would have to be further investigated through PED.

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Figure 7-21 Assumed Constructability of U-Wall based on other canal Construction as seen above

Constructability was discussed through the PDT and there was assumptions on how the wall would be built. As seen in Figure 7-21 for reference the assumption would consist of small lengths of the wall being constructed as well as maintaining the current canal by keeping half of it active as the other half is being constructed. The Makiki Floodwall was further on eliminated from the TSP due to induced damages.

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7.6. Other Design Alternatives

7.6.1. T wall Design

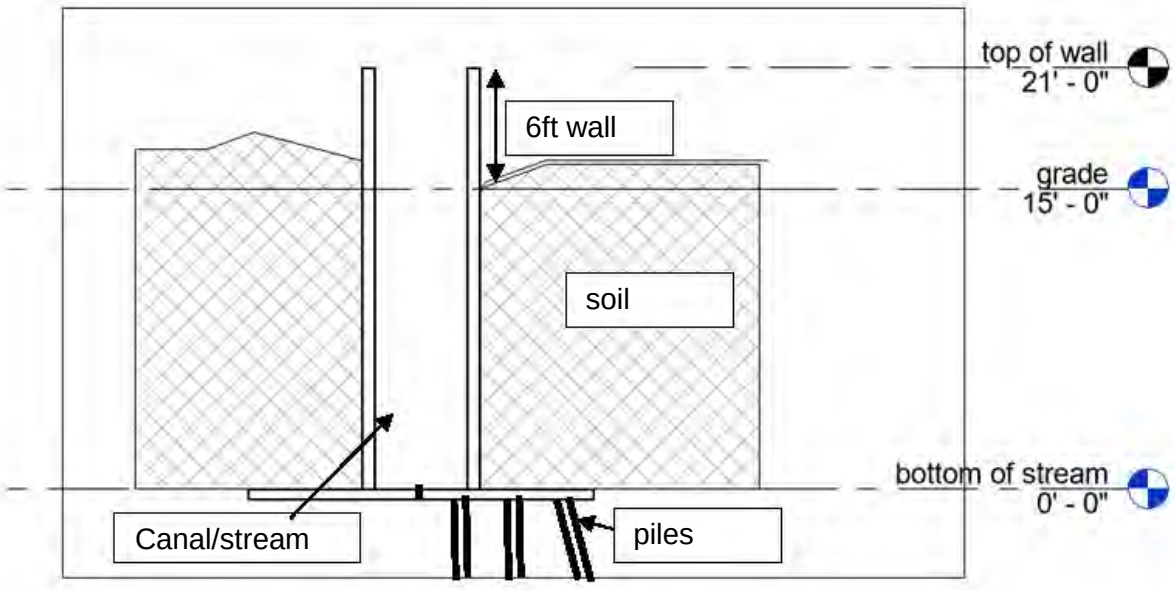

Figure 7-22. T wall on Piles cross section

A T-wall with piles (Figure 7-22) was considered in lieu of the L-wall on macropiles. There were too many unknowns when considering this wall type. Since there was no updated survey the topography of each stream could not be assumed. Some streams were deeper than others so the T-wall concrete and pile design would differ based on the depth of inside the canal/stream. The cost of removing fill to place the cap and piles was assumed to be more expensive compared to the L-wall with macropiles already sitting on grade. The construction costs were also assumed to be more expensive than that assumed on the L-wall on macropiles. Due to these considerations the T-wall never went past a concept level of design.

7.6.2. Other Cantilever wall types

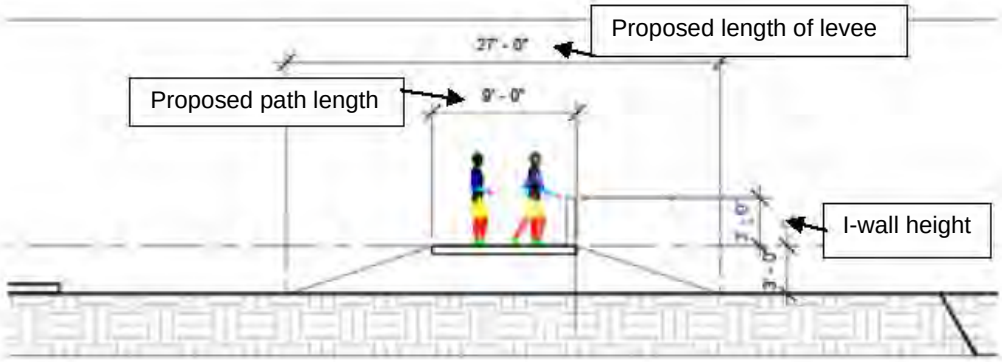

Figure 7-23. 3' I-Wall on Levee

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Other cantilever wall types were considered such as a 3ft I wall on a levee (Figure 7-23) instead of a 6ft cantilever wall. The benefit of this would be for locals to use this as recreational area and be able to use the levee as a path and still look over the wall. The reasoning for this wall type not being further investigated is because of the assumption of unsuitable soils, and not having updated topography to ensure there is enough space for the levee. Also, the I-wall being at the edge of the levee is not ideal so the consideration of offsetting the wall would have to be made. Since there is no insurance there would be space to lengthen the path on top of the levee to offset the wall and due to time restraints, this concept was not further investigated.

7.6.3. Ala Wai Canal Walk Flood protection

Figure 7-24. Chicago Shoreline Terraced Wall cross section and Shoreline implementation in Chicago

A concrete terraced walkway consisting of a concrete stepped walkway being help by macropiles, sheet pile, and stone fill was considered at the concept level (See Figure 7-24). This specific wall type would be applicable at the Ala Wai Canal where the population and tourism are more present. This flood protection would be disguised as a stepped walkway for tourists.

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The reasoning why this concept did not move forward was due to costs compared to an I-wall and L-wall.

8. Other Structural Design Elements

8.1. Gate design

The gate design throughout the project was assumed to be a double swing gate. This assumption is based on the perception that most of the Gate structures will be on roads. Therefore, designing a single swing gate may not be realistic. For preliminary studies the structural engineer is assuming a double swing gate as can be seen in Figure 8-1.

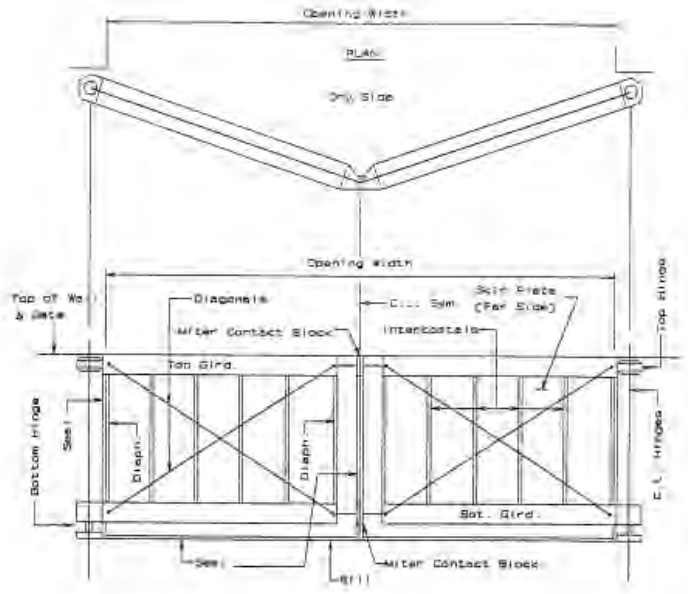

Figure 8-1. Example of a Double Swing Gate

Some locations can be further investigated and the gate type can be reduced to a single swing gate due to length of road closure as seen below in Figure 8-2.

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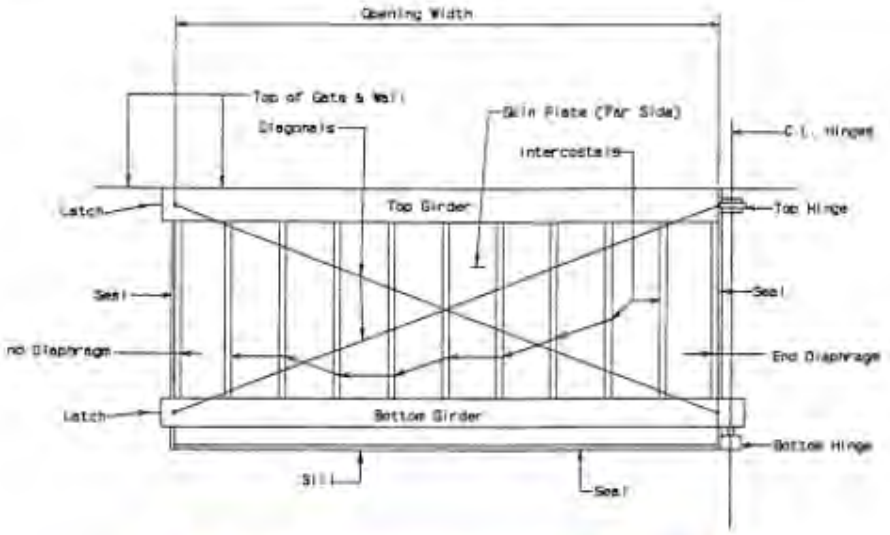

Figure 8-2. Example of a Single Swing Gate

Location	No. of Gates
Woodlawn	1
Ala Wai	9 to 12
Koali Rd	2
Kahaha Rd	5
Kaimuki High School	0 to 2

Table 8-1 Gates per Location

8.2. Weir Design

There is a Weir design to be considered for this project. The location of the weir will be along stream that is located to the left of the Ala Wai Golf Course. At this stage of the project there is no design for the Weir. There were only conceptual considerations provided to cost.

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9. Individual Measures

9.1. Ala Wai Floodwalls

9.1.1. Alternative 2b I-Wall and L-wall on Macropiles

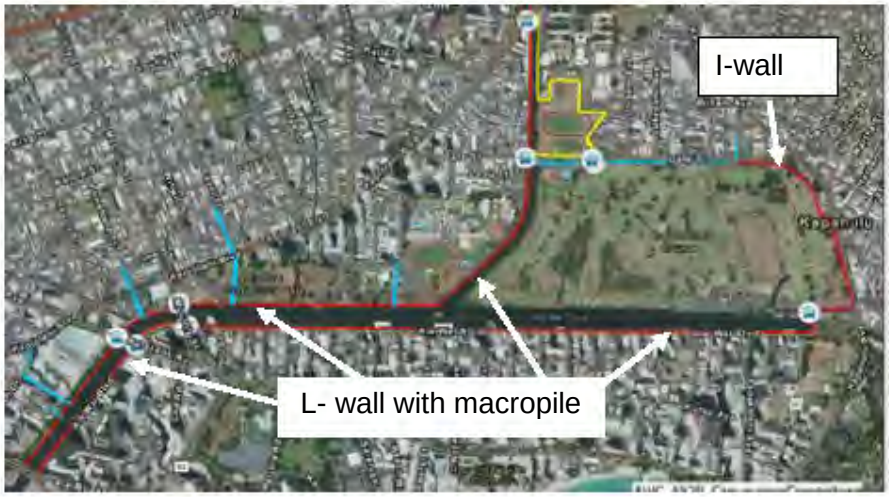

Figure 9-1.Aerial view of Ala Wai Floodwalls Alt 2B

Figure 9-2. I-wall location regarding Ala Wai Floodwalls

For Alternative 2b the approximate length of I wall is 4740 ft and the approximate length of L-wall with macropiles is 20005 ft (See Figure 9-1). The location of the I wall is along the golf course as well the along Kapahulu Ave (Figure 9-2).

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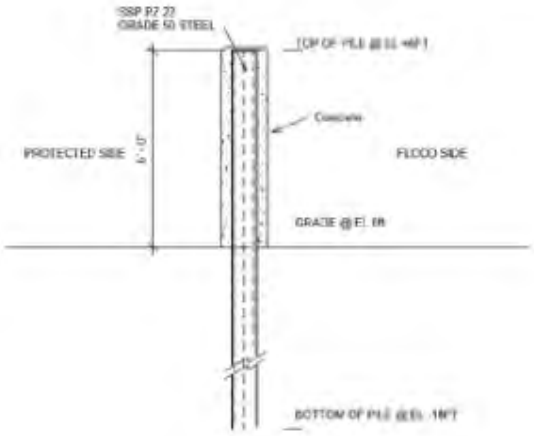

Figure 9-3. I wall Cross section for Ala Wai Floodwalls

The I-wall is composed of a PZ22 SSP wall at a top of wall elevation of +6ft and an embedment depth of -18ft. This wall will also be encased with concrete for architectural affects (Figure 9-3). Please see section 7.1 on more information I-walls. The proximity of the I wall in respect to the street has not been determined due to no plans being provided. This being said there was no assumption of a surcharge load on the CWALSHT design. Further investigation will have to clarify the grade and the proximity of the I-wall to nearby roads/structures that can affect the design.

Figure 9-4. L wall location within Ala Wai Floodwalls

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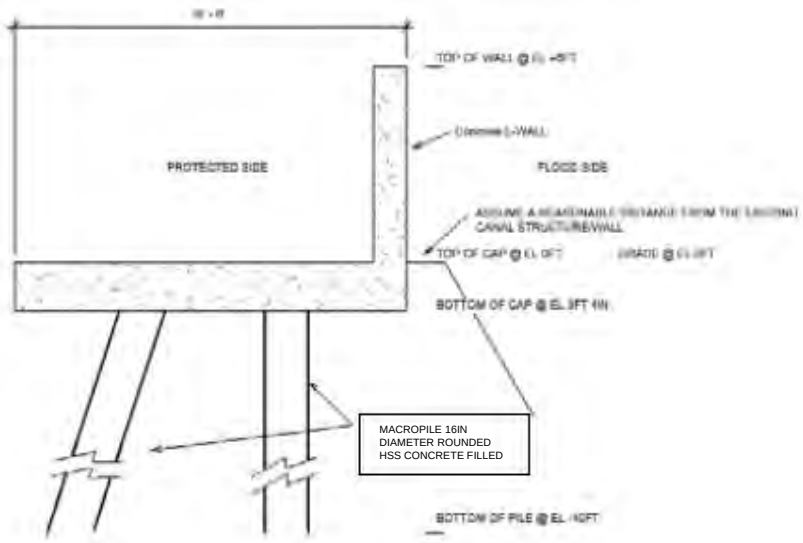

Figure 9-5 Typical Cross section of L-wall on macropiles

The L-Wall locations can be seen in Figure 9-1, 9-4 and 9-7. The L-walls will run down the canal to the Kahanamoku Lagoon. This wall is feasible with the assumption that there is enough space to place the L-wall all along the canal. A typical cross section of the L-wall on macropiles can be seen on Figure 9-5. See Appendix 3 for the pile design information.

9.1.2. Alternative 5

Figure 9-6 Ariel View of Ala Wai Floodwalls Alternative 5

For Alternative 5 the approximate length of a 6ft tall I wall is 4180 ft and the approximate length of a 6 ft tall L-wall with macropiles is 19960 ft (See Figure 9-4). The location of the I wall is along the gold course as well the along Kapahulu Ave (Figure 9-2). The difference between the two alternatives is that there is a detention basin along Alternative 5.

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9.1.3. TSP (Alternative 5.3)

Figure 9-7 TSP ALA WAI CANAL AREA

For Alternative 5.3 (TSP) the approximate length for the Ala Wai Golf Course is 1,891 ft of L-walls on macropile. This length includes both the six ft and nine ft walls. For the Ala Wai Canal Floodwall there will be a total length of 17,125ft of J-Wall, 4,069 ft of L-wall on Macropiles, and 1,658 ft consisting of the Tieback I-Wall. For more information on the various wall types please see Section 7.

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9.1.4. Structural Considerations

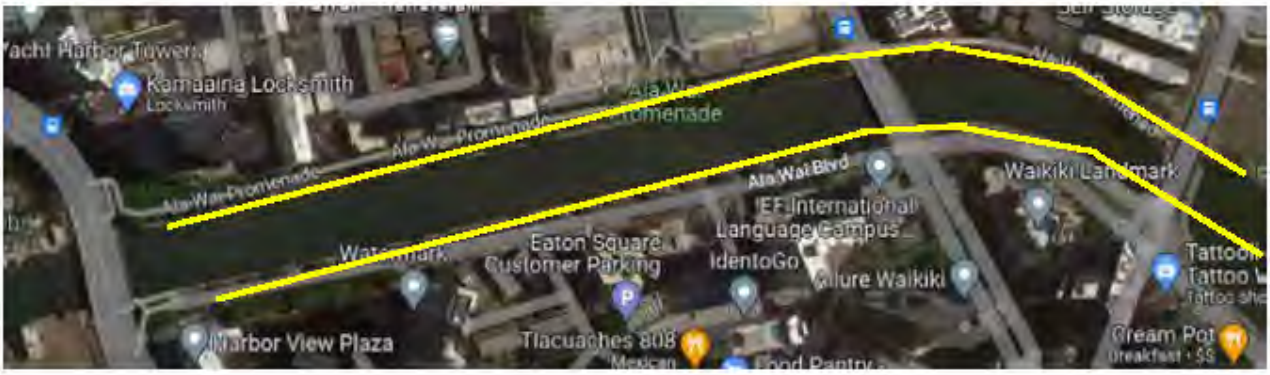

Figure 9-8. L-wall proximity

As mentioned in Section 8.1 there were a lot of assumptions made on the Design. Further investigation is needed when it comes to the wall design. The risk of assuming location without any plans can affect the design. Especially the section (marked in yellow) along the Ala Wai Bld and Promenade as seen in Figure 9-8. There may be obstructions that can potentially affect the design and must be clarified and resolved.

For the Tie-back I Wall design there were many factors that were assumed to put together a design for feasibility. Since there was no survey or cross section to use as reference the design is subject to change.

9.2. Kaimuki Highschool

Figure 9-9. Aerial View of Kaimuki Highschool Alternatives 1, 2b, 5

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Alternative 2b, and 5 will include a 6ft tall L-wall with macropile section that is 1030 ft, and 1800 ft long respectfully, and of 2330 ft and 1460 ft respectfully for the I wall portion of the area; also 6ft tall. Figure 9-9 shows the L-wall along the stream and the I wall in the High School track/park area.

Alternative 1 is very similar to Alternative 2b and 5 except it will tie into the golf course berm. This alternative includes 2,700 ft of a 6ft tall I wall and 1,700 ft of a 6ft tall L-wall with macropiles. Please see Section 7 on more information on I-walls and L-walls.

9.2.1. Structural Considerations

For this portion of the project the concern of space with the L-wall portion of the alignment needs to be explored more and there will need to be a survey conducted and proper cross sections given to the structural engineer. Below in Figure 9-10 there are a few initial possible obstructions such as a the buildings and the roads. There will need to be more investigation in this particular area to make sure the L-Wall is feasible.

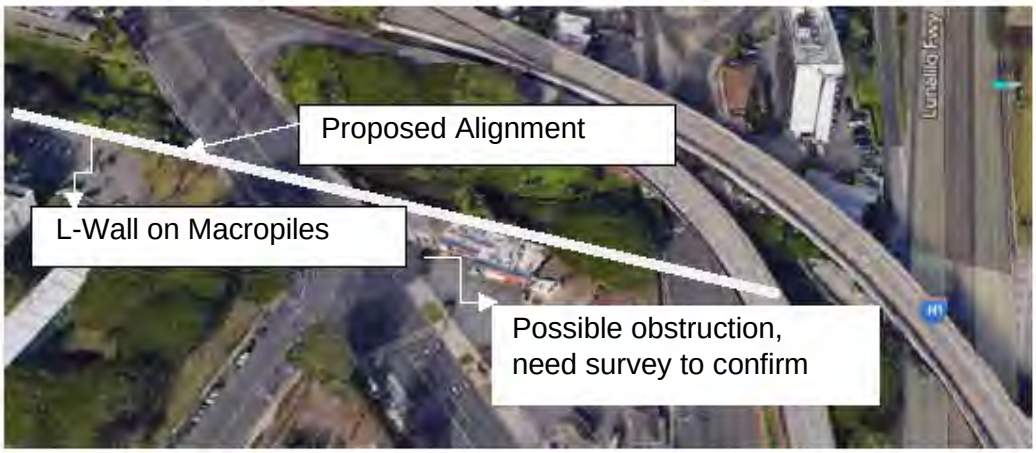

Figure 9-10. Section of L-wall for Kaimuki School Section. Possible obstruction

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9.3. Woodlawn Floodwall

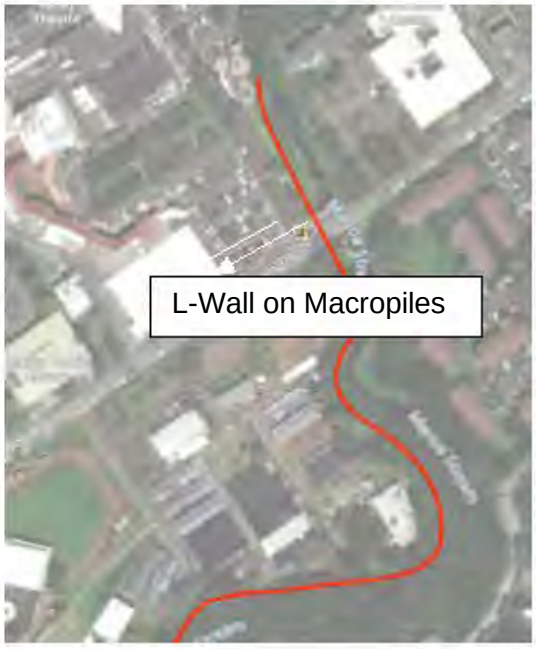

Figure 9-11. Aerial View of Woodlawn

The Woodlawn Floodwall span 1,270 ft and considers an L-wall with macropiles only. At this stage of the design the I wall was not considered because there are too many unknowns. For future exploration the possibility of changing some lengths of wall to I-walls may be possible.

9.3.1. Structural Considerations

When looking into the southern portion of the alignment past the bridge; there may need to be some further investigation regarding wall type, and construction. As one can see in Figure 9-12, the canal becomes more narrow and steep and there is not much space for construction material going further into the canal. An L-wall on macropiles was considered due to the possible stability issues the I-wall may bring. Confirmation through survey and updated soil information can confirm feasibility on wall type in future design work. For more information on the L-wall with Macropiles wall type please see Section 7.

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Figure 9-12 Woodlawn looking south from the bridge

9.4. Makiki District Park and Manoa District Park

Makiki District Park and Manoa District Park will have the same concept for their wall design. Makiki Park wall alignment will span 1,200 ft and will be an I wall. The Manoa Park wall alignment will span 1,580 ft and will also be an I wall. These walls will be six ft tall. The protected side will be straight grade while the flood side will be assumed to have a slope of 3V:1H as can be seen in Figure 9-13. For more information on the I Wall design please see Section 7.

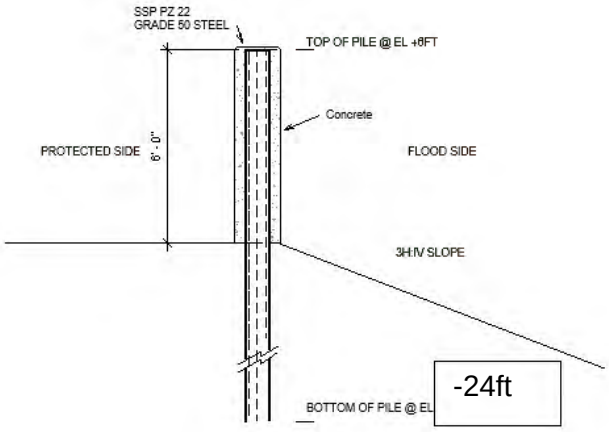


Figure 9-13.I wall Cross section for Manoa and Makiki District Parks

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

9.4.1. Structural Considerations.

Figure 9-14 Makiki Park

Figure 9-15. Manoa Park

As can be seen above Makiki Park and Manoa Park both have enough area where one can consider a few wall types and combination of wall types. For example, with further investigation, one can design an SSP wall and have a slope embankment cover most of the SSP wall so the community can walk and use the area for seating. A rendition was made below (Figure 9-15) to show an example of that. If something such as the below rendition is considered, then the design of the SSP would need to be reevaluated in further design work.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Figure 9-16. Sloped Embankment w/ SSP and Concrete Cap

9.5. Kanaha Floodwall Type and Structural Considerations

Figure 9-17. Aerial View Kanaha Floodwall

The Kanaha Floodwall includes 2,200 ft of 6ft tall L-wall with macropiles. Figure 9-17 shows the area in which this floodwall will be located along the red line. As one can see below Figure 9-18 the area is very urban and real-estate will be an issue along this alignment. Further investigation may result to considering another wall type that is feasible. At this stage of the project there were no cross section provided to confirm location of neighboring buildings so the L-Wall was assumed. For more information on L-walls please refer to Section 7.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Figure 9-18. Kanaha Floodwall location

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

9.6. Koali Road Floodwall

Koali Rd floodwall includes 2,510 ft of L-wall with macropiles and is set at 6ft tall. This wall type was considered due to the alignment being along a stream.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

9.6.1. Structural Considerations

Further investigation must be considered before moving forward with the L wall design including a survey being done so that proper cross sections can be obtained. The cross section assumes that the wall type can be placed on the existing road. Before the design is to be considered it will need to be confirmed that the road can be designed over it or that the community knows that road will no longer be accessible.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Appendix 1

Soil Conditions

1.1.1. Woodlawn:

0.0-7.5 ft Clayey SILT (MH) - Medium stiff to stiff with sand and gravel (may include cobbles)

Blow Counts: 15 (ranges from 10-35)
Moist Unit Weight, g: 105 pcf (ranges from 95-120 pcf)
Effective (Long Term) Friction Angle, f': 30 degrees (ranges from 25-35 degrees)
Effective (Long Term) Cohesion, c': 100 psf (ranges from 0-200 psf)
Total (Short Term) Friction Angle, f: 20 degrees (ranges from 15-30 degrees)
Total (Short Term) Cohesion, c: 900 psf (ranges from 750-1500 psf)

7.5-14.0 ft Silty SAND (SM) - Loose to dense, with gravel (may include cobbles)

Blow Counts: 10 (ranges from 5-30)
Moist Unit Weight, g: 105 pcf (ranges from 95-125 pcf)
Effective (Long Term) Friction Angle, f': 30 degrees (ranges from 30-35 degrees)
Effective (Long Term) Cohesion, c': 100 psf (ranges from 0-500 psf)
Total (Short Term) Friction Angle, f: 30 degrees (ranges from 25-37 degrees)
Total (Short Term) Cohesion, c: 100 psf (ranges from 500-1,000 psf)

14.0-20.5 ft Silty GRAVEL (GM) - Medium dense to dense, with sand, cobbles, and boulders

Blow Counts: 12 (ranges from 10-30)
Moist Unit Weight, g: 110 pcf (ranges from 105-130 pcf)
Effective (Long Term) Friction Angle, f': 30 degrees (ranges from 30-35 degrees)
Effective (Long Term) Cohesion, c': 100 psf (ranges from 100-500 psf)
Total (Short Term) Friction Angle, f: 30 degrees (ranges from 30-35 degrees)
Total (Short Term) Cohesion, c: 100 psf (ranges from 100-500 psf)

> 20.5 ft Weathered basalt

Groundwater is assumed to be at 8.5 feet.

Drilling info for Woodlawn: 25 ft of soil and 15 ft of rock (basalt), with difficult drilling due to cobbles and boulders below

1.1.2. Manoa and Maikiki

0.0-20.0 ft Alluvial Deposits - Clayey SILT (MH), Sandy Silt (ML, MH), and Silty Sand (SM) - Soft, loose

Blow Counts: 1 (ranges from 1-4)
Moist Unit Weight, g: 100 pcf (ranges from 85-105 pcf)
EVALUATE SCENARIO 1
Effective (Long Term) Friction Angle, f': 20 degrees (ranges from 15-25 degrees)
Effective (Long Term) Cohesion, c': 100 psf (ranges from 0-500 psf)
Total (Short Term) Friction Angle, f: 10 degrees (ranges from 5-20 degrees)

Total (Short Term) Cohesion, c: 500 psf (ranges from 250-750 psf)

EVALUATE SCENARIO 2

Effective (Long Term) Friction Angle, f': 26 degrees (ranges from 25-30 degrees)
Effective (Long Term) Cohesion, c': 100 psf (ranges from 0-200 psf)
Total (Short Term) Friction Angle, f': 26 degrees (ranges from 25-30 degrees)
Total (Short Term) Cohesion, c': 100 psf (ranges from 0-200 psf)

20.0-30.0 ft Alluvial Deposits - Silty Gravelly SAND (SP) and Sandy Gravel (SP) - Very loose to loose, saturated z

Moist Unit Weight, g: 110 pcf (ranges from 100-120 pcf)
Effective (Long Term) Friction Angle, f': 26 degrees (ranges from 25-30 degrees)
Effective (Long Term) Cohesion, c': 100 psf (ranges from 0-200 psf)
Total (Short Term) Friction Angle, f': 26 degrees (ranges from 25-30 degrees)
Total (Short Term) Cohesion, c': 100 psf (ranges from 0-200 psf)

30.0-50.0 ft Sandy SILT (MH) - Soft

Blow Counts: 1 (ranges from 1-3)
Moist Unit Weight, g: 95 pcf (ranges from 90-105 pcf)
Effective (Long Term) Friction Angle, f': 20 degrees (ranges from 15-25 degrees)
Effective (Long Term) Cohesion, c': 100 psf (ranges from 0-500 psf)
Total (Short Term) Friction Angle, f: 10 degrees (ranges from 5-20 degrees)
Total (Short Term) Cohesion, c: 500 psf (ranges from 250-750 psf)

1.2. Drilling Conditions

1.2.1. Kanaha

Kanaha: 740 lf with 20 ft soil and 20 rock (cinders) and 1,460 lf with 32.5 ft soil and 7.5 ft rock (cinders).

1.2.2. Kaoli

Koali rd: 515 lf of 29 ft of cobbly/boulder clay (difficult drilling) and 11 ft of basalt / 555 lf of 30 ft of cobbly/boulder clay (difficult drilling) and 10 ft of rock (basalt) / 1415 lf of 35 ft of soil (difficult drilling) and 5 ft of boulders (difficult drilling).

1.2.3. Kaimuki

Kaimuki: 20 ft of soil and 20 ft of coral for sections immediately adjacent to the stream and 40 ft of soil everywhere else with the lower 20 ft consisting of difficult drilling.

Appendix 2

CWALSHT
For I Walls

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 10-AUGUST-2022 TIME: 21:01:02

****
* INPUT DATA *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--CONTROL
CANTILEVER WALL DESIGN
FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.50

III.--WALL DATA
ELEVATION AT TOP OF WALL = 6.00 FT.

IV.--SURFACE POINT DATA

IV.A.--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	0.00
50.00	0.00

IV.B.--LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	0.00
50.00	0.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
90.00	85.00	20.00	100.00	0.00	0.00	-20.00	0.00	DEF	DEF
105.00	100.00	26.00	100.00	0.00	0.00	-30.00	0.00	DEF	DEF
95.00	90.00	20.00	100.00	0.00	0.00			DEF	DEF

V.B.--LEFTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = DEFAULT
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = DEFAULT

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
90.00	85.00	20.00	100.00	0.00	0.00	-20.00	0.00	DEF	DEF
105.00	100.00	26.00	100.00	0.00	0.00	-30.00	0.00	DEF	DEF
95.00	90.00	20.00	100.00	0.00	0.00			DEF	DEF

VI.--WATER DATA
UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = 6.00 (FT)
LEFTSIDE ELEVATION = 0.00 (FT)
NO SEEPAGE

VII.--VERTICAL SURCHARGE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 10-AUGUST-2022 TIME: 21:01:16

****
* SOIL PRESSURES FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

				<------NET------>			
	NET	<---LEFTSIDE--->		(SOIL + WATER)		<--RIGHTSIDE--->	
ELEV.	WATER	PASSIVE	ACTIVE	ACTIVE	PASSIVE	ACTIVE	PASSIVE
(FT)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)
6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0	62.4	0.0	0.0	62.4	62.4	0.0	0.0
4.0	124.8	0.0	0.0	124.8	124.8	0.0	0.0
3.0	187.2	0.0	0.0	187.2	187.2	0.0	0.0
2.0	249.6	0.0	0.0	249.6	249.6	0.0	0.0
1.0	312.0	0.0	0.0	312.0	312.0	0.0	0.0
0.0+	374.4	0.0	0.0	374.4	374.4	0.0	0.0
0.0-	374.4	169.6	0.0	204.8	544.0	0.0	169.6
-1.0	374.4	214.3	0.0	160.1	588.7	0.0	214.3
-2.0	374.4	258.9	0.0	115.5	633.3	0.0	258.9
-3.0	374.4	303.6	0.0	70.8	678.0	0.0	303.6
-4.0	374.4	348.2	0.0	26.2	722.6	0.0	348.2
-4.6	374.4	374.4	0.0	0.0	748.8	0.0	374.4
-5.0	374.4	392.9	0.0	-18.5	767.3	0.0	392.9
-6.0	374.4	437.5	0.0	-63.1	811.9	0.0	437.5
-7.0	374.4	482.1	0.0	-107.7	856.5	0.0	482.1
-8.0	374.4	526.8	0.0	-152.4	901.2	0.0	526.8
-9.0	374.4	571.4	0.0	-197.0	945.8	0.0	571.4
-10.0	374.4	616.1	0.0	-241.7	990.5	0.0	616.1
-11.0	374.4	660.7	0.0	-286.3	1035.1	0.0	660.7
-12.0	374.4	705.3	0.0	-330.9	1079.7	0.0	705.3
-13.0	374.4	750.0	0.0	-375.6	1124.4	0.0	750.0
-14.0	374.4	794.6	0.0	-420.2	1169.0	0.0	794.6
-15.0	374.4	839.3	0.0	-464.9	1213.7	0.0	839.3
-16.0	374.4	883.9	0.0	-509.5	1258.3	0.0	883.9
-17.0	374.4	928.6	0.0	-554.2	1303.0	0.0	928.6
-18.0	374.4	973.2	0.0	-598.8	1347.6	0.0	973.2
-19.0	374.4	1017.8	0.0	-643.4	1392.2	0.0	1017.8
-20.0	374.4	1157.4	1.3	-781.7	1530.5	1.3	1157.4
-21.0	374.4	1313.1	58.1	-880.6	1629.4	58.1	1313.1
-22.0	374.4	1391.9	121.9	-895.6	1644.4	121.9	1391.9
-23.0	374.4	1472.7	138.4	-959.9	1708.7	138.4	1472.7
-24.0	374.4	1553.4	154.9	-1024.1	1772.9	154.9	1553.4
-25.0	374.4	1634.2	171.9	-1088.0	1836.8	171.9	1634.2
-26.0	374.4	1715.0	189.5	-1151.1	1899.9	189.5	1715.0
-27.0	374.4	1795.8	206.7	-1214.6	1963.4	206.7	1795.8
-28.0	374.4	1876.5	223.3	-1278.8	2027.6	223.3	1876.5
-29.0	374.4	1957.3	240.0	-1342.9	2091.7	240.0	1957.3
-30.0	374.4	1888.0	297.3	-1216.3	1965.1	297.3	1888.0
-31.0	374.4	1804.7	354.3	-1076.1	1824.9	354.3	1804.7

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 10-AUGUST-2022 TIME: 21:01:18

****
* SUMMARY OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

WALL BOTTOM ELEV. (FT) : -23.29
PENETRATION (FT) : 23.29

MAX. BEND. MOMENT (LB-FT) : 1.7804E+04
AT ELEVATION (FT) : -13.03

MAX. SCALED DEFL. (LB-IN^3): 7.7399E+09
AT ELEVATION (FT) : 6.00

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELLASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
IN INCHES.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHOREDOR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 10-AUGUST-2022 TIME: 21:01:18

****
* COMPLETE OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
6.00	0.0000E+00	0.	7.7399E+09	0.00
5.00	1.0400E+01	31.	7.2969E+09	62.40
4.00	8.3200E+01	125.	6.8539E+09	124.80
3.00	2.8080E+02	281.	6.4112E+09	187.20
2.00	6.6560E+02	499.	5.9689E+09	249.60
1.00	1.3000E+03	780.	5.5278E+09	312.00
0.00+	2.2464E+03	1123.	5.0890E+09	374.40
0.00-	2.2464E+03	1123.	5.0890E+09	204.84
-1.00	3.4646E+03	1306.	4.6541E+09	160.11
-2.00	4.8429E+03	1443.	4.2252E+09	115.47
-3.00	6.3366E+03	1537.	3.8047E+09	70.83
-4.00	7.9012E+03	1585.	3.3952E+09	26.19
-4.59	8.8340E+03	1593.	3.1612E+09	0.00
-5.00	9.4920E+03	1589.	2.9994E+09	-18.46

-6.00	1.1064E+04	1548.	2.6199E+09	-63.10
-7.00	1.2574E+04	1463.	2.2595E+09	-107.74
-8.00	1.3975E+04	1333.	1.9209E+09	-152.38
-9.00	1.5224E+04	1158.	1.6064E+09	-197.02
-10.00	1.6276E+04	939.	1.3181E+09	-241.67
-11.00	1.7087E+04	675.	1.0580E+09	-286.31
-12.00	1.7611E+04	366.	8.2731E+08	-330.95
-13.00	1.7804E+04	13.	6.2703E+08	-375.59
-14.00	1.7621E+04	-385.	4.5746E+08	-420.23
-15.00	1.7019E+04	-828.	3.1828E+08	-464.88
-16.00	1.5951E+04	-1315.	2.0844E+08	-509.52
-17.00	1.4374E+04	-1847.	1.2609E+08	-554.16
-18.00	1.2243E+04	-2423.	6.8498E+07	-598.80
-18.44	1.1124E+04	-2690.	5.0167E+07	-618.35
-19.00	9.5286E+03	-2961.	3.1978E+07	-346.56
-20.00	6.4750E+03	-3066.	1.1873E+07	136.96
-21.00	3.5584E+03	-2687.	2.9765E+06	620.47
-22.00	1.2623E+03	-1825.	3.1853E+05	1103.99
-23.00	7.0180E+01	-479.	8.5325E+02	1587.51
-23.29	0.0000E+00	0.	0.0000E+00	1727.24

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELLASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

III.--WATER AND SOIL PRESSURES

		<-------------SOIL PRESSURES-------------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION (FT)	PRESSURE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
6.00	0.	0.	0.	0.	0.
5.00	62.	0.	0.	0.	0.
4.00	125.	0.	0.	0.	0.
3.00	187.	0.	0.	0.	0.
2.00	250.	0.	0.	0.	0.
1.00	312.	0.	0.	0.	0.
0.00+	374.	0.	0.	0.	0.
0.00-	374.	170.	0.	0.	170.
-1.00	374.	214.	0.	0.	214.
-2.00	374.	259.	0.	0.	259.
-3.00	374.	304.	0.	0.	304.
-4.00	374.	348.	0.	0.	348.
-4.59	374.	374.	0.	0.	374.
-5.00	374.	393.	0.	0.	393.
-6.00	374.	437.	0.	0.	437.
-7.00	374.	482.	0.	0.	482.
-8.00	374.	527.	0.	0.	527.
-9.00	374.	571.	0.	0.	571.
-10.00	374.	616.	0.	0.	616.
-11.00	374.	661.	0.	0.	661.
-12.00	374.	705.	0.	0.	705.
-13.00	374.	750.	0.	0.	750.
-14.00	374.	795.	0.	0.	795.
-15.00	374.	839.	0.	0.	839.
-16.00	374.	884.	0.	0.	884.
-17.00	374.	929.	0.	0.	929.
-18.00	374.	973.	0.	0.	973.
-18.44	374.	993.	0.	0.	993.
-19.00	374.	1018.	0.	0.	1018.
-20.00	374.	1157.	1.	1.	1157.
-21.00	374.	1313.	58.	58.	1313.
-22.00	374.	1392.	122.	122.	1392.
-23.00	374.	1473.	138.	138.	1473.
-23.29	374.	1553.	155.	155.	1553.
-25.00	374.	1634.	172.	172.	1634.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 15-AUGUST-2022 TIME: 13:55:26

****
* INPUT DATA *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--CONTROL
CANTILEVER WALL DESIGN
FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.50

III.--WALL DATA
ELEVATION AT TOP OF WALL = 6.00 FT.

IV.--SURFACE POINT DATA

IV.A.--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	0.00
1.00	-0.50
3.00	-1.00
5.00	-1.50
7.00	-2.00
10.00	-3.00
20.00	-4.00
25.00	-5.00
35.00	-5.50

IV.B.--LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	0.00
1.00	0.00
3.00	0.00
5.00	0.00
7.00	0.00
10.00	0.00
20.00	0.00
25.00	0.00
35.00	0.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = 1.00
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = 1.50

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
105.00	100.00	20.00	100.00	0.00	0.00	-20.00	0.00	DEF	DEF
110.00	105.00	26.00	100.00	0.00	0.00	-30.00	0.00	DEF	DEF
95.00	90.00	20.00	100.00	0.00	0.00			DEF	DEF

V.B.--LEFTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = 1.00
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = 1.50

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
105.00	100.00	20.00	100.00	0.00	0.00	-20.00	0.00	DEF	DEF
110.00	105.00	26.00	100.00	0.00	0.00	-30.00	0.00	DEF	DEF
95.00	90.00	20.00	100.00	0.00	0.00			DEF	DEF

VI.--WATER DATA
UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = 6.00 (FT)
LEFTSIDE ELEVATION = 0.00 (FT)
NO SEEPAGE

VII.--VERTICAL SURCHARGE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 15-AUGUST-2022 TIME: 13:55:28

****
* SOIL PRESSURES FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

				<------NET------>			
	NET	<---LEFTSIDE--->		(SOIL + WATER)		<--RIGHTSIDE--->	
ELEV.	WATER	PASSIVE	ACTIVE	ACTIVE	PASSIVE	ACTIVE	PASSIVE
(FT)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)
6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0	62.4	0.0	0.0	62.4	62.4	0.0	0.0
4.0	124.8	0.0	0.0	124.8	124.8	0.0	0.0
3.0	187.2	0.0	0.0	187.2	187.2	0.0	0.0
2.0	249.6	0.0	0.0	249.6	249.6	0.0	0.0
1.0	312.0	0.0	0.0	312.0	312.0	0.0	0.0
0.0+	374.4	0.0	0.0	374.4	374.4	0.0	0.0
0.0-	374.4	169.6	0.0	204.8	568.8	0.0	194.4
-1.0	374.4	238.5	0.0	135.9	523.7	0.0	149.3
-2.0	374.4	307.5	0.0	66.9	584.7	0.0	210.3
-3.0	374.4	374.4	0.0	0.0	631.8	0.0	257.4
-3.0	374.4	376.4	0.0	-2.0	633.1	0.0	258.7
-4.0	374.4	445.3	0.0	-70.9	681.1	0.0	306.7
-5.0	374.4	514.2	0.0	-139.8	721.7	0.0	347.3
-6.0	374.4	583.1	0.0	-208.7	757.1	0.0	382.7
-7.0	374.4	652.0	0.0	-277.6	810.8	0.0	436.4
-8.0	374.4	720.9	0.0	-346.5	881.6	0.0	507.2
-9.0	374.4	789.8	0.0	-415.4	948.6	0.0	574.2
-10.0	374.4	858.7	0.0	-484.3	1008.9	0.0	634.5
-11.0	374.4	927.6	0.0	-553.2	1067.9	0.0	693.5
-12.0	374.4	996.5	0.0	-622.1	1127.8	0.0	753.4
-13.0	374.4	1065.4	43.1	-663.5	1144.6	27.5	813.4
-14.0	374.4	1134.3	124.5	-663.6	1122.8	96.3	873.0
-15.0	374.4	1203.2	173.3	-682.7	1119.4	146.1	918.2
-16.0	374.4	1272.1	194.1	-734.7	1139.8	163.0	959.6
-17.0	374.4	1341.0	215.0	-788.1	1175.4	178.5	1016.1
-18.0	374.4	1409.9	235.9	-843.8	1217.6	191.7	1079.1
-19.0	374.4	1478.8	256.8	-900.0	1267.8	204.4	1150.2
-20.0	374.4	1681.3	240.9	-1121.1	1479.8	185.8	1346.3
-21.0	374.4	1891.9	223.7	-1347.5	1691.0	170.0	1540.3

-22.0	374.4	1979.7	242.2	-1416.9	1748.5	188.4	1616.3
-23.0	374.4	2069.9	260.7	-1488.4	1809.8	207.2	1696.1
-24.0	374.4	2160.2	279.1	-1559.9	1872.0	225.9	1776.8
-25.0	374.4	2250.4	298.6	-1632.1	1932.5	243.9	1856.7
-26.0	374.4	2340.7	318.5	-1704.4	1996.6	261.9	1940.7
-27.0	374.4	2431.0	337.4	-1776.6	2069.8	280.0	2032.8
-28.0	374.4	2521.2	356.0	-1848.8	2136.7	298.0	2118.4
-29.0	374.4	2611.5	374.6	-1921.1	2199.8	316.0	2200.0
-30.0	374.4	2500.6	450.7	-1737.2	2018.4	389.0	2094.7
-31.0	374.4	2370.9	525.5	-1536.5	1822.8	460.0	1973.9

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 15-AUGUST-2022 TIME: 13:55:29

****
* SUMMARY OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

WALL BOTTOM ELEV. (FT) : -18.19
PENETRATION (FT) : 18.19

MAX. BEND. MOMENT (LB-FT) : 1.2313E+04
AT ELEVATION (FT) : -9.41

MAX. SCALED DEFL. (LB-IN^3): 3.4438E+09
AT ELEVATION (FT) : 6.00

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELLASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
IN INCHES.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHOREDOR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 15-AUGUST-2022 TIME: 13:55:29

****
* COMPLETE OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)

6.00	0.0000E+00	0.	3.4438E+09	0.00
5.00	1.0400E+01	31.	3.2032E+09	62.40
4.00	8.3200E+01	125.	2.9627E+09	124.80
3.00	2.8080E+02	281.	2.7223E+09	187.20
2.00	6.6560E+02	499.	2.4824E+09	249.60
1.00	1.3000E+03	780.	2.2437E+09	312.00
0.00+	2.2464E+03	1123.	2.0072E+09	374.40
0.00-	2.2464E+03	1123.	2.0072E+09	204.84
-1.00	3.4605E+03	1294.	1.7748E+09	135.85
-2.00	4.8105E+03	1395.	1.5483E+09	66.95
-2.97	6.1869E+03	1427.	1.3361E+09	0.00
-3.00	6.2274E+03	1427.	1.3301E+09	-1.96
-4.00	7.6424E+03	1391.	1.1227E+09	-70.86
-5.00	8.9865E+03	1286.	9.2845E+08	-139.77
-6.00	1.0191E+04	1111.	7.4974E+08	-208.67
-7.00	1.1187E+04	868.	5.8861E+08	-277.57
-8.00	1.1905E+04	556.	4.4677E+08	-346.48
-9.00	1.2276E+04	175.	3.2545E+08	-415.38
-10.00	1.2233E+04	-274.	2.2529E+08	-484.28
-11.00	1.1705E+04	-793.	1.4619E+08	-553.19
-12.00	1.0623E+04	-1381.	8.7245E+07	-622.09
-12.47	9.9065E+03	-1677.	6.6043E+07	-641.53
-13.00	8.9337E+03	-1972.	4.6563E+07	-468.21
-14.00	6.7823E+03	-2277.	2.1251E+07	-141.79
-15.00	4.4890E+03	-2255.	7.6388E+06	184.63
-16.00	2.3804E+03	-1907.	1.8101E+06	511.05
-17.00	7.8287E+02	-1233.	1.6843E+05	837.47
-18.00	2.2778E+01	-233.	1.2394E+02	1163.89
-18.19	0.0000E+00	0.	0.0000E+00	1227.38

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELLASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

III.--WATER AND SOIL PRESSURES

		<----------SOIL PRESSURES---------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION (FT)	PRESSURE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
6.00	0.	0.	0.	0.	0.
5.00	62.	0.	0.	0.	0.
4.00	125.	0.	0.	0.	0.
3.00	187.	0.	0.	0.	0.
2.00	250.	0.	0.	0.	0.
1.00	312.	0.	0.	0.	0.
0.00+	374.	0.	0.	0.	0.
0.00-	374.	170.	0.	0.	194.
-1.00	374.	239.	0.	0.	149.
-2.00	374.	307.	0.	0.	210.
-2.97	374.	374.	0.	0.	257.
-3.00	374.	376.	0.	0.	259.
-4.00	374.	445.	0.	0.	307.
-5.00	374.	514.	0.	0.	347.
-6.00	374.	583.	0.	0.	383.
-7.00	374.	652.	0.	0.	436.
-8.00	374.	721.	0.	0.	507.
-9.00	374.	790.	0.	0.	574.
-10.00	374.	859.	0.	0.	634.
-11.00	374.	928.	0.	0.	693.
-12.00	374.	996.	0.	0.	753.
-12.47	374.	1029.	20.	13.	782.
-13.00	374.	1065.	43.	27.	813.
-14.00	374.	1134.	125.	96.	873.
-15.00	374.	1203.	173.	146.	918.
-16.00	374.	1272.	194.	163.	960.
-17.00	374.	1341.	215.	178.	1016.
-18.00	374.	1410.	236.	192.	1079.
-18.19	374.	1479.	257.	204.	1150.
-20.00	374.	1681.	241.	186.	1346.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 15-AUGUST-2022 TIME: 13:45:45

****
* INPUT DATA *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--CONTROL
CANTILEVER WALL DESIGN
FACTOR OF SAFETY FOR ACTIVE PRESSURES = 1.00
FACTOR OF SAFETY FOR PASSIVE PRESSURES = 1.50

III.--WALL DATA
ELEVATION AT TOP OF WALL = 6.00 FT.

IV.--SURFACE POINT DATA

IV.A.--RIGHTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	0.00
50.00	0.00

IV.B.--LEFTSIDE

DIST. FROM WALL (FT)	ELEVATION (FT)
0.00	0.00
50.00	0.00

V.--SOIL LAYER DATA

V.A.--RIGHTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = 1.00
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = 1.50

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
105.00	100.00	20.00	100.00	0.00	0.00	-20.00	0.00	DEF	DEF
110.00	105.00	26.00	100.00	0.00	0.00	-30.00	0.00	DEF	DEF
95.00	90.00	20.00	100.00	0.00	0.00			DEF	DEF

V.B.--LEFTSIDE
LEVEL 2 FACTOR OF SAFETY FOR ACTIVE PRESSURE = 1.00
LEVEL 2 FACTOR OF SAFETY FOR PASSIVE PRESSURE = 1.50

SAT. WGHT. (PCF)	MOIST WGHT. (PCF)	ANGLE OF INTERNAL FRICTION (DEG)	COH-ESION (PSF)	ANGLE OF WALL FRICTION (DEG)	ADH-ESION (PSF)	<--BOTTOM--> ELEV. (FT)	SLOPE (FT/FT)	<-SAFETY-> <-FACTOR-> ACT.	PASS.
105.00	100.00	20.00	100.00	0.00	0.00	-20.00	0.00	DEF	DEF
110.00	105.00	26.00	100.00	0.00	0.00	-30.00	0.00	DEF	DEF
95.00	90.00	20.00	100.00	0.00	0.00			DEF	DEF

VI.--WATER DATA
UNIT WEIGHT = 62.40 (PCF)
RIGHTSIDE ELEVATION = 6.00 (FT)
LEFTSIDE ELEVATION = 0.00 (FT)
NO SEEPAGE

VII.--VERTICAL SURCHARGE LOADS
NONE

VIII.--HORIZONTAL LOADS
NONE

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS

DATE: 15-AUGUST-2022 TIME: 13:45:47

****
* SOIL PRESSURES FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--SOIL PRESSURES

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

				<------NET------>			
	NET	<---LEFTSIDE--->		(SOIL + WATER)		<--RIGHTSIDE--->	
ELEV.	WATER	PASSIVE	ACTIVE	ACTIVE	PASSIVE	ACTIVE	PASSIVE
(FT)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)	(PSF)
6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.0	62.4	0.0	0.0	62.4	62.4	0.0	0.0
4.0	124.8	0.0	0.0	124.8	124.8	0.0	0.0
3.0	187.2	0.0	0.0	187.2	187.2	0.0	0.0
2.0	249.6	0.0	0.0	249.6	249.6	0.0	0.0
1.0	312.0	0.0	0.0	312.0	312.0	0.0	0.0
0.0+	374.4	0.0	0.0	374.4	374.4	0.0	0.0
0.0-	374.4	169.6	0.0	204.8	544.0	0.0	169.6
-1.0	374.4	238.5	0.0	135.9	612.9	0.0	238.5
-2.0	374.4	307.5	0.0	66.9	681.9	0.0	307.5
-3.0	374.4	374.4	0.0	0.0	748.8	0.0	374.4
-3.0	374.4	376.4	0.0	-2.0	750.8	0.0	376.4
-4.0	374.4	445.3	0.0	-70.9	819.7	0.0	445.3
-5.0	374.4	514.2	0.0	-139.8	888.6	0.0	514.2
-6.0	374.4	583.1	0.0	-208.7	957.5	0.0	583.1
-7.0	374.4	652.0	0.0	-277.6	1026.4	0.0	652.0
-8.0	374.4	720.9	0.0	-346.5	1095.3	0.0	720.9
-9.0	374.4	789.8	0.0	-415.4	1164.2	0.0	789.8
-10.0	374.4	858.7	0.0	-484.3	1233.1	0.0	858.7
-11.0	374.4	927.6	0.0	-553.2	1302.0	0.0	927.6
-12.0	374.4	996.5	0.0	-622.1	1370.9	0.0	996.5
-13.0	374.4	1065.4	43.1	-647.9	1396.7	43.1	1065.4
-14.0	374.4	1134.3	124.5	-635.4	1384.2	124.5	1134.3
-15.0	374.4	1203.2	173.3	-655.5	1404.3	173.3	1203.2
-16.0	374.4	1272.1	194.1	-703.6	1452.4	194.1	1272.1
-17.0	374.4	1341.0	215.0	-751.6	1500.4	215.0	1341.0
-18.0	374.4	1409.9	235.9	-799.6	1548.4	235.9	1409.9
-19.0	374.4	1478.8	256.8	-847.6	1596.4	256.8	1478.8
-20.0	374.4	1681.3	240.9	-1066.0	1814.8	240.9	1681.3
-21.0	374.4	1891.9	223.7	-1293.8	2042.6	223.7	1891.9
-22.0	374.4	1979.7	242.2	-1363.1	2111.9	242.2	1979.7
-23.0	374.4	2069.9	260.7	-1434.9	2183.7	260.7	2069.9
-24.0	374.4	2160.2	279.1	-1506.7	2255.5	279.1	2160.2
-25.0	374.4	2250.4	298.6	-1577.5	2326.3	298.6	2250.4
-26.0	374.4	2340.7	318.5	-1647.8	2396.6	318.5	2340.7
-27.0	374.4	2431.0	337.4	-1719.1	2467.9	337.4	2431.0
-28.0	374.4	2521.2	356.0	-1790.8	2539.6	356.0	2521.2
-29.0	374.4	2611.5	374.6	-1862.5	2611.3	374.6	2611.5
-30.0	374.4	2500.6	450.7	-1675.5	2424.3	450.7	2500.6
-31.0	374.4	2370.9	525.5	-1471.0	2219.8	525.5	2370.9

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHORED OR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 15-AUGUST-2022 TIME: 13:45:48

****
* SUMMARY OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--SUMMARY

RIGHTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

LEFTSIDE SOIL PRESSURES DETERMINED BY SWEEP SEARCH WEDGE METHOD.

WALL BOTTOM ELEV. (FT) : -17.74
PENETRATION (FT) : 17.74

MAX. BEND. MOMENT (LB-FT) : 1.2313E+04
AT ELEVATION (FT) : -9.41

MAX. SCALED DEFL. (LB-IN^3): 3.3913E+09
AT ELEVATION (FT) : 6.00

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF
ELLASTICITY IN PSI TIMES PILE MOMENT
OF INERTIA IN IN^4 TO OBTAIN DEFLECTION
IN INCHES.

PROGRAM CWALSHT-DESIGN/ANALYSIS OF ANCHOREDOR CANTILEVER SHEET PILE WALLS
BY CLASSICAL METHODS
DATE: 15-AUGUST-2022 TIME: 13:45:48

****
* COMPLETE OF RESULTS FOR *
* CANTILEVER WALL DESIGN *
****

I.--HEADING
'MANOA PARK SCENARIO 1 LONG TERM (FCTORED)

II.--RESULTS

ELEVATION (FT)	BENDING MOMENT (LB-FT)	SHEAR (LB)	SCALED DEFLECTION (LB-IN^3)	NET PRESSURE (PSF)
6.00	0.0000E+00	0.	3.3913E+09	0.00
5.00	1.0400E+01	31.	3.1531E+09	62.40
4.00	8.3200E+01	125.	2.9149E+09	124.80
3.00	2.8080E+02	281.	2.6769E+09	187.20
2.00	6.6560E+02	499.	2.4394E+09	249.60
1.00	1.3000E+03	780.	2.2031E+09	312.00
0.00+	2.2464E+03	1123.	1.9691E+09	374.40
0.00-	2.2464E+03	1123.	1.9691E+09	204.84
-1.00	3.4605E+03	1294.	1.7390E+09	135.85
-2.00	4.8105E+03	1395.	1.5149E+09	66.95
-2.97	6.1869E+03	1427.	1.3051E+09	0.00
-3.00	6.2274E+03	1427.	1.2991E+09	-1.96
-4.00	7.6424E+03	1391.	1.0941E+09	-70.86
-5.00	8.9865E+03	1286.	9.0228E+08	-139.77

-6.00	1.0191E+04	1111.	7.2597E+08	-208.67
-7.00	1.1187E+04	868.	5.6724E+08	-277.57
-8.00	1.1905E+04	556.	4.2781E+08	-346.48
-9.00	1.2276E+04	175.	3.0889E+08	-415.38
-10.00	1.2233E+04	-274.	2.1113E+08	-484.28
-11.00	1.1705E+04	-793.	1.3443E+08	-553.19
-12.00	1.0623E+04	-1381.	7.7885E+07	-622.09
-13.00	8.9272E+03	-2016.	3.9604E+07	-647.85
-13.08	8.7583E+03	-2069.	3.7174E+07	-646.82
-14.00	6.6483E+03	-2465.	1.6661E+07	-216.72
-15.00	4.1527E+03	-2448.	5.1755E+06	252.13
-16.00	1.9093E+03	-1961.	9.0191E+05	720.98
-17.00	3.8682E+02	-1006.	3.1339E+04	1189.83
-17.74	0.0000E+00	0.	0.0000E+00	1535.82

NOTE: DIVIDE SCALED DEFLECTION MODULUS OF ELLASTICITY IN PSI TIMES PILE MOMENT OF INERTIA IN IN^4 TO OBTAIN DEFLECTION IN INCHES.

III.--WATER AND SOIL PRESSURES

		<----------SOIL PRESSURES---------->			
	WATER	<----LEFTSIDE----->		<---RIGHTSIDE---->	
ELEVATION (FT)	PRESSURE (PSF)	PASSIVE (PSF)	ACTIVE (PSF)	ACTIVE (PSF)	PASSIVE (PSF)
6.00	0.	0.	0.	0.	0.
5.00	62.	0.	0.	0.	0.
4.00	125.	0.	0.	0.	0.
3.00	187.	0.	0.	0.	0.
2.00	250.	0.	0.	0.	0.
1.00	312.	0.	0.	0.	0.
0.00+	374.	0.	0.	0.	0.
0.00-	374.	170.	0.	0.	170.
-1.00	374.	239.	0.	0.	239.
-2.00	374.	307.	0.	0.	307.
-2.97	374.	374.	0.	0.	374.
-3.00	374.	376.	0.	0.	376.
-4.00	374.	445.	0.	0.	445.
-5.00	374.	514.	0.	0.	514.
-6.00	374.	583.	0.	0.	583.
-7.00	374.	652.	0.	0.	652.
-8.00	374.	721.	0.	0.	721.
-9.00	374.	790.	0.	0.	790.
-10.00	374.	859.	0.	0.	859.
-11.00	374.	928.	0.	0.	928.
-12.00	374.	996.	0.	0.	996.
-13.00	374.	1065.	43.	43.	1065.
-13.08	374.	1071.	50.	50.	1071.
-14.00	374.	1134.	125.	125.	1134.
-15.00	374.	1203.	173.	173.	1203.
-16.00	374.	1272.	194.	194.	1272.
-17.00	374.	1341.	215.	215.	1341.
-17.74	374.	1410.	236.	236.	1410.
-19.00	374.	1479.	257.	257.	1479.

Appendix 3

Group Outputs for L wall

US Army Corps of Engineers® Chicago District	PROJECT TITLE: ALA WAI FEASIBILITY STUDY	COMPUTED BY: KHS	DATE:	
	COMPUTATION TITLE: Attachment 3 - 6ft wall	CHECKED BY:	DATE:	

Design References:

EM 1110-2-2104 Strength Design for Reinforced Concrete Hydraulic Structures

EM 1110-2-2906 Design of Pile Foundations

AISC 14th Edition

ACI 318-14

ASCE 7-16

EM 1110-2-2502 Floodwalls and Other Hydraulic Retaining Structures

Design Summary:

The following calculations detail all load case for preliminary design for the L wall at +6ft Geometric parameters, elevations, and calculations of preliminary values, such as pile spacing can be found in the summary sheet.

Design Assumptions:

1. In this current iteration of the design, settlement loads are still preliminary and subject to change pending review

2. Additionally, the foundation deany uplift due to checks being preliminary

Table of Contents:

Group Input and Result
Load Calculations
Load Combinations

U.S. ARMY CORPS OF ENGINEERS - CHICAGO DISTRICT

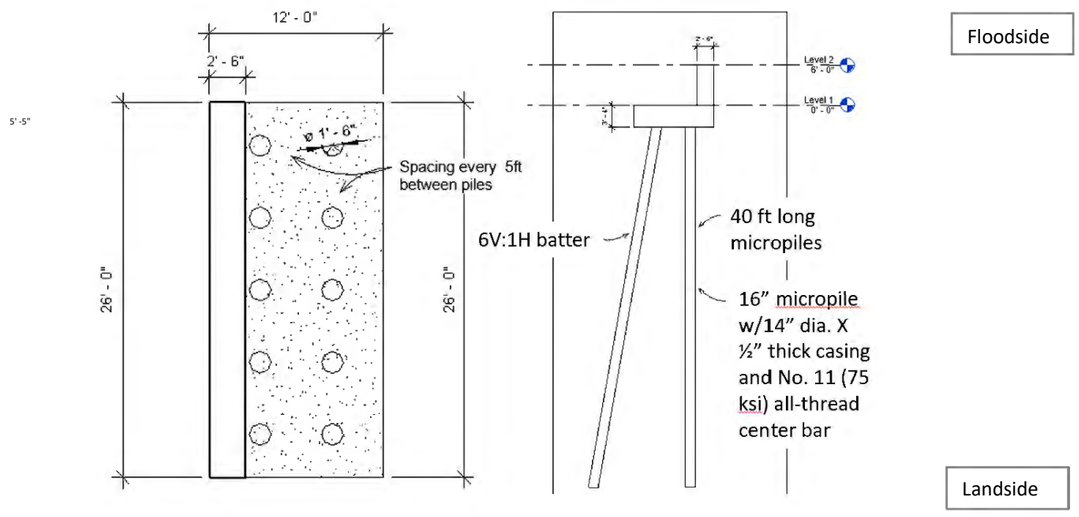
Project: Ala Wai feasibility

Subject: **GROUP INPUT & RESULTS SUMMARY**

DOR: K.SITKO **Updated:** Oct-23 **Checker:** **Date:**

MONOLITH PARAMETERS

Geometric Parameters used for Design



T/Pile Cap EL	0	ft	(T/Cap adjusted to be at grade level)		
B/Pile Cap EL	-3.33	ft			
Design Elevation	6				
Width of Monolith	12				1.0166
Length to Wall Stem FS	26	ft	10.5 ft	8.5	
Length to Sheetpile (From FS)	0	ft			
Total Length of Pile Cap	20	ft			
Thickness of Wall Stem	2.667	ft			
Min Pile Cap Thickness	#REF!		#REF!	in	
Thickness of Pile Cap	0	ft	0	in	
Grade	0	ft			

Calculations for Pile Spacing

N =	2		*Number of Piles Rows*
$B_{min.width}$ =	1.3333333	ft	*Minimum Pile Width per EM 2906*
$B_{max.width}$ =	1.3333333	ft	*Maximum Pile Width per EM 2906*
B =	26	ft	*Assumed Pile Cap Length*
$d_{min.edge}$ =	2.5	ft	*Minimum Edge Distance per EM 2906*
d_{edge} =	2	ft	*Assumed Edge Distance*
$d_{edge.long}$ =	3.25	ft	*Assumed Edge Distance Longitudinally*

GROUP Results Summary

Pile Number

Foundation Loads Summary for Input into Group (Unfactored)

Load Case	LC #	Fx	Fy	Fz	Mx	My	Mz
1A.1	1	186	0	94	0	2,917	0

Foundation Loads Summary for Input into Group (Unfactored)

Load Case	LC #	Fx	Fy	Fz	Mx	My	Mz
1A.1	1	186	0	94	0	35,004	0

U.S. ARMY CORPS OF ENGINEERS - CHICAGO DISTRICT

Project: ALA WAI

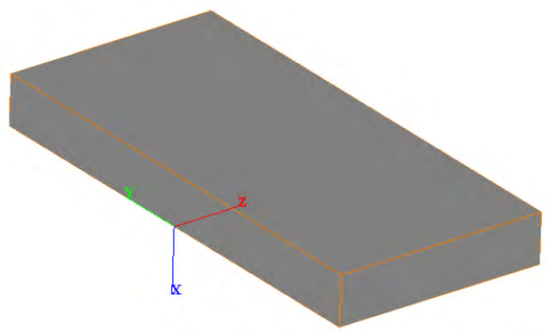
Subject: **Determination of Pile Foundation Loads (Land Bridge Monoliths)**

DOR: K.Sitko **Updated:** Oct-23 **Checker:** **Date:**

MONOLITH PARAMETERS

Geometric Parameters used for Design

T/Pile Cap EL	0	ft
B/Pile Cap EL	-3.5	ft
Design Elevation	6	ft
Width of Monolith	13	ft
Length to Wall Stem FS	26	ft
Length to Sheetpile (From Flood Side)	0	ft
Total Length of Pile Cap	26	ft
Thickness of Wall Stem	2.667	ft
Thickness of Pile Cap	3.667	ft
Grade	0	ft



change the inputs for pressures

PERMANENT LOADS, LP

Dead Loads, D

All permanant loads due to structure weight

Concete Weight, γ_c: 150 pcf

	Length (ft)	Width/Height (ft)	Area (ft^2)	Thickness (ft)	Volume (ft^3)
Pile Cap	13	26	338	3.667	1239.4

Load		Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Pile Cap		185.92					13.00		2416.92	
	0	0.00					26.00		0.00	
Total		**185.92**							**2416.92**	

Vertical Earth Pressure, EV

Since there is no soil on top the floodwall structure, the vertical pressure due to soil is 0

Lateral Earth Pressure, EH

$\phi = \phi' =$	28	
$\theta =$	90	
$\delta =$	0	
$K_O =$	0.5305	
$K_P =$	2.7698	
(Amended) $K_P =$	1.119648879	
$K_A =$	0.3610	
saturated unit weight soil, Y_{sat}:	#REF!	pcf
submerged unit weight soil, Y':	#REF!	pcf
top of soil EL. =	2.00	ft
bot. of base EL. =	-3.50	ft
h =	5.50	ft
length of wall:	13	ft

Submerged earth pressures will be used on the floodside during flood events.

Saturated earth pressures will be used on the landside

Per EM 2502 Section II 3-4b, the passive pressure is adjusted to be 1/2 the calculate passive pressure due to the settlement being relatively small compared to what is needed to develop full passive resistance

Surface Soils have been revised to be sand per Geotechnical Engineers. This will be included/revised Post-35%

$$K_P = \frac{1 + \sin\phi}{1 - \sin\phi} = \tan^2\left(45° + \frac{\phi}{2}\right) = \frac{1}{K_A}$$

$$P_{PH} = \frac{1}{2} K_P \gamma' h^2 + 2c\sqrt{K_P}\, h$$

$$P_A = \frac{1}{2} \gamma' \frac{1}{\sin\theta \cos\delta} K_A h^2$$

Passive/Active Pressure
EM 1110-2-2502 [3-20]

Passive Pressure
EM 1110-2-2502 [3-21]

Active Pressure
EM 1110-2-2502 [3-11]

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
EH_{FS_dry}									
EH_{PS_dry}									
EH_{FS_sat}			0.00	1.83				0	
EH_{PS_sat}			0.00	1.83				0	
EH_{FS_sub}			0.00	1.83				0	
EH_{PS_sub}			0.00	1.83				0	

Downdrag, DD

Downdrag loads are are calculated by analyzing the negative skin friction and Settlement Induced Bending (SIB) (for battered piles) caused by the settlement of soil on deep pile foundations. This negative skin friction will only be applicable in the calculation of pile stresses and not pile capacity, however, SIB will be applied to all load cases. The value of these loads will be provided by the Geotechnical Engineer

TEMPORARY LOADS, LT

Hydrostatic Loads, Hs

Weight of Water, γ_w:	64 pcf	Heel Length of Wall:	0 ft	T/Pile Cap:	0 ft
Pile Cap Length:	26 ft	FS Sheetpile Distance:	0 ft	B/Pile Cap:	-3.5 ft
Pile Cap Width:	26 ft	PS Sheetpile Distance:	0 ft	T/Wall Stem:	6 ft

Head EL Tail EL

10 yr.	9.000	0 ft
100 yr.	9.0000	0 ft
750 yr	9	0 ft
MaxD	9.0000	0 ft

Hydrostatic Pressure Values

AEP	P_{head} (T/CAP) [ksf]	P_{head} (B/CAP) [ksf]	P_{tail} [ksf]
10 yr	0.576	0.8	0.224
100 yr	0.576	0.8	0.224
750 yr	0.576	0.8	0.224
MaxD	0.576	0.8	0.224

Tailwater EL are currently assumed to be at normal water level (slightly conservative). More information requested from H&H will be added later on to determine more accurate tailwater pressures during flood events

750 yr. SWL capped at the TOW for a pre-overtopping event, since a higher SWL will create an overtopping event that will eventually equalize the hydrostatic pressure on both sides of the wall

Lateral Hydrostatic Pressure

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Hsh_{10_H}			130.00	4.17				541.6666667	
Hsh_{100_H}			130.00	4.17				541.6666667	
Hsh_{750_H}			130.00	4.17				541.6666667	
Hsh_{MAXD}			130.00	4.17				541.6666667	
Hsh_{10_T}			-35.67	1.17				-41.61733333	
Hsh_{100_T}			-35.67	1.17				-41.61733333	
Hsh_{750_T}			-35.67	1.17				-41.61733333	
Hsh_{MaxD_T}			-35.67	1.17				-41.61733333	

Water Weight

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Hsv_{10_H}	0.00			0.00				0	
Hsv_{100_H}	0.00			0.00				0	
Hsv_{750_H}	0.00			0.00				0	
Hsv_{MAXD}	0.00			0.00				0	

Uplift Pervious Values

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Hsp_{10_H}	0.00			10.56				0	
Hsp_{100_H}	0.00			10.56				0	
Hsp_{750_H}	0.00			10.56				0	
Hsp_{MAXD}	0.00			10.56				0	

Uplift Impervious Values

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Hsl_{10_H}	0.00			0.00				0	
Hsl_{100_H}	0.00			0.00				0	
Hsl_{750_H}	0.00			0.00				0	
Hsl_{MAXD}	0.00			0.00				0	

Surcharge Loads, ES

Since load combinations with surcharge as the principal lateral load are much smaller than lateral loads due to infrequent surge, surcharge loads will not be evaluated.

Live Loads, L

Live Loads due to traffic, rails, or equipment may be considered for other structures, but not for this floodwall structure

DYNAMIC LOADS, LD

Wind Loading, W

Select Risk Category:	IV		*Critical Structure*	
V =	170 mph		*Basic Wind Speed*	
Wind Directionality Factor, K_d =	0.85		*Table 26.6-1, ASCE-7 16*	
Select Exposure Category:	D			
Topographic Factor, K_{zt} =	1.0		*26.8.2, ASCE-7 16*	
Exposure Coefficient, K_z =	1.08	20 ft	*(use Table 26.10-1, ASCE 7-16)*	
Ground Elevation Factor, K_e	1			
$q_h = 0.00256K_zK_{zt}K_dK_eV^2$ (lb/ft^2)	q_h =	67.92 psf	*Eq. 26.10-1, ASCE 7-16*	
	Gust Factor, G =	0.85	*26.11.4, ASCE 7-16*	
	Clearance Ratio, R_{cl}=	1	*For Freestanding Wall*	
	Aspect Ratio, l/h =	0.000		
	C_f =	1.45	*Figure 29.3-1 ASCE-7 16*	
W = F = q_hGC_f (psf)	W =	**83.71 psf**	*Eq. 29.3-1 ASCE 7-16*	

750 year wind load is not included since the SWL will be above the top of wall during this event. Wind cannot act on the floodwall structure

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
10 yr Wind			0.00	-1.50				0	
100 yr Wind			0.00	-1.50				0	

U.S. ARMY CORPS OF ENGINEERS - CHICAGO DISTRICT

Project: Ala wai

Subject: **Determination of Pile Foundation Load Combinations**

DOR: K.Sitko **Updated:** Aug-22 **Checker:** **Date:**

1) Load Case 1A.1: Normal Operating + Impervious Uplift

D + EV + EH + Hw_10 + Hsh_10 + Hs_10_imp + Hsv_10 + W_{10}

Item	Fx	Fy	Fz	Mx	My	Mz
D	185.9				2416.9	
EV	0.0				0.0	
EH_{FS}			0.0		0.0	
EH_{PS}			0.0		0.0	
H_{c_10}	0.00		0.00		0.0	
H_{sh_10}			94.33		500.0	
$H_{s_10_imp}$	0.0				0.0	
H_{sv_10}	0.0				0.0	
W_{10}			0.0		0.0	
Totals:	**186**	**0**	**94**	**0**	**2,917**	**0**

2.2(D + EV + EH + Hw_10 + Hsh_10 + Hs_10_imp + Hsv_10 + W_{10}) + SIB

Item	LF	Fx	Fy	Fz	Mx	My	Mz
D	2.2	409.0				5317.2	
EV	2.2	0.0				0.0	
EH_{FS}	2.2			0.0		0.0	
EH_{PS}	2.2			0.0		0.0	
H_{c_10}	2.2	0.0		0.0		0.0	
H_{sh_10}	2.2	0.0		207.5		1100.1	
$H_{s_10_imp}$	2.2	0.0				0.0	
H_{sv_10}	2.2	0.0				0.0	
W_{10}	2.2			0.0		0.0	
SIB							
Totals:		**409**		**208**		**6,417**	

transect 67 m44

GROUP for Windows, Version 2022.12.1

Serial Number : 447578430

Analysis of A Group of Piles
Subjected to Axial and Lateral Loading

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Time and Date of Analysis

Date: September 27, 2023 Time: 06:14:27

***** COMPUTATION RESULTS *****

Lwall on micropiles

***** LOAD CASES RESULTS *****

LOAD CASE : 1
CASE NAME : Load Case
LOAD TYPE : Dead, DL

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

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VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
172.000	-1.26086E-06	39.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
1.03349E-04	29126.0	-3.14859E-05

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
-0.0946133	-0.0108004	0.13124

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
-1.62555E-04	2.80810E-03	-1.02189E-05

* PASSIVE RESISTANCE IN PILE CAP *

HOR. LOAD Y,KIP	HOR. LOAD Z,KIP	POSITION, FT	EQ. DIAM, FT
0.0283066	0.34398	-0.33333	2.00000

THE GLOBAL STRUCTURAL COORDINATE SYSTEM

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
1	-0.010370	-5.9238E-03	0.1312	-1.6255E-04	2.8081E-03	-1.0219E-05
2	0.1581	3.8295E-03	0.1312	-1.6255E-04	2.8081E-03	-1.0219E-05
3	-9.8185E-03	-5.9238E-03	0.1225	-1.6255E-04	2.8081E-03	-1.0219E-05
4	0.1587	3.8295E-03	0.1225	-1.6255E-04	2.8081E-03	-1.0219E-05
5	-0.010922	-5.9238E-03	0.1400	-1.6255E-04	2.8081E-03	-1.0219E-05
6	0.1576	3.8295E-03	0.1400	-1.6255E-04	2.8081E-03	-1.0219E-05
7	-9.2666E-03	-5.9238E-03	0.1137	-1.6255E-04	2.8081E-03	-1.0219E-05
8	0.1592	3.8295E-03	0.1137	-1.6255E-04	2.8081E-03	-1.0219E-05
9	-0.011474	-5.9238E-03	0.1488	-1.6255E-04	2.8081E-03	-1.0219E-05
10	0.1570	3.8295E-03	0.1488	-1.6255E-04	2.8081E-03	-1.0219E-05
MINIMUM	-0.011474	-5.9238E-03	0.1137	-1.6255E-04	2.8081E-03	-1.0219E-05
Pile N.	9	1	7	1	1	1
MAXIMUM	0.1592	3.8295E-03	0.1488	-1.6255E-04	2.8081E-03	-1.0219E-05
Pile N.	8	2	9	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN

transect 67 m44

1	-13.564	-1.2062	-2.4836	-9.6306	902.00	-68.990
2	49.054	1.2285	7.2868	-32.450	1288.9	64.484
3	-12.842	-1.2626	-3.5126	-9.6306	961.04	-70.401
4	49.347	1.1345	6.4799	-31.142	1332.0	60.892
5	-14.286	-1.1641	-1.5439	-9.6306	846.73	-68.143
6	48.709	1.2216	8.2352	-32.865	1241.0	65.625
7	-12.121	-1.3214	-4.5521	-9.6306	1018.8	-71.537
8	44.331	1.2006	20.260	-34.881	3.0640E-12	71.163
9	-15.008	-1.0912	-0.6516	-9.6306	792.77	-65.430
10	48.381	1.2885	9.1380	-34.082	1192.1	68.969
MINIMUM	-15.008	-1.3214	-4.5521	-34.881	3.0640E-12	-71.537
Pile N.	9	7	7	8	8	7
MAXIMUM	49.347	1.2885	20.260	-9.6306	1332.0	71.163
Pile N.	4	10	8	1	4	8

THE PILE COORDINATE SYSTEM (LOCAL AXES)

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	-0.010370	-5.9238E-03	0.1312	-1.6255E-04	2.8081E-03	-1.0219E-05
2	0.1935	-3.8295E-03	-0.069251	-1.5625E-04	-2.8081E-03	-4.5994E-05
3	-9.8185E-03	-5.9238E-03	0.1225	-1.6255E-04	2.8081E-03	-1.0219E-05
4	0.1910	-3.8295E-03	-0.060814	-1.5625E-04	-2.8081E-03	-4.5994E-05
5	-0.010922	-5.9238E-03	0.1400	-1.6255E-04	2.8081E-03	-1.0219E-05
6	0.1960	-3.8295E-03	-0.077688	-1.5625E-04	-2.8081E-03	-4.5994E-05
7	-9.2666E-03	-5.9238E-03	0.1137	-1.6255E-04	2.8081E-03	-1.0219E-05
8	0.1885	-3.8295E-03	-0.052376	-1.5625E-04	-2.8081E-03	-4.5994E-05
9	-0.011474	-5.9238E-03	0.1488	-1.6255E-04	2.8081E-03	-1.0219E-05
10	0.1984	-3.8295E-03	-0.086126	-1.5625E-04	-2.8081E-03	-4.5994E-05
MINIMUM	-0.011474	-5.9238E-03	-0.086126	-1.6255E-04	-2.8081E-03	-4.5994E-05
Pile N.	9	1	10	1	2	2
MAXIMUM	0.1984	-3.8295E-03	0.1488	-1.5625E-04	2.8081E-03	-1.0219E-05
Pile N.	10	2	9	2	1	1

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
1	-13.564	-1.2062	-2.4836	-9.6306	902.00	-68.990
2	48.588	-1.2285	9.9300	-8.4379	-1288.9	-71.693
3	-12.842	-1.2626	-3.5126	-9.6306	961.04	-70.401
4	48.587	-1.1345	10.789	-8.4379	-1332.0	-67.871

5	-14.286	-1.1641	-1.5439	-9.6306	846.73	-68.143
6	48.588	-1.2216	8.9209	-8.4379	-1241.0	-72.908
7	-12.121	-1.3214	-4.5521	-9.6306	1018.8	-71.537
8	48.587	-1.2006	-3.8763	-8.4379	-3.0549E-12	-78.801
9	-15.008	-1.0912	-0.6516	-9.6306	792.77	-65.430
10	48.589	-1.2885	7.9604	-8.4379	-1192.1	-76.467
MINIMUM	-15.008	-1.3214	-4.5521	-9.6306	-1332.0	-78.801
Pile N.	9	7	7	1	4	8
MAXIMUM	48.589	-1.0912	10.789	-8.4379	1018.8	-65.430
Pile N.	10	9	4	2	7	9

PILE GROUP	STRESS,KIP/IN**2
1	0.067463
2	0.2417
3	0.063873
4	0.2417
5	0.071053
6	0.2417
7	0.060283
8	0.2417
9	0.074643
10	0.2417
MINIMUM	0.060283
Pile N.	7
MAXIMUM	0.2417
Pile N.	6

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR	DISPL. z-DIR	MOMENT z-DIR	MOMENT y-DIR	SHEAR y-DIR	SHEAR z-DIR	SOIL REACT y-DIR	SOIL REACT z-DIR	SOIL REACT STRESS	TOTAL FLEX. RIG. z-DIR	FLEX. RIG. y-DIR
	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN	KIP/IN	KIP/IN**2	KIP-IN**2	KIP-IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********	**********
1	-5.9238E-03	-9.6031E-03	-18.637	-45.164	-1.2062	-6.8780	-0.025663	-0.057412	0.067463	3.1683E+07	2.5911E+07
x(FT)	0.0000	11.000	9.0000	20.000	0.0000	7.0000	7.0000	12.000	0.0000	0.0000	0.0000
2	-4.3478E-03	-0.069251	-9.7629	-1288.9	-1.2285	-1.3709	-0.024037	-0.043884	0.2417	3.1682E+07	2.5270E+07
x(FT)	2.0000	0.0000	13.000	0.0000	0.0000	22.000	3.0000				

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```
  0.0000      0.0000      0.0000      0.0000
       3  -5.9238E-03   -0.011004     -17.809     -49.282     -1.2626     -7.3138   -0.027412
-0.060063    0.063873  3.1682E+07  2.5759E+07
     x(FT)      0.0000      11.000      9.0000      19.000      0.0000      7.0000      7.0000
  11.000      0.0000      0.0000      0.0000
       4  -4.3774E-03   -0.060814     -9.6556     -1332.0     -1.1345     -1.4787   -0.014335
-0.042012      0.2417  3.1683E+07  2.5239E+07
     x(FT)      2.0000      0.0000      14.000      0.0000      0.0000      22.000      3.0000
  0.0000      0.0000      0.0000      0.0000
       5  -5.9238E-03 -8.6094E-03     -19.944     -42.156     -1.1641     -6.5524   -0.030335
-0.055459    0.071053  3.1683E+07  2.6162E+07
     x(FT)      0.0000      12.000      9.0000      20.000      0.0000      8.0000      8.0000
  12.000      0.0000      0.0000      0.0000
       6  -4.3364E-03   -0.077688     -9.9885     -1241.0     -1.2216     -1.2676   -0.017872
-0.045608      0.2417  3.1682E+07  2.5322E+07
     x(FT)      2.0000      0.0000      13.000      0.0000      0.0000      22.000      3.0000
  0.0000      0.0000      0.0000      0.0000
       7  -5.9238E-03   -0.012767     -16.688     -54.851     -1.3214     -7.8247   -0.030920
-0.063042    0.060283  3.1682E+07  2.5625E+07
     x(FT)      0.0000      10.000      9.0000      19.000      0.0000      6.0000      6.0000
  10.000      0.0000      0.0000      0.0000
       8  -4.2815E-03   -0.052377     -18.810     -165.13     -1.2006     -3.8763   -0.015289
-0.050011      0.2417  3.1680E+07  3.1641E+07
     x(FT)      2.0000      0.0000      11.000      7.0000      0.0000      0.0000      11.000
  5.0000      0.0000      0.0000      7.0000
       9  -5.9238E-03 -7.7439E-03     -19.760     -39.193     -1.0912     -6.2269   -0.022040
-0.053467    0.074643  3.1684E+07  2.6445E+07
     x(FT)      0.0000      13.000      10.000      21.000      0.0000      9.0000      9.0000
  13.000      0.0000      0.0000      0.0000
      10  -4.3078E-03   -0.086126     -10.144     -1192.1     -1.2885     -1.1651   -0.026904
-0.047210      0.2417  3.1681E+07  2.5381E+07
     x(FT)      2.0000      0.0000      12.000      0.0000      0.0000      22.000      4.0000
  0.0000      0.0000      0.0000      0.0000

      Min. -5.9238E-03   -0.086126     -19.944     -1332.0     -1.3214     -7.8247   -0.030920
-0.063042    0.060283  3.1680E+07  2.5239E+07
   Pile N.       1          10           5           4           7           7           7
   7           7           8           4

       * MAXIMUM VALUES AND LOCATIONS *

     PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT
SOIL REACT     TOTAL    FLEX. RIG.  FLEX. RIG.
               y-DIR       z-DIR       z-DIR       y-DIR       y-DIR       z-DIR       y-DIR
 z-DIR      STRESS       z-DIR       y-DIR
                 IN          IN        KIP-IN      KIP-IN        KIP         KIP       KIP/IN
KIP/IN     KIP/IN**2   KIP-IN**2   KIP-IN**2
    ******  **********  **********  **********  **********  **********  **********  **********
**********  **********  **********  **********
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1	1.3302E-04	0.1312	68.990	902.00	0.1831	0.7635	4.4601E-03	0.059153
0.067463	3.1698E+07	3.1698E+07						
x(FT)	17.000	0.0000	0.0000	0.0000	14.000	23.000	23.000	2.0000
0.0000	20.000	24.000						
2	3.0147E-05	0.030165	71.693	96.421	0.1106	11.045	3.0891E-03	0.080618
0.2417	3.1698E+07	3.1698E+07						
x(FT)	22.000	8.0000	0.0000	18.000	19.000	3.0000	22.000	10.000
0.0000	16.000	12.000						
3	1.1625E-04	0.1225	70.401	961.04	0.1733	0.8232	3.7217E-03	0.056863
0.063873	3.1698E+07	3.1698E+07						
x(FT)	17.000	0.0000	0.0000	0.0000	15.000	23.000	22.000	2.0000
0.0000	3.0000	24.000						
4	3.2141E-05	0.034817	67.871	106.02	0.1103	11.653	2.7139E-03	0.083750
0.2417	3.1698E+07	3.1698E+07						
x(FT)	22.000	7.0000	0.0000	18.000	20.000	2.0000	22.000	10.000
0.0000	3.0000	12.000						
5	1.5588E-04	0.1400	68.143	846.73	0.1979	0.7167	4.9947E-03	0.061681
0.071053	3.1698E+07	3.1698E+07						
x(FT)	17.000	0.0000	0.0000	0.0000	14.000	23.000	23.000	3.0000
0.0000	3.0000	16.000						
6	2.8581E-05	0.025941	72.908	87.299	0.1123	10.347	3.6321E-03	0.077461
0.2417	3.1698E+07	3.1698E+07						
x(FT)	21.000	8.0000	0.0000	18.000	19.000	3.0000	22.000	10.000
0.0000	4.0000	23.000						
7	9.7204E-05	0.1137	71.537	1018.8	0.1633	0.8837	5.2023E-03	0.054360
0.060283	3.1698E+07	3.1698E+07						
x(FT)	18.000	0.0000	0.0000	0.0000	15.000	23.000	22.000	2.0000
0.0000	4.0000	16.000						
8	1.0767E-04	8.7189E-04	78.801	8.7555	0.2771	2.0146	3.7644E-03	0.024949
0.2417	3.1698E+07	3.1698E+07						
x(FT)	16.000	15.000	0.0000	20.000	14.000	12.000	18.000	15.000
0.0000	4.0000	20.000						
9	1.6114E-04	0.1488	65.430	792.77	0.2011	0.7025	3.8395E-03	0.064218
0.074643	3.1698E+07	3.1698E+07						
x(FT)	17.000	0.0000	0.0000	0.0000	14.000	24.000	23.000	3.0000
0.0000	3.0000	16.000						
10	2.6829E-05	0.022031	76.467	78.362	0.1124	9.7334	4.7464E-03	0.074170
0.2417	3.1698E+07	3.1698E+07						
x(FT)	21.000	9.0000	0.0000	18.000	19.000	4.0000	22.000	10.000
0.0000	4.0000	13.000						
Max.	1.6114E-04	0.1488	78.801	1018.8	0.2771	11.653	5.2023E-03	0.083750
0.2417	3.1698E+07	3.1698E+07						
Pile N.	9	9	8	7	8	4	7	4
6	1	1						

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***** SUMMARY FOR LOAD CASES AND COMBINATIONS *****

***** LOAD CASES RESULTS *****

LOAD CASE : 1

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
172.000	-1.26086E-06	39.0000	1.03349E-04	29126.0	-3.14859E-05

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
-0.0946133	-0.0108004	0.13124	-1.62555E-04	2.80810E-03	-1.02189E-05

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
MINIMUM	-0.011474	-5.9238E-03	0.1137	-1.6255E-04	2.8081E-03	-1.0219E-05
Pile N.	9	1	7	1	1	1
MAXIMUM	0.1592	3.8295E-03	0.1488	-1.6255E-04	2.8081E-03	-1.0219E-05
Pile N.	8	2	9	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
MINIMUM	-15.008	-1.3214	-4.5521	-34.881	3.0640E-12	-71.537
Pile N.	9	7	7	8	8	7
MAXIMUM	49.347	1.2885	20.260	-9.6306	1332.0	71.163
Pile N.	4	10	8	1	4	8

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
MINIMUM	-0.011474	-5.9238E-03	-0.086126	-1.6255E-04	-2.8081E-03	-4.5994E-05
Pile N.	9	1	10	1	2	2
MAXIMUM	0.1984	-3.8295E-03	0.1488	-1.5625E-04	2.8081E-03	-1.0219E-05
Pile N.	10	2	9	2	1	1

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
MINIMUM	-15.008	-1.3214	-4.5521	-9.6306	-1332.0	-78.801
Pile N.	9	7	7	1	4	8

MAXIMUM	48.589	-1.0912	10.789	-8.4379	1018.8	-65.430
Pile N.	10	9	4	2	7	9

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR	DISPL. z-DIR	MOMENT z-DIR	MOMENT y-DIR	SHEAR y-DIR	SHEAR z-DIR	SOIL REACT y-DIR	SOIL REACT TOTAL STRESS
	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN	KIP/IN	KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-5.9238E-03	-0.086126	-19.944	-1332.0	-1.3214	-7.8247	-0.030920	-0.063042	0.060283
Pile N.	1	10	5	4	7	7	7	7	7
Max.	1.6114E-04	0.1488	78.801	1018.8	0.2771	11.653	5.2023E-03	0.083750	0.2417
Pile N.	9	9	8	7	8	4	7	4	6

US Army Corps of Engineers® Chicago District	PROJECT TITLE: ALA WAI FEASIBILITY STUDY	COMPUTED BY: KHS	DATE:	
	COMPUTATION TITLE: Attachment 3 - 9ft wall	CHECKED BY:	DATE:	

Design References:

EM 1110-2-2104 Strength Design for Reinforced Concrete Hydraulic Structures

EM 1110-2-2906 Design of Pile Foundations

AISC 14th Edition

ACI 318-14

ASCE 7-16

EM 1110-2-2502 Floodwalls and Other Hydraulic Retaining Structures

Design Summary:

The following calculations detail all load case for preliminary design for the L wall at +6ft Geometric parameters, elevations, and calculations of preliminary values, such as pile spacing can be found in the summary sheet.

Design Assumptions:

1. In this current iteration of the design, settlement loads are still preliminary and subject to change pending review

2. Additionally, the foundation dont include any uplift due to checks being preliminary

Table of Contents:

Group Input and Result
Load Calculations
Load Combinations

U.S. ARMY CORPS OF ENGINEERS - CHICAGO DISTRICT

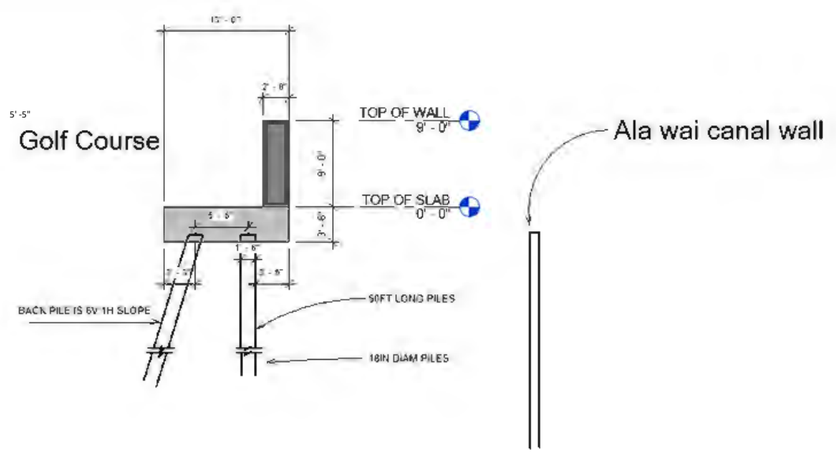
Project: Ala Wai feasibility

Subject: **GROUP INPUT & RESULTS SUMMARY**

DOR: K.SITKO **Updated:** Oct-23 **Checker:** **Date:**

MONOLITH PARAMETERS

Geometric Parameters used for Design



Floodside

Ala wai canal wall

Landside

T/Pile Cap EL	0 ft	(T/Cap adjusted to be at grade level)		
B/Pile Cap EL	-3.67 ft			
Design Elevation	9			
Width of Monolith	13			1.0166
Length to Wall Stem FS	26 ft	10.5 ft	8.5	
Length to Sheetpile (From FS)	0 ft			
Total Length of Pile Cap	20 ft			
Thickness of Wall Stem	2.667 ft			
Min Pile Cap Thickness	#REF!	#REF! in		
Thickness of Pile Cap	3.67 ft	44.04 in		
Grade	0 ft			

Calculations for Pile Spacing

N =	2		*Number of Piles Rows*
$B_{min.width}$ =	1.3333333 ft		*Minimum Pile Width per EM 2906*
$B_{max.width}$ =	1.3333333 ft		*Maximum Pile Width per EM 2906*
B =	26 ft		*Assumed Pile Cap Length*
$d_{min.edge}$ =	2.5 ft		*Minimum Edge Distance per EM 2906*
d_{edge} =	2 ft		*Assumed Edge Distance*
$d_{edge.long}$ =	3.25 ft		*Assumed Edge Distance Longitudinally*

GROUP Results Summary

Pile Number

Foundation Loads Summary for Input into Group (Unfactored)

Load Case	LC #	Fx	Fy	Fz	Mx	My	Mz
1A.1	1	186	0	94	0	2,917	0

Foundation Loads Summary for Input into Group (Unfactored)

Load Case	LC #	Fx	Fy	Fz	Mx	My	Mz
1A.1	1	186	0	94	0	35,004	0

U.S. ARMY CORPS OF ENGINEERS - CHICAGO DISTRICT

Project: ALA WAI

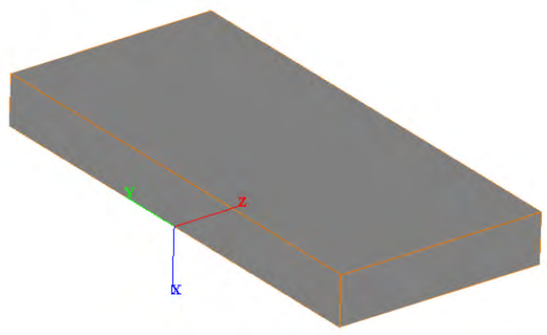
Subject: **Determination of Pile Foundation Loads (Land Bridge Monoliths)**

DOR: K.Sitko **Updated:** Oct-23 **Checker:** **Date:**

MONOLITH PARAMETERS

Geometric Parameters used for Design

T/Pile Cap EL	0	ft
B/Pile Cap EL	-3.5	ft
Design Elevation	9	ft
Width of Monolith	13	ft
Length to Wall Stem FS	26	ft
Length to Sheetpile (From Flood Side)	0	ft
Total Length of Pile Cap	26	ft
Thickness of Wall Stem	2.667	ft
Thickness of Pile Cap	3.667	ft
Grade	0	ft



change the inputs for pressures

PERMANENT LOADS, LP

Dead Loads, D

All permanant loads due to structure weight

Concete Weight, γ_c: 150 pcf

	Length (ft)	Width/Height (ft)	Area (ft^2)	Thickness (ft)	Volume (ft^3)
Pile Cap	13	26	338	3.667	1239.4

Load		Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Pile Cap		185.92					13.00		2416.92	
	0	0.00					26.00		0.00	
Total		**185.92**							**2416.92**	

Vertical Earth Pressure, EV

Since there is no soil on top the floodwall structure, the vertical pressure due to soil is 0

Lateral Earth Pressure, EH

$\phi = \phi' =$	28	
$\theta =$	90	
$\delta =$	0	
$K_O =$	0.5305	
$K_P =$	2.7698	
(Amended) $K_P =$	1.119648879	
$K_A =$	0.3610	
saturated unit weight soil, Y_{sat}:	#REF!	pcf
submerged unit weight soil, Y':	#REF!	pcf
top of soil EL. =	2.00	ft
bot. of base EL. =	-3.50	ft
h =	5.50	ft
length of wall:	13	ft

Submerged earth pressures will be used on the floodside during flood events.

Saturated earth pressures will be used on the landside

Per EM 2502 Section II 3-4b, the passive pressure is adjusted to be 1/2 the calculate passive pressure due to the settlement being relatively small compared to what is needed to develop full passive resistance

Surface Soils have been revised to be sand per Geotechnical Engineers. This will be included/revised Post-35%

$$K_P = \frac{1 + \sin\phi}{1 - \sin\phi} = \tan^2\left(45° + \frac{\phi}{2}\right) = \frac{1}{K_A}$$

Passive/Active Pressure
EM 1110-2-2502 [3-20]

$$P_{PH} = \frac{1}{2} K_p \gamma' h^2 + 2c\sqrt{K_p}\, h$$

Passive Pressure
EM 1110-2-2502 [3-21]

$$P_A = \frac{1}{2} \gamma' \frac{1}{\sin\theta \cos\delta} K_A h^2$$

Active Pressure
EM 1110-2-2502 [3-11]

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]

EH_{FS_dry}				
EH_{PS_dry}				
EH_{FS_sat}	0.00	1.83		0
EH_{PS_sat}	0.00	1.83		0
EH_{FS_sub}	0.00	1.83		0
EH_{PS_sub}	0.00	1.83		0

Downdrag, DD

Downdrag loads are are calculated by analyzing the negative skin friction and Settlement Induced Bending (SIB) (for battered piles) caused by the settlement of soil on deep pile foundations. This negative skin friction will only be applicable in the calculation of pile stresses and not pile capacity, however, SIB will be applied to all load cases. The value of these loads will be provided by the Geotechnical Engineer

TEMPORARY LOADS, LT

Hydrostatic Loads, Hs

Weight of Water, γ_w:	64 pcf	Heel Length of Wall:	0 ft	T/Pile Cap:	0 ft
Pile Cap Length:	26 ft	FS Sheetpile Distance:	0 ft	B/Pile Cap:	-3.5 ft
Pile Cap Width:	26 ft	PS Sheetpile Distance:	0 ft	T/Wall Stem:	6 ft

	Head EL	Tail EL	
10 yr.	9.000		0 ft
100 yr.	9.0000		0 ft
750 yr	9		0 ft
MaxD	9.0000		0 ft

Hydrostatic Pressure Values

AEP	P_{head} (T/CAP) [ksf]	P_{head} (B/CAP) [ksf]	P_{tail} [ksf]
10 yr	0.576	0.8	0.224
100 yr	0.576	0.8	0.224
750 yr	0.576	0.8	0.224
MaxD	0.576	0.8	0.224

Tailwater EL are currently assumed to be at normal water level (slightly conservative). More information requested from H&H will be added later on to determine more accurate tailwater pressures during flood events

750 yr. SWL capped at the TOW for a pre-overtopping event, since a higher SWL will create an overtopping event that will eventually equalize the hydrostatic pressure on both sides of the wall

Lateral Hydrostatic Pressure

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Hsh_{10_H}			130.00	4.17				541.6666667	
Hsh_{100_H}			130.00	4.17				541.6666667	
Hsh_{750_H}			130.00	4.17				541.6666667	
Hsh_{MAXD}			130.00	4.17				541.6666667	
Hsh_{10_T}			-35.67	1.17				-41.61733333	
Hsh_{100_T}			-35.67	1.17				-41.61733333	
Hsh_{750_T}			-35.67	1.17				-41.61733333	
Hsh_{MaxD_T}			-35.67	1.17				-41.61733333	

Water Weight

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Hsv_{10_H}	0.00			0.00				0	
Hsv_{100_H}	0.00			0.00				0	
Hsv_{750_H}	0.00			0.00				0	
Hsv_{MAXD}	0.00			0.00				0	

Uplift Pervious Values

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Hsp_{10_H}	0.00			10.56				0	
Hsp_{100_H}	0.00			10.56				0	
Hsp_{750_H}	0.00			10.56				0	
Hsp_{MAXD}	0.00			10.56				0	

Uplift Impervious Values

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
Hsi_{10_H}	0.00			0.00				0	

HsI_{100_H}	0.00	0.00	0
HsI_{750_H}	0.00	0.00	0
HsI_{MAXD}	0.00	0.00	0

Surcharge Loads, ES

Since load combinations with surcharge as the principal lateral load are much smaller than lateral loads due to infrequent surge, surcharge loads will not be evaluated.

Live Loads, L

Live Loads due to traffic, rails, or equipment may be considered for other structures, but not for this floodwall structure

DYNAMIC LOADS, LD

Wind Loading, W

Select Risk Category:	IV		*Critical Structure*	
V =	170 mph		*Basic Wind Speed*	
Wind Directionality Factor, K_d =	0.85		*Table 26.6-1, ASCE-7 16*	
Select Exposure Category:	D			
Topographic Factor, K_{zt} =	1.0		*26.8.2, ASCE-7 16*	
Exposure Coefficient, K_z =	1.08	20 ft	*(use Table 26.10-1, ASCE 7-16)*	
Ground Elevation Factor, K_e	1			
$q_h = 0.00256K_zK_{zt}K_dK_eV^2$ (lb/ft^2)	q_h =	67.92 psf	*Eq. 26.10-1, ASCE 7-16*	

750 year wind load is not included since the SWL will be above the top of wall during this event. Wind cannot act on the floodwall structure

Gust Factor, G =	0.85		*26.11.4, ASCE 7-16*
Clearance Ratio, R_{cl}=	1		*For Freestanding Wall*
Aspect Ratio, l/h =	0.000		
C_f =	1.45		*Figure 29.3-1 ASCE-7 16*
$W = F = q_hGC_f$ (psf)	W =	**83.71 psf**	*Eq. 29.3-1 ASCE 7-16*

Load	Fx [kip]	Fy [kip]	Fz [kip]	x [ft]	y [ft]	z [ft]	Mx [kip-ft]	My [kip-ft]	Mz [kip-ft]
10 yr Wind			0.00	0.00				0	
100 yr Wind			0.00	0.00				0	

U.S. ARMY CORPS OF ENGINEERS - CHICAGO DISTRICT

Project: Ala wai

Subject: **Determination of Pile Foundation Load Combinations**

DOR: K.Sitko **Updated:** Aug-22 **Checker:** **Date:**

1) Load Case 1A.1: Normal Operating + Impervious Uplift

D + EV + EH + Hw_10 + Hsh_10 + Hs_10_imp + Hsv_10 + W_{10}

Item	Fx	Fy	Fz	Mx	My	Mz
D	185.9				2416.9	
EV	0.0				0.0	
EH_{FS}			0.0		0.0	
EH_{PS}			0.0		0.0	
H_{c_10}	0.00		0.00		0.0	
H_{sh_10}			94.33		500.0	
$H_{s_10_imp}$	0.0				0.0	
H_{sv_10}	0.0				0.0	
W_{10}			0.0		0.0	
Totals:	**186**	**0**	**94**	**0**	**2,917**	**0**

2.2(D + EV + EH + Hw_10 + Hsh_10 + Hs_10_imp + Hsv_10 + W_{10}) + SIB

Item	LF	Fx	Fy	Fz	Mx	My	Mz
D	2.2	409.0				5317.2	
EV	2.2	0.0				0.0	
EH_{FS}	2.2			0.0		0.0	
EH_{PS}	2.2			0.0		0.0	
H_{c_10}	2.2	0.0		0.0		0.0	
H_{sh_10}	2.2	0.0		207.5		1100.1	
$H_{s_10_imp}$	2.2	0.0				0.0	
H_{sv_10}	2.2	0.0				0.0	
W_{10}	2.2			0.0		0.0	
SIB							
Totals:		**409**		**208**		**6,417**	

transect 67 m44

GROUP for Windows, Version 2022.12.1

Serial Number : 447578430

Analysis of A Group of Piles
Subjected to Axial and Lateral Loading

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Time and Date of Analysis

Date: October 01, 2023 Time: 22:00:40

***** COMPUTATION RESULTS *****

Lwall on micropiles

***** LOAD CASES RESULTS *****

LOAD CASE : 1
CASE NAME : Load Case 3
LOAD TYPE : Dead, DL

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

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VERT. LOAD,KIPS	HOR. LOAD Y,KIPS	HOR. LOAD Z,KIPS
186.000	0.00000	94.0000

MOMENT X ,KIP-IN	MOMENT Y,KIP-IN	MOMENT Z,KIP-IN
0.00000	33683.0	0.00000

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

VERTICAL ,IN	HORIZONTAL Y,IN	HORIZONTAL Z,IN
-0.0834072	2.38050E-12	0.14179

ANGLE ROT. X,RAD	ANGLE ROT. Y,RAD	ANGLE ROT. Z,RAD
3.25979E-14	2.20424E-03	1.93314E-15

* PASSIVE RESISTANCE IN PILE CAP *

HOR. LOAD Y,KIP	HOR. LOAD Z,KIP	POSITION, FT	EQ. DIAM, FT
1.43327E-09	0.39610	-0.33333	2.00000

THE GLOBAL STRUCTURAL COORDINATE SYSTEM

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
1	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
2	0.1150	-5.5331E-13	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
3	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
4	0.1150	-5.5331E-13	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
5	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
6	0.1150	-5.5331E-13	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
7	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
8	0.1150	-5.5331E-13	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
9	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
10	0.1150	-5.5331E-13	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
MINIMUM	-0.017280	-5.5331E-13	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
Pile N.	1	2	1	1	1	1
MAXIMUM	0.1150	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
Pile N.	2	1	1	1	1	1

* PILE TOP REACTIONS *

PILE GROUP	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN

1	-24.681	2.9109E-10	1.2940	2.7396E-09	774.17	1.9130E-08
2	61.881	-2.8390E-10	17.427	8.9511E-09	1133.2	-1.7614E-08
3	-24.681	2.9109E-10	1.2940	2.7396E-09	774.17	1.9130E-08
4	61.881	-2.8390E-10	17.427	8.9511E-09	1133.2	-1.7614E-08
5	-24.681	2.9109E-10	1.2940	2.7396E-09	774.17	1.9130E-08
6	61.881	-2.8390E-10	17.427	8.9511E-09	1133.2	-1.7614E-08
7	-24.681	2.9109E-10	1.2940	2.7396E-09	774.17	1.9130E-08
8	61.881	-2.8390E-10	17.427	8.9511E-09	1133.2	-1.7614E-08
9	-24.681	2.9109E-10	1.2940	2.7396E-09	774.17	1.9130E-08
10	61.881	-2.8390E-10	17.427	8.9511E-09	1133.2	-1.7614E-08
MINIMUM	-24.681	-2.8390E-10	1.2940	2.7396E-09	774.17	-1.7614E-08
Pile N.	1	2	1	1	1	2
MAXIMUM	61.881	2.9109E-10	17.427	8.9511E-09	1133.2	1.9130E-08
Pile N.	2	1	2	2	2	1

THE PILE COORDINATE SYSTEM (LOCAL AXES)

* PILE TOP DISPLACEMENTS *

PILE GROUP	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
1	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
2	0.1565	5.5332E-13	-0.093920	3.1293E-14	-2.2042E-03	9.3323E-15
3	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
4	0.1565	5.5332E-13	-0.093920	3.1293E-14	-2.2042E-03	9.3323E-15
5	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
6	0.1565	5.5332E-13	-0.093920	3.1293E-14	-2.2042E-03	9.3323E-15
7	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
8	0.1565	5.5332E-13	-0.093920	3.1293E-14	-2.2042E-03	9.3323E-15
9	-0.017280	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
10	0.1565	5.5332E-13	-0.093920	3.1293E-14	-2.2042E-03	9.3323E-15
MINIMUM	-0.017280	5.5332E-13	-0.093920	3.1293E-14	-2.2042E-03	1.9331E-15
Pile N.	1	2	2	2	2	1
MAXIMUM	0.1565	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	9.3323E-15
Pile N.	2	1	1	1	1	2

* PILE TOP REACTIONS *

PILE GROUP	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
1	-24.681	2.9110E-10	1.2940	2.7397E-09	774.17	1.9130E-08
2	64.110	2.8390E-10	4.7888	2.3869E-09	-1133.2	1.9613E-08
3	-24.681	2.9110E-10	1.2940	2.7397E-09	774.17	1.9130E-08
4	64.110	2.8390E-10	4.7888	2.3869E-09	-1133.2	1.9613E-08

5	-24.681	2.9110E-10	1.2940	2.7397E-09	774.17	1.9130E-08
6	64.110	2.8390E-10	4.7888	2.3869E-09	-1133.2	1.9613E-08
7	-24.681	2.9110E-10	1.2940	2.7397E-09	774.17	1.9130E-08
8	64.110	2.8390E-10	4.7888	2.3869E-09	-1133.2	1.9613E-08
9	-24.681	2.9110E-10	1.2940	2.7397E-09	774.17	1.9130E-08
10	64.110	2.8390E-10	4.7888	2.3869E-09	-1133.2	1.9613E-08
MINIMUM	-24.681	2.8390E-10	1.2940	2.3869E-09	-1133.2	1.9130E-08
Pile N.	1	2	1	2	2	1
MAXIMUM	64.110	2.9110E-10	4.7888	2.7397E-09	774.17	1.9613E-08
Pile N.	2	1	2	1	1	2

PILE GROUP	STRESS,KIP/IN**2
1	0.096991
2	0.2519
3	0.096991
4	0.2519
5	0.096991
6	0.2519
7	0.096991
8	0.2519
9	0.096991
10	0.2519
MINIMUM	0.096991
Pile N.	1
MAXIMUM	0.2519
Pile N.	2

* EFFECTS FOR LATERALLY LOADED PILE *

* MINIMUM VALUES AND LOCATIONS *

PILE	DISPL. y-DIR	DISPL. z-DIR	MOMENT z-DIR	MOMENT y-DIR	SHEAR y-DIR	SHEAR z-DIR	SOIL REACT y-DIR
	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN
******	**********	**********	**********	**********	**********	**********	**********
1	-4.5787E-14	-5.8348E-03	-1.9130E-08	-40.938	-6.3542E-11	-6.2601	-8.6139E-13
x(FT)	18.000	14.000	0.0000	23.000	15.000	10.000	26.000
2	-7.9247E-15	-0.093920	-1.9613E-08	-1133.2	-2.5248E-11	-0.9619	-7.4118E-13
x(FT)	20.000	0.0000	0.0000	0.0000	18.000	24.000	23.000

SOIL REACT z-DIR	SOIL REACT STRESS	TOTAL z-DIR	FLEX. RIG. z-DIR	FLEX. RIG. y-DIR
KIP/IN	KIP/IN**2	KIP-IN**2	KIP-IN**2	
**********	**********	**********	**********	
-0.052158	0.096991	4.7296E+07	4.2284E+07	
15.000	0.0000	0.0000	2.0000	
-0.053874	0.2519	4.7296E+07	3.7628E+07	

```
  2.0000      0.0000      0.0000      0.0000
       3  -4.5787E-14 -5.8348E-03 -1.9130E-08     -40.938 -6.3542E-11     -6.2601 -8.6139E-13
-0.052158    0.096991  4.7296E+07  4.2284E+07
     x(FT)      18.000      14.000      0.0000      23.000      15.000      10.000      26.000
  15.000      0.0000      0.0000      2.0000
       4  -7.9247E-15   -0.093920 -1.9613E-08     -1133.2 -2.5248E-11     -0.9619 -7.4118E-13
-0.053874      0.2519  4.7296E+07  3.7628E+07
     x(FT)      20.000      0.0000      0.0000      0.0000      18.000      24.000      23.000
  2.0000      0.0000      0.0000      0.0000
       5  -4.5787E-14 -5.8348E-03 -1.9130E-08     -40.938 -6.3542E-11     -6.2601 -8.6139E-13
-0.052158    0.096991  4.7296E+07  4.2284E+07
     x(FT)      18.000      14.000      0.0000      23.000      15.000      10.000      26.000
  15.000      0.0000      0.0000      2.0000
       6  -7.9247E-15   -0.093920 -1.9613E-08     -1133.2 -2.5248E-11     -0.9619 -7.4118E-13
-0.053874      0.2519  4.7296E+07  3.7628E+07
     x(FT)      20.000      0.0000      0.0000      0.0000      18.000      24.000      23.000
  2.0000      0.0000      0.0000      0.0000
       7  -4.5787E-14 -5.8348E-03 -1.9130E-08     -40.938 -6.3542E-11     -6.2601 -8.6139E-13
-0.052158    0.096991  4.7296E+07  4.2284E+07
     x(FT)      18.000      14.000      0.0000      23.000      15.000      10.000      26.000
  15.000      0.0000      0.0000      2.0000
       8  -7.9247E-15   -0.093920 -1.9613E-08     -1133.2 -2.5248E-11     -0.9619 -7.4118E-13
-0.053874      0.2519  4.7296E+07  3.7628E+07
     x(FT)      20.000      0.0000      0.0000      0.0000      18.000      24.000      23.000
  2.0000      0.0000      0.0000      0.0000
       9  -4.5787E-14 -5.8348E-03 -1.9130E-08     -40.938 -6.3542E-11     -6.2601 -8.6139E-13
-0.052158    0.096991  4.7296E+07  4.2284E+07
     x(FT)      18.000      14.000      0.0000      23.000      15.000      10.000      26.000
  15.000      0.0000      0.0000      2.0000
      10  -7.9247E-15   -0.093920 -1.9613E-08     -1133.2 -2.5248E-11     -0.9619 -7.4118E-13
-0.053874      0.2519  4.7296E+07  3.7628E+07
     x(FT)      20.000      0.0000      0.0000      0.0000      18.000      24.000      23.000
  2.0000      0.0000      0.0000      0.0000

      Min. -4.5787E-14   -0.093920 -1.9613E-08     -1133.2 -6.3542E-11     -6.2601 -8.6139E-13
-0.053874    0.096991  4.7296E+07  3.7628E+07
   Pile N.       1           2           2           2           1           1           1
   2           1           1           2

       * MAXIMUM VALUES AND LOCATIONS *

     PILE     DISPL.      DISPL.      MOMENT      MOMENT       SHEAR       SHEAR    SOIL REACT
SOIL REACT     TOTAL    FLEX. RIG.  FLEX. RIG.
               y-DIR       z-DIR       z-DIR       y-DIR       y-DIR       z-DIR       y-DIR
 z-DIR      STRESS       z-DIR       y-DIR
                 IN          IN        KIP-IN      KIP-IN        KIP         KIP       KIP/IN
KIP/IN     KIP/IN**2   KIP-IN**2   KIP-IN**2
    ******  **********  **********  **********  **********  **********  **********  **********
**********  **********  **********  **********
```

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1	1.4026E-12	0.1418	6.4288E-09	786.20	2.9110E-10	1.2940	7.3217E-12	0.070708
0.096991	4.7296E+07	4.7296E+07						
x(FT)	0.0000	0.0000	11.000	2.0000	0.0000	0.0000	10.000	4.0000
0.0000	0.0000	18.000						
2	6.6816E-13	0.010674	2.5450E-09	61.772	2.8390E-10	8.2751	5.8680E-12	0.064346
0.2519	4.7296E+07	4.7296E+07						
x(FT)	2.0000	11.000	12.000	20.000	0.0000	6.0000	6.0000	11.000
0.0000	0.0000	29.000						
3	1.4026E-12	0.1418	6.4288E-09	786.20	2.9110E-10	1.2940	7.3217E-12	0.070708
0.096991	4.7296E+07	4.7296E+07						
x(FT)	0.0000	0.0000	11.000	2.0000	0.0000	0.0000	10.000	4.0000
0.0000	0.0000	28.000						
4	6.6816E-13	0.010674	2.5450E-09	61.772	2.8390E-10	8.2751	5.8680E-12	0.064346
0.2519	4.7296E+07	4.7296E+07						
x(FT)	2.0000	11.000	12.000	20.000	0.0000	6.0000	6.0000	11.000
0.0000	0.0000	16.000						
5	1.4026E-12	0.1418	6.4288E-09	786.20	2.9110E-10	1.2940	7.3217E-12	0.070708
0.096991	4.7296E+07	4.7296E+07						
x(FT)	0.0000	0.0000	11.000	2.0000	0.0000	0.0000	10.000	4.0000
0.0000	0.0000	17.000						
6	6.6816E-13	0.010674	2.5450E-09	61.772	2.8390E-10	8.2751	5.8680E-12	0.064346
0.2519	4.7296E+07	4.7296E+07						
x(FT)	2.0000	11.000	12.000	20.000	0.0000	6.0000	6.0000	11.000
0.0000	0.0000	32.000						
7	1.4026E-12	0.1418	6.4288E-09	786.20	2.9110E-10	1.2940	7.3217E-12	0.070708
0.096991	4.7296E+07	4.7296E+07						
x(FT)	0.0000	0.0000	11.000	2.0000	0.0000	0.0000	10.000	4.0000
0.0000	0.0000	17.000						
8	6.6816E-13	0.010674	2.5450E-09	61.772	2.8390E-10	8.2751	5.8680E-12	0.064346
0.2519	4.7296E+07	4.7296E+07						
x(FT)	2.0000	11.000	12.000	20.000	0.0000	6.0000	6.0000	11.000
0.0000	0.0000	14.000						
9	1.4026E-12	0.1418	6.4288E-09	786.20	2.9110E-10	1.2940	7.3217E-12	0.070708
0.096991	4.7296E+07	4.7296E+07						
x(FT)	0.0000	0.0000	11.000	2.0000	0.0000	0.0000	10.000	4.0000
0.0000	0.0000	17.000						
10	6.6816E-13	0.010674	2.5450E-09	61.772	2.8390E-10	8.2751	5.8680E-12	0.064346
0.2519	4.7296E+07	4.7296E+07						
x(FT)	2.0000	11.000	12.000	20.000	0.0000	6.0000	6.0000	11.000
0.0000	0.0000	36.000						
Max.	1.4026E-12	0.1418	6.4288E-09	786.20	2.9110E-10	8.2751	7.3217E-12	0.070708
0.2519	4.7296E+07	4.7296E+07						
Pile N.	1	1	1	1	1	2	1	1
2	1	1						

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***** SUMMARY FOR LOAD CASES AND COMBINATIONS *****

***** LOAD CASES RESULTS *****

LOAD CASE : 1

* TABLE L * COMPUTATION ON PILE CAP

* EQUIVALENT CONCENTRATED LOAD AT ORIGIN *

LOAD X,KIP	LOAD Y,KIP	LOAD Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
186.000	0.00000	94.0000	0.00000	33683.0	0.00000

* DISPLACEMENT OF GROUPED PILE FOUNDATION AT ORIGIN *

DISP X,IN	DISP Y,IN	DISP Z,IN	ROT X,RAD	ROT Y,RAD	ROT Z,RAD
-0.0834072	2.38050E-12	0.14179	3.25979E-14	2.20424E-03	1.93314E-15

* PILE TOP DISPLACEMENTS, GLOBAL *

	DISP. X,IN	DISP. Y,IN	DISP. Z,IN	ROT. X,RAD	ROT. Y,RAD	ROT. Z,RAD
MINIMUM	-0.017280	-5.5331E-13	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
Pile N.	1	2	1	1	1	1
MAXIMUM	0.1150	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	1.9331E-15
Pile N.	2	1	1	1	1	1

* PILE TOP REACTIONS, GLOBAL *

	FOR. X,KIP	FOR. Y,KIP	FOR. Z,KIP	MOM X,KIP-IN	MOM Y,KIP-IN	MOM Z,KIP-IN
MINIMUM	-24.681	-2.8390E-10	1.2940	2.7396E-09	774.17	-1.7614E-08
Pile N.	1	2	1	1	1	2
MAXIMUM	61.881	2.9109E-10	17.427	8.9511E-09	1133.2	1.9130E-08
Pile N.	2	1	2	2	2	1

* PILE TOP DISPLACEMENTS, LOCAL *

	DISP. x,IN	DISP. y,IN	DISP. z,IN	ROT. x,RAD	ROT. y,RAD	ROT. z,RAD
MINIMUM	-0.017280	5.5332E-13	-0.093920	3.1293E-14	-2.2042E-03	1.9331E-15
Pile N.	1	2	2	2	2	1
MAXIMUM	0.1565	1.4026E-12	0.1418	3.2598E-14	2.2042E-03	9.3323E-15
Pile N.	2	1	1	1	1	2

* PILE TOP REACTIONS, LOCAL *

	AXIAL,KIP	LAT. y,KIP	LAT. z,KIP	MOM x,KIP-IN	MOM y,KIP-IN	MOM z,KIP-IN
MINIMUM	-24.681	2.8390E-10	1.2940	2.3869E-09	-1133.2	1.9130E-08
Pile N.	1	2	1	2	2	1

MAXIMUM	64.110	2.9110E-10	4.7888	2.7397E-09	774.17	1.9613E-08
Pile N.	2	1	2	1	1	2

* EFFECTS FOR LATERALLY LOADED PILE *

PILE	DISPL. y-DIR	DISPL. z-DIR	MOMENT z-DIR	MOMENT y-DIR	SHEAR y-DIR	SHEAR z-DIR	SOIL REACT y-DIR	SOIL REACT z-DIR	TOTAL STRESS
	IN	IN	KIP-IN	KIP-IN	KIP	KIP	KIP/IN	KIP/IN	KIP/IN**2
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
Min.	-4.5787E-14	-0.093920	-1.9613E-08	-1133.2	-6.3542E-11	-6.2601	-8.6139E-13	-0.053874	0.096991
Pile N.	1	2	2	2	1	1	1	2	1
Max.	1.4026E-12	0.1418	6.4288E-09	786.20	2.9110E-10	8.2751	7.3217E-12	0.070708	0.2519
Pile N.	1	1	1	1	1	2	1	1	2

US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix H — Climate Change Analysis

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Report Status: Draft, November 2023

Executive Summary

This is an ECB 2018-14 evaluation of potential climate vulnerabilities facing the Ala Wai Canal, conducted to complement the Flood Risk Management General Reevaluation Study. The Ala Wai Canal is a 2-mile-long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands, thus allowing development of the Waikiki district. It receives inflows from the Makiki, Manoa, and Palolo streams.

This assessment was performed to highlight existing and future challenges facing the project due to past and future climatic changes, in accordance with the guidance in Engineering Construction Bulletin (ECB) 2018-14, revised 10 Sep 2020. Background information on the project can be found in the 2021 feasibility study and in the main body of the 2022 General Reevaluation Report (GRR) (this climate assessment is intended as an appendix to the GRR); background information on climate-affected risks to projects and assessments thereof can be found in the ECB.

CEPOH is reviewing the stream/floodwall/canal system for flood control purposes. For this study, tourism, recreation and environmental purposes, are regarded as secondary to inundation due to riverine flooding and tidal effects. Consequently, riverine flood operations and tidal effects are the focus of this climate analysis.

The intent of the project is a reduction in flooding due to precipitation and associated streamflow. Although this is linked to sea level rise via the downstream boundary of the watershed, the coastal inundation and storm flooding due to SLC are not being addressed by these proposed measures. The project is not intended to reduce coastal storm damage and/or sunny day flooding due to relative sea level change.

The following list summarizes the climate assessment conclusions for the Ala Wai basin area.

1. Inundation of the Ala Wai Canal area would potentially affect a permanent population of 65,000 people with a daily transient population (mostly tourists) of 200,000.
2. Annual flood damages have been assessed for the current layout (Future Without Project condition) as $32.2 million (FY2021 dollars were assumed).
3. More than 40 combinations of floodwalls, flapgates, levees, tunnels and pumpstations were reviewed; the team's tentatively selected project (TSP) has been selected based on expected conditions through 2080, with acknowledgement that in the event of even higher water levels (more from relative sea level rise than from riverine flow changes) the design should be adaptable to the changes (wider levees and floodwalls at which vertical additions would be feasible).
4. Mean temperatures in Hawaii are projected to rise by 2 to 4 °F by the end of the 21st century (NOAA gives a range of 2 °F to 10 °F for Hawaii).
5. There is agreement in the literature that average rainfall is likely to decrease on Oahu.
6. There is less certainty over whether intense rainfall events are expected to increase or decrease in frequency, although the NCA4 does indicate that the frequency is increasing.
7. The effects of any seasonal rainfall trends are masked by observed and projected cyclical El Niño/La Niña changes, which seem to be occurring more frequently than the historical 7-year cycles.

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8. The Hawaiian Islands are small, relative to the typical modeling cell size in typical climate models, and so the models' projections for Hawaii are in general less clear than for the continental United States.
9. The literature review did not lead to a clear projection that inundation floods should be expected to occur more, or less, frequently. Both intense precipitation events and dry periods were expected to be more frequent, while the overall annual flow is expected to remain about the same.
10. A review of site-specific streamflow for the years 1968 to 2021 revealed no monotonic trends, and no nonstationarities.
11. The USACE Time Series Tool was used to prepare projections from the available data. The tool projected forward to the year 2034 using two different sets of assumptions (Autoregressive Integrated Moving Average (ARIMA) or exponential) but both extrapolation techniques allowed for "no change" to the expected annual peak flows (no trend), with large uncertainty bands.
12. The project is intended to decrease flood risk losses (lives or flood damages). The USACE Climate Hydrology Assessment Tool (CHAT) does not cover the Hawaii Region in its Vulnerability Assessment, and so a scoring of how the location is more vulnerable, or less so, with respect to flooding, than projects in other districts, has not been prepared. That the project was authorized indicates a concern that the vulnerability is significant relative to locations in the contiguous United States (CONUS).

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The table that follows is provided as an aid to the reader.

Listing of Acronyms for Climate Change Executive Summary

Acronym	Meaning
°C	Degree Celsius (or degree Centigrade)
°F	Degree Fahrenheit

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Acronym	Meaning
A1, A2	GCM settings A1 and A2 assume levels of increases in greenhouse gas emissions.
AEP	Annual Exceedance Probability
ARIMA	Autoregressive Integrated Moving Average
B1, B2	GCM settings B1 and B2 assume levels of reductions in greenhouse gas emissions.
BC	Boundary Condition. Of importance in the Ala Wai Canal watershed study was the assumed final water level BC, taking into account combinations of storm surge, sea-level change, and Inter-Annual Variability.
BCSD	Bias Corrected Spatially Disaggregated
CHAT	Climate Hydrology Assessment Tool
CMIP	Coupled Model Intercomparison Project
CONUS	Contiguous/Conterminous/Continental United States
CoP	Community of Practice
ECB	Engineering Construction Bulletin
ENSO	El Niño Southern Oscillation
EWL	Extreme Water Level
FWOP	Future Without Project (scenario used in assessing possible changes)
FY	Fiscal Year
GCM	Global Climate Model (or General Circulation Model)
GHM	Global Hydrologic Model
GMT	Greenwich Mean Time (or Greenwich Meridian Time). Noon in Hawaii corresponds to 2200 hrs GMT.
GRR	General Reevaluation Report
H&H	Hydrology and Hydraulics
HEC-RAS	Hydrologic Engineering Center – River Analysis System

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Acronym	Meaning
HUC	Hydrological Unit Class (or classification)
IAV	Inter-Annual Variability (water surface fluctuations in the ocean, caused by irregular fluctuations in coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents). NOAA 2022 indicates that ENSO is a large factor in IAV in Pacific Ocean stations.
MHHW	Mean Higher High Water
mm	Millimeter(s)
NAVD/ NAVD88	North American Vertical Datum of 1988
NCIA	Northeast Climate Impact Assessment
NCA, NCA4	(Fourth) National Climate Assessment
NGVD/ NGVD29	National Geodetic Vertical Datum of 1929
NOAA	National Oceanic and Atmospheric Administration
NSD	Non-Stationarity Detection
PAR	Population at Risk
POH, CEPOH	USACE Pacific Ocean Honolulu District
Q_n	Peak flow expected with a return period on average of n years (AEP is 1/n)
R^2	Coefficient of Determination (square of R the correlation coefficient)
R25	Total number of days per annum with precipitation above 1 inch (corresponds to 25 mm)
R5d	Annual maximum 5-day precipitation amount
R95p	Fraction of annual total precipitation from events exceeding the 1961-1990 95th percentile
RCM	Regional Climate Model
RCP	Representative Concentration Pathway. Scenario for future greenhouse gas emissions total. RCP 4.5 is considered low; RCP8.5 is considered high.
SDII	Simple Daily Intensity Index (regarding rainfall)

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Acronym	Meaning
SLC, RSLC	Sea-Level Change, Relative Sea-Level Change
SQRA	Semi-Quantitative Risk Assessment
TST	Time Series Tool
USACE	US Army Corps of Engineers
USBR	US Bureau of Reclamation
USGS	US Geological Survey
VA	Vulnerability Assessment
VIC	Variable Infiltration Capacity
WOWA	Weighted-Order, Weighted-Average

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1. Literature Review

The Ala Wai Canal is situated in the Waikiki District, near Honolulu in Oahu Island, Hawaii. Hawaii constitutes the US Geological Survey's Water Resources Region number 20 (Seaber et al 1987). Given the canal's flood risk management purpose, climate variables of greater concern include any increases in precipitation or increased streamflow to the canal. Examples are extreme precipitation events such as occurred in November 1965, December 1967, during Hurricane Iniki in 1992, or in storms in October 2004, March 2006, October-November 2006, December 2008, June 2011, April 2018, and December 2021 (NOAA, 2022).

Additional flooding occurred in March 2006 as part of an extended rain event caused by a developing La Niña pattern (NOAA National Weather Service, 2006). La Niña cycles tend to amplify and extend the winter wet season, creating above normal rainfall and frequency of thunderstorms (Bravender, 2011). Hurricanes have not historically posed a significant threat of headwater flooding from long duration, intense precipitation. Due to the location of the Hawaiian Islands in the Pacific relative to a high-pressure feature to the northeast, large storms are usually deflected or weakened before they approach the region. Cooler waters also play a role in weakening tropical systems that track through the area (Puleo, 2020).

Kona lows are more typical storm events affecting the watershed and the Hawaiian Islands generally. The word "kona" is Hawaiian for "leeward" which means the side of an island that is usually sheltered from prevailing trade winds and associated rainfall; the trade winds typically come from the northeast to east-northeast. Kona lows are subtropical storms that occur during the cool season in the north central Pacific. Historically, kona lows bring abundant moisture from the southwest which can produce significant precipitation in multiple forms (e.g., rain, snow, hail) in short time periods, leading to flash flooding and other related storm damages (Mossison & Businger; NOAA NESDIS, 2021).

Hawaii is also subject to astronomical tidal events. There are two high tides per day, in a cycle that follows the daily (repeating approximately every 24 hours 50 minutes) moonrise and moonset events, with timing delays that can be precisely calculated for a given location, Honolulu's shoreline in this case, on the earth. The gravitational attraction effect from the moon is greatest at the midpoint in time between moonrise and moonset, and again at the midpoint between moonset and the following moonrise, but the oceans' response depends on how the water is affected by the obstacles of shallow or deep obstacles in the approach to islands and continents. The major driving factor in these cycles is the gravitational influence of the moon on the water in the oceans of the rotating earth. The effect of the high tide when the moon is not visible (after moonset, before moonrise) is an anomaly of the "forcing" effect of the moon on the harmonic tidal nature of the ocean's cyclic motion.

The size of the high and low tides varies, depending also on the smaller gravitational influence from the sun. At new moon and full moon, the tides are particularly large owing to the interplay of the moon and sun on the motion of the oceans. At these times, the earth, moon and sun are aligned most nearly in a straight line (the straight-line alignment is exact during full eclipses).

Separately, it is noted that the effect of the moon on the tides is greater once per lunar month when the moon is at perigee (closest in its elliptical orbit to the earth), and smaller at apogee

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(moon farthest from the earth). Tidal effects and relative sea-level change are reviewed in more detail in the "Sea Level Change" subsection of the Literature Review section.

Table 0.1 is a summary of relevant climate data for a 30-year period 1991-2020 at the Daniel K. Inouye International Airport, 7 miles west of the Ala Wai Canal location.

Table 0.1 Climate Data for Honolulu International Airport

Climate data for Honolulu International Airport (1991-2020 normals); 1877-to-2021 extremes													
MONTH	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Record high (°F)	88	88	89	91	93	92	94	95	95	94	93	89	95
Mean maximum (°F)	84.0	84.6	85.0	86.4	88.5	89.1	90.4	91.1	91.2	90.1	87.3	85.1	91.7
Average high (°F)	80.5	80.5	81.2	83.1	84.8	86.9	88.1	88.8	88.4	86.9	84.1	81.8	84.6
Daily mean (°F)	73.6	73.8	74.7	76.6	78.2	80.3	81.6	82.2	81.6	80.4	78.0	75.5	78.0
Average low (°F)	66.8	67.1	68.1	70.1	71.5	73.8	75.1	75.6	74.8	73.9	71.8	69.2	71.5
Mean minimum (°F)	60.0	60.2	62.1	64.6	66.3	70.1	71.6	71.8	70.6	69.0	66.1	63.1	58.5
Record low (°F)	52	52	53	56	60	63	63	63	64	61	57	54	52
Average precipitation (inches)	1.84	1.94	2.36	0.77	0.82	0.50	0.52	0.84	0.88	1.51	2.25	2.18	16.41
Average precipitation days (>0.01 in)	7.7	7.6	8.7	7.5	6.0	6.3	7.3	5.7	7.2	7.7	8.6	8.9	89.2
Average relative humidity (%)	73.3	70.8	68.8	67.3	66.1	64.4	64.6	64.1	65.5	67.5	70.4	72.4	67.9
Mean monthly sunshine hours	213.5	212.7	259.2	251.8	280.6	286.1	286.1	303.1	278.8	244.0	200.4	199.5	3,035.9
Percent possible sunshine	63	66	69	66	69	71	74	76	76	68	60	59	68
Data Sources: NOAA sources (Now Data – NOAA Online Weather; US Monthly Climate Normals; WMO Climate Normals for Honolulu, Oahu, HI 1961-2021). The record of extremes is based on records from February 1877 to September 1949 in downtown Honolulu, with the record continuing at the airport from October 1949 to 2021 (current when checked).													

The record low temperature for the station was 52 °F on January 20, 1969.

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The three sources for this information are listed below:

- NOAA 2021(a). "NowData - NOAA Online Weather Data". National Oceanic and Atmospheric Administration. Retrieved September 11, 2021.

- NOAA 2021(b). "Station: Honolulu INTL AP, HI". *U.S. Climate Normals 2020: U.S. Monthly Climate Normals (1991-2020)*. National Oceanic and Atmospheric Administration. Retrieved September 11, 2021.

- NOAA 2021(c). "WMO Climate Normals for HONOLULU, OAHU, HI 1961–1990". National Oceanic and Atmospheric Administration. Retrieved September 11, 2021.

A January 2015 literature synthesis conducted by the USACE Institute for Water Resources (USACE 2015) summarizes the available climate change literature for the Hawaii region, covering both observed and projected changes. These include temperature, precipitation, and streamflow. Wuebbles, D.J. et al 2017 (Volume 1) and Reidmiller, D.R. et al 2018 (Volume 2) reviewed climate changes in progress in the United States in a report widely referred to as simply the fourth National Climate Assessment (NCA) or NCA4. Keener et al (2018) prepared Chapter 27 of Volume 2 of NCA4. Chapter 27 has as its focus Hawaii and the U.S.-Affiliated Pacific Islands. The USACE literature synthesis and NCA4 are the two major sources of the information referenced in this literature review. The focus of these references is on summarizing trends identified within historical and observed temperature, precipitation, and streamflow records, as well as providing an indication of future hydrometeorology based on the outputs from Global and Regional Climate/Circulation Models (GCMs and RCMs). In this assessment, background on observed and projected temperature and precipitation is provided as context for the impact they have on observed and projected streamflow.

2. Temperature

2.1 Temperature Observations

Observed changes in annual average temperature for the Hawaii Region have increased by 1.26 °F for the 1986-2016 period relative to the 1925-1960 period. Observed annual average maximum and annual average minimum temperature have increased by 1.01 °F and 1.49 °F in the Hawaii region, respectively (Keener et al (2018)). The NCA4 noted temperatures having risen 0.76 °F in Hawaii from 1918 to 2018, with 2015 and 2016 having been the two warmest years on record through 2018 (Keener et al, 2018 [NCA4 Vol2, Ch 27]). The average annual temperatures since 1918 are summarized in Figure 0.1.

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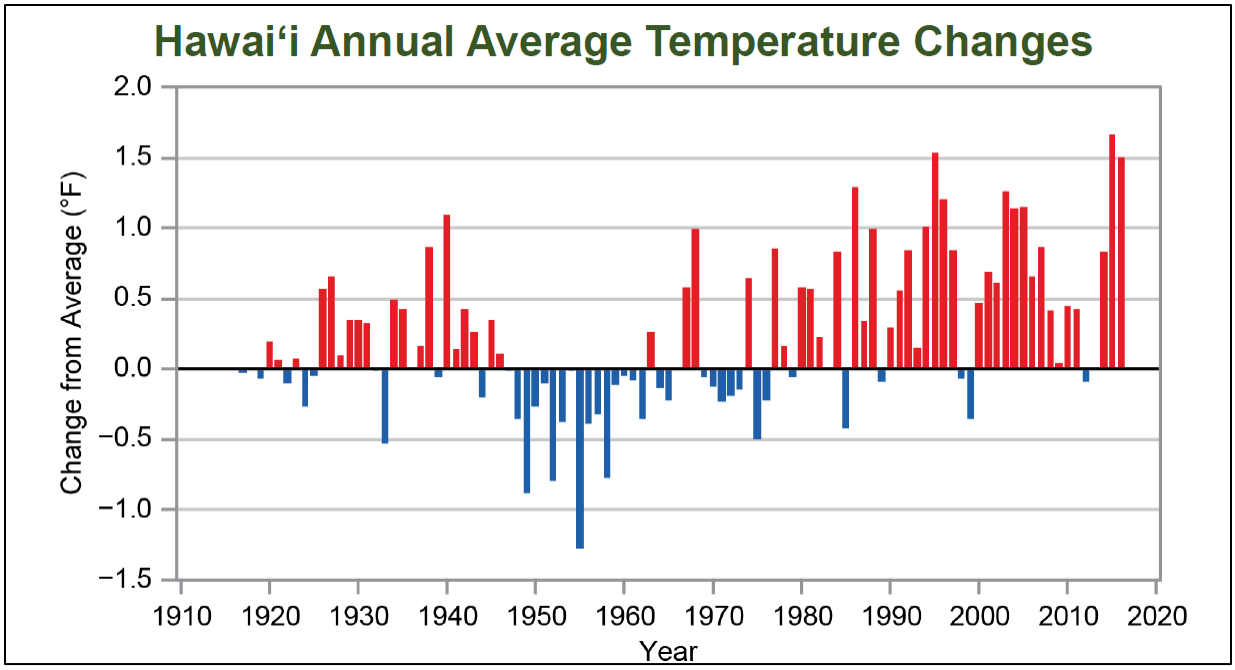

Figure 0.1 Rising temperatures since 1918 compared to 1944-1980 average (from University of Hawaii at Manoa, reported in NCA4 Vol 2 Ch 27).

Safeeq et al (2013) reviewed temperatures at 7 stations on Oahu over the years 1969 to 2007. Although mean and maximum temperatures appeared to be increasing, the trends were not significant. The annual minimum temperature, however, had increased significantly at six stations on the leeward side of the island, while there was one station on the windward northern side of the island where the annual minimum temperature was decreasing significantly. At the Ala Wai Canal, the annual minimum temperature appeared to have been increasing by approximately 0.05 °C per year (5 °C or 9 °F per century). This is shown in Figure 0.2. The Safeeq et al (2013) team noted that night-time minimum temperatures were rising in general, resulting in a smaller diurnal temperature range (DTR) over time. The decrease between daily maximum and minimum values had also been noted by Fletcher (2010) in a review of climate change briefing paper by the University of Hawaii at Manoa.

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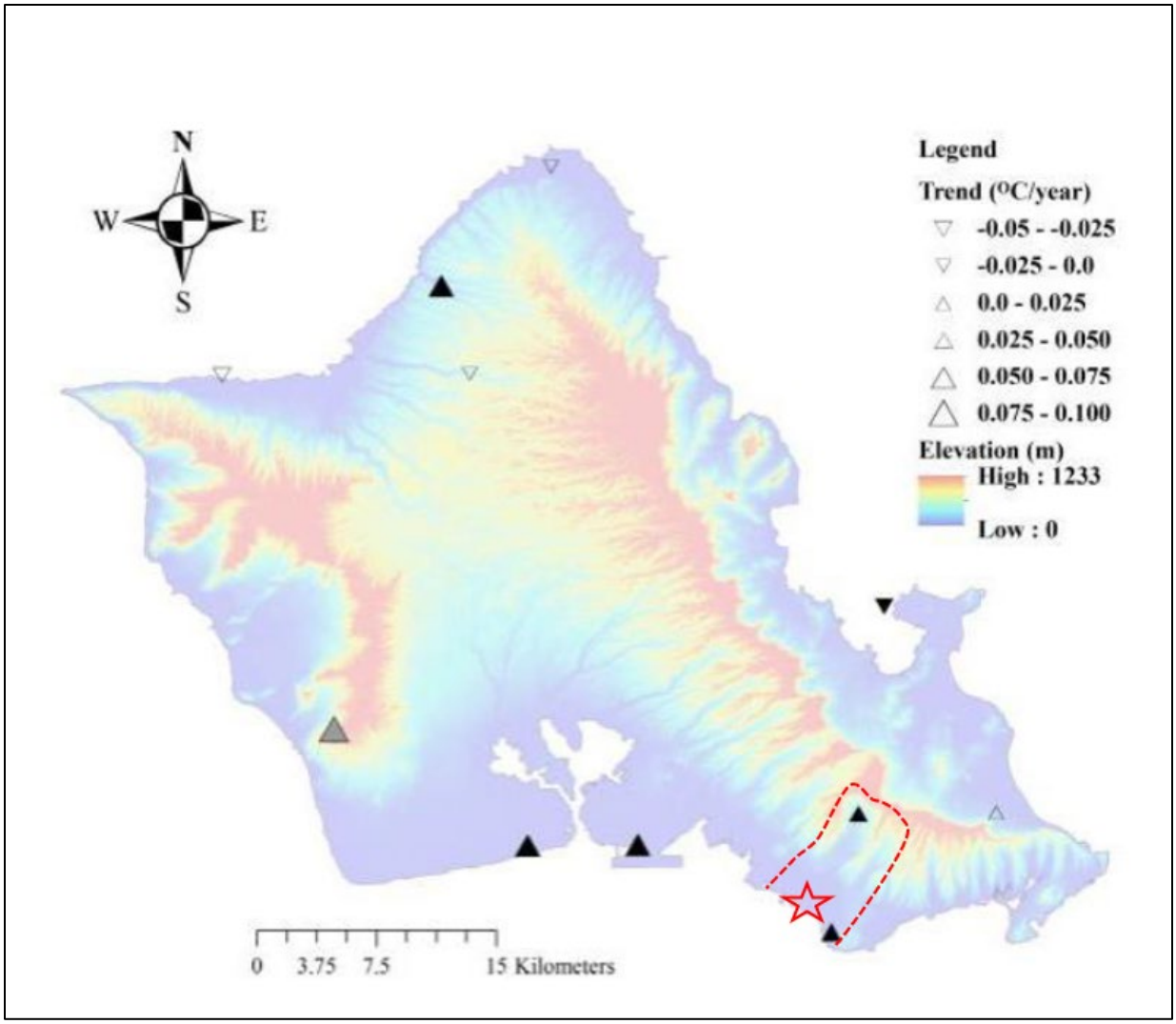

Figure 0.2 Safeeq et al 2013 Review of Annual Minimum Temperature Changes in the Oahu Region. The approximate location of the Ala Wai Canal is noted with a star; the approximate limits of the Ala Wai watershed are noted with a broken red outline.

2.2 Temperature Projections

NCA4 (Keener, V. et al (2018)) reviewed temperature changes and projected RCP 4.5 and RCP 8.5 models. The temperature projections are summarized in Figure 0.3. The cyclical climatic effects El Niño and La Niña were expected to increase in frequency, and they would also add to uncertainty over how temperatures would change in Hawaii. In review of temperature changes under RCPs ranging from RCP4.5 to RCP8.5, NCA4 V1 Ch6, (Vose et al, 2018) noted expected temperature increases of 4.0 to 6.0 °F (2.2 to 3.3 °C) by 2099, expected to be the smallest temperature increases in the United States, owing to the tempering effects of the surrounding Pacific Ocean. They tabled minimum, mean, and maximum temperatures in Hawaii as rising over time by 1.49, 1.26, and 1.01 °F as derived from the nClimDiv dataset.

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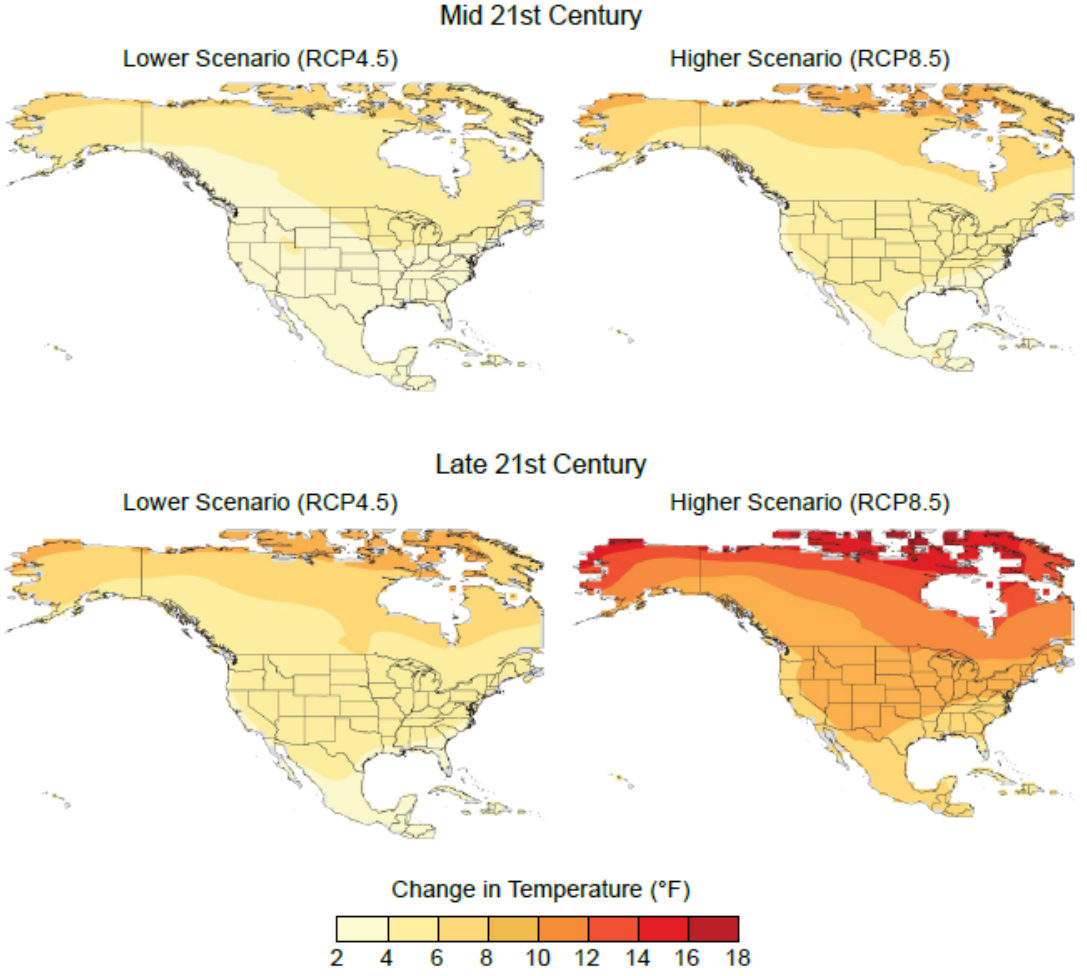

Figure 6.7. Projected changes in annual average temperatures (°F). Changes are the difference between the average for mid-century (2036–2065; top) or late-century (2070–2099, bottom) and the average for near-present (1976–2005). Each map depicts the weighted multimodel mean. Increases are statistically significant in all areas (that is, more than 50% of the models show a statistically significant change, and more than 67% agree on the sign of the change[45]). (Figure source: CICS-NC and NOAA NCEI).

Figure 0.3 Projected Temperature-Changes Reported in NCA4 – for Hawaii, increases by 2099 of 4.0 to 6.0 °F (2.2 to 3.3 °C) were projected.

Leong et al (2014) in NCA3 examined results of projected increases in average temperature ranges of 1.5 °F (0.83 °C) by 2055 relative to 1971-2000) under a scenario of substantial emissions reduction (B1) to 3.5 F (1.9 °C) assuming continued increases in emissions (A2). Walsh et al (2014) developed an increase in temperatures ranging from 3 °F to 5 °F (1.7 °C to 2.8 °C), for the scenarios shown in Figure 0.4.

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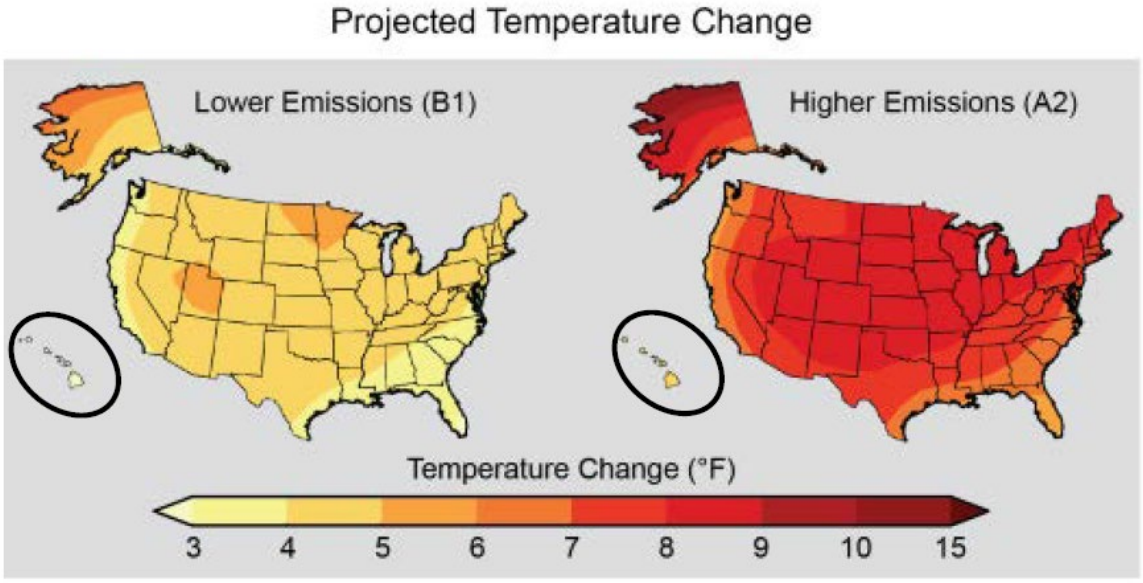

Figure 3.1. Projected changes in average surface air temperature (°F) between 2071-2099 relative to the 1970-1999 for B2 (low emissions) scenario (left) and A2 (high emissions) scenario (right). The Hawaii Region is within the black oval (Carter et al., 2014).

Figure 0.4 Projected Air Temperature Changes. Based on NCA3 (Walsh et al) as reported by CDM Smith in USACE (2015). For Hawaii, the ranges are 3 °F to 5 °F (1.7 to 2.8 °C)

Keener et al (2013) reviewed the results of climate models assuming high (A2) or low (B1) emissions scenarios to develop similar estimates for Hawaii: mean annual temperatures were projected to rise by 2 °F (1.1 °C) under B1 scenario, or by 5 °F (2.8 °C) through the end of the 21st century. The result is presented in Figure 0.5.

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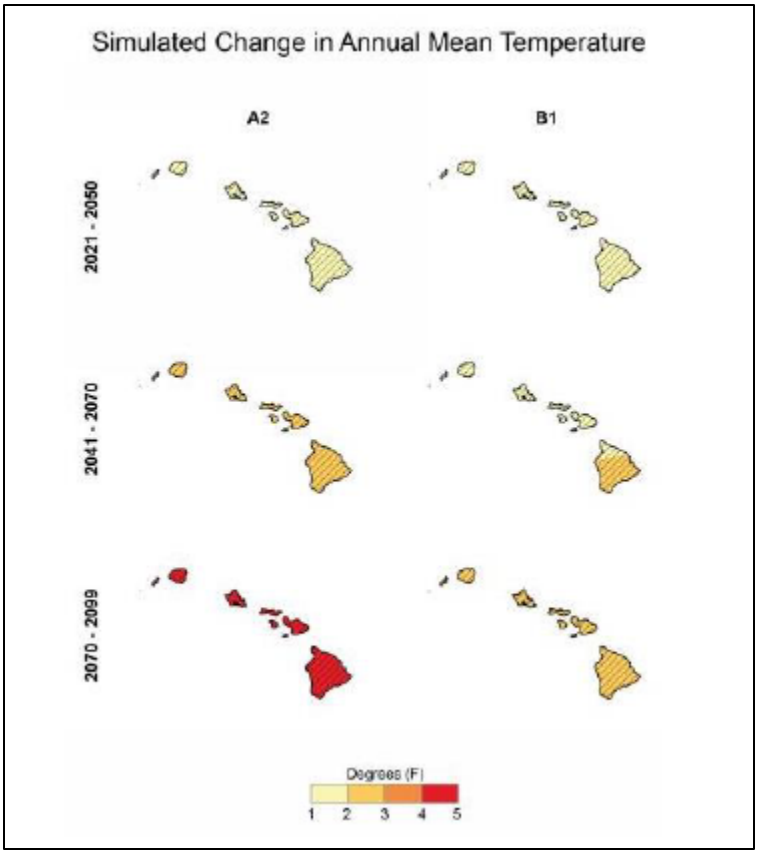

Figure 0.5 Projected changes in annual mean temperature in Hawaii (°F) between 2021-2099 for the A2 (high emissions) scenario (left) and B1 (low emissions) scenario (right) (Keener et al, 2013).

NOAA has published a set of individual state climate summaries containing information on historical climate variations and trends, future climate model projections of climate conditions, and past and future conditions of sea level and coastal flooding. Regarding temperatures in Hawaii, NOAA reported (Stevens et al 2022) that temperatures had risen by about 2 °F since 1950, with a sharp increase in warming over the most recent decade (2010 to 2020). For Honolulu, NOAA report noted that temperatures had increased by 2.6 °F and had been consistently above the 1951-1980 average since 1975. The annual number of days below freezing was reported to be decreasing over time, and the daily temperature range was decreasing over time, largely due to nighttime warming.

Figure 0.6 provides a summary of the expected changes, based on the two scenarios (RCP4.5 and RCP8.5) in which greenhouse emissions either continue to increase (higher emissions) or increase at a slower rate. Although the figure is taken from the state-specific NOAA report (Stevens et al 2022), the NOAA report refers to work by Vose et al at North Carolina State University in 2014. Observed temperatures are generally within the envelope of model simulations of the historical period (gray shading). Historically unprecedented warming is projected during this century. Less warming is expected under a lower emissions future (the coldest end-of-century projections being about 2 °F warmer than the historical average; green shading) and more warming under a higher emissions future (the hottest end-of-century projections being about 10 °F warmer than the hottest year in the historical record; red shading).

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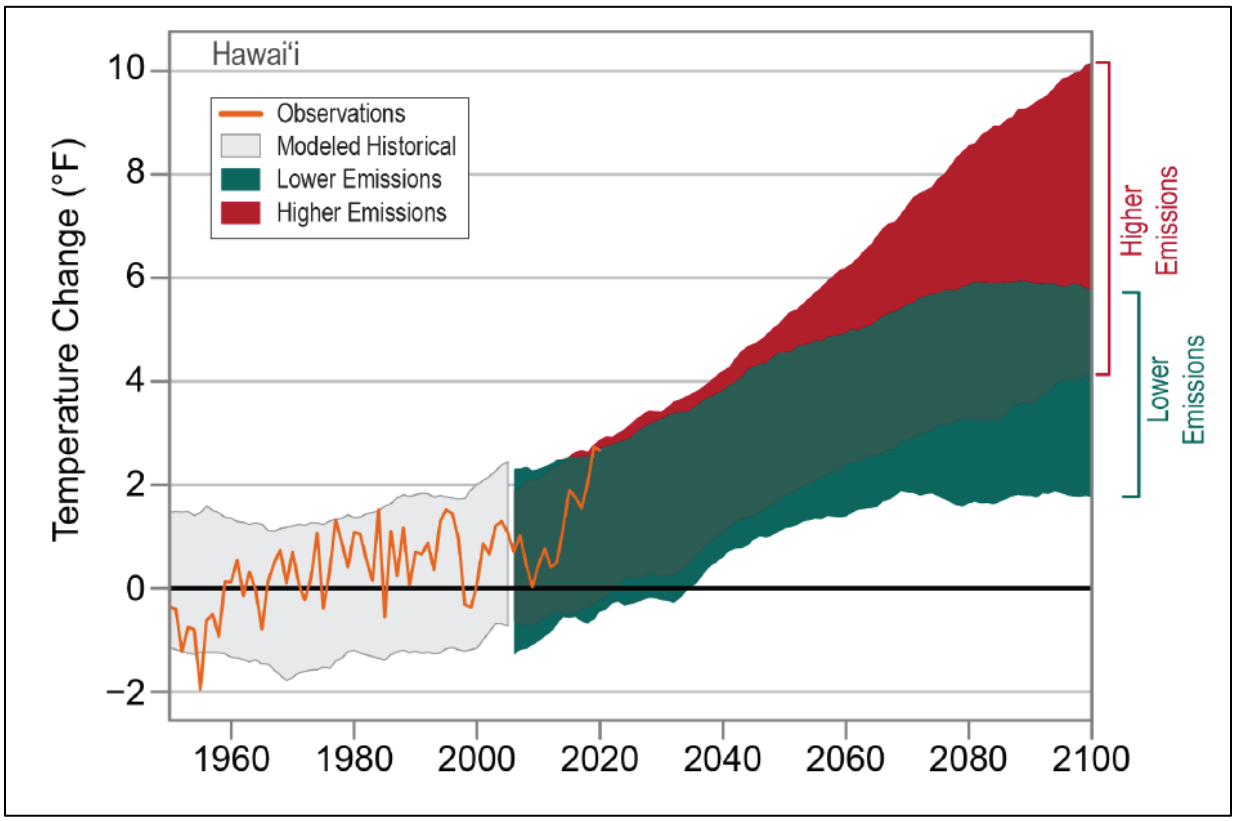

Figure 0.6 Observed and Projected Temperature Change in Hawaii (Source: NOAA State Climate Summary 149-HI)

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3. Precipitation

3.1 Precipitation Observations

NCA4 Volume 2 Chapter 27 noted regions of the Hawaiian Islands in which the change in flow levels was statistically significant. For Oahu, the percentage change in precipitation per decade was mostly small (a decrease of less than 4% per decade), although there was a region of larger and statistically significant change on the windward (unsheltered) northern mountains, draining to the north (away from the Ala Wai Canal area). These trends are shown in Figure 0.7.

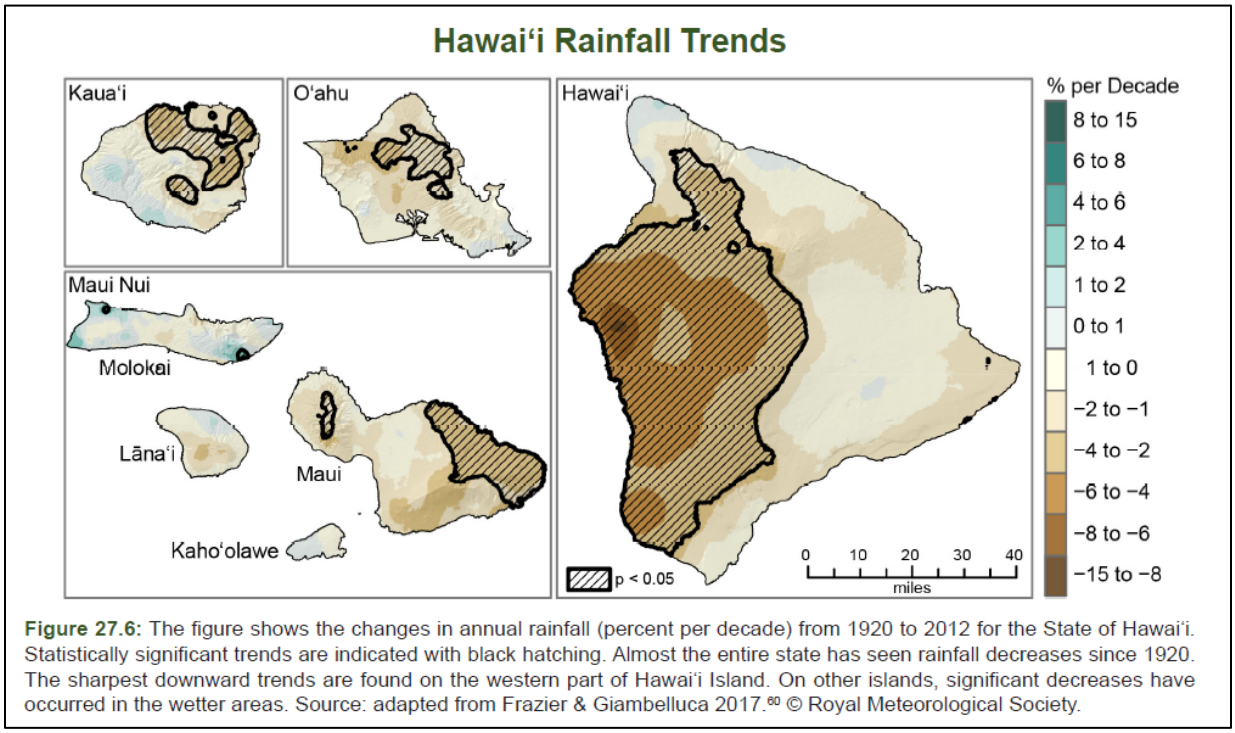

Figure 27.6: The figure shows the changes in annual rainfall (percent per decade) from 1920 to 2012 for the State of Hawai'i. Statistically significant trends are indicated with black hatching. Almost the entire state has seen rainfall decreases since 1920. The sharpest downward trends are found on the western part of Hawai'i Island. On other islands, significant decreases have occurred in the wetter areas. Source: adapted from Frazier & Giambelluca 2017.[60] © Royal Meteorological Society.

Figure 0.7 Observed Rainfall Trends in Hawaii 1920-2012 (Source: NCA4)

Fletcher (2010) noted, however, that despite the decreases in average precipitation (he cited a 15% reduction in rainfall over the previous 20 years), there was a trend of increasing rain intensity. He reported a 12% increase in the heaviest downpours (measured as the heaviest 1% of all events) for the period 1958 to 2007.

Fletcher's findings were at odds with the studies by Chen and Chu (2014) and Chu et al (2010). These studies both found that the incidence of intense precipitation was decreasing on Oahu. Data reviewed by Chen and Chu (2014) included the frequency of 300-mm (12-inch) storms 1960 to 2009, while Chu et al (2010) reviewed, for the epochs 1959-1979 and 1980-2007: total number of days with precipitation above 1 inch (R25); the simple daily intensity index (SDII); annual maximum 5-day precipitation amount (R5d); and the fraction of annual total precipitation from events exceeding the 1961-1990 95th percentile (R95p). It should be noted that the island of Hawaii, south-east of Oahu, appeared to be experiencing more, not fewer, intense rainfall events.

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The USGS has prepared a useful summary figure showing rainfall in the Hawaiian Islands. This is presented as Figure 0.8. It is noted that the Ala Wai Canal area has an expected annual rainfall total of less than 40 inches, but that the contributing drainage basin region includes regions shaded to indicate precipitation of 40-80 and 80-120 inches, and a smaller regions of greater peak values listed as noted.

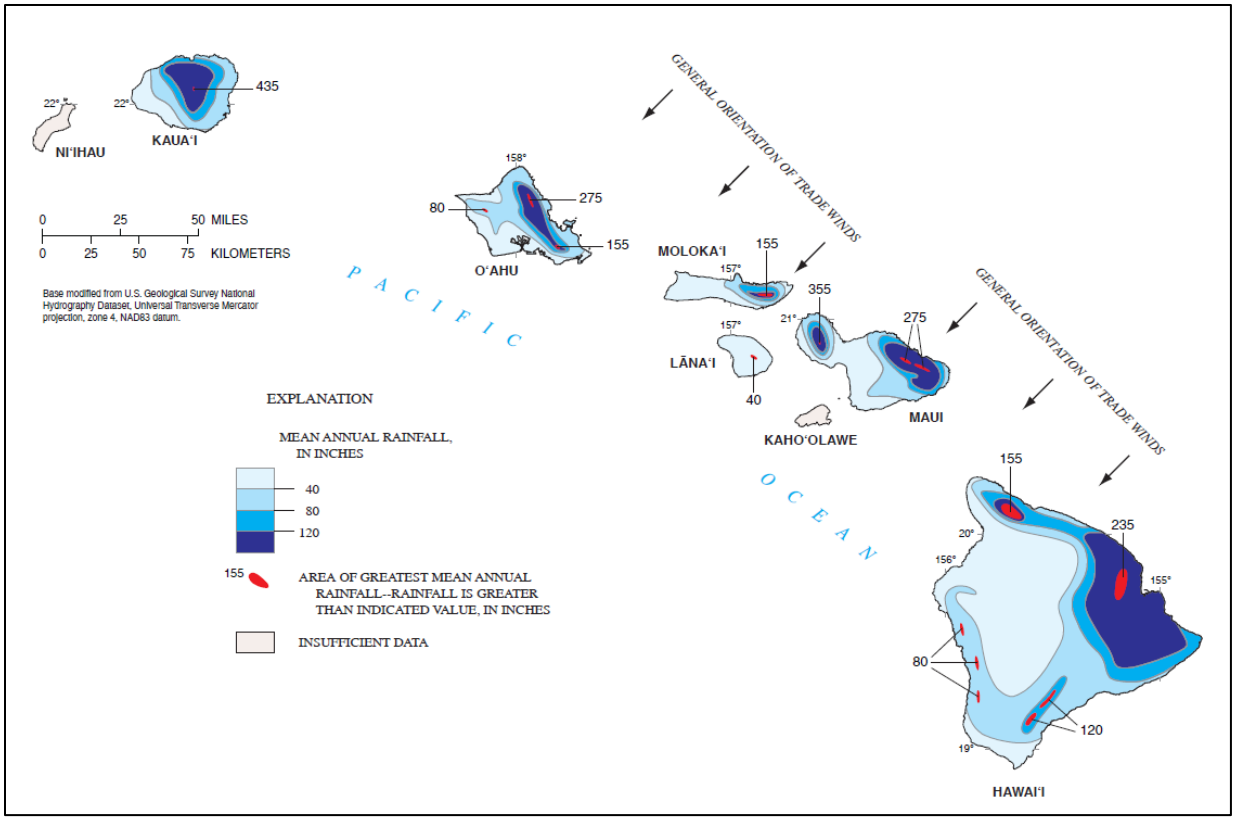

Figure 0.8 Rainfall Observed in the Hawaiian Islands (from Oki 2014, modified from Giambelluca et al, 1986).

Giambelluca (2013) prepared a meteorological report for Hawaii that included the map in Figure 0.9

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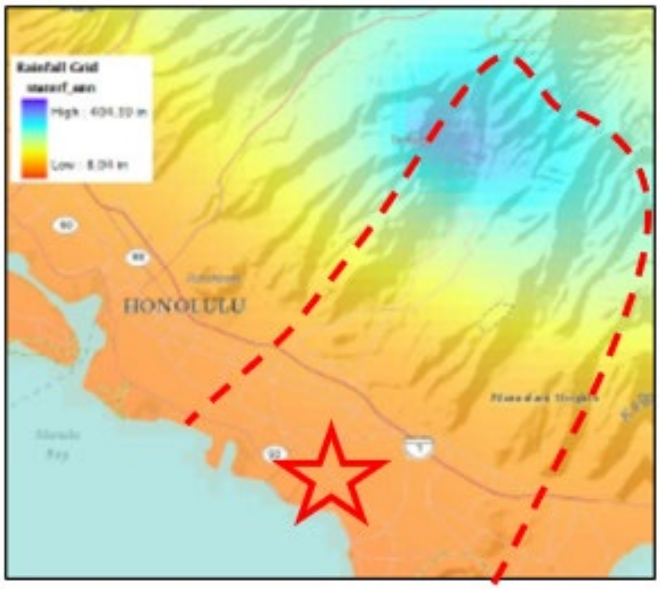

Figure 0.9 Mean Annual Rainfall View of the Waikiki Drainage Basin Area, from Giambelluca (2013). The approximate boundary of the watershed is shown with a red dotted line; the approximate location of the canal is shown with a red star.

USACE 2021 reviewed the USGS report. The USACE (2021) summary included that the 16.2 square-mile basin included Makiki and Manoa watersheds with annual rainfall of more than 160 inches per annum, with less rain falling on the Palolo section of the watershed. The less steep regions around Ala Wai and Waikiki, received about 30 inches per annum. USACE (2021) noted that these regions of lower overall rainfall were also more urbanized, more impervious, and better served by a storm drain system, contributing to flashy runoff behavior with a typical time to peak of less than 1 hour, and a typical total flood hydrograph duration less than 6 hours.

3.2 Precipitation Projections

Keener et al (2018) report projected changes in precipitation of small-to-30% increases in end-of-century precipitation under a higher-scenario (RCP 8.5) case, with small-to-60% decreases in precipitation for dry areas under the same RCP 8.5 case. The report noted uncertainty arising from downscaling as a matrix of large (190-mile x 190-mile) cells is used in the model, but less crude results are required for forecasting purposes at locations as individual watersheds in the individual islands in Hawaii. For the Ala Wai Canal project, for example, the project has a basin area smaller than 30 square miles. Different downscaling methods lead to different results. The authors note that for the lower scenario RCP4.5, decreases of up to 60% should be expected in the sheltered areas of Oahu (south side of the island) for the period 2071-2100, relative to the range observed 1920-2021, with similar expected changes for the more extreme RCP8.5 (decreases of 10% to 60%). The authors noted that the number of climate and water resources monitoring stations had declined in the region, reducing the ability of researchers to project future changes in climate.

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The NOAA report for the State noted trends of northern Hawaii receiving less annual precipitation over the current century, compared to the late 20th century, with the main island and southern islands receiving up to 5% more precipitation by the middle of the 21st Century, while more northern Hawaiian Islands would receive up to 5% less precipitation. This summary figure is shown in Figure 0.10.

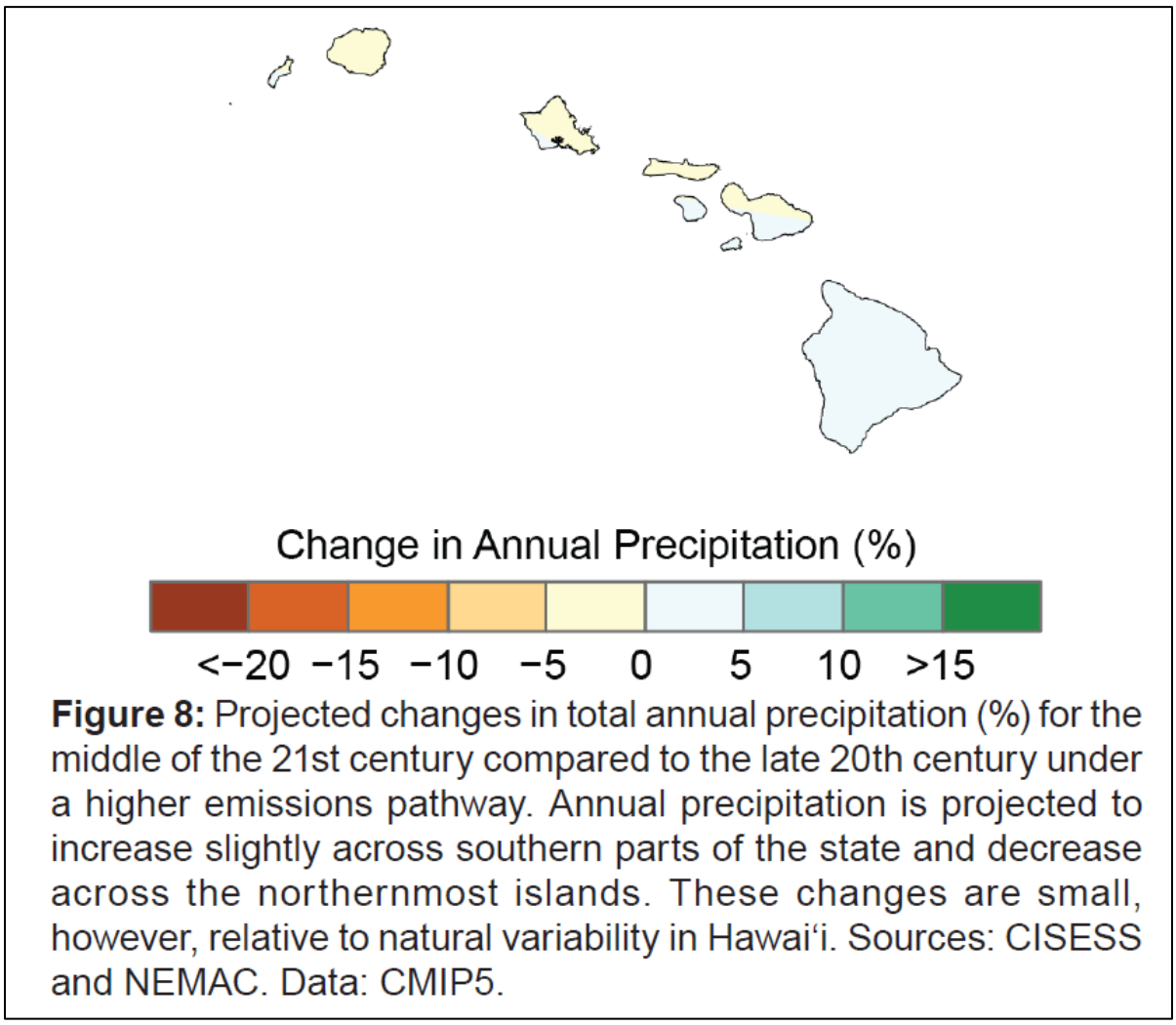

Figure 8: Projected changes in total annual precipitation (%) for the middle of the 21st century compared to the late 20th century under a higher emissions pathway. Annual precipitation is projected to increase slightly across southern parts of the state and decrease across the northernmost islands. These changes are small, however, relative to natural variability in Hawai'i. Sources: CISESS and NEMAC. Data: CMIP5.

Figure 0.10 Changes in total annual precipitation in Hawaii for the mid-21st century, compared to the late 20th century.

While Oahu fell mostly into the "less precipitation" category, the Waikiki region appeared to be on the edge of the "more" and the "less" precipitation zones. The NOAA report noted that the projected changes were small compared to the natural variability of precipitation in the State.

USACE (2015) reported a similar divergence of results in the NCA3 report (Walsh et al, 2014), based on different emissions projections and seasons: winter and spring (wet-season period is roughly October through April) precipitation was not expected to change in the 20th century, but

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summer and fall (dry season) were potentially 10% to 30% wetter, although the increase was not found to be statistically significant.

The NCA4 (Keener et al, 2018) referenced primarily model results from RCP4.5 and RCP8.5 emissions assumptions. The NCA4 acknowledged previous findings of a decreasing trend in the number of extreme rainfall events in Hawai‘i, but indicated that both droughts and floods were becoming more frequent in the state. This finding was made, based on “a more detailed spatiotemporal analysis from a grid-box level down to the island level”.

Hotter, drier soil conditions are expected to increase the rate of soil moisture loss in the leeward side of the island, where lower annual rainfall is expected. Droughts are therefore likely to become more intense (Stevens et al, in NOAA 2022). The observed and projected changes in peak streamflow are reviewed in the section on Streamflow.

4. Cyclical Patterns: El Niño Southern Oscillation and La Niña

Every 3 to 7 years climate conditions over the Pacific Ocean basin change dramatically because of the El Niño-Southern Oscillation (ENSO). The extremes of this oscillation are referred to as El Niño and La Niña.

As summarized by NOAA’s Pacific ENSO Applications Climate Center, an El Niño event would typically result in the following climate impacts in Hawai‘i:

- More rain the beginning of the season, then rapidly less;
- Weaker trade winds, with occasional westerly winds;
- Near, to slightly above, normal sea level;
- High run-up from distant swells;
- Much warmer temperatures at and below the sea surface; and
- Increased risk of tropical cyclones (storms form closer and move towards the islands).

The strength of these ENSO-related patterns in the short term can make it difficult to detect the more gradual, long-term trends of climatic change. It is unknown how the timing and intensity of ENSO will continue to change in the coming decades, but recent climate model results suggest a doubling in frequency of both El Niño and La Niña extremes in the 21st century as compared to the 20th century under scenarios with more warming (Keener et al (2018)).

The NCA4 outlines changes that have been observed in the Pacific in the year that follows an El Niño event. While the Hawaiian Islands do not appear to be affected by the temporary increases or decreases in sea levels, they are in a region mapped as subject to especially dry weather in January through March (the middle to the end of the typical rainy season) following an El Niño event, with an increased frequency of tropical cyclones immediately south of the islands during the El Nino event, potentially affecting the south-facing Waikiki region with increased rains; and especially wet weather in December through February (also late in the typical rainy season) following a La Niña event. The effects of El Niño/ La Niña cycles on Pacific weather patterns are shown in Figure 0.11.

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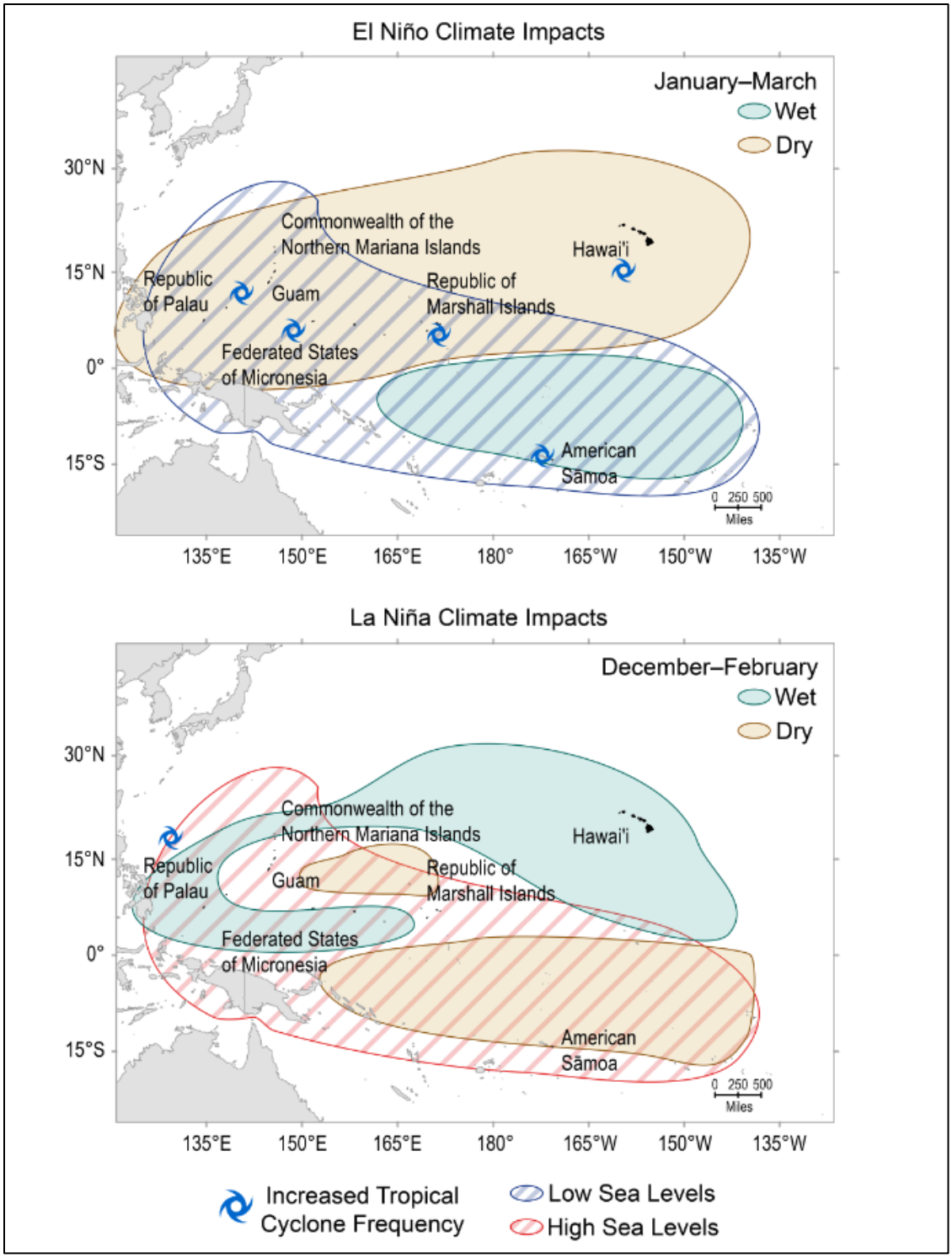

Figure 0.11 Effects on Pacific Ocean Weather of Prior-Year El Niño and La Niña events.

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If both the “drier” and the “stormier” tendencies are in effect immediately following an El Niño event, then the year’s “late rainy season” months are likely to see alternating bouts of wet and dry weather in general, with both effects occurring together (in the same rainy season), immediately after the El Niño extreme of the cycle.

5. Tropical Cyclones: Frequency and Intensity

The way climate change alters the frequency and intensity of tropical cyclones is complex. Riehl (1949) reviewed historical evidence along all the Hawaiian Islands, noting that “The larger the rainfall the greater becomes the relative homogeneity of storms. As storm intensity increases, the importance of orography declines.” However, tropical cyclone frequency and intensity in the central Pacific are expected to increase. This is in part due to:

1. changes in tropical cyclone tracks
2. increased formation of tropical cyclones near Hawai‘i
3. weakening of the vertical wind shear that typically tears tropical cyclones apart as they approach the islands
4. greater frequency of ENSO occurrences (Keener, et al., 2018).

A physically based empirical model analysis in 2013 revealed that the primary cause for an increased tropical cyclone frequency around the Hawaiian Islands was due to storm tracks shifting northward in the open ocean southeast of the island (Murakami, Wang, Li, & Kitoh, 2013). The study also found two other causes for an increased frequency of tropical cyclone occurrences:

1) tropical cyclone formation in the open ocean east of the Hawaiian domain is expected to increase; and
2) a projected change-in-track effect off the coast

of Mexico (tropical cyclones that form there are more likely to propagate into the Hawaiian domain).

Tropical cyclones are expected to make landfall more frequently and with greater intensity in Hawai‘i due to the loss of a “vertical wind shear” that typically tears them apart as they approach the islands. In Hawai‘i, strong northeasterly trade winds flow in the opposite direction of the westerly winds aloft in the upper atmosphere. The effect – a “vertical wind shear” – essentially tears apart approaching tropical cyclones before they can make landfall. However, this wind shear is simulated to weaken. Under the assumption that CO_2 concentrations are doubled, model simulations show an approximate doubling of the risk of landfalling tropical cyclones in Hawai‘i (Grabowski M., 2020).

El Niño events typically result in an increased risk of tropical storms landfalling, as storms form closer and move towards the islands more easily. The number of ENSO occurrences is also expected to increase, as discussed in the previous section. The most active hurricane season through 2022 in the Central Pacific was 2015 (a strong ENSO season), with 8 hurricanes and 6 additional tropical storms (NCEI, 2022).

6. Inter-Annual Variability (IAV) in Sea-Level Measurements

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Inter-Annual Variability (IAV; water surface fluctuations in the ocean) is caused by irregular fluctuations in coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents).

NOAA (2022) indicates that ENSO is a large factor in the IAV of Pacific Ocean stations.

Like individual storms, the IAV provides an extra factor that confuses the gentle rises and falls of the ocean due to the gravitational effects of the sun and moon, and so it is quantified by observation of the combined effects and subtracting out these known tidal effects.

The observed effect of IAV will be examined later in this report (for example, in Figure 0.15 in the section on Sea Level Change).

7. Streamflow

7.1 Streamflow Observations

Oki et al (2010), in USGS Scientific Investigation Report 2010-5035, summarized how the number of monitored USGS stream gaging stations in Oahu had fluctuated. There were 24 in 1957; 36 in 1971; 41 in 1994; 24 in 2008; 27 in 2010. The available data was consequently limited, with few records longer than 20 years. Given the sparsity of data, Oki et al (2010) divided Oahu into only 2 regions for purposes of generating estimates of n-year peak flows at ungaged sites, where n varied from 2 to 500. The Ala Wai GRR canal project has a focus on return periods up to Q_{100}, and mostly at or below the Q_{50} flow. Although various factors were considered in preparation of the regression equations, such as the underlying geology, soil types, vegetation cover, the maximum 48-hr precipitation with return period 2-years or 5 years, and elevation, the selected regressions were based on drainage area and mean annual precipitation, with standard errors of prediction ranging from 40% to 51%, and coefficient of determination R^2 ranging from 0.73 to 0.77. The analysis did not appear to take into account the possibility of climate change.

The Oki et al (2010)-derived regression equations for Oahu's leeward side are shown in Table 0.2. The Ala Wai project is on the leeward side. It is unclear what PRECIP values would be appropriate since there are three parallel streams, each of which includes some area at various rainfall values (as shown previously in Figure 0.8 and Figure 0.9). (Table 0.2 and Figure 0.12) demonstrate the relative insensitivity of the peak flow at the Ala Wai catchment to relatively large (+/- 10%) changes in annual precipitation.

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Table 0.2 USGS Expressions for Peak Flows in Oahu (from Oki et al, 2010). Drainage Areas are in square miles; annual precipitation is in inches; regression flows are calculated in cubic feet per second.

USGS Expressions for Peak Flows in Oahu (from Oki et al, 2010). Drainage areas are in square miles; annual precipitation is in inches; regression flows are calculated in cubic feet per second.

Oahu Leeward Region: Regression Equation • For DRNAREA 0.56 to 45.1 sq mi; • For PRECIP 31.9 to 252 inches per annum	Standard error of prediction, in percent	R^2	Standard model error, in percent
Q_2 = 2.339 (DRNAREA $^{0.679}$) (PRECIP $^{1.113}$)	51	0.74	48
Q_5 = 17.58 (DRNAREA $^{0.668}$) (PRECIP $^{0.820}$)	42	0.76	40
Q_{10} = 49.09 (DRNAREA $^{0.664}$) (PRECIP $^{0.674}$)	40	0.77	38
Q_{25} = 145.2 (DRNAREA $^{0.657}$) (PRECIP $^{0.520}$)	40	0.76	37
Q_{50} = 290.4 (DRNAREA $^{0.652}$) (PRECIP $^{0.422}$)	40	0.76	37
Q_{100} = 539.5 (DRNAREA $^{0.646}$) (PRECIP $^{0.335}$)	41	0.75	38
Q_{500} = 1,841 (DRNAREA $^{0.633}$) (PRECIP $^{0.162}$)	44	0.73	40

Fletcher (2010) noted that changes in rainfall since the 1940's seemed to be producing corresponding reductions in streamflow, both from stormflow and from baseflow.

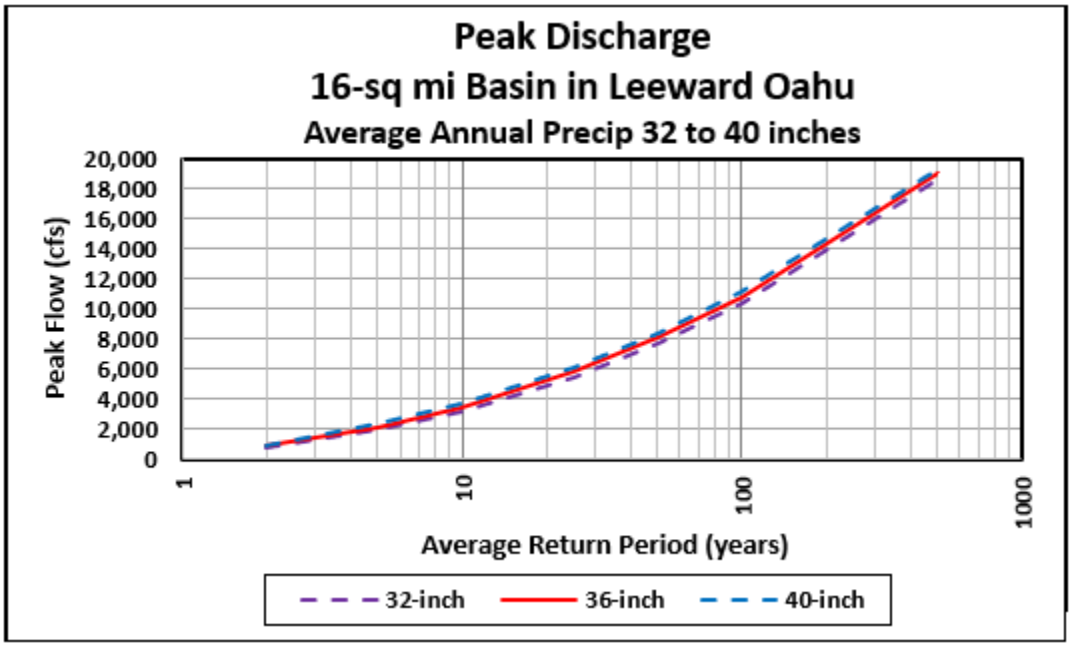

Figure 0.12 Peak Discharge Return Periods for a 16-Square-Mile Drainage Basin, for Annual Average Precipitation 32 to 40 Inches per Year

For a 16-square-mile basin in leeward Oahu (such as the Ala Wai basin), and for assumed annual precipitation of 32 to 40 inches per annum, Figure 0.12 has been prepared to show a range of plausible peak discharge probabilities. As the tight band of results shows, the peak

flow for a 16-square-mile area is not greatly affected by the size of the average annual precipitation. Review of different drainage basin areas leads to a range of expected peak flows, but for the range of annual precipitation rates reviewed, the same pattern of narrow bands from 32 inches to 40 inches applies.

Applying the equation-set of Oki et al (2010), as summarized in Figure 0.12 and Table 0.2, for a 36-inch annual precipitation rate and a range of drainage basin areas, yields the following estimates of flow in cubic feet per second:

- 1 sq mi. Q_2 = 126; Q_5=332; Q_{10}=549; Q_{25}=936; Q_{50}=1,318; Q_{100}=1,792; Q_{500} = 3,290.
- 2 sq mi. Q_2 = 202; Q_5=528; Q_{10}=871; Q_{25}=1,476; Q_{50}=2,070; Q_{100}=2,804; Q_{500} = 5,102.
- 4 sq mi. Q_2 = 324; Q_5=838; Q_{10}=1,379; Q_{25}=2,379; Q_{50}=3,253; Q_{100}=4,388; Q_{500} = 7,912.
- 8 sq mi. Q_2 = 518; Q_5=1,332; Q_{10}=2,186; Q_{25}=3,669; Q_{50}=5,112; Q_{100}=6,867; Q_{500}=12,270.
- 10 sq mi. Q_2 = 603; Q_5=1,546; Q_{10}=2,535; Q_{25}=4,249; Q_{50}=5,912; Q_{100}=7,931; Q_{500}=14,130.
- **16 sq mi. Q_2 = 829; Q_5=2,116; Q_{10}=3,463; Q_{25}=5,786; Q_{50}=8,032;** Q_{100}=10,750; Q_{500}=19,030.
- 20 sq mi. Q_2 = 965; Q_5=2,465; Q_{10}=4,116; Q_{25}=6,699; Q_{50}=9,290; Q_{100}=12,410; Q_{500}=21,910.

The estimates were corrected to the nearest full cubic foot per second, or, for larger results, to 4 significant figures, in keeping with the precision of the Oki et al (2010) equation coefficients. The flow estimates of greatest concern for the current (GRR) study are in bold font; the earlier 2021 FRM Validation Report had a wider focus extending to the 500-year peak flow.

USACE (2015) reported studies by Oki (2004) (16 stations on four Hawaiian Islands, reviewed for changes in flow 1913 to 2002), Mair and Fares (2010) (Makaha Valley in the Ala Wai watershed, where flow records reviewed 1960 to 2008, showed how before 1994 only 9 days per year of zero-flow were typically recorded, but that this had increased to 157 days per year of zero flow for the period 1994 to 2008) and Bassiouni and Oki (2013) (records reviewed 1913 to 2008); USACE (2015) concluded that “There are limited studies for observed hydrological trends. The studies that do exist are in general consensus that there is a long-term, downward trend in baseflows and total flows in streams. The detected shift and long-term trends reflect region-wide changes in climatic and land-cover factors.”

Stevens et al (2022) noted in the NOAA climate summary for the State of Hawaii: “Extreme precipitation events have become less frequent for Kauai and Oahu but more frequent for the Island of Hawaii,” but their report was not definitive about the likely frequency or likely size of flooding in streams.

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7.2 Streamflow Projections

USACE (2015) reported that Hagemann et al (2013) applied three GCMs across two emission scenarios to seed eight different hydrologic models for projecting precipitation, evapotranspiration and runoff on a global scale. For the Hawaii region, the results showed an overall increase in runoff of approximately 160 to 200 mm/year (~6.5 to 8 inches/year) for the 2071-2100 planning horizon compared to the years 1971-2000), assuming an A2 emissions scenario. The USACE (2015) summary was stated as an ensemble of 3 GCMs and 8 GHMs. The USACE (2015) summary did not state what the second assumed emission assumption was, but B2 is likely.

USACE (2015) reported that Doll and Zhang (2010) worked with a similar suite of several GCM models with emission assumptions stated as A2 and B2. Their report showed mild (relative to global results) impacts to Hawaii, for both low and average flows, which were expected to decrease by 10 to 20% by the authors' planning horizon target of 2055.

In a study focused on "the mountainous Hawaii watershed", Safeeq and Fares (2012) reviewed models of evapotranspiration and streamflow. On the basis of climate scenarios, their model predicted a range of -51% to +90% for change in the annual streamflow over a 43-year modeled period (ending in the middle of the 21st century).

Both USACE (2015) and CDM Smith (2012) cautioned that hydrologic parameters were a significant source of uncertainty.

8. Sea Level Change

A model of expected inundation for the area of interest is shown in Figure 0.13. The influence of the coastline is clear in the aerial view. The 0.1 AEP (10-year) inundation map was prepared during the RAS modeling effort to define the end of the channel flow area, as defined in the hydraulic model.

More than 40 combinations of floodwalls, flapgates, levees, tunnels and pumpstations were reviewed; the team's tentatively selected project (TSP) has been selected based on expected conditions through 2080, with acknowledgement that in the event of even higher water levels (more from relative sea level change RSLC than from riverine flow changes) the design should be adaptable to the changes (wider levees and floodwalls at which vertical additions would be feasible. All alternatives were modeled and assessed in terms of geotechnical, structural, construction, real estate requirements, constructability, and costs. The biggest anticipated change through 2080 was in RSLC. An assessment of different conditions was made assuming higher peak water surface levels than anticipated, and the team took into account the possibility of wider floodwalls that could be raised in the future. Since the site-specific flow data indicated small decreases in annual peak flow year over year, the likely requirement for this change came from RSLC, not from a changed riverine-flooding condition. Given the early stage of design (less than 30% design complete), these features of resilience are not yet completely incorporated into the designs.

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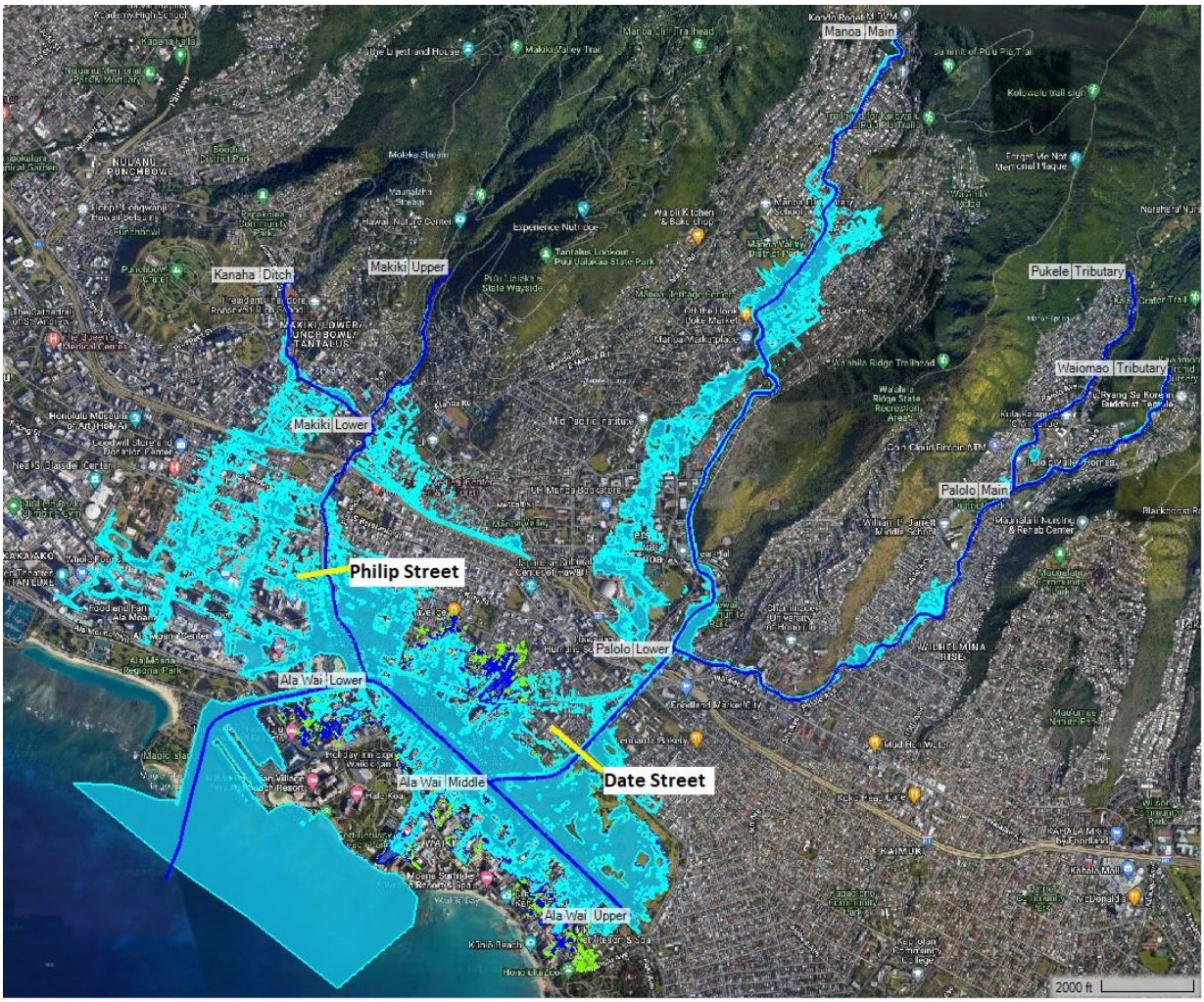

Figure 0.13 Current Study: 2080 FWOP 0.10 AEP (10-year) fluvial flood with various downstream boundary conditions (intermediate SLC and IAV for MHHW (cyan color), 0.99 AEP (1 year) (flooding beyond MHHW in blue color), and 0.50 AEP (2 year) (flooding beyond MHHW in blue color), and 0.50 AEP (2 year) (flooding beyond MHHW and 0.99 AEP tidal in green color). Yellow lines: tidal limit on the Makiki Stream (Philip Street) and Manoa-Palolo Canal (Date Street)

It is noted that the 10-year inundation map presented includes a section of the Manoa Stream in which the river breaks its banks to flow along a parallel route for about a mile through city streets before rejoining the river at a location downstream of its confluence with the Palolo, but upstream of the gage location. Similarly, the western tributary (itself comprising Kanaha and Makiki streams) gives rise to inundation outside their respective streambanks/channel banks. This projection is reviewed in greater detail in the H&H appendix, in its Ala Wai Flood Risk Management General Reevaluation Study: HEC-RAS Boundary Conditions (USACE (2022)). The figure is introduced here in order to show tributary rivers, their approach to the Ala Wai Canal, and the need to incorporate coastal concerns into an overall Ala Wai Canal analysis.

Hawaii's coastline is subject to astronomical tidal vents, with two high tides every 24 hours 50 minutes. These are governed by the gravitational influence of the moon and sun on the oceans. Full moons and new moons tend to coincide with a larger tidal range. For Hawaii, there are six-

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week periods in June-July and again in December-January when the effects are especially large, corresponding to the earth being farthest from or closest to the sun (University of Hawai'i (2018)).

The potential for future sea-level change, relative to ground levels, to affect the project area was evaluated briefly following ER-1100-2-8162 and ETL 1100-2-01. The ETL prescribes a method for defining three future projections (three sea-level curves) that are used to bound the estimate for sea-level rise (SLR) over time. The sea-level projections (curves) are site-specific and are derived based on the historical sea-level trend (the local sea-level change) blended with the eustatic change (the change in sea-level due to changes in either the volume of water in the world oceans or net changes in the volume of the ocean basins).

The three SLR scenario curves for Honolulu Hawaii were obtained using the CESL SLR web tool, http://www.corpsclimate.us/ccaceslcurves(new)html. The tool defines a lower bound for sea-level rise, an intermediate trend, and an upper bound curve. The sea-level projections examined in this study (Figure 0.14) are based on the National Ocean Service (NOS) Station at Honolulu, Hawaii (Gauge 1612340). Based on the CESL-SLR webtool, the degree of sea level change that may affect the project (at 50 years from 2030) could increase tidal water level elevation by 0.2 ft, 0.8 ft, or 2.6 ft; depending on which of the three scenario curves is applied, from the assumed project start year of 2030. The 2080 estimates corresponded to projected increases in mean sea level above the average mean sea level elevation of the current tidal epoch (1983-2001) of 0.4 ft, 1.1 ft, or 3.3 ft. (The 3.3-ft estimate is approximately equal to 1.0 m). It was noted that the 2080 "design elevation" might be reached as soon as 2040 following the USACE high RSLC projection, or as late as approximately 2180 following the low RSLC projection.

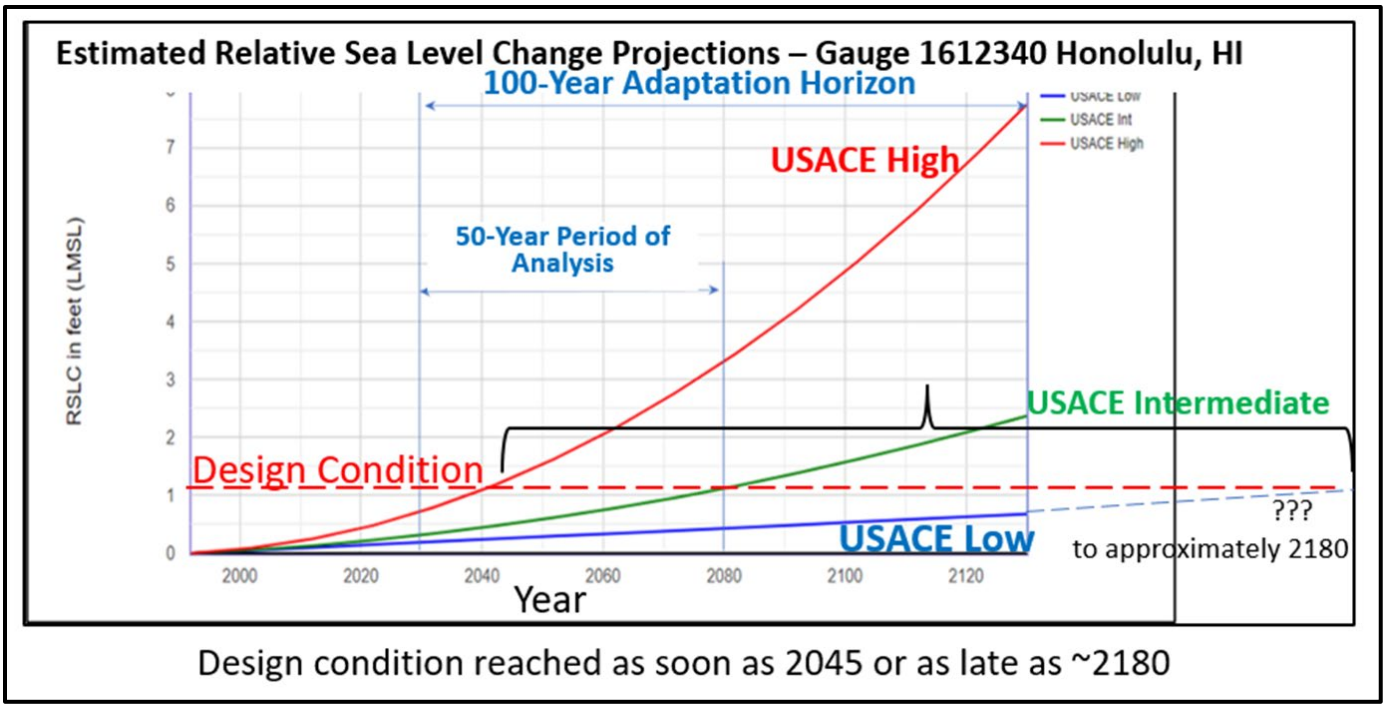

Figure 0.14 USACE Low, Medium and High Sea-Level Change Projections for Honolulu, Hawaii

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The three curves in Figure 0.14 were used to inform Table 0.3, in which the **intermediate** and **high** RSLC projections are combined with a typical one-year extreme water level (EWL) and inter-annual variability to generate possible downstream design boundary conditions for the basic FWOP and FWP conditions.

The 50-year period of analysis that is called out in the figure is in keeping with EP 1100-2-1 which acknowledges that, historically, economic forecasts beyond the 50-year time period were not considered reliable.

The 100-year estimate is in keeping with the need to cover the 100-year period through 2130 is consistent with the need laid out in EP 1100-2-1 for projections through a recommended 100-year epoch of analysis.

Table 0.3 Projected Downstream Water Levels including SLC, EWL and IAV (ft, MSL)

Year	USACE Low	USACE Intermediate	USACE High	USACE Int + EWL (0.99 AEP)	USACE High + EWL (0.99 AEP)	USACE Int + EWL (0.99) + IAV
1992	0.00	0.00	0.00	1.61	1.61	2.10
2030	0.20	0.33	0.72	1.90	2.33	2.40
2035	0.23	0.39	0.89	1.97	2.49	2.46
2040	0.23	0.43	1.08	2.03	2.69	2.53
2045	0.26	0.52	1.31	2.10	2.92	2.59
2050	0.30	0.59	1.54	2.17	3.15	2.66
2055	0.33	0.66	1.77	2.26	3.38	2.76
2060	0.33	0.75	2.07	2.33	3.67	2.82
2065	0.36	0.82	2.33	2.43	3.94	2.92
2070	0.39	0.92	2.62	2.53	4.23	3.02
2075	0.39	1.02	2.95	2.62	4.56	3.12
2080	**0.43**	**1.12**	**3.31**	2.72	4.92	**3.22**
2085	0.46	1.21	3.67	2.82	5.28	3.31
2090	0.49	1.35	4.04	2.92	5.64	3.41
2095	0.49	1.44	4.43	3.05	6.04	3.54
2100	0.52	1.57	4.86	3.15	6.46	3.64
2105	0.56	1.71	5.28	3.28	6.89	3.77
2110	0.59	1.80	5.74	3.41	7.35	3.90
2115	0.59	1.94	6.20	3.54	7.81	4.04
2120	0.62	2.10	6.69	3.67	8.30	4.17
2125	0.66	2.23	7.22	3.81	8.83	4.30
2130	0.69	2.36	7.74	3.97	9.35	4.46

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The 2080 target date is highlighted in the table, where the expected RSLC increase for the year (1.12 feet above the current LMSL, intermediate curve) was combined with the surge and IAV fluctuation condition to generate an estimate that the BC should be 3.22 feet above the current LMSL.

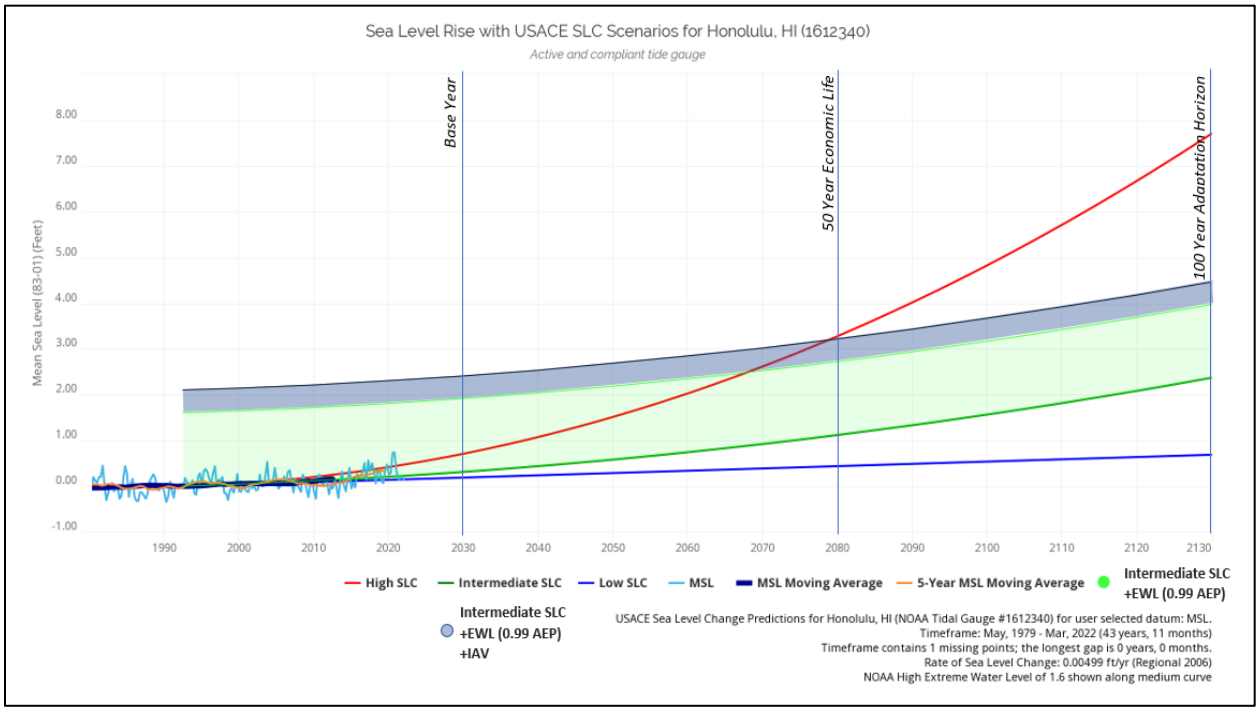

Figure 0.15 USACE Sea Level Tracker 1980-2130 including estimated Future Project Boundary Conditions

Review of Figure 0.15 shows that if the shaded regions were above the red (high) curve instead of the green (intermediate) curve, the 50-year design condition would be reached in about 2045 (LMSL with IAV and a 0.99% annual surge condition). For the projections through 2080, the difference in excess of RSLC due to extreme water level and interannual variability is 2.2 feet. Hydraulic modeling was conducted to develop an understanding of sensitivity of inundation to different rates of RSLC. The 2.2-ft elevation difference, the TSP through 2080 appeared to be adequate through a 20-year flood event.

An even higher BC was examined, in which the high-rate curve was extended through 2100, and the FWP and FWOP results indicated 0.8 ft to 1.7 ft of reduction in inundation for modeled storms up to the 20-year event, for the one test location that was examined in detail (See Table 0.4). A more complete review of elevations and velocities throughout the basin area is possible, based on the modeling that has been completed, but the elevations reviewed, for the tidal assumptions made, were taken as indicative of likely results and adequate for a sensitivity analysis in support of the review of alternatives. The analysis does not constitute a full uncertainty analysis, but the BC selections made do serve to indicate the likely changes that might be seen in the event of a different RSLC rate, over a plausible range of values.

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Fletcher (2010) prepared a climate change summary for Hawaii, reporting the expected rise of about 1 meter (about 3 feet) in expected sea-level during the 21st Century. The area around the Ala Wai Canal that was below the expected high tide under this scenario was depicted in one of his illustrations. The area was similar to the area of concern for the current project.

See Figure 0.16.

Figure 0.16 Details from Fletcher (2010). Fletcher added the blue line to show the expected level of the high tide at the end of the 21st century.

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A review of the timing of high water level events in relation to high streamflows was conducted for the Manoa-Palolo Gauge and the Honolulu tidal gauge situated near to (2 miles west of) the project. The water level time series and streamflow series datasets were found to be independent variables, removing the need to develop a joint probability. Figure 0.17 is presented to demonstrate the lack of any relation between high water levels and high streamflows.

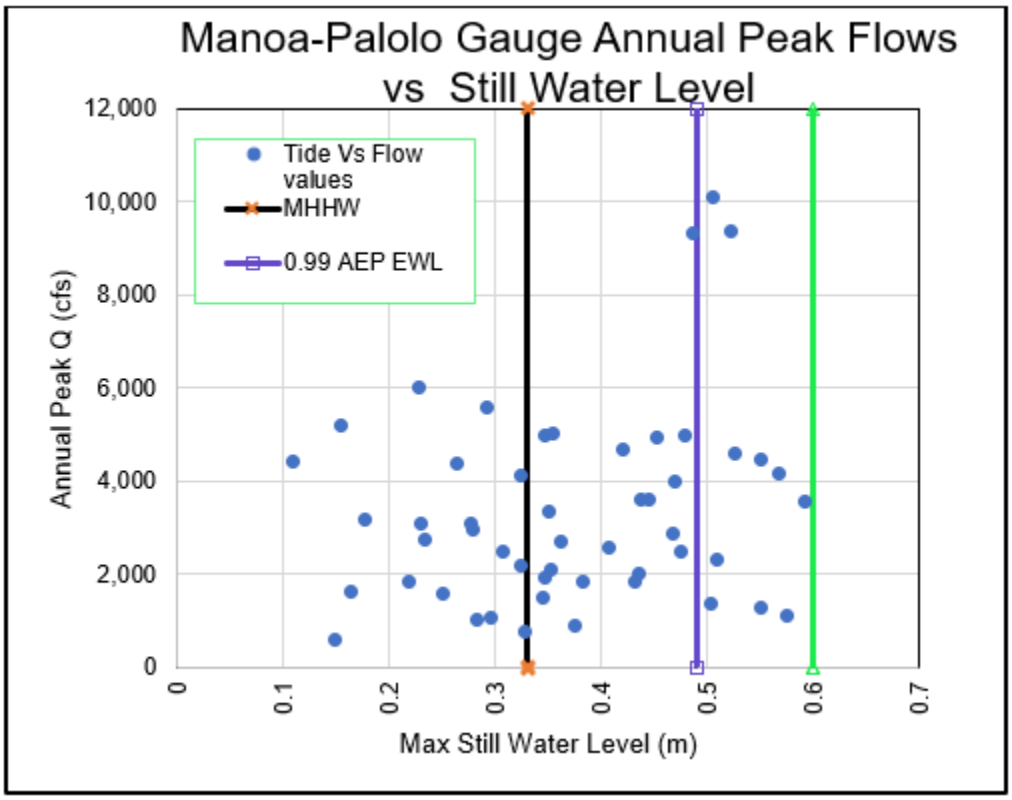

Figure 0.17 Manoa-Palolo Gauge Annual Peak Flows vs Still Water Level

Based on the review of the relative concurrence of high runoff flows and high water level events, no relationship is apparent between these two phenomena. Most high runoff events occur when water level elevations are less than the 0.99 AEP elevation: for the Manoa-Palolo watershed, 39 of 51 events (76%) occurred when still water levels were less than the 0.99 AEP Extreme Water Level (100-year high tide level).

The analysis summarized in Figure 0.17 reviews high tide (maximum still water level) in conjunction with annual peak flow. Table 0.3 and Figure 0.15 present water levels that include storm induced rises in water level such as surge and wave action.

Modeling of combinations of downstream boundary conditions shows that upstream water surface elevations are not sensitive to the downstream boundary condition; and the coastal water level influence is limited to the lower, flatter portion of the watershed less than 0.5 mile from the canal, with limited influence when streamflow exceeds the AEP=0.05 (20-year) case, because of the steepness of the watershed. For the computed 2-year modeled storm events, the coastal water level effect extends to Fern Street at only 1,300 feet upstream of the Ala Wai

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Canal; for larger modeled storms up to the 20-year storm, assuming the intermediate RSLC curve up to the estimated 2130 mean sea level, the differences due to sea level extend as far as Phillip Street, at 2,300 feet (0.44 mile) upstream of the Ala Wai Canal.

Initially, therefore, the team determined by sensitivity analysis that the two sources of flooding could be mitigated-for safely as separate exercises.

It was noted however that any future change in the rate of RSLC was not captured in the analysis performed. Consequently, FWOP and FWP hydraulic modeling was repeated for the same fluvial cases (5, 10, and 20-year storms), for two new assumptions concerning boundary conditions, resulting in three sets of results: a downstream boundary condition at assumed MSL 3.22 ft, a second set for BC at 5.41 ft, and a third BC at 6.30 ft.

Reference was made to the observed RSLC at Honolulu. The team reviewed available data since 1922 and observed that both the 5-year MSL moving average trend and the 19-year MSL moving average appeared to be oscillating about the intermediate SLC curve (See Figure 0.18).

A “baseline” condition was computed for the boundary condition, taken as a combination of the intermediate RSLC curve for the year 2080, with additional elevation for a 10-year storm surge and inter-annual variation IAV.

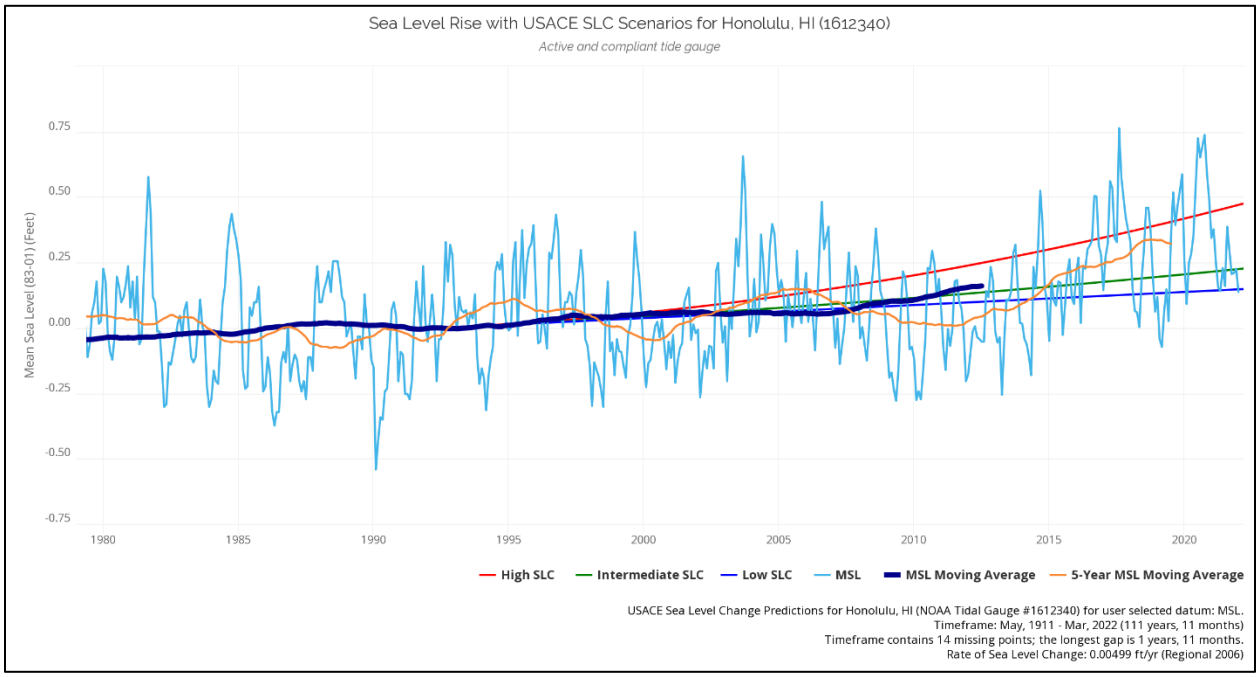

Figure 0.18 Historic Relative Sea Level Change 1980-2022 (US Army Corps of Engineers, n.d.)

The project team reviewed the 0.99 Annual Exceedance Probability (1-year) Extreme Water Level, including the **intermediate** Sea Level Rise and Inter-Annual Variability, for a project economic life (**2080**) still water level elevation of 3.22 ft-LMSL. Sensitivity to sea-level rise was reviewed using two larger downstream pool levels: 5.41 ft and 6.3 ft as the receiving water level boundary condition. These correspond to: firstly, the same set of parameters, but assuming the

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high-RSLC scenario were to occur, for the same 2080 target year (5.41); and secondly, the same set of parameters assuming the **high**-RSLC scenario were to occur, but extending the projection **through 2100**. For the sensitivity study, the FWOP and with-project water levels were estimated for three storm cases: 20%, 10%, and 5% (5-year, 10-year, and 20-year storms). These results are summarized in Table 0.4 (with reference to one cross-section located immediately upstream of the inflow from the Makiki Stream/Canal) and Figure 0.19, Figure 0.20, and Figure 0.21.

Table 0.4 Inundation Levels' Sensitivity to Projected RSLC and Storm Events up to 5% Storm at the confluence of Makiki Canal and Ala Wai Canal

Fluvial Flood Event		Down-stream	Future Without Project (FWOP)			Future With Project (FWP)		
AEP (%)	Avg Return Period (years)	Boundary Condition Elevation (ft MSL)	Left Over-bank	Channel	Right Over-bank	Left Over-bank	Channel	Right Over-bank
20%	5-yr	3.22	4.67 *	4.57	5.1	-	-	-
10%	10-yr		5.37 *	5.03	5.62	-	-	-
5%	20-yr		5.76 *	5.48	6.04	-	-	-
20%	5-yr	5.41	6.02	6.00	6.08	-	6.45	5.32
10%	10-yr		6.26	6.27	6.50	-	6.86	5.77
5%	20-yr		6.50	6.52	6.93	-	7.23	6.09
20%	5-yr	6.30	6.67	6.70	6.91	-	7.17	5.46
10%	10-yr		6.86	6.90	7.23	-	7.51	5.89
5%	20-yr		7.03	7.09	7.56	-	7.85	6.19

- Elevations are stated for one key location immediately upstream of the confluence of Ala Wai Canal and the Makiki Stream Canal.
- The asterisk symbol * is used to denote partial flooding on the left overbank. Inundation on the left overbank is absent from FWP computer runs, even when the downstream BC is set to 6.30 (3.08 feet higher than the 2080 FWOP condition, corresponds to the estimated condition for a 1-year event with IAV, set for the year 2100 assuming the “high” curve for RSLC.
- For the three storm events (5, 10, or 20-yr) with the two “elevated” BC assumptions (5.41 to 6.3 feet), the level of inundation on the right overbank is reduced by 0.7 (smaller storms) to 1.6 feet (larger storms).
- The TSP project is protective with the 5.41-ft water level BC to generate approximately the same right-overbank results as for the FWOP condition with only 3.22-ft BC water level.

The table summarizes the water levels with or without the project, for the two higher water levels, at just a single point in the system (one cross-section and two related overland water stations at the confluence of the Makiki Stream/Canal and the Ala Wai Canal). The maps in Figure 0.20 and Figure 0.21 show the differences between the two model runs on a more system-wide basis. Although the simulated water levels in the FWP condition rise in the canal itself relative to the FWOP condition, the proposed changes limit the quantities of water that enter the overbank area, and so inundation and flooding are reduced.

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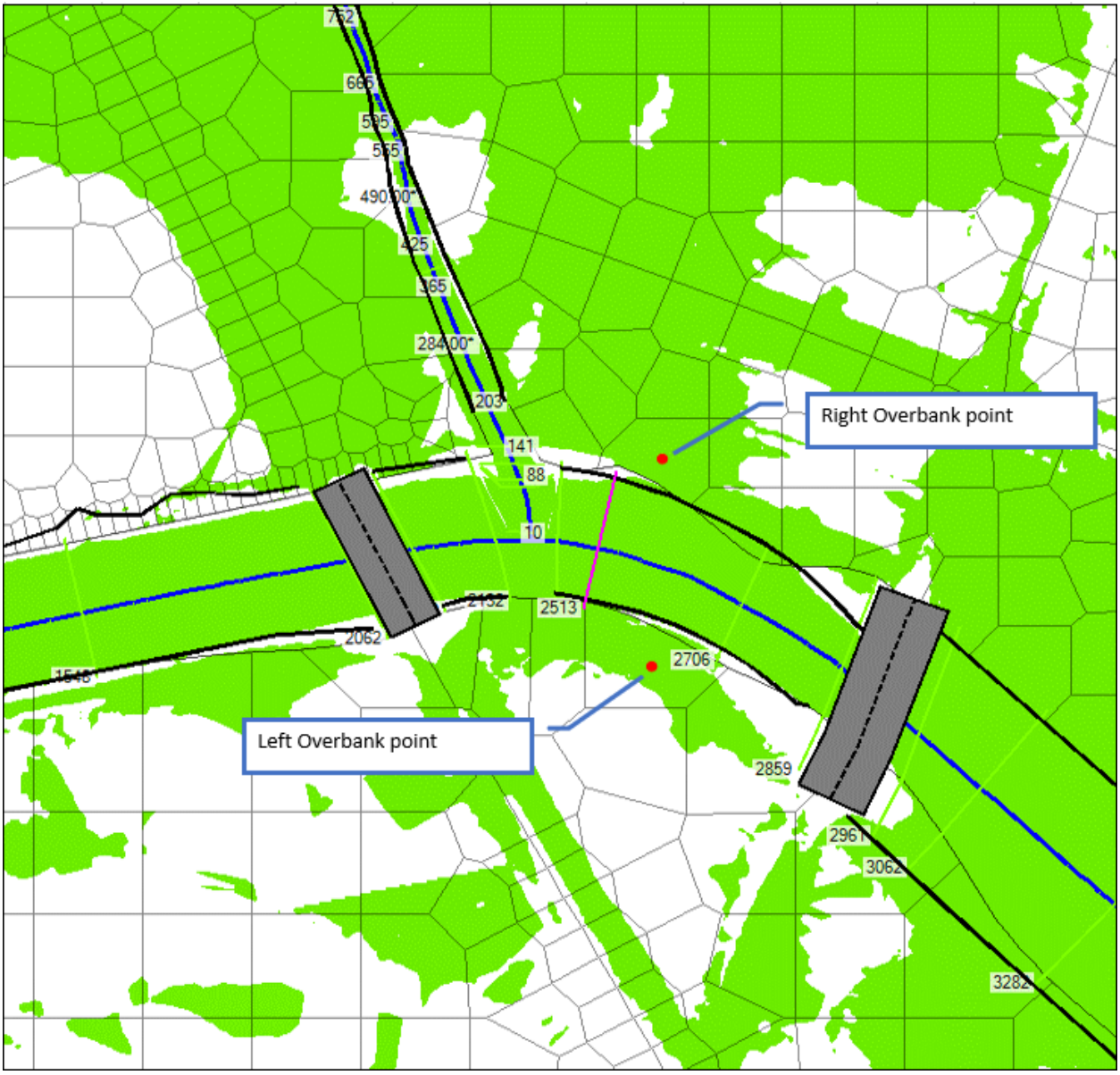

Figure 0.19 Locations of Cross-Sections at the Confluence of Ala Wai Canal and Makiki Canal

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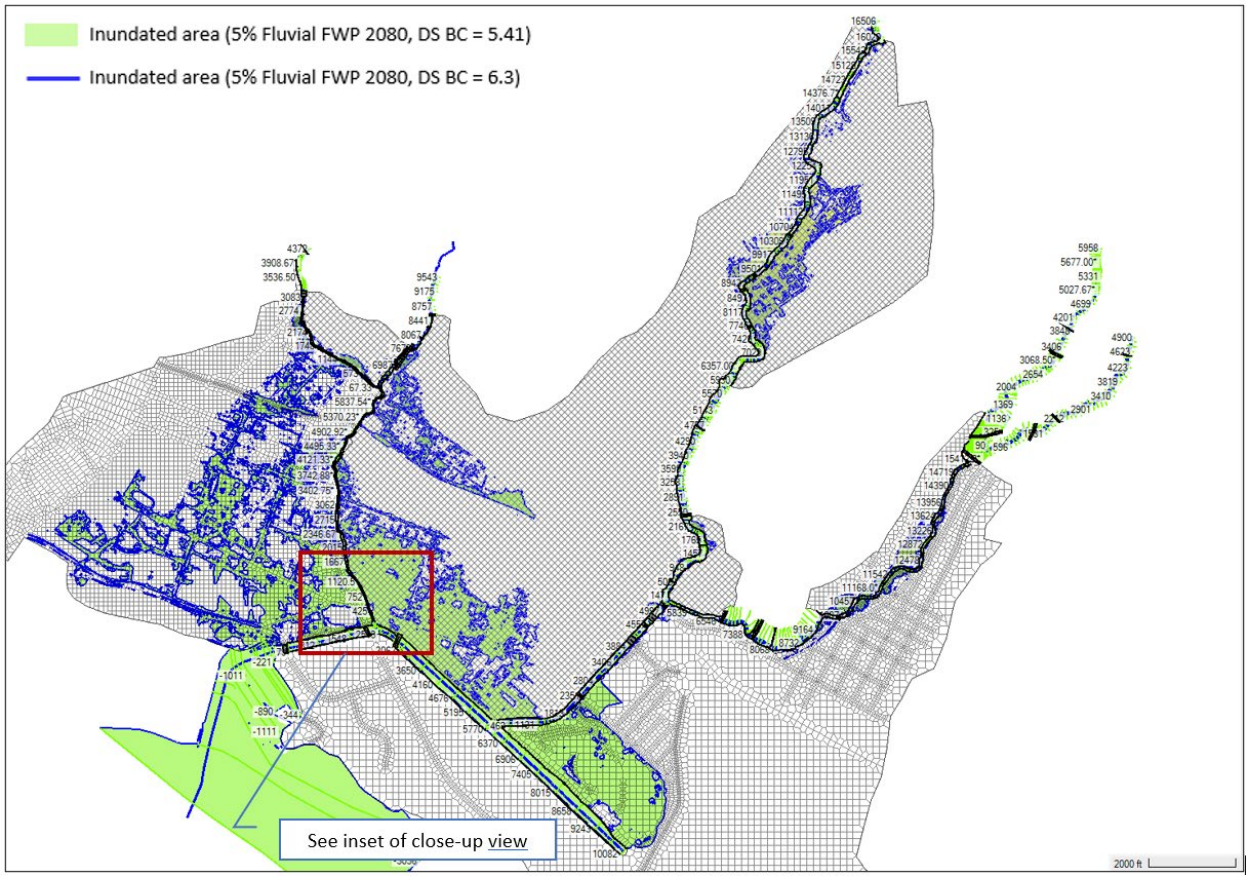

Figure 0.20 Ala Wai Modeled System View

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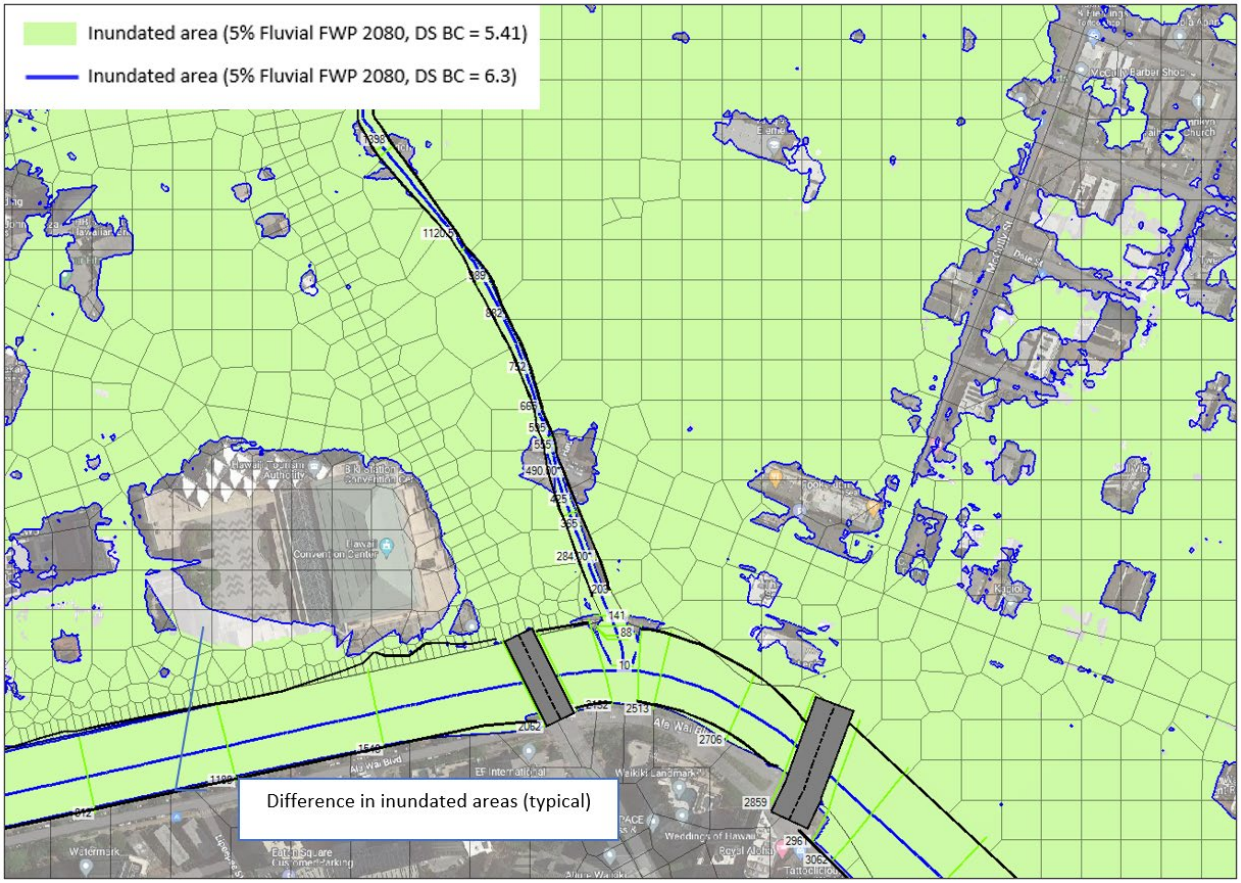

Figure 0.21 Ala Wai Modeled System View – "Inset/Close-up" Details at the Confluence of Ala Wai Canal and Makiki Canal

There is potential overlap between the inundation areas under the Fletcher (2010) projected inundation region and the various GRR alternatives for a final array. The alternatives are summarized below.

The costs estimated in 2023 did not include the costs of any utility or facility relocations or non-structural alternative measures.

1. **Alternative 1 – Storage Cornerstone (storage).** Includes 5 main storage areas (detention at Makiki Park and Tennis courts; detention at Manoa Valley District Park; detention at Ala Wai Golf Course; detention at Kapiolani Park; detention at Kaimuki High School.) The golf course and Kapiolani Park are likely inside the Fletcher (2010) area of tidal rise.
   *A real estate assessment in 2023 indicated that **real estate purchases** associated with this alternative, along with easements and temporary access during construction, would cost about $30 million.*

2B. Alternative 2B – Conveyance Cornerstone (floodwalls). Capacity increases at Woodlawn Bridge and at the Ala Wai canal itself. The timing of the increased riverine flow during a flood would remove water ahead of inundation in the tidally influenced area. It should be noted that the Ala Wai floodwall part of the design is inside the Fletcher (2010) increased high tide assessment.

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*An initial real estate assessment in 2023 indicated that **real estate purchases** associated with this alternative, along with easements and temporary access during construction, would cost about $9 million.*

2C. Alternative 2C – Conveyance Cornerstone (Second outlet at the east end of the canal). Timing of the increased flow would remove water ahead of inundation in the tidally influenced area. It should be noted that this extra outlet is inside the Fletcher (2010) increased high tide assessment, and requires some storage measures around the canal.

*An initial real estate assessment in 2022 indicated that **real estate purchases** associated with this alternative, along with easements and temporary access during construction, would cost about $121 million. The alternative was not pursued for a subsequent more detailed cost estimate in January 2023.*

5. Alternative 5C – Hybrid alternative (TSP). For a more complete description, the reader is referred to the hydraulic appendix. This alternative is the tentatively selected plan (TSP) and so it is described in greater detail than was used for the previous summaries (1, 2B, 2C). The alternative includes a 6-ft-high, 1,270-ft-long floodwall with a closure structure (gate) at Woodlawn Drive in the Manoa Valley, along the right bank of Manoa Stream, upstream of the University of Hawaii. There would be a 6-ft-high, 2,510-ft-long floodwall at the confluence of Manoa and Palolo Streams, following the alignment of Koali Road, with two concrete drainage structures to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. The Koali Road floodwall design would include two road closure structures and installation of flap gats on two smaller culverts. At the Ala Wai Golf Course, an earthen levee of height 6 to 9 feet and length 10,176 feet would be constructed to create a detention basin at the facility. The design would allow for erosion control as water entered the golf course, and four concrete drainage structures with three flap gates would allow collected stormwater to drain slowly into Ala Wai Canal. A new floodwall would be constructed, tying into the levee embankment, up to 9 feet high, with one road closure structure, one drainage structure, and a canoe access point. At the Ala Wai Canal, a 6-ft-high, 22,852-ft-long floodwall would be constructed, with 59 of the existing storm sewers retrofitted with flap gates, and a further 14 to remain in service as drainage structures. There would be eleven road closures and three canoe access points. The design includes an elevated walking path in the Manoa-Palolo Canal area. Where the Makiki Stream enters the Ala Wai Canal, a 6-ft-high 883-ft-long floodwall with two flap gates, one concrete drainage structure, and four road closure structures would be constructed. *At the time of writing in late August 2023, the exact alignment and height of the structures in and around the golf course were being refined, and details of real estate "takings" remained to be confirmed.* It is noted that parts of the proposed changes would mitigate the inundation region identified by Fletcher (2010). *An initial real estate assessment in 2022 indicated that **real estate purchases** associated with this alternative (in its 2022 draft form), along with easements and temporary access during construction, would cost about $33 million. As this became the team's preferred "Tentatively Selected" project, greater scrutiny was brought to bear on the geometry and costs of this alternative. The resulting **Alternative 5.3** had total real estate purchases of $58.1 million. The increase from 2022 was largely due to changes at the Ala Wai golf course levee, necessary purchase of 5 residential properties, and costs to relocate approximately 100 utility lines (water, sewer, power, gas).*

Review of construction costs, damages, and damages prevented (both dollar costs and life-loss estimates) was performed for 5 alternatives plus the FWOP condition. For the Tentatively Selected Plan (TSP), a further sensitivity analysis was performed to review the likely performance of the with-or-without-project performance under the USACE "high RSLC"

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condition. In essence, the 2080 estimate of a stillwater of 1.12 ft becomes a stillwater estimate of 3.31 ft (an increase of 2.19 ft). Including storm surge and interannual variability, 2.72 ft rises to 4.92 ft (an increase of 2.20 ft).

In the event that sea level rises at the rate of the USACE intermediate curve assumptions, the design condition is reached in 2080. If the rise proceeds at the USACE high curve rate, the design condition is reached between 2040 and 2045. From Figure 0.22, it appears that the intermediate curve is more realistic. The high curve was used as a reference in the sensitivity review to help establish how the alternatives might respond to more rapid RSLC.

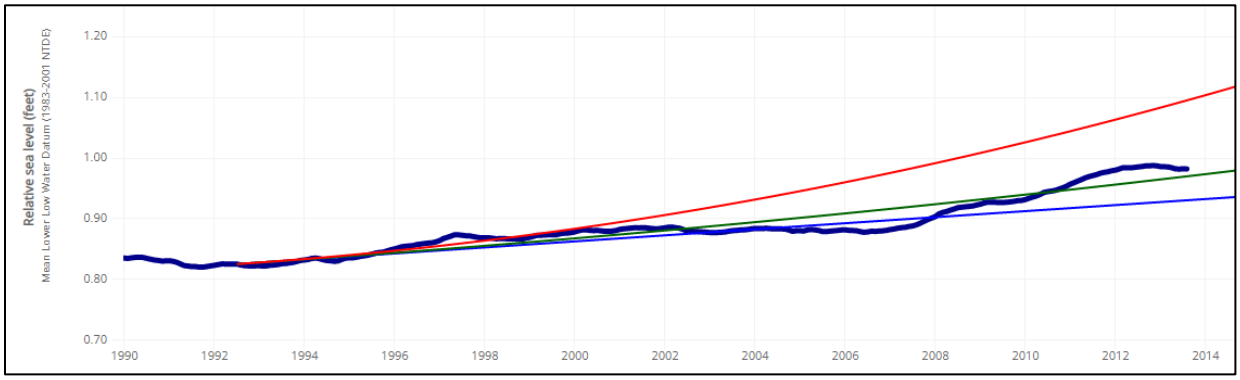

Figure 0.22 Low/Intermediate/High Projections (Mean Lower Low Water) of Relative Sea-Level Rise for Honolulu (projections from 1992)

9. Literature Review Summary

Recent climate literature indicates that there is evidence of observed, increasing mean air temperature trends in the study region. Nightly minimum temperatures are rising more quickly than daily maximum temperatures. Mean temperatures are projected to rise by 2 to 10 °F (1.1 to 5.6 °C) by the end of the 21st century.

Total precipitation and the occurrence of extreme storm events has been decreasing over time. Projections through 2010 indicated that this trend was expected to continue, although more recent studies, especially the NCA4 (2018), indicate that extreme storms may become more frequent. The nature of long-term trends is not easily discerned because of the effects of multiple-year cycles such as ENSO, changes in how winds might track, and changes in how the temperature-changes at altitude might affect the storm patterns.

Streamflow is widely expected to decrease over the 21st century, although there are indications that peak flows might increase. The NCA4 finding of increased stormflow flooding, for example, acknowledges the previous projections of reduced danger from extreme streamflow, but indicates that a more refined analysis of GCMs might indicate not only more droughts, but also more extreme runoff floods.

The USACE literature synthesis findings are summarized in Figure 0.23.

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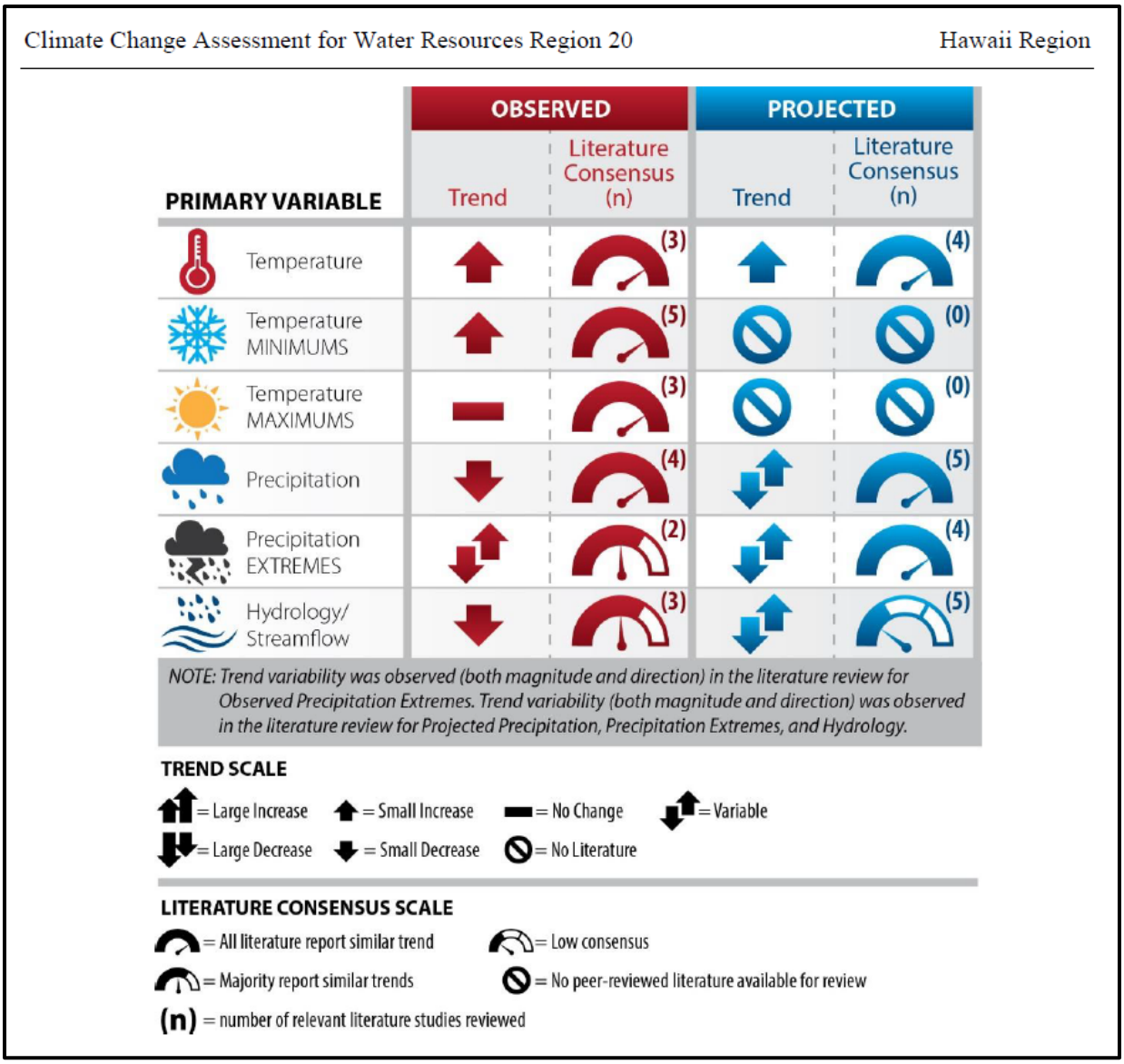

Figure 0.23 Summary matrix of observed and projected climate trends for Hawaii (USACE 2015)

10. Record of Inflows to Ala Wai Canal and Nonstationarity Analysis

The primary objective of this study is to improve the flood risk management posture in the Ala Wai drainage basin area, so the focus of this investigation is the high flow regime that is best represented by annual peak values of the daily average flows.

Major tributaries to the Ala Wai Canal are the Manoa and Palolo Streams and the Makiki Creek. The Manoa and Palolo Streams meet upstream just north of Lunalilo Freeway (Route 1) and then follow a channel south for approximately 4,800 feet before discharging to the Ala Wai Canal, immediately west (downstream) of the Ala Wai Golf Course. The USGS maintains a gaging station on the drainage ditch between the confluence and the outfall/discharge point,

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about 0.6 miles upstream of the confluence with the Ala Wai Canal. The basin area at this location (16247100-Manoa-Palolo Drainage Canal at Moiliili, Oahu, HI) is 10.2 square miles. There is an unbroken record of peak annual flows since 1968. The NSD tool applies analysis to the period from 1968 to 2021.

Peak annual flows are summarized in Figure 0.24. No nonstationarities were detected in this record. The mean value of the annual peaks is 3,300 cfs; their standard deviation is 2,100 cfs; their variance is 4,400,000 $ft^6\ sec^{-2}$.

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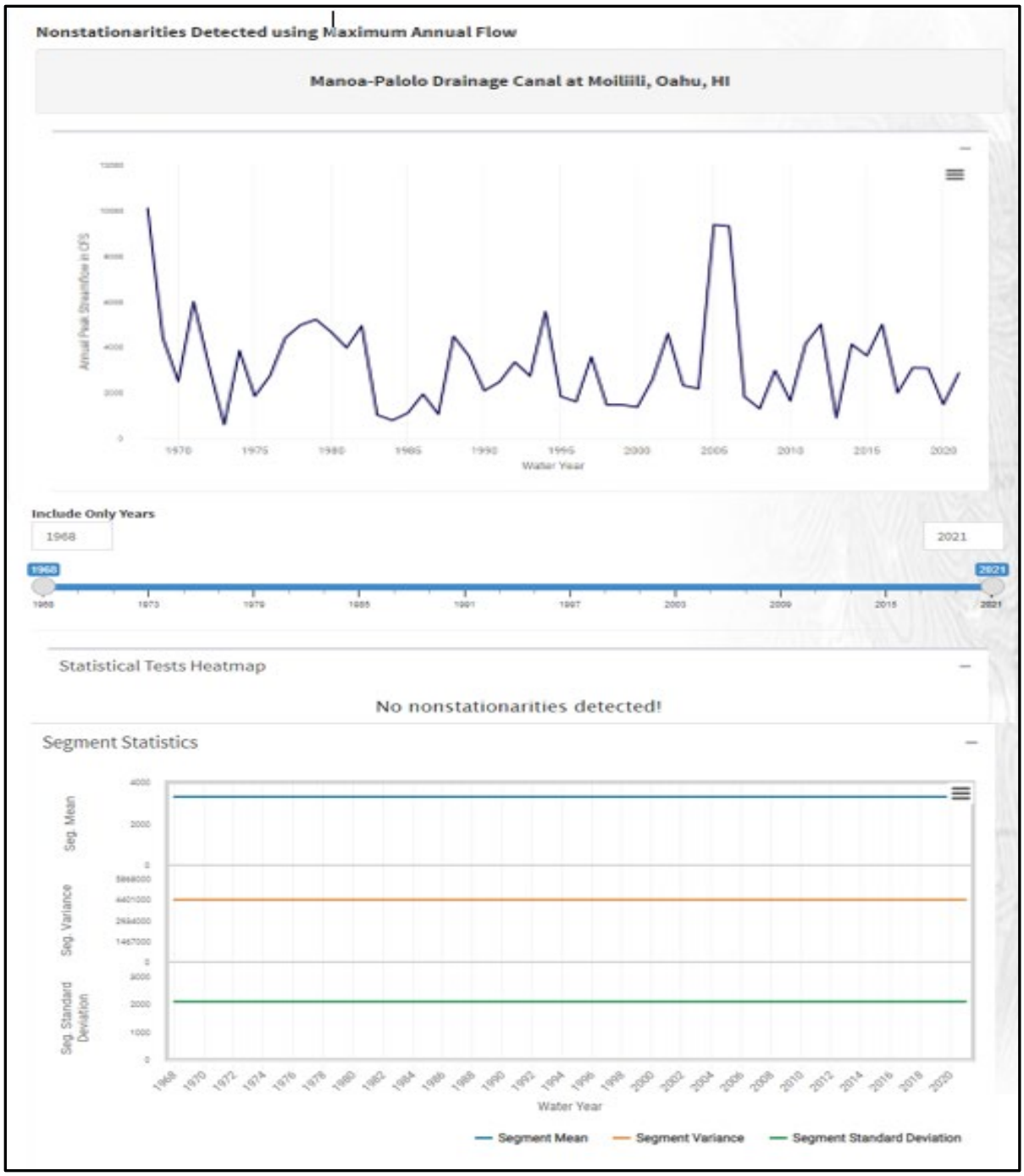

Figure 0.24 Output of the Nonstationarity Detection Tool for Manoa-Palolo Canal at Moiliili, Honolulu, HI. USGS Gage 16247100. The mean value of the annual peaks is 3,300 cfs; their standard deviation is 2,100 cfs; their variance is 4,400,000 ft^6/sec^2.

Additionally, as shown in Figure 0.25, no monotonic trends are detected in the peak streamflow dataset between 1968 and 2021 using the Mann-Kendall (p-value = 0.40>0.05) and Spearman Rank Order (p-value = 0.40>0.05) tests applied using a 0.05 level of significance.

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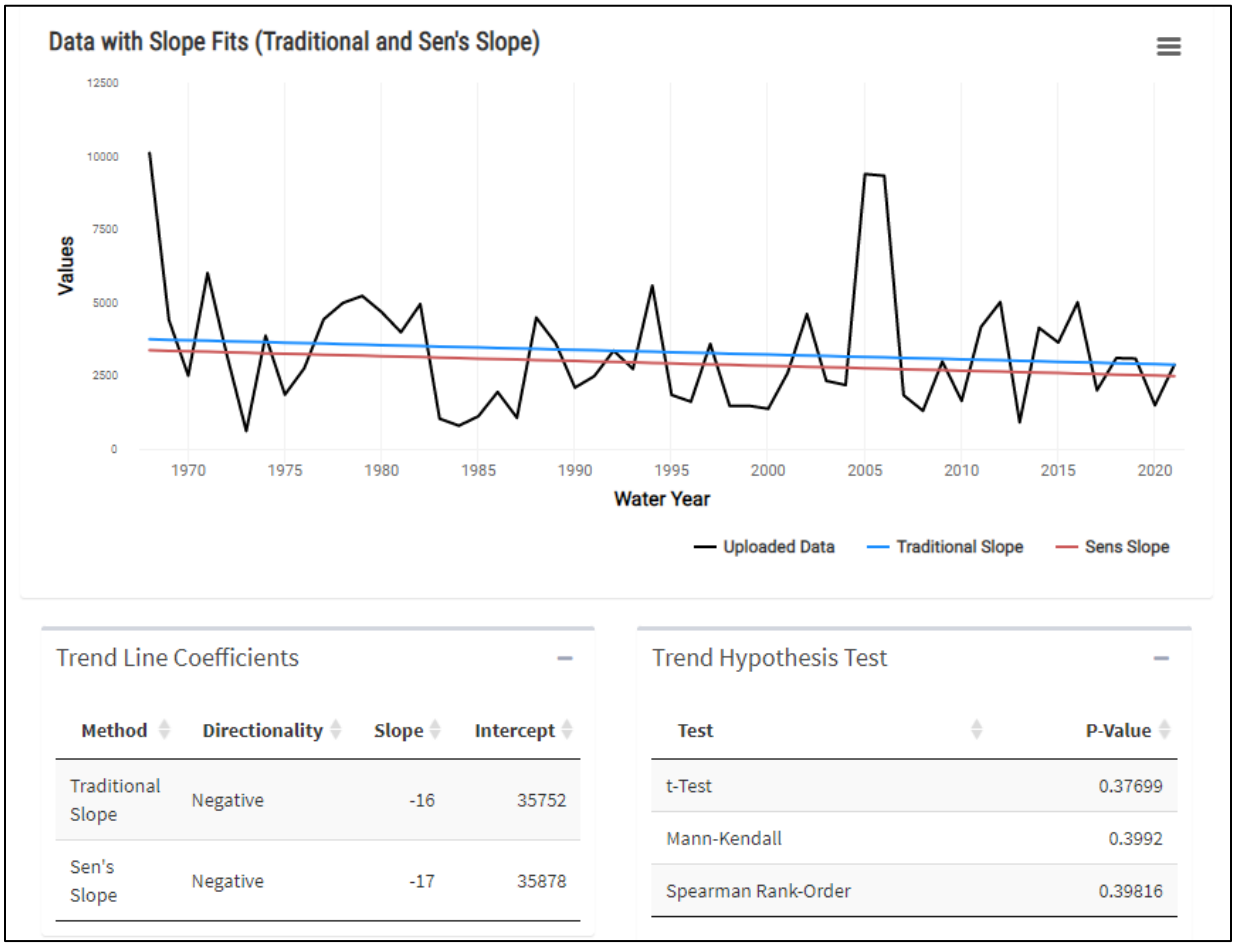

Trend Line Coefficients

Method	Directionality	Slope	Intercept
Traditional Slope	Negative	-16	35752
Sen's Slope	Negative	-17	35878

Trend Hypothesis Test

Test	P-Value
t-Test	0.37699
Mann-Kendall	0.3992
Spearman Rank-Order	0.39816

Figure 0.25 Trend Lines and Statistical Summary for Maximum Annual Flow at Gage 16247100 data 1968 to 2021.

Review of available data on the USGS website shows that the gage appears to have been upgraded in late 2004. The USGS record shows a single data point for each day from 1968 through mid-2004. In the first 5 days of September 2004, however, the record for September 2 included 30-minute readings as well as the single data point for the day, and the jerky nature of the record indicates that calibration was in progress. That was the only day with 30-minute readings in those 5 days. The one-day daily readings were still being recorded at that time. By January 2005, however, there was a smoother continuous record of flows consistent with the new system having been “brought on line”.

As noted above, the record of daily peak flows appeared to be trending downwards over the period 1968 to 2021. Guidance has been to not give too much credence to the actual rate of change, especially since the downward trend was not statistically significant at the 5% significance level. If the daily peaks had been better known in the years 1968 to 2004, then the downward trend might have been more pronounced, because the recorded annual peaks in the 1968-2004 would have been slightly higher, while results from 2005 would still have been as used in the analysis.

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It is noted that the gage is located to detect discharges from 10.2 square miles, or approximately two-thirds of the drainage basin contributing to the canal. An existing gage on the Makiki stream, at the South King Street bridge, and also located about 0.6 miles upstream of its own confluence with Ala Wai Canal, would ideally complement the analysis, covering much of the remaining third of the watershed, but the record from this smaller site has only 12 years of record, including a large gap from 2005 to 2011, while an unbroken 30 year record is a preferred minimum record length for statistical testing.

A summary of annual peak flow data from the shorter record is included in Figure 0.26.

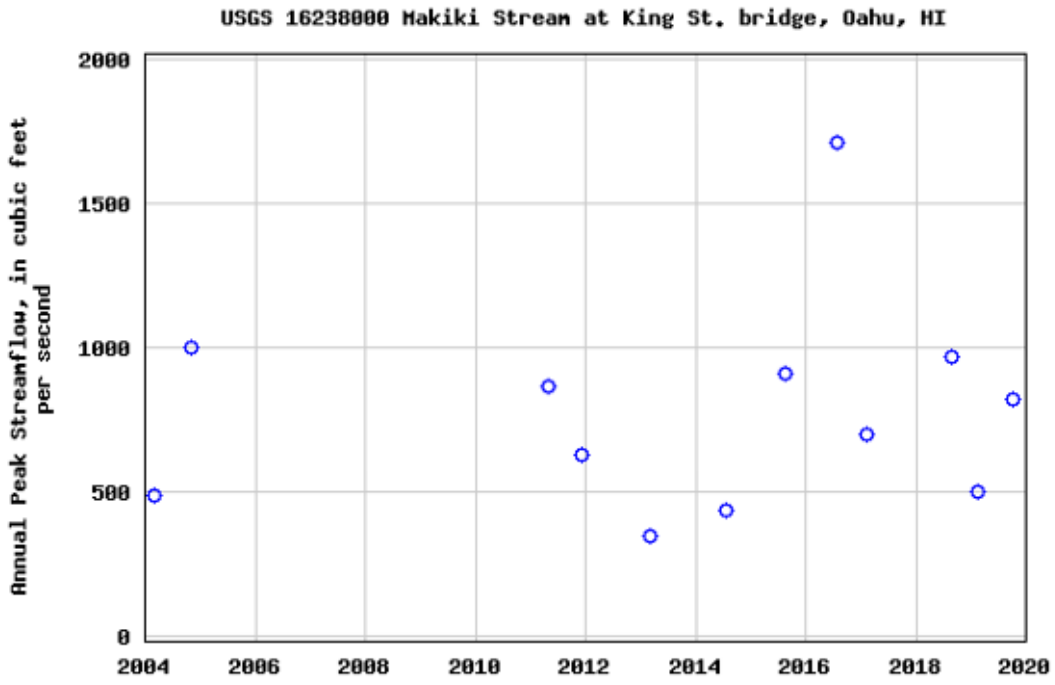

Figure 0.26 Annual Peak Discharge, Makiki Stream at King Street (USGS)

Given the small number of data points (only 12) and the relatively large gap (5 years 2006 to 2010) in the middle of the record, the Makiki Gage record has been set aside for these purposes, and the gage at the Manoa-Palolo Drain, based on a basin area of 10.2 square miles, has been taken as representative of the entire 16.2-square mile watershed with respect to trends and nonstationarities.

11. Climate Hydrology Assessment Tool

The NCA4 report indicated, based on recent projections and inferences taken from the grid network, that frequencies of drought and heavy rainfall events were likely to increase. The report acknowledged, however, that the “heavier rainfall” forecast was a recent result and not

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supported by numerous earlier reports that projected reductions in annual average flows and annual peak flows during the 21st century.

The CHAT provides useful summary projections for most of the USA, but the coverage for Hawaii is still under development. The location of small islands smaller than a typical modeling grid cell, subject to subtle changes in prevailing wind direction, with land-elevation-based effects on atmospheric inversions and precipitation, and the cycling effects of El Niño Southern Oscillation (ENSO), all make for less straight-forward analysis.

The possibility of extending the observed record based on regression equations was investigated using the USACE Time Series Toolbox and two sets of assumptions regarding valid emission rates. These are shown in Figure 0.27 and Figure 0.28. In one case, there was a slight reduction in the mean value; in the other, there was no change in the mean value. It was noted that the software reviewed the available data to determine that by default the peak flow data set did not extend beyond 2034, an indication of its representative range. In both statistical projections, it was noted that a 97% confidence interval included projected values that were significantly smaller than zero, indicating that neither of the figures should be viewed as “true”.

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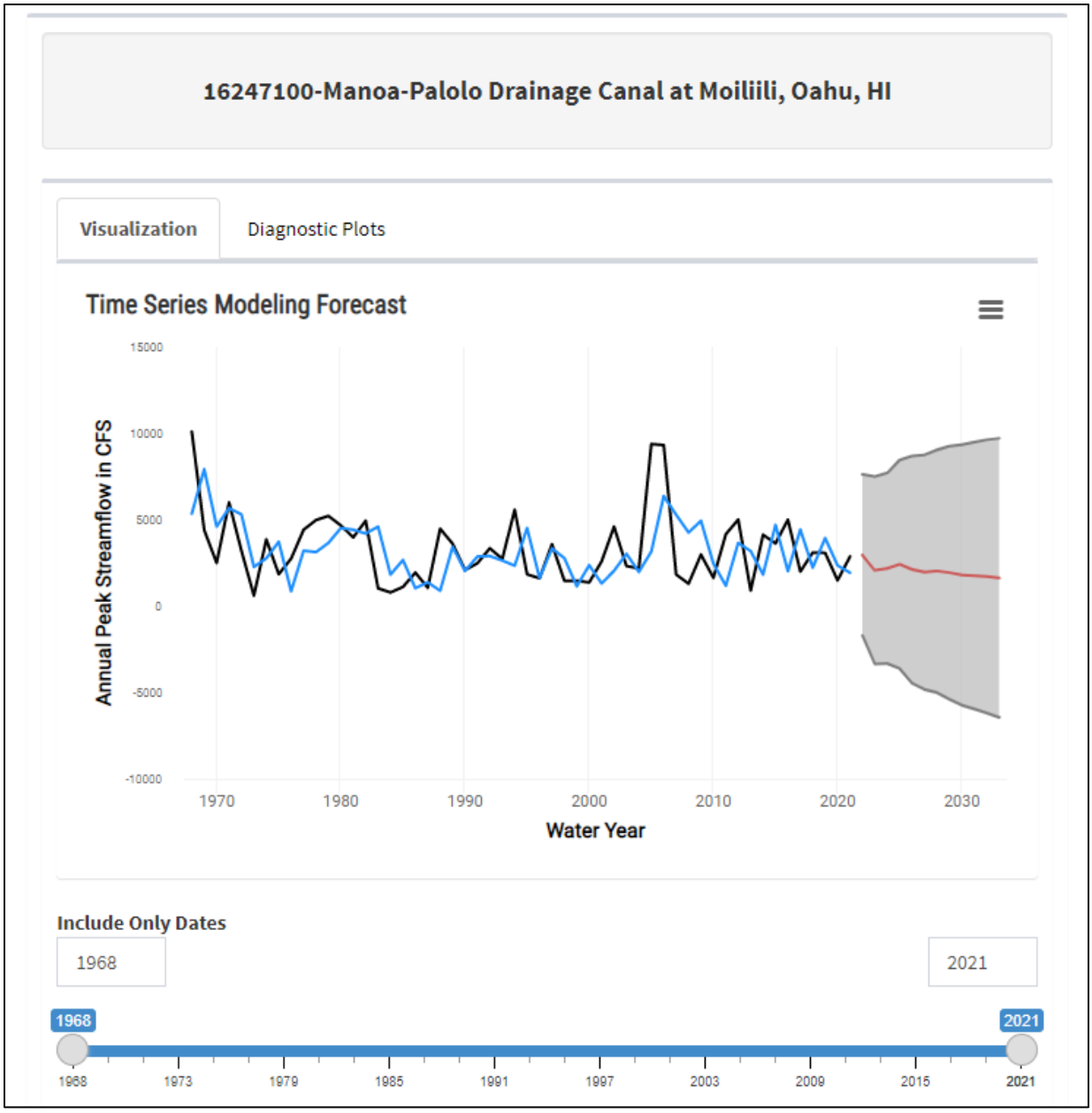

Figure 0.27 Time Series Tool Modeling Forecast (Autoregressive Integrated Moving Average) for the Manoa-Palolo Gage Location.

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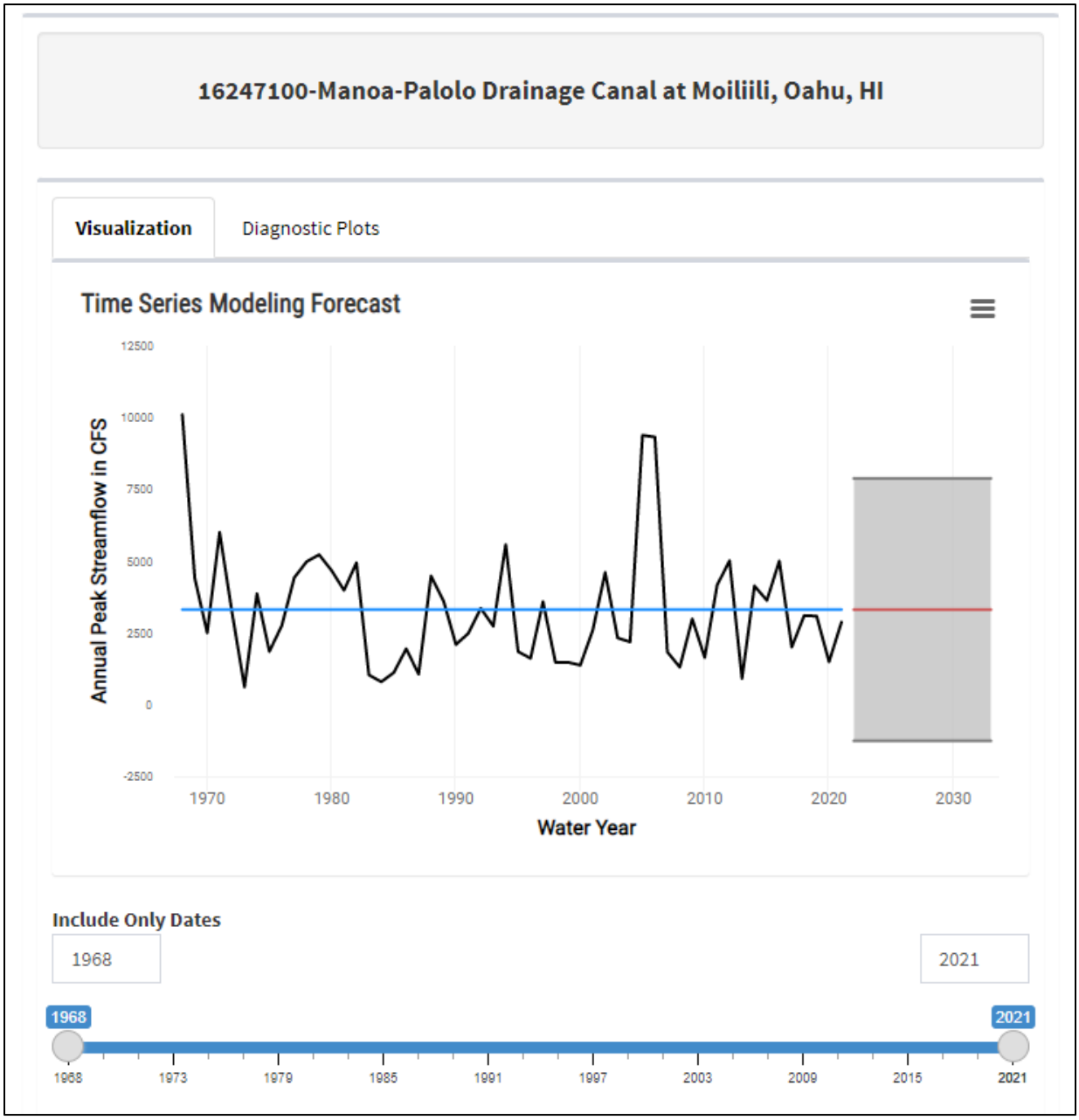

Figure 0.28 Time Series Tool Modeling Forecast (Exponential Smoothing) for the Manoa-Palolo Gage Location.

As can be seen in the figures, there are wide uncertainty bounds regarding the patterns of future annual peak flows.

12. Vulnerability Assessment

The USACE Watershed Climate Vulnerability Assessment (VA) Tool facilitates a screening-level, comparative assessment of the vulnerability of a given business line and HUC-4 watershed to the impacts of climate change, relative to the other HUC-4 watersheds within the

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continental United States (CONUS). It uses the Coupled Model Intercomparison Project (CMIP5) GCM-BCSD-VIC dataset (2014) to define projected hydrometeorological inputs, combined with other data types, to define a series of indicator variables to define a vulnerability score.

For locations Outside the Continental US (OCONUS), however, the tool is not yet a viable method for assessing vulnerability.

Based on the literature review in this report, in the 21st century Hawaii is projected to experience increasing temperatures, decreasing average rainfall, and potentially (not all sources agree) increasing incidences of extreme storms.

1. The increasing temperatures will increase evaporation and evapotranspiration losses, reducing the amount of water available for water supply or freshwater in ecosystems.
2. The decreases in average rainfall will reduce the amount of recharge to groundwater, and for lower-lying regions, the amount of recharge from groundwater to surface water. This will result in stressed plants in the watershed, and lower flows in streams. If the plant cover is jeopardized, then bare ground will be exposed.
3. Heavy storms, falling on a dry watershed, will replenish the groundwater to some extent, although surface flow is likely to be increased more directly.
4. The increased frequency of heavy storms, falling on a stressed watershed, will lead to increased stormflows (potentially a more flashy watershed), with increased volumes of sediment and debris being washed downstream.

In this numbered/bulleted list of likely consequences, the first three are likely to reduce flooding in the Ala Wai Canal region. The fourth item, a consequence of intense downpours, would indicate that heavier stormflows should be expected on a more frequent basis.

For the State of Hawaii, Tetra Tech (2018) prepared a summary of ways to prepare for projected sea-level rise. For the Island of Oahu, their report included Figure 0.29, which included a summary of expected economic losses.

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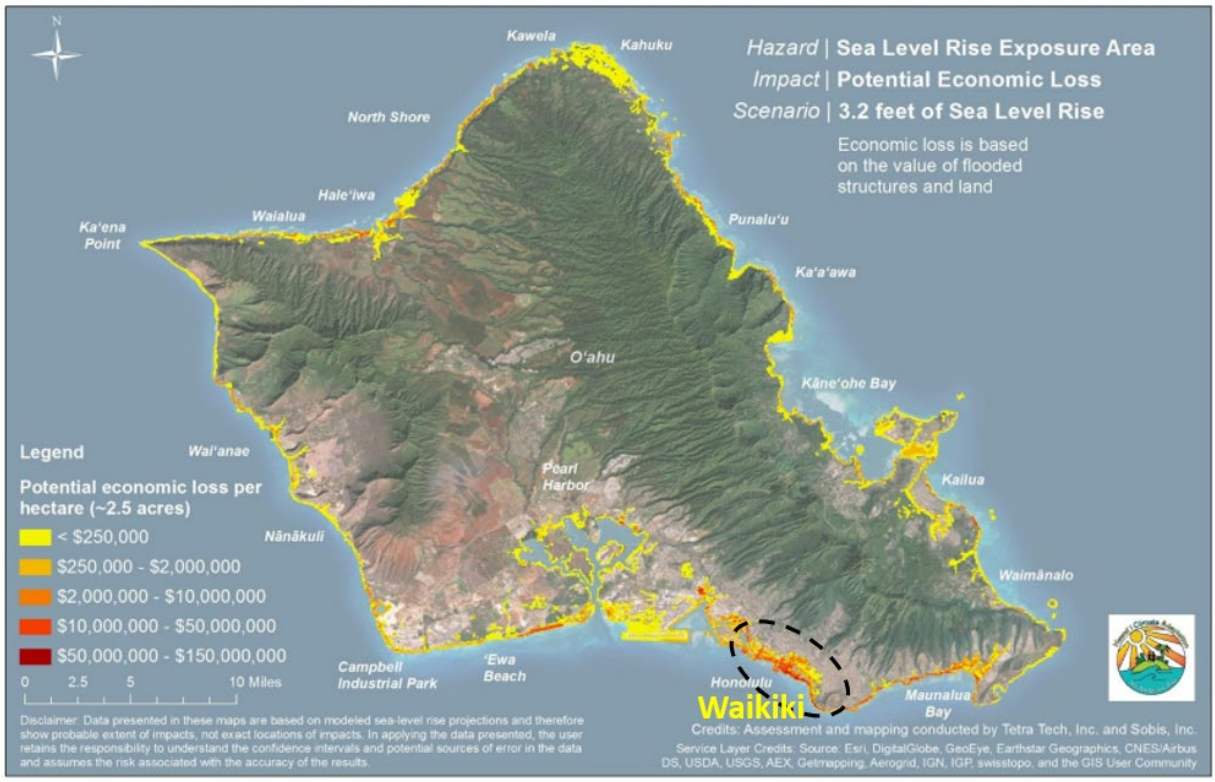

Figure 0.29 Potential Economic Loss per Hectare in Oahu due to 3.2-ft of Sea-Level Rise (Waikiki region is shown with a dashed black oval). Source: Tetra Tech (2018)

The costs (economic losses) generated in the 2018 Tetra Tech report will clearly be subject to change due to detailed developments in the region and due to annual inflation. It is noted that the Waikiki region appeared to be most vulnerable (most red part of the shading), on an island that includes the State Capital, Honolulu.

Specific to the Ala Wai watershed, the Flood Risk Management Validation Report (USACE 2021, prepared in 2017-2021) indicated a population at risk of 65,000 residents and an additional 200,000 transient visitors daily (tourists, workers, students, etc.) Modeling performed after a storm event in 2004 indicated that a one percent storm would cause damages to 3,000 structures and cause total damages of $1.14 B. The 2021 report analyzed a number of likely storm sizes and return periods, summarizing expected annual storm damage costs for without-project and with-project conditions, where more than 200 flood damage reduction measures were compared in a feasibility assessment, leading to a combination of 6 suggested renovation measures.

As of September 2023, the GRR team's real estate assessment was that 5-year to 500-year storms would cause induced damages in the range $125 M (5-year) to $5.5 B (500-year). This summary is consistent with annual induced damages in the range $100 M to $200 M per annum (actual assessment not yet available as of 9/27/2023).

Figure 0.30 shows the layout of the buildings modeled as at risk in the USACE 2021 FRM Validation Report.

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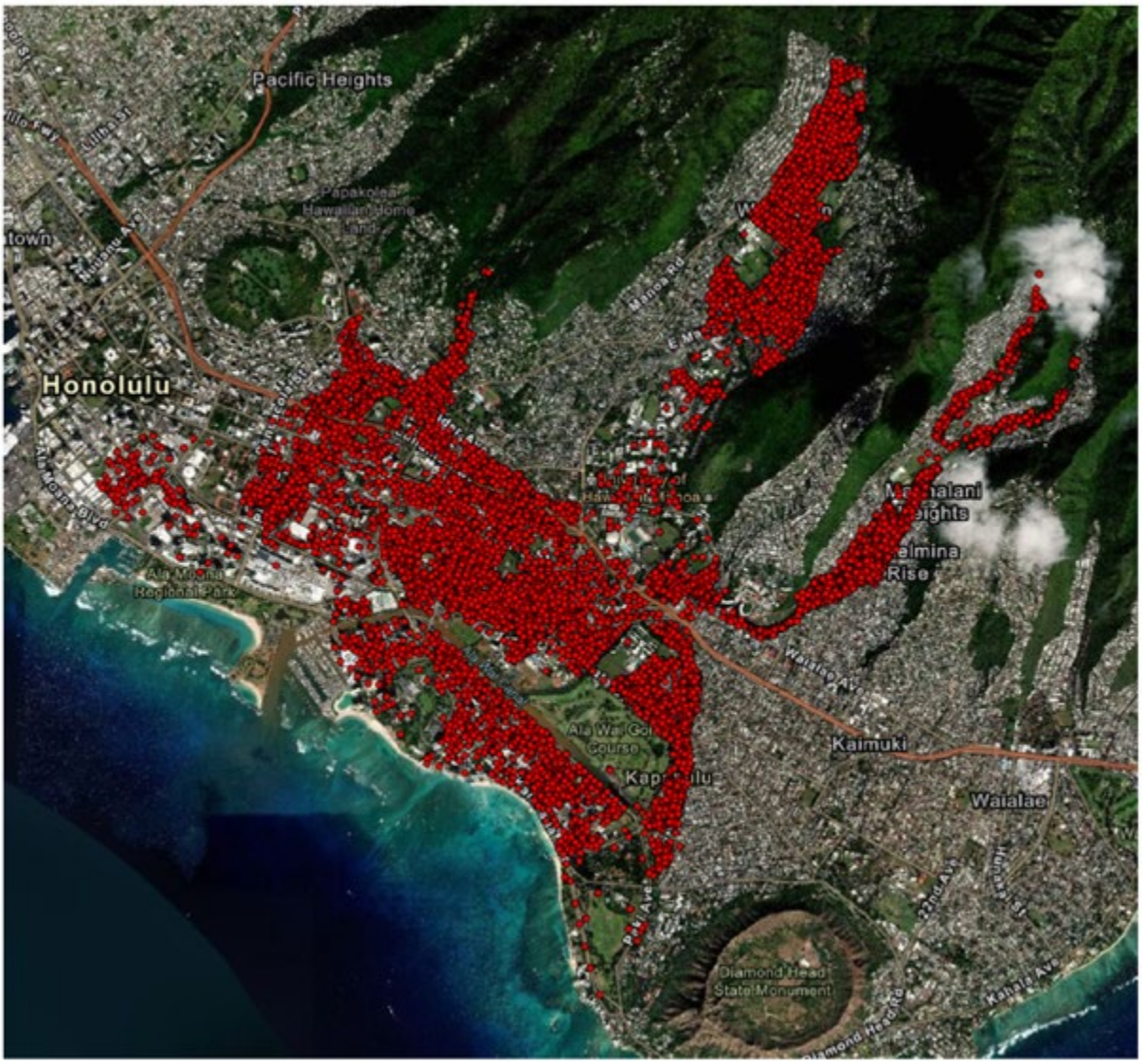

Figure 0.30 Overview of the Georeferenced Structure Inventory. Structures were taken as having entrances above ground level by 2 feet, with standard deviation 0.7 ft (uniform distribution was assumed, truncated to ignore elevations below ground level, since so few buildings actually have basements). Greater detail can be found in the USACE 2021 validation report (hydraulic and economic sections).

Figure 0.31 shows the locations of the measures proposed, including seven detention storage areas that were removed from consideration during the sensitivity review of options for the feasibility study.

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Figure 0.31 USACE 2021 Summary of Project Features

Review of the inundation without, or with, the combined improvements is summarized in the two views presented in Figure 0.32. In both cases, the inundated area is mostly shown with green shading, for depths below 1 foot. Greater depths are shown in yellow (1-2 ft), red (2-3 ft), or blue (>3 ft) shading. The modeled/proposed changes led to a marked reduction in the proportion of colors representing deeper inundation.

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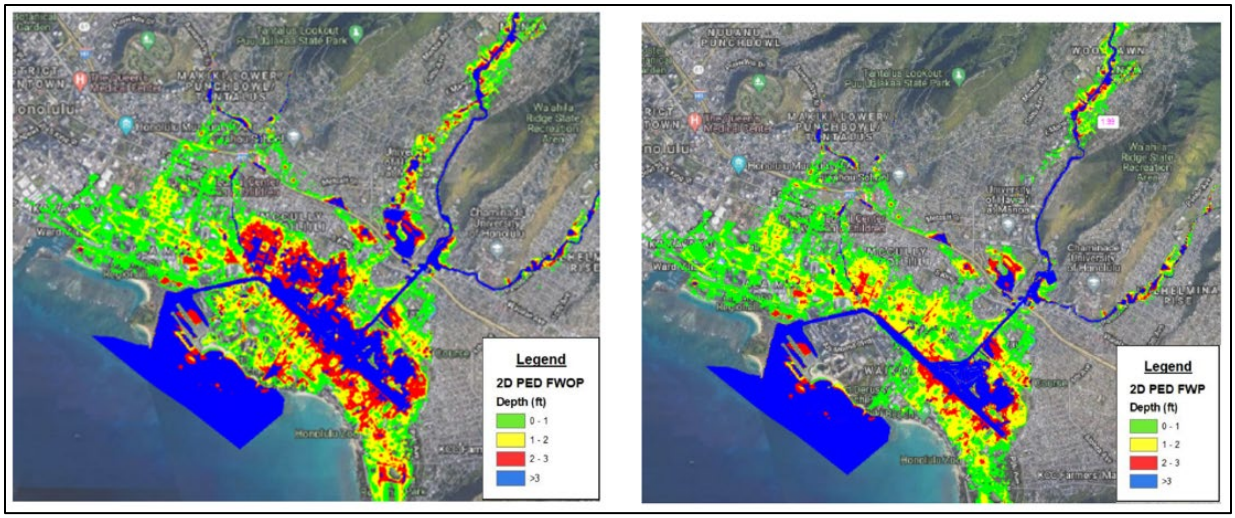

Figure 0.32 Expected AEP 0.01 (=1/100 yr) inundation for FWOP and FWP renovations, per USACE 2021 RAS model (Validation Study)

The full economic report for the case shown in Figure 0.32 (2021 FRM Validation Report) tabled eight recurrence probabilities from 0.5 to 0.002 ("2-year" to "500-year" average return-period) storms. Twenty-four damage zones were reviewed to compare damages.

In the modeled FWOP scenario, total damage costs ranged from $730,000 for the 0.5 AEP (2-year storm) case to $2,200 million for the 0.002 AEP (500-year storm) case.

In the 2021 report's With-Project scenario, total damage costs ranged from $716,000 for the 0.5 AEP case to $1,290 million for the 0.002 AEP case. The potential saving was therefore about 2% for the 2-year flood event and about 41% for the 500-year case.

The expected annual damages costs were $32.2 million for the FWOP case and $17.5 million following the report's proposed NED With-Project renovations.

The 2021 validation report indicated a need for a General Reevaluation Report (GRR) (this report) with a focus on events recurring with a more frequent average return period AEP 0.4 to AEP 0.1 (2.5-year to 10-year storms).

As part of the GRR, the 2023 TSP was developed. The layout of the TSP layout is summarized in Figure 0.33.

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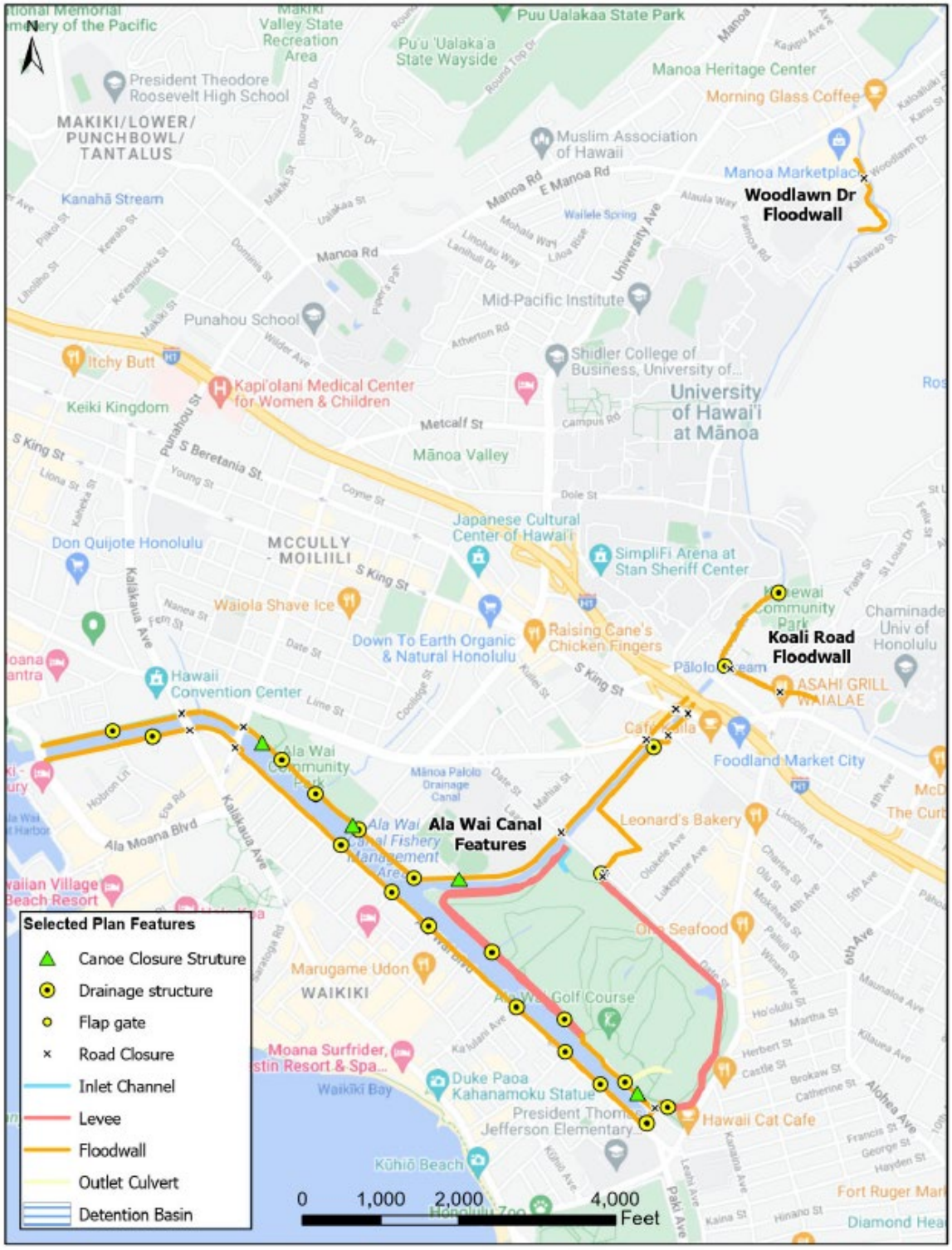

Figure 0.33 Features of the 2023 Tentatively Selected Project (Google Terrain View).

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13. Conclusion

Recent climate science literature indicates observed trends of rising mean and extreme temperatures. The literature indicates that the observed annual mean precipitation is reducing over time, with ambiguous projections regarding annual maximum values. These trends are less easy to extract from the data due to changes in the cyclical patterns of the El Niño Southern Oscillation (both severity and periodicity). Prevailing wind directions appear to be shifting over time; and the extent of any changes to the interplay between low-level and upper-level wind, with their varying temperatures and percent saturation, remain uncertain.

The literature is ambiguous on projected stream runoff trends.

As a result, regional projections of future streamflows are mixed and depend on the climate model and its assumptions.

In lieu of a climate-model projection method, the Time Series Tool was used to extend the existing observation record for the site to the year 2034, but the short extension had such wide uncertainty bands on the resulting “projections” that no clear pattern emerged.

The nonstationarity analysis did not indicate the presence of any strong nonstationarities in the record of annual peak inflows to the canal system. Trend analysis of observed 3-day peak inflow data showed a slight decreasing trend, but this was not statistically significant.

The watershed (Makiki, Manoa and Palolo Streams, discharging to the Ala Wai Canal, which discharges to the Pacific Ocean) is known to be vulnerable in the flood risk management business line. No comparison has been made between this risk, or the potential future risk, and vulnerabilities in other USACE districts.

The project is intended for riverine flooding reduction, although there are significant sea-level components to the downstream boundary conditions of the associated hydraulic modeling.

Sea level rise is a clear issue for Oahu, and particularly for the Waikiki area of interest in this study. The TSP has been evaluated using hydraulic modeling of FWP and FWOP assumptions, based on the USACE intermediate sea-level-rise assumptions through 2080. A sensitivity analysis indicated that the TSP likely provides significant reduction in inundation, for storms up to the 20-year event, through at least 2100, even under the USACE high SLC assumptions.

As indicated in **Table 0.5**, high runoff events caused by more runoff in general or more intense storms would lead to more damaging effects in the study area. The analysis of flows at the site, however, does not lead to a conclusion of increases in either average or peak flows over time. Regionally, average flows appear to be diminishing over time, but peak flows may be rising relative to the average flows. It is not clear whether the damaging high flows would be increased or diminished over time. The table outlines how the main risk management measures considered in the study might be affected by changes in inflow patterns. Since the regional and site-specific data do not indicate a clear climatic change underway for the basin with respect to peak riverine flows, it is unclear how the climate trends that have been examined would affect the measures under consideration. The residual flood risk to the project, due to climate change, is therefore classified as low.

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Based on this assessment, the recommendation is to treat the potential effects of climate change and long-term natural variability in climate as occurring within the uncertainty range calculated for the current hydrologic analysis.

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Table 0.5 Residual Risk to Ala Wai Canal Due to Climate Change

Residual Risk to Ala Wai Canal Due to Climate Change

Feature or Measure	Trigger	Hazard	Harm	Qualitative Likelihood
Approved/designed combination of features/ measures is installed: • tunnels, • channel bypass, • channel modifications, • daylighting, • detention, • channel naturalization, • grade control structures, • underground storage, • bridge modifications, • floodwalls, • submerged pipes, • microtunnels, • debris management/ catchments, • canal deepening/ widening, • vertical storage tunnels.	Higher precipitation and temperatures result in more extreme runoff events.	FWOP per 2021 estimates: PAR is large: 65,000 residents and 200,000 daily visitors (mostly tourists). 17,085 structural features: homes, residential vehicles, businesses, public structures, street segments. Flood damages as $721 million for an AEP 1/100 y storm; or $2.20 B for AEP 1/500 y storm.	Widespread flooding between 1 and 3 feet deep (approximately 6 square miles). Assessment of loss of life not located. **Annual damages assessed in 2021:** **FWOP $32.2 million.** ***(2021 FRM Validation Report; report noted that FDA indicated essentially a doubling of the one-time damages for increases from a 1/50 yr to 1/100 yr, and again from 1/100 yr to 1/200 yr cases.)*** **With-Project: $17.5 million.** [Preliminary: GRR September 2023 assessed storm-induced damages of: $125 M (5-yr) or $5.5 B (500-year): consistent with annual induced damages in the range $100 M to $200 M per annum (actual assessment not yet available as of 9/27/2023).]	**Low probability** of increased flooding due to climate change. It is not clear whether, due to climate change, there will be an increase or decrease in annual peak flows. **USACE (2015)** indicates this uncertainty; **NCA4** acknowledges the uncertainty but points to likely increases in peak flow despite decreases in average flow. **Site-specific data** review shows a slight drop in annual peak streamflow. "**Low**" assessment is taken as valid for all measures.

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Residual Risk to Ala Wai Canal Due to Climate Change

Feature or Measure	Trigger	Hazard	Harm	Qualitative Likelihood
Details as shown above.	Sea-level rises closer to the USACE high-curve projection than the assumed intermediate-curve projection.	Project design condition is reached in 2040 to 2045 (not 2080).	Damages are approximately as developed in 2021. System failure: up to 2.2 feet of inundation more than estimated in the vulnerable area. The change in the inundation level is limited to the immediate vicinity of the canals, for unusually large storms (greater than the 20-year event). [Preliminary: GRR September 2023 assessed storm-induced damages of: $125 M (5-yr) or $5.5 B (500-year): consistent with annual induced damages in the range $100 M to $200 M per annum (actual assessment not yet available as of 9/27/2023).]	**Low**: the monitored data appears to be tracking the intermediate curve. Hydraulic sensitivity modeling indicates that, with the high RSLC assumption, the TSP system is effective for at least the assumed 20-year flood, at least to the year 2100.

The purpose of this study is flood risk management. The recent literature points to smaller average flows over time but is not clear about whether the runoff associated with stormflows will be greater or smaller as a result. Site-specific data indicates a slight reduction in annual peak flows, but there are large uncertainty bounds associated with this extrapolation which extended by default only as far as 2034. The potential for change in the high-flow runoff patterns may become apparent with the collection of more years of runoff data and/or further climate modeling.

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US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix I — Real Estate

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This document contains CONTROLLED UNCLASSIFIED INFORMATION (CUI). It contains information that may be exempt from public release under the Freedom of Information Act (5 USC 552). It is to be controlled, stored, handled, transmitted, distributed, and disposed of in accordance with USACE policy relating to CUI information and it is not to be released to the public or other personnel who do not have a valid “need to know” without prior written approval of an authorized USACE official.

Report Status: Draft, November 2023

EXECUTIVE SUMMARY

The Ala Wai General Reevaluation Report (Study) with Integrated Supplemental Environmental Impact Statement is authorized under Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970, as amended. The Real Estate Plan (REP) is generally prepared as an appendix to the Study to support the acquisition requirements of the TSP. The REP presents the real estate requirements, proposes the acquisition strategy, develops a cost estimate for real estate acquisition, and incorporates an internal technical review.

A Tentatively Selected Plan (TSP) was selected based on cost, ecological output, economic benefits, completeness, effectiveness, efficiency, and acceptability. The TSP includes constructing one detention basin (Ala Wai Golf Course Detention Basin: 128.35 ac.), one levee (Ala Wai Golf Course Levee, Inlet Culvert, Outlet Culvert: 9.18 ac.), and three floodwalls (Ala Wai Canal Floodwall: 3.83 ac., Koali Road Floodwall: 0.70 ac., and Woodlawn Bridge Floodwall: 0.35 ac.). Relocation of utility easements totaling 3.35 acres is anticipated. Construction areas and access routes are estimated alongside project features. Additionally, four staging areas estimated at 5.56 acres are planned in close proximity to the project features. Construction is anticipated for two (2) years.

The Non-Federal Sponsor (NFS) for the Study is the City and County of Honolulu (CCH). The NFS is responsible for ensuring that it possesses the appropriate real estate interests for all real property required for the proposed project. The minimum estate required for the detention basin is a permanent flowage easement totaling 128.35 acres. The minimum estate required for the floodwalls are flood protection levee easements totaling 14.06 acres. The minimum estate required for staging, construction, and site access are temporary work area easements totaling 5.54 acres. The minimum estate required for utility relocations is utility easements totaling 3.35 acres.

Both residential and commercial structures are anticipated to be affected by the placement of structural project features. Five commercial and residential structures are anticipated to be relocated due to the Woodlawn Bridge Floodwall, Koali Road Floodwall, and Ala Wai Canal Floodwall. Relocation values including relocation benefits are estimated at $5,299,900.

Induced flooding is reasonably anticipated as a result of the Ala Wai Golf Course Detention Basin, Ala Wai Golf Course Floodwall, Koali Road Floodwall, and Woodlawn Bridge Floodwall. Due to the significant induced flooding estimated to cover the entirety of the detention basin, a permanent flowage easement is required. Additionally, induced flooding is also anticipated as a result of the proposed floodwalls. Further legal analysis is required on a parcel-by-parcel basis regarding physical invasion takings and just compensation payment requirements. Due to recent Federal Circuit legal opinions, a conservative range of estimated buyouts is assumed, which indicates a fee simple value ranging from $124.55M (5yr event, 2 parcels affected) to $5.47B (500yr event, 673 parcels affected).

The estimated real estate cost associated with the TSP is approximately $58,088,600, including all recommended lands, easements, rights-of-way, relocations, and disposals (LERRDs), relocations, incremental real estate contingency, administrative costs to be carried out by the NFS, and Government costs for LERRDs monitoring and certification. The real estate cost estimate above does not include estimated costs for induced flooding, which may range from $124.55M to $5.47B. The NFS will be assessed on its capability to acquire and provide the LERRDs necessary for the proposed project.

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1. Authority and Purpose

The Study is authorized under Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970, as amended. A Feasibility Cost Share Agreement (FCSA) was executed between USACE and the non-Federal sponsor, CCH Engineering Division, in 2001.

The U.S. Army Corps of Engineers (USACE), in partnership with the CCH, is identifying and assessing flood risk management alternatives. This study was appropriated under the Supplemental Appropriations of the Bipartisan Budget Act of 2018 (Public Law 115-123), dated 9 February 2018, which funded the initiation and completion of previously authorized flood and storm damage reduction studies.

Past studies include a Reconnaissance Report (1999), Ala Wai Flood Study (2001), and Manoa Watershed Study (2006). The Reconnaissance Report sought a comprehensive management and restoration plan to restore aquatic habitat and biological diversity in the Canal and upstream tributaries. The Ala Wai Flood Study identified several mitigative measures and conceptual alternatives that could potentially minimize flood damages to Waikiki and the surrounding area. The results of this technical study were used to establish that the USACE could be involved in the investigation of flood risk management in the Ala Wai Canal. The Mānoa Watershed Project resulted in detailed topographic mapping, hydrologic and hydraulic modeling, and identification of potential measures to address specific flood problems; however, it was terminated before implementation. Information developed through the Mānoa Watershed Project by NRCS was subsequently incorporated into the Ala Wai Canal Project, which was restarted in 2007.

Due to the potential for unavoidable, significant effects an Environmental Impact Statement was prepared for compliance with the National Environmental Policy Act (NEPA). Environmental analysis will comply with all environmental laws as applicable. The analysis is anticipated to be completed by relying on existing literature, remote sensing technologies, and data available from other agencies for use in GIS.

Generally, the Real Estate Plan (REP) is prepared by the USACE Honolulu District (District) as an appendix to the Feasibility Report. The REP presents the real estate requirements, proposes the acquisition strategy, develops a cost estimate for real estate acquisition, and incorporates an internal technical review. USACE Mapping reviews tract ownerships and acreages to prepare exhibits for the REP. USACE Appraisal prepares (or contracts for) and approves a cost estimate or gross appraisal, as needed for acquisitions. USACE Environmental provides applicable compliance memoranda and/or documentation in accordance with NEPA/Hawaii Environmental Policy Act (HEPA), National Historic Preservation Act (NHPA), and USACE Hazardous, Toxic, and Radioactive Waste (HTRW) policy.

Project real estate requirements include a review of NFS-owned parcels as well as required LERRDs to be carried out by the NFS. LERRDs are requirements that the U.S. Government has determined the NFS must meet for the construction, operation, and maintenance of the project. If LERRDs are required, USACE Real Estate coordinates with the NFS and provides the NFS with a partner packet outlining the NFS's responsibilities and notice informing the NFS of the risks of early acquisition.

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The information contained herein is tentative for planning purposes only. Final real property acquisition acreages, limitations, and cost estimates are subject to change after approval of a final Feasibility Report, including plan modifications that occur during the Preconstruction Engineering and Design Phase (PED).

2. Project Description and Location

The Ala Wai Watershed is located on the southeastern side of the island of Oahu, Hawai'i, and includes Makiki, Mānoa, and Palolo streams, all of which drain to the Ala Wai Canal. The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Ko'olau Mountains to the nearshore waters of Mamala Bay. The Canal is a 2-mile-long waterway constructed during the 1920s to drain extensive coastal wetlands, thus allowing development of the Waikiki District. A large portion of the watershed, including most of Waikiki, is highly susceptible to flooding. See Figure 2-1: Study Area.

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Figure 2-1: Study Area

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A high level of flood risk exists within the Ala Wai Watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) and aging and undersized infrastructure result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Mānoa, and Palolo valleys. To combat flooding, a final array of alternative plans was formulated through combinations of screened management measures. Final Study alternatives included:

- Alternative 0: No Action
- Alternative 1: Storage Cornerstone
- Alternative 2B: Conveyance Cornerstone
- Alternative 5.3: Hybrid

2.1. Tentatively Selected Plan: Hybrid

Alternative 5.3: Hybrid was selected as the Tentatively Selected Plan (TSP). Project features, also referred to as measures, include:

1. Ala Wai Golf Course Detention Basin: 128.35 ac.
2. Ala Wai Golf Course Levee, Inlet Culvert, Outlet Culvert: 9.18 ac.
3. Ala Wai Canal Floodwall: 3.83 ac.
4. Koali Road Floodwall: 0.70 ac.
5. Woodlawn Bridge Floodwall: 0.35 ac.
6. Construction and Staging Areas: 5.54 ac.
7. Utility Relocations: 3.35 ac.

Ala Wai Golf Course Detention Basin and Levee – At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately 6-9 ft in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 8,315 ft in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. On the left descending bank of the Manoa-Palolo Canal, there is an overtopping spillway section, approximately 100 feet in length, that is reinforced with erosion protection. The levee along the Manoa-Palolo Canal is also lined with erosion protection on the canal side. A portion of the existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be used as an inlet location for overflow into the Ala Wai Golf Course Detention Basin. A small inlet channel would be excavated and lined with erosion control material to improve the flow onto the golf course. Three concrete drainage structures and three flap gates would be constructed along the levee alignment of the Ala Wai Golf Course to allow collected stormwater within the basin and from local runoff to slowly drain into Ala Wai Canal. The detention basin also includes a floodwall along the golf course parking lot near the Ala Wai Canal, which is 9 feet in height. The floodwall has one concrete drainage structure and two flap gates. The drainage structure at this location

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serves to outlet flow from the Diamond Head neighborhood. The original outlet will be enclosed by concrete (instead of daylighted) and will need reconstruction of the vehicle and pedestrian access at this location. A small section of floodwall near the Kapahulu Avenue and Ala Wai Boulevard intersection at the Diamond Head end of the canal will tie-in to the golf course levee and Ala Wai Canal floodwall system. This section is 6 feet in height and includes one road closure structure and one drainage structure. Finally, there is one canoe access point in this location. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

Ala Wai Canal Floodwall – At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending 6 ft above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 22,852 ft long. Existing stormwater sewers inletting into the Ala Wai Canal would be modified so that fourteen would be drainage structures and 59 would be retrofitted with flap gates. Eleven road closure structures would be constructed. There are three canoe access points for this feature. The typical cross section of this feature varies along the alignment but all are assumed to be 6 feet above ground. The floodwall along the Ala Wai Canal and the lower right descending bank of the Manoa-Palolo Canal will include an elevated walking path. On the left descending bank of the Manoa-Palolo Canal and near Kaimuki High School, there will be a floodwall on micropiles with no walking path. Where space is constricted, along the upper right descending bank of the Manoa-Palolo Canal, Giken walls (tied-back I-wall) will be constructed, with no walking path. The purpose of the Ala Wai Canal Floodwall system would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki.

Woodlawn Drive Floodwall & Koali Road Floodwall – Also within Manoa Valley, a floodwall extending 6 ft above ground level (i.e., Woodlawn Drive Floodwall) would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,270 ft in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,510 ft in length. Two concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two flap gates would be retrofitted on smaller stormwater culverts along this feature. Two road closure structures would be constructed. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system.

Construction areas have been identified adjacent to project features. Additionally, four staging areas have been identified for the storage of materials and equipment. The staging areas would be restored upon construction completion. Construction is anticipated for two (2) years.

The TSP includes life-cycle maintenance with operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) performed on a routine basis. The NFS is aware of its responsibility to perform all OMRR&R. A detailed OMRR&R plan will be prepared during the detailed design phase. See Figure 2-2: Project Feature Map 1, Figure 2-3: Project Feature Map 2, Figure 2-4: Project Feature Map 3, and Figure 2-5: Project Feature Map 4.

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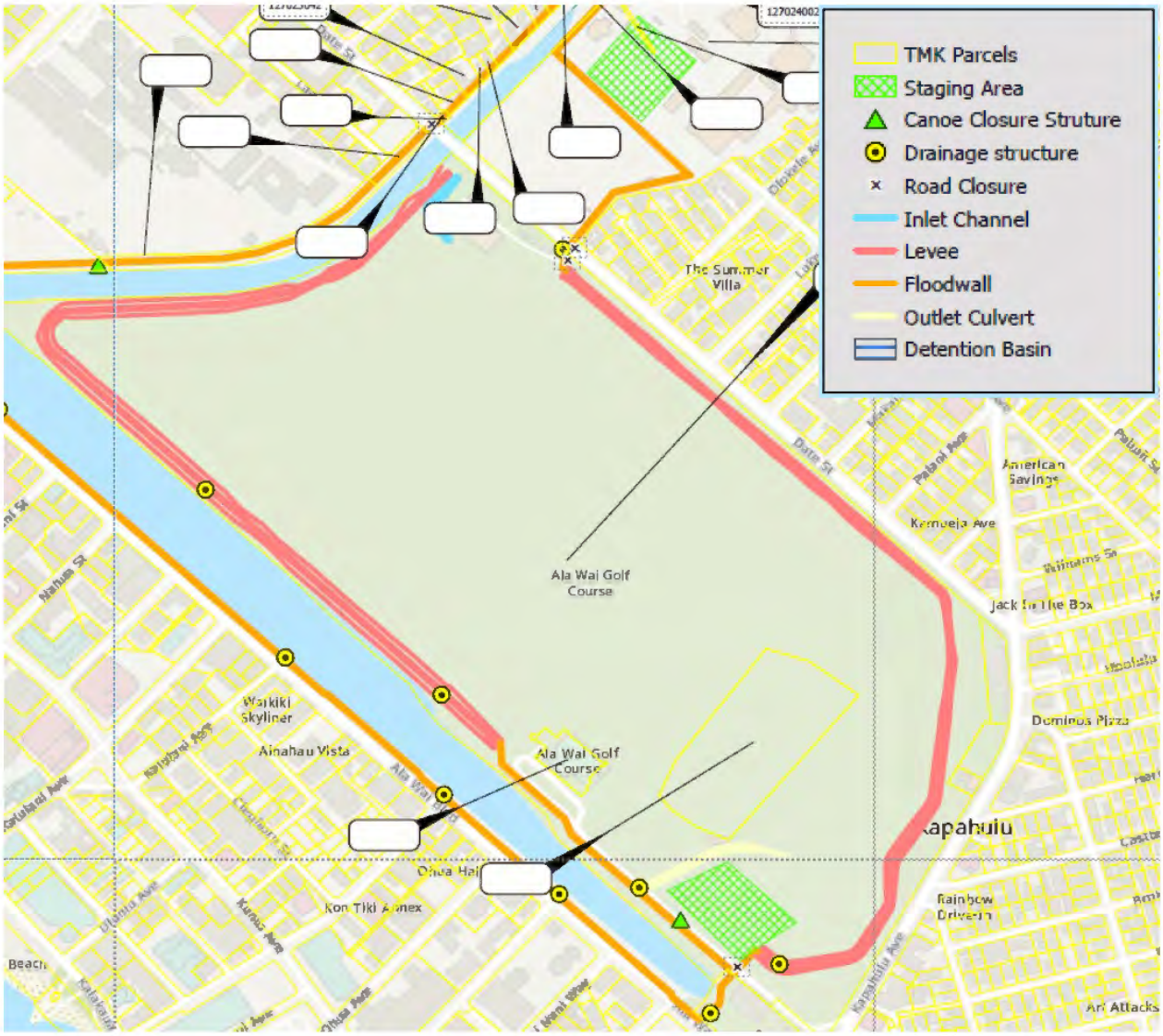

Figure 2-2: Project Feature Map 1

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Figure 2-3: Project Feature Map 2

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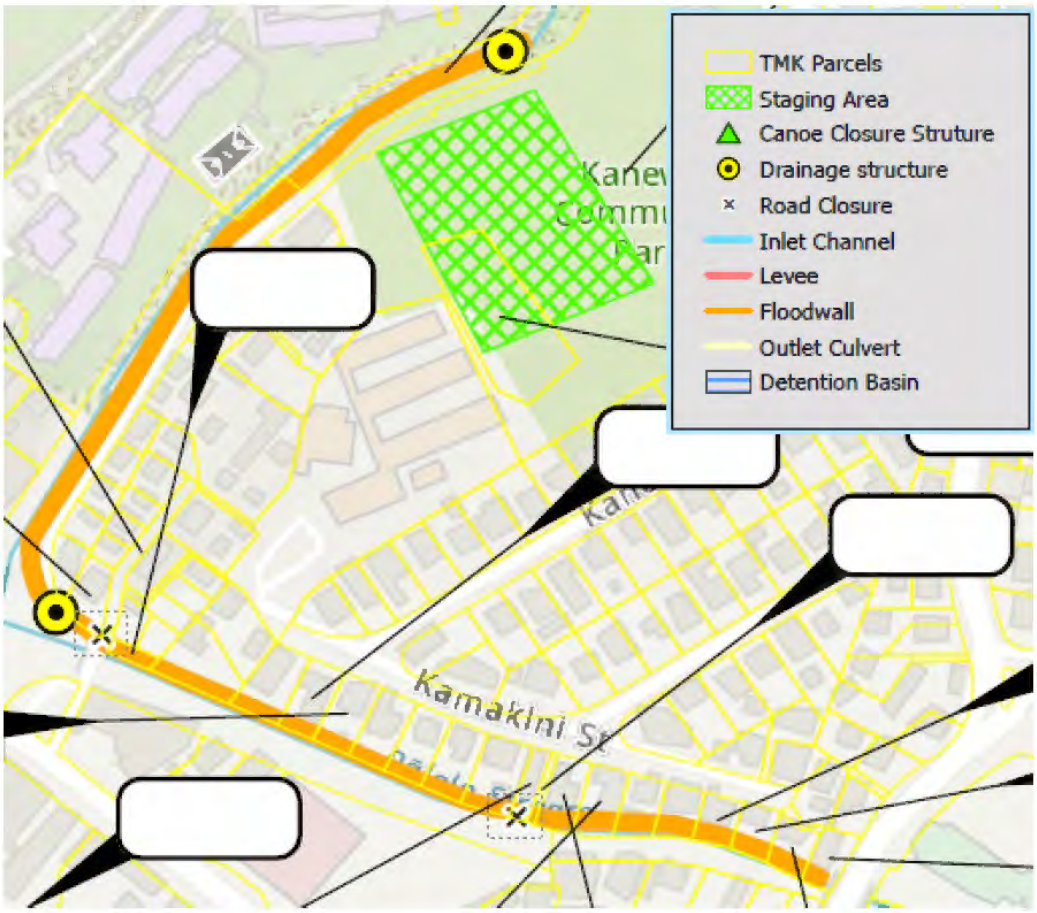

Figure 2-4: Project Feature Map 3

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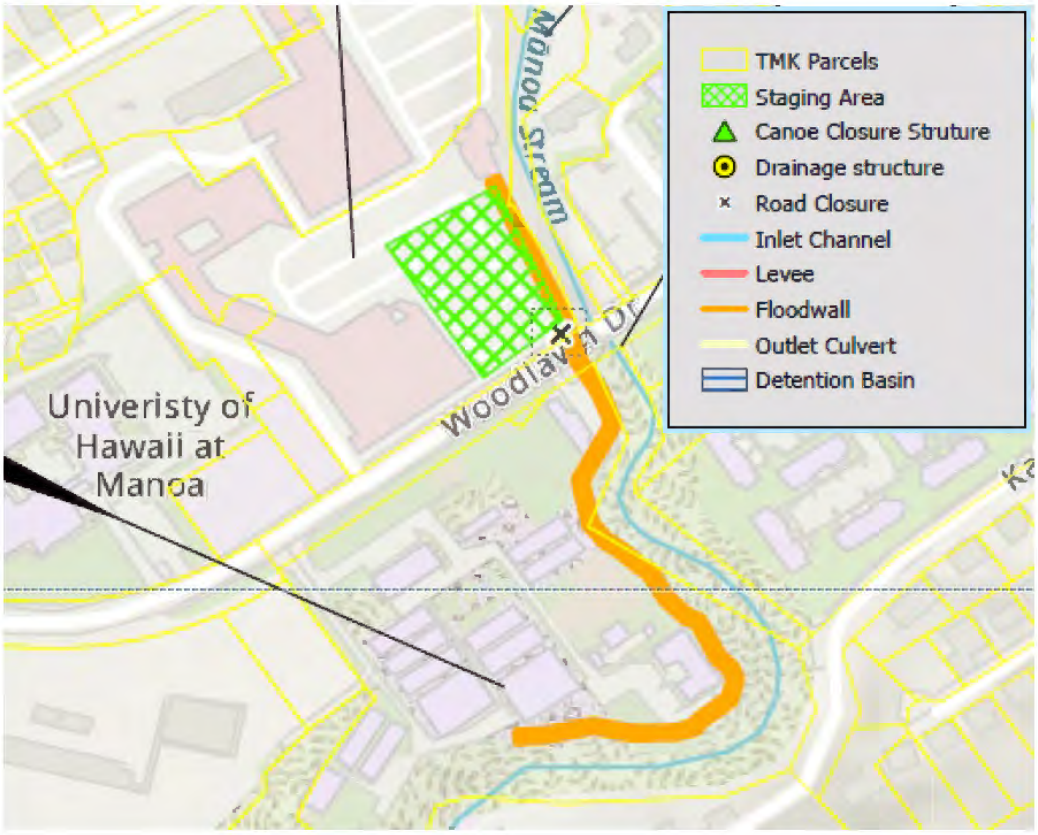

Figure 2-5: Project Feature Map 4

2.2. Structures in the Area

The project footprint encompasses the physical location of the TSP and all included project features or measures, either individually or collectively, that will be impacted to facilitate construction associated with the TSP The project footprint includes numerous public and private structures, facilities, and utilities. The Civil Engineering Appendix indicates that proposed project features are anticipated to affect existing structures. See Section 10: Facility and Utility Relocations for further information.

2.3. Staging and Construction

Four staging areas totaling approximately 5.54 acres have been identified. Staging areas include: Ala Wai Golf Course Staging Area (2.29 ac.), Koali Road Floodwall Staging Area 1 (0.43 ac.), Koali Road Floodwall Staging Area 2 (1.82 ac.), and Woodlawn Bridge Floodwall Staging Area (0.99 ac.). Staging areas and site access must be established for the use and distribution of construction materials and equipment. The staging area generally contains contractor trailers, parking, fencing, and storage of equipment and materials. Additionally, construction is assumed within a 10-foot-wide corridor alongside the structural project features, See Figures 2-2 to 2-5 above for staging area locations. Staging and construction will be required for two (2) years during project construction.

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2.4. Site Access

It is anticipated that personnel, equipment, and imported materials would access project construction along public roadways parallel to the airport. Access points identified within the public roadways can be used without additional perpetual real estate interests for operations and maintenance. Access routes have not yet been identified by the civil engineering report. If additional real estate interests are required for access points identified adjoining construction areas outside of public roadways, they will be included in temporary work area easements as project features are refined.

2.5. Ownership by Project Feature

The following Table 2-1: Real Estate Interest Required by Project Feature summarizes the land areas and real estate interests by project feature.

Table 2-1: Real Estate Interest Required by Project Feature

Project Feature	Approximate Area (Acres)	Owner	Zoning	Interest Required
1. Ala Wai Golf Course Detention Basin	128.35	State	Preservation	Flowage Easement (permanent)
2. Ala Wai Golf Couse Levee	9.18 ac.	State	Preservation	Flood protection levee easement
3. Ala Wai Canal Floodwall	0.09		Preservation, Commercial, Residential	Flood protection levee easement
	0.18	State		
	0.01	CCH		
	0.22	CCH		
	0.27	CCH		
	0.32	CCH		
	0.08	State		
	0.02	CCH		
	0.02	Private		
	0.02	Private		
	0.01	Private		
	0.01	Private		
	0.00	Private		
	0.02	Private		
	0.01	Private		
	0.03	Private		
	0.04	Private		
	0.13	CCH		
	0.55	CCH		
	0.01	State		
	0.02	Private		
	0.03	Private		
	0.07	Private		
	0.06	Private		
	0.03	Private		
	0.00	Private		
	0.02	Private		
	0.03	Private		
	0.01	Private		

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Project Feature	Approximate Area (Acres)	Owner	Zoning	Interest Required
	0.01	CCH		
	0.01	Private		
	0.03	HIDOT		
	0.86	CCH		
	0.44	State		
	0.10	CCH		
	0.07	HIDOT		
4. Koali Road Floodwall	0.24	Private	Residential	Flood protection levee easement
	0.04	Private		
	0.02	Private		
	0.01	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.01	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.02	Private		
	0.01	Private		
	0.01	Private		
	0.12	CCH		
5. Woodlawn Bridge Floodwall	0.34	Univ. of HI	Residential, Commercial	Flood protection levee easement
	0.01	State		
6. Construction and Staging	2.29	State	Preservation, Commercial	Work area easement, temporary (two years)
	0.43	CCH		
	1.82	CCH		
	0.99	Private		
7. Utility Relocations	3.35	Private	Residential, Commercial	Utility easement, permanent

3. Sponsor's Real Estate Interests

Based on a review of the City & County of Honolulu Department of Planning & Permitting maps, it is assumed that the NFS owns some interests required for proposed project feature (DPP, 2023).

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4. Estates Required

The NFS is responsible for providing all LERRDs required for the construction, operation, and maintenance of the project. The NFS is instructed to acquire the minimum real estate interests necessary for the project. LERRDs required for the proposed project include:

4.1. Flowage Easement (permanent)

1. Ala Wai Golf Course Detention Basin: 128.35 acres

The minimum estate required for the detention basins is a permanent flowage easement totaling approximately 128.35 acres.

Flowage Easement (Permanent)

The perpetual right, power, privilege and easement permanently to overflow, flood and submerge (the land described in Schedule A) Tracts Nos. _____, _____ and _____), (and to maintain mosquito control) in connection with the operation maintenance of the project as authorized by the Act of Congress approved _____, and the continuing right to clear and remove and brush, debris and natural obstructions which, in the opinion of the representative of the United States in charge of the project, may be detrimental to the project, together with all right, title and interest in and to the timber, structures and improvements situate on the land (excepting _____, (here identify those structures not designed for human habitation which the District Engineer determines may remain on the land)); provided that no structures for human habitation shall be constructed or maintained on the land, that no other structures shall be constructed or maintained on the land except as may be approved in writing by the representative of the United States in charge of the project, and that no excavation shall be conducted and no landfill placed on the land without such approval as to the location and method of excavation and/or placement of. landfill; the above estate is taken subject to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purposes authorized by Congress or abridging the rights and easement hereby acquired; provided further that any use of the land shall be subject to Federal and State laws with respect to pollution.

4.2. Flood Protection Levee Easement

2. Ala Wai Golf Course Levee: 9.18 acres
3. Ala Wai Golf Course Floodwall: 3.83 acres
4. Koali Road Floodwall: 0.70 acres
5. Woodlawn Bridge Floodwall: 0.35 acres

The minimum estate required for the floodwalls is a perpetual flood protection levee easement totaling approximately 14.06 acres.

Flood Protection Levee Easement Standard Estate

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A perpetual and assignable right and easement in (the land described in Schedule A) (Tracts Nos, _____, _____ and _____) to construct, maintain, repair, operate, patrol, and replace a flood protection (levee) (floodwall)(gate closure) (sandbag closure), including all appurtenances thereto; reserving, however, to the owners, their heirs and assigns, all such rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads, and pipelines.

4.3. Temporary Work Area Easement

6. Construction and Staging Areas: 5.54 acres

The minimum estate required for construction and staging, including access, is a temporary work area easement totaling approximately 5.54 acres. The temporary work area easement is estimated to be required for two (2) years during project construction.

Temporary Work Area Easement Standard Estate

A temporary easement and right of way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____), for a period not to exceed _____, beginning with date of possession the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a (borrow area) (work area), including the right to (borrow and/or deposit fill, spoil and waste material thereon) (move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right of way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

4.4. Utility Easement

10. Utility Relocations: 3.35 acres

The minimum estate required for relocation of existing sewer, water, gas, and power utilities along the Koali Road Floodwall, Ala Wai Golf Course Detention Basin, and the Ala Wai Canal Floodwall is a utility easement totaling approximately 3.35 acres. The size of the utility easement is assumed as a 20-foot wide easement.

Utility and/or Pipeline Easement Standard Estate

A perpetual and assignable easement and right of way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____,_____ and _____), for the location, construction, operation, maintenance, alteration; repair and patrol of (overhead) (underground) (specifically name type of utility or pipeline); together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement

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hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

5. Federal Projects/Ownership

There are no current proposed project features with prior Federal project credit. Additionally, there are no Federally owned lands within the LERRDs required for the proposed project. Any interest in land provided as an item of local cooperation for a previous Federal project is not eligible for credit.

6. Navigation Servitude

As the Study does not propose any features with waterways, navigation servitude is not applicable to this Study. The navigation servitude is the dominant right of the Government under the Commerce Clause of the U.S. Constitution (U.S. CONST. art.I, §8, cl.3) to use, control, and regulate the navigable waters of the United States and the submerged lands thereunder for various commerce-related purposes including navigation and flood control. In tidal areas, the servitude extends to all lands below the mean high-water mark. In non-tidal areas, the servitude extends to all lands within the bed and banks of a navigable stream that lie below the ordinary high-water mark.

Generally, it is the policy of the USACE to utilize the navigation servitude in all available situations, whether or not the project is cost-shared or fully Federally funded. Lands over which the navigation servitude is exercised are not to be acquired nor eligible for credit for a Federal navigation or flood control project or another project to which a navigation nexus can be shown.

7. Maps

Maps are intended as a preliminary tool to illustrate the project footprint, LERRDs to be acquired, and lands within the navigation servitude. Changes to LERRDs footprints may occur and cost estimates are subject to change even after approval of the Integrated Feasibility Report, including plan modifications that occur during the PED phase. Detailed maps will be provided prior to the Notice to Acquire (NTA), which is the formal notification to the NFS of the required LERRDs. For the purposes of this study, including Study location and Study area, refer to Figure 2-1: Study Area. For LERRDs requirements, refer to Figure 2-2: Project Feature Map 1 through Figure 2-5: Project Feature Map 4.

8. Induced Flooding

Induced flooding is reasonably anticipated as a result of the following project features: Ala Wai Golf Course Detention Basin, Ala Wai Golf Course Floodwall, Koali Road Floodwall, and Woodlawn Bridge Floodwall. Where significant induced flooding is anticipated, or where otherwise required, a written legal analysis is performed incorporating facts relating to the depth, frequency, duration, and extent.

The Ala Wai Golf Course Detention Basin hydrologic and hydraulic models indicate that storm water is anticipated to be drained within 45 minutes of a flood event, but that it could take up to

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three days for all water to drain. As significant induced flooding is anticipated for flood events, covering the entirety of the detention basins, a permanent flowage easement is required.

Induced flooding is also anticipated in nearby properties as a result of structural project features. A preliminary assessment was conducted utilizing Induced Flooding by Reach prepared by USACE NWO, August 21, 2023. Further legal analysis is required on a parcel-by-parcel basis regarding physical invasion takings and just compensation payment requirements. Due to recent Federal Circuit legal opinions, a conservative approach to estimated buyouts required due to takings is assumed. Table 8-1 below illustrates the number of parcels and the estimated value of those affected parcels by flood event. As illustrated, even at the 5-year flood event affecting two parcels, the fee simple value is $124.55M. By the 500-year event, 673 parcels affected are estimated at $5.47B.

Table 8-1: Induced Flooding Buyout Estimate by Flood Event

Flood Event	Number of Parcels Affected	Value of Affected Parcels
5Yr	2	$124,551,000
10Yr	7	$143,417,000
20Yr	16	$238,667,000
50Yr	57	$1,153,860,000
100Yr	76	$2,488,618,000
200Yr	85	$3,047,232,000
500Yr	673	$5,466,734,000

9. Baseline Cost Estimate for Real Estate

The estimated real estate cost associated with the TSP is approximately $58,088,600, which includes required interests, relocations, incremental real estate contingency, and incidental acquisition costs for both the NFS and Government.

Table 9-1: Baseline Cost Estimate for Real Estate

Real Estate Requirement	Size (Acres)	Cost Estimate
1. Ala Wai Golf Course Detention Basin: Flowage Easement (permanent)	128.35	$8,691,500
2. Ala Wai Golf Course Levee: Flood Protection Levee Easement	9.18	$5,398,100
3. Ala Wai Canal Floodwall: Flood Protection Levee Easement	3.83	$17,413,800
4. Koali Road Floodwall: Flood Protection Levee Easement	0.70	$4,673,900
5. Woodlawn Bridge Floodwall: Flood Protection Levee Easement	0.35	$2,387,100
6. Staging and Construction: Temporary Work Area Easement	5.54	$4,731,700
7. Utility Relocations	3.35	$2,810,500
8. Residential/Commercial Relocations	0.21	$5,249,900

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Hazard Removals	$0
Mineral Rights	$0
Damages	$0
Uniform Relocation Assistance	$50,000
Incremental Real Estate Costs (Contingency)	$6,494,400
Incidental Acquisition Costs: NFS	$157,600
Incidental Acquisition Costs: Government	$30,100
TOTAL	**$58,088,600**

The values for the baseline cost estimate were obtained from a Land Cost Estimate Report prepared by a licensed USACE appraiser, Northwestern Division, effective June 8, 2023. In accordance with USACE Real Estate Policy Guidance Letter 31, Real Estate Support to Civil Works Planning, a cost estimate is sufficient for projects in which the value of LERRDs is not expected to exceed 15 percent of total project costs. A cost estimate is not an appraisal as defined by the Uniform Standards Professional Appraisal Practice (USPAP); however, it conforms to USACE regulations. Cost is an estimate of fact, not an opinion of value, based upon land planning and engineering design parameters at a specific level of detail. As the design parameters are refined, the engineering and land planning facts may change necessitating a change in the cost estimate.

Incremental real estate costs are estimated at 20 percent of required real estate costs (flowage easements, flood protection levee easements, and temporary work area easements) for risk-based contingencies.

Incidental acquisition costs are estimated to include NFS costs incurred for title work, appraisals, review of appraisals, coordination meetings, review of documents, legal support, and other costs that are incidental to project LERRDs as well as Government costs for staff monitoring and reviewing and approving LERRDs. Incidental Government costs are estimated for NFS monitoring as well as LERRDs certification.

10. Public Facility and Utility Relocations

A preliminary review of civil and geotechnical engineering information and aerial maps indicate, at this phase of design, utility relocations are anticipated along the Koali Road Floodwall, Ala Wai Golf Course Detention Basin, and the Ala Wai Canal Floodwall. Given the densely populated residential area surrounding, it is not likely that these utilities can be relocated within existing easement rights of way. See Table 10-1: Estimated Utility Relocations and Figure 10-1: Koali Road Floodwall Utility Locations.

Table 10-1: Estimated Utility Relocations

Measure	No. of Utility Relocations			
	Sewer	Water	Gas	Power
Koali Road Floodwall	1,100LF	2x65LF	0	8x65LF
Ala Wai Golf Course Detention	4x100LF	0	0	6x100LF
Ala Wai Canal Floodwall	28x65LF	16x65LF	4x65LF	22x65LF

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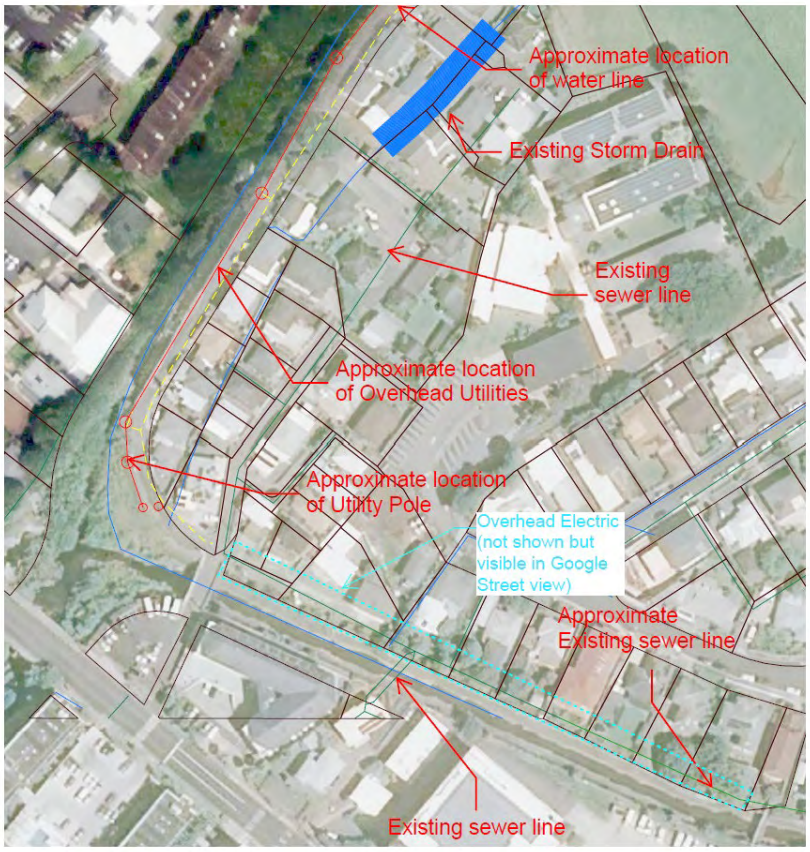

Figure 10-1: Koali Road Floodwall Utility Locations

11. Public Law 91-646 Relocation Benefits

Both residential and commercial structures are anticipated to be affected by the placement of structural project features, thus necessitating relocation benefits. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, PL 91-646, as amended, commonly called the Uniform Act, is the primary law for acquisition and relocation activities on Federal or federally assisted projects and programs. The NFS is required to follow the guidance of PL 91-646 regarding the displacement of towns, businesses, farms, or persons as well as habitable and commercial structures. Five commercial and residential structures are anticipated to be relocated due to the Woodlawn Bridge Floodwall, Koali Road Floodwall, and Ala Wai Canal Floodwall. As illustrated in Table 11-1: Estimated Residential and Commercial Relocations below, the value of the five structures, including the cost of relocation benefits, is estimated at $5,299,900.

Table 11-1: Estimated Residential and Commercial Relocations

Measure	Property Type	Acreage	Estimated Value

Woodlawn Bridge Floodwall	Commercial	0.01	$17,500
Koali Road Floodwall	Residential	0.14	$1,292,300
Ala Wai Canal Floodwall	Commercial	0.02	$189,100
	Residential	0.03	$2,817,200
	Residential	0.01	$933,800
Relocation Benefits			$50,000
TOTAL			**$5,299,900**

12. Minerals, Timber, and Crop Activity

Based on a review of the Geotechnical Appendix, currently, there is insufficient boring coverage for design purposes at every measure location. Borings and laboratory testing to confirm soil and rock conditions at each specific feature location will be required to develop more specific designs.

In accordance with Hawaii Revised Statutes (HRS) §182-2, all mineral rights within the State of Hawaii are reserved for the State (HRS §182-2, 2014). Acquisition of an interest in land conveys no right, title, or interest in or to the minerals.

Additionally, no known timber or crops are anticipated to be affected by the proposed project.

13. Assessment of Sponsor's Acquisition Capability

An Assessment of the NFS's Real Estate Acquisition Capability will be conducted jointly with the NFS in preparation for the final Real Estate Plan. A sample Sponsor's Acquisition Capability Assessment is included in Attachment 1.

14. Zoning

No enactments of zoning ordinances are proposed in lieu of, or to facilitate, acquisition in connection with the proposed project. Zoning within the project footprint is predominantly Preservation and Residential (Hawaii DPP, 2023).

15. Acquisition Milestones

Given the proposed Project potentially affects over 40 private property owners, the following preliminary schedule estimates twenty-four (24) months for NFS LERRDs planning and acquisition. A final planned timeline below will be mutually agreed upon by USACE Real Estate, Project Management, and the NFS.

The NFS's preliminary acquisition planning is estimated at six (6) months as follows:

Survey/Map/Title	90 Days
Legal Description	30 Days
Appraisal	60 Days

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The NFS's LERRDs acquisition is estimated at eighteen (18) months as follows:

Documentation	120 Days
Negotiation	180 Days
CCH Approval	120 Days
Payment	60 Days
LERRD Certification	60 Days

16. Environmental Impacts

Potential environmental impacts resulting from the proposed project are being considered, including investigation under the NEPA/HEPA, HTRW policy, National Historic Preservation Act, Archaeological and Historic Preservation Act, Clean Water Act, Endangered Species Act, Farmland Protection Policy Act, Fish and Wildlife Coordination Act, Migratory Bird Treaty Act, Native American Graves and Repatriation Act, Noise Control Act, Plant Protection Act, Rivers and Harbors Act, and Magnuson-Stevens Fishery Conservation and Management Act.

National Environmental Policy Act (NEPA)

It is assumed that an Environmental Assessment is the appropriate NEPA document for the final array of alternatives. Environmental analysis will comply with all environmental laws applicable. Analysis will be completed by relying on existing literature, remote sensing technologies, and data available from other agencies for use in GIS.

Hazardous, Toxic, and Radioactive Waste (HTRW) Policy

In the 2017 Ala Wai Canal Flood Risk Management EIS, an assessment identified a variety of HTRW sites within the Mānoa watershed. Additional information regarding the assessment results is provided in the Final Reconnaissance Phase Hazardous, Toxic, and Radioactive Waste Assessment for the Ala Wai Watershed Project (Myounghee Noh and Associates, 2009).

Based on the findings of the HTRW Appendix, which included a review of historical data and environmental records, there are currently no specific sites that are anticipated to prevent implementation of the project. However, the proposed work is within a dense urban area, and recognized environmental conditions (RECs) or sites with unresolved issues were identified in proximity to various project features. Depending on the final alignment of project features and on the extent of construction excavation, it is possible that some sites may have impacted soils or groundwater.

It is recommended that environmental contamination database results be reviewed during PED. Targeted soil sampling as part of a Phase II investigation is recommended for any areas requiring excavation that have identified specific impacts or potential impacts.

National Historic Preservation Act (NHPA)

In accordance with Section 106 of the NHPA, cultural and historic resources for the Ala Wai watershed were originally evaluated in the context of a National Historic Preservation Act Programmatic Agreement (PA) between USACE, the Hawai'i State Historic Preservation Office, the State of Hawai'i Department of Land and Natural Resources, the Oahu Island Burial Council, the Office of Hawaiian Affairs, and Historic Hawai'i Foundation. The PA details

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procedures to be utilized to evaluate project effects and determine appropriate and mutually agreeable mitigation and treatment approaches for known or inadvertently discovered historic properties. The Ala Wai PA was fully executed on November 16, 2016, and remains in effect for seven years.

A historic structures inventory survey was conducted in 2010 for the Ala Wai watershed to inform the analysis in the 2017 Ala Wai Canal Flood Risk Management EIS. The inventory identified a variety of structures dating from 1965 or earlier, including bridges, culverts, channel modifications, dams, and water supply structures.

17. Landowner Concerns

Private landowner concerns are anticipated in the project footprint and Study area due to the potentially large number of privately-owned parcels that could be affected. Multiple stakeholder and agency meetings and other public involvement efforts have been conducted throughout the planning process.

In general, stakeholders have expressed support for the project and emphasized the need for near-term action to reduce the risk of flooding.

18. Notification to Sponsor

The NFS, CCH, is involved in the planning process and supportive of the project. The NFS will be provided a Local Sponsor Toolkit and advised of the risks of acquiring LERRDs before the execution of the PPA. A Sample Letter Advising Against Early Acquisition is included in Attachment 2.

Additionally, once the LERRDs are finalized, a Notice to Acquire Letter will be transmitted to the NFS. The Notice to Acquire Letter serves as the formal instruction for the NFS to acquire the real estate interests needed for the proposed project. A Sample Notice to Acquire Letter is included in Attachment 3.

19. Other Relevant Real Estate Issues

There are no other known relevant real estate issues in the Study area.

20. References

Mineral Rights Reserved to the State, HRS § 182-2 (2014). https://www.capitol.hawaii.gov/hrscurrent/Vol03_Ch0121-0200D/HRS0182/HRS_0182-0002.htm

State of Hawaii, Department of Planning & Permitting. *Honolulu Land Information System.* Retrieved February 24, 2023, from http://gis.hicentral.com/.

U.S. Army Corps of Engineers, Honolulu District. *Draft Feasibility Report/Environmental Assessment, Ala Wai General Reevaluation Report,* March 2023.

U.S. Army Corps of Engineers, Northwestern Division. *Land Cost Estimate,* effective June 8, 2023.

U.S. CONST. art.I, §8, cl.3.

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Attachment 1: Sponsor's Acquisition Capability Assessment

Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability

Project: Ala Wai General Reevaluation Report
Project Authority: Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970, as amended
Non-Federal Sponsor: City and County of Honolulu
Name, Title
Address
Phone, email

Legal Authority	**Yes**	**No**
1. Does the NFS have legal authority to acquire and hold title to real property for project purposes? (statutory citation)		
2. Does the NFS have the power of eminent domain for the project (statutory citation)		
3. Does the NFS have "quick-take" authority for this project?		✓
4. Are there any lands/interests in land required for the project that are located outside the NFS's authority boundary?		
5. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn?		
6. Will the NFS's in-house staff require training to become familiar with the real estate requirements of Federal projects, such as PL 91-646, as amended?		✓
7. If #6 is yes, has a reasonable plan been developed to provide training?		NA

Willingness to Participate	**Yes**	**No**
8. Has the NFS stated its general willingness to participate in the project and its understanding of the general scope and role?		
9. Is the NFS agreeable to signing a Project Partnership Agreement and supplying funding as stipulated in the agreement?		
10. Was the NFS provided the Local Sponsor Toolkit? Date		

Acquisition Experience and Capability	**Yes**	**No**
11. Taking into consideration the project schedule and complexity, does the NFS have the capability, with in-house staffing or contract support, to provide the necessary services, including surveying, appraisal, title, negotiation, condemnation, closing, and relocation assistance, as required for the project?		
12. Is the NFS's projected in-house staffing level sufficient considering its workload?		
13. Can the NFS obtain contractor support, if required, in a timely manner?		
14. Is the NFS's staff located within reasonable proximity to the project site?		
15. Will the NFS likely request USACE assistance in acquiring real estate?		

Schedule Capability	**Yes**	**No**
16. Has the NFS approved the tentative project real estate schedule and indicated its willingness and ability to utilize its financial, acquisition, and condemnation capabilities to provide the necessary project LERRDs in accordance with the proposed project schedule so the Government can advertise and award a construction contract as required by overall project schedules and funding limitations? The anticipated NFS real estate acquisition timeframe for the project is twenty-eight (28) months. **NFS Initials:**		

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LERRD Crediting	Yes	No
17. Has the NFS indicating its understanding of LERRD credits and its capability and willingness to gather the necessary information to submit LERRD credits within six (6) months after possession of all real estate and completion of relocations so the project can be financially settled? **NFS Initials:**		

Past Action and Coordination	Yes	No
1. Has the NFS performed satisfactorily on other USACE projects?		
2. Has the assessment been coordinated with NFS?		
3. Does the NFS concur with the assessment? (provide explanation if no)		

With regard to the project, the NFS is anticipated to be:	Select One
Fully Capable: previous experience; financial capability; authority to hold title; in-house staff can perform necessary services (survey, appraisal, title, negotiation, closing, relocation assistance, condemnation) as required by the LERRDs.	
Moderately Capable: financial capability; authority to hold title; can perform, with contract support, necessary services (survey, appraisal, title, negotiation, closing, relocation assistance, condemnation) as required by the LERRDs.	
Marginally Capable: financial capability; authority to hold title; will rely on approved contractors to provide necessary services (survey, appraisal, title, negotiation, closing, relocation assistance, condemnation) as required by the LERRDs.	
Insufficiently Capable (provide explanation): financial capability; will rely on another entity to hold title; will rely on approved contractors to provide necessary services (survey, appraisal, title, negotiation, closing, relocation assistance, condemnation) as required by the LERRDs.	

USACE Prepared by:	NFS Reviewed by:
Tiffany Murray Realty Specialist USACE Honolulu District	Name Title Office
Date:	Date:

USACE Approved by:	
Considering the capability of the NFS and the ancillary support to be provided by contract services, it is my opinion that the risks associated with LERRDs acquisition and closeout of the project have been properly identified and mitigated.	
Erica Labeste Chief, Real Estate Division U.S. Army Corps of Engineers Honolulu District	Date:

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Attachment 2: Sample Letter Advising Against Early Acquisition

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

March 23, 2023

Real Estate Division

SUBJECT: Ala Wai Watershed Integrated Feasibility Report, Risks of Early Acquisition

Name
Title, Office
Address
City, State

Dear xx:

Reference is made to the Ala Wai Integrated Feasibility Report (Study) as authorized under Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970, as amended. The City and County of Honolulu, as the Non-Federal Sponsor, is responsible for ensuring that it possesses the authority to acquire and hold title for all real property required for the proposed project. The Non-Federal Sponsor shall provide one hundred percent (100%) of the lands, easements, rights-of-way, utility or public facility relocations, and dredged or excavated material disposal areas (LERRDs) as well as operation, maintenance, and repair required by the project.

The United States Army Corps of Engineers, Honolulu District, advises your office that there are risks associated with the acquisition of LERRDs prior to the execution of a Project Partnership Agreement (PPA) or Local Cooperation Agreement (LCA). The City and County of Honolulu will assume full and sole responsibility for any and all costs and liabilities arising out of premature acquisition. Project risks generally include, but are not limited to:

a. Congress may not appropriate funds to construct the proposed project;
b. The proposed project may otherwise not be funded or approved for construction;
c. A PPA/LCA mutually agreed to by the Non-Federal Sponsor and the Government may not be executed;
d. The Non-Federal Sponsor may incur liability and expense by virtue of its ownership of contaminated lands, or interests therein, whether such liability should arise out of local, state, or Federal laws or regulations, including liability arising out of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended;
e. The Non-Federal Sponsor may acquire interest or estates that are later determined by the Government to be inappropriate, inefficient, or otherwise not required for the project;
f. The Non-Federal Sponsor may initially acquire insufficient or excessive real property acreage, which could result in additional negotiations and or/benefit payments under Public Law 91-646 or additional payment of fair market value to affected landowners;
g. The Non-Federal Sponsor may incur costs or expenses in connection with its decision to acquire LERRDs in advance of the executed PPA/LCA and the Government's Notice to Acquire (NTA).

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If you have further questions, please contact the USACE Honolulu District, Real Estate Division, at (808) 835-4055.

Sincerely,

Erica Labeste
Chief, Real Estate Division
U.S. Army Corps of Engineers
Honolulu District

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Attachment 3: Sample Notice to Acquire Letter

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HONOLULU DISTRICT
FORT SHAFTER, HAWAII 96858-5440

March 23, 2023

Real Estate Division

SUBJECT: Ala Wai Watershed Integrated Feasibility Report, Notice to Acquire

Name
Title, Office
Address
City, State

Dear xx:

This letter serves as your Notice to Acquire the real estate interests required from the City and County of Honolulu for the Ala Wai Watershed Project (Project) as authorized under authorized under Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970, as amended. Enclosed are the final Authorization for Entry for Construction, Attorney's Certificate of Authority, and project real estate drawings. Also enclosed is the standard language to be used for the required conveyance documents between the City and County of Honolulu, as the Non-Federal Sponsor, and landowners.

In accordance with the Project Partnership Agreement (PPA) dated xx, the City and County of Honolulu shall provide the real property interests and relocations required for the construction, operation, and maintenance of the project. As required by the PPA, the Government has determined the Flood Protection Levee Easements and Temporary Work Area Easements as shown on the real estate drawings are required for project implementation. The PPA also requires the City and County of Honolulu to comply with the Uniform Relocations and Assistance and Real Property Acquisition Policies Act. 42 U.S.C. § 4601, et. seq., and the Uniformed Regulations, 49 C.F.R. part 24. More information can be found at http://www.fhwa.dot.gov/realestate/realprop.

After acquisition of the required real estate interests, the City and County of Honolulu shall complete and sign the Authorization for Entry for Construction and Attorney's Certificate of Authority. Please return the original signed authorization documents to the Corps of Engineers, Honolulu District Real Estate Division, by mail to the address contained in the letterhead. In addition, the City and County of Honolulu shall provide copies of all conveyance documents for required real estate acquisitions to the Corps of Engineers. The Corps of Engineers requires the conveyance documents prior to advertising a construction contract. Copies of conveyance documents may be scanned and submitted electronically to the contact person below.

If you have any questions, please contact Tiffany Murray, Realty Specialist, at (808) 835-4065 or tiffany.murray@usace.army.mil.

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Sincerely,

Erica Labeste
Chief, Real Estate Division
U.S. Army Corps of Engineers
Honolulu District

Enclosures

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Ala Wai Canal Flood Management - Tentatively Selected Plan

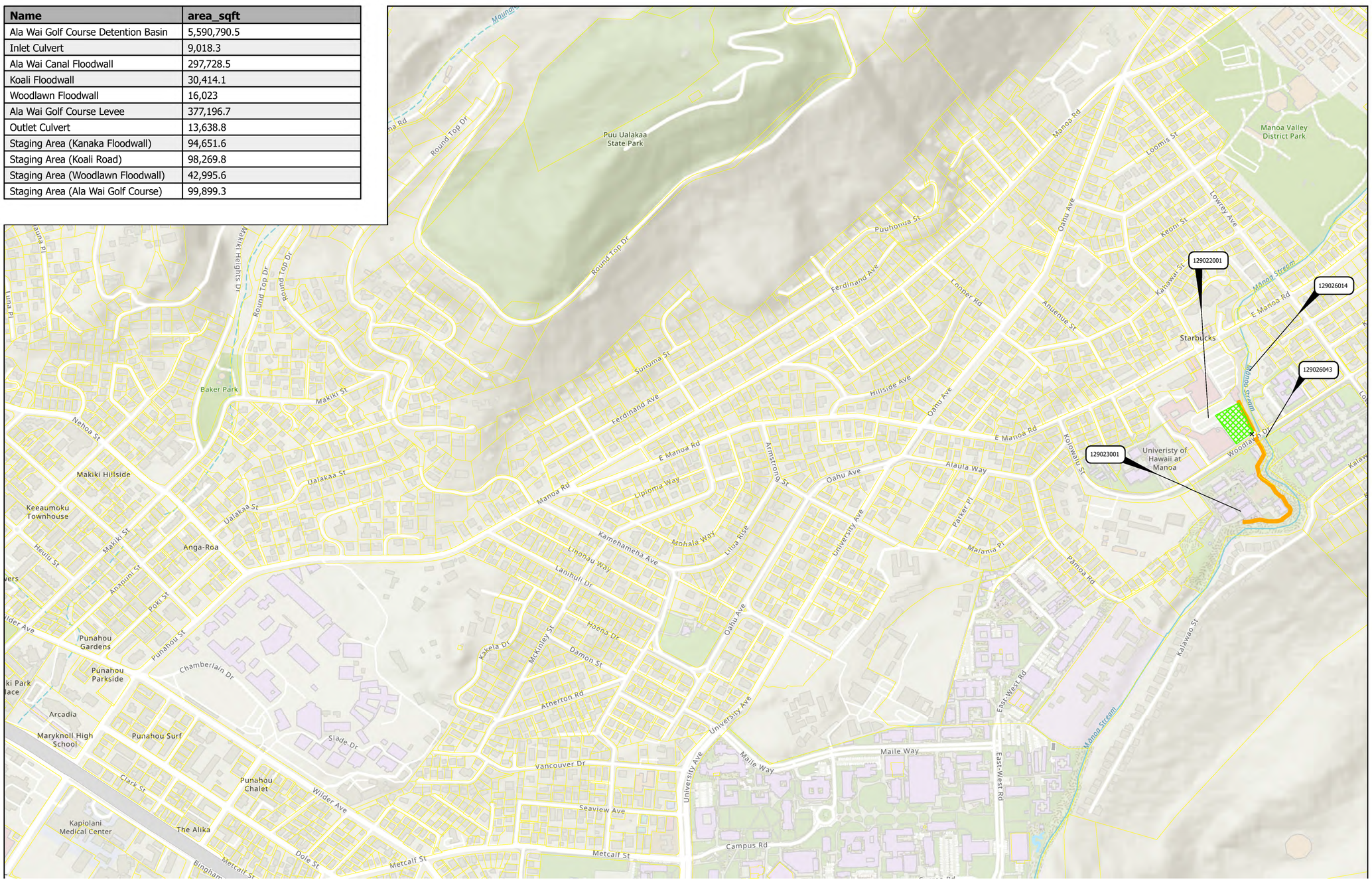
Island of Oahu, Hawaii

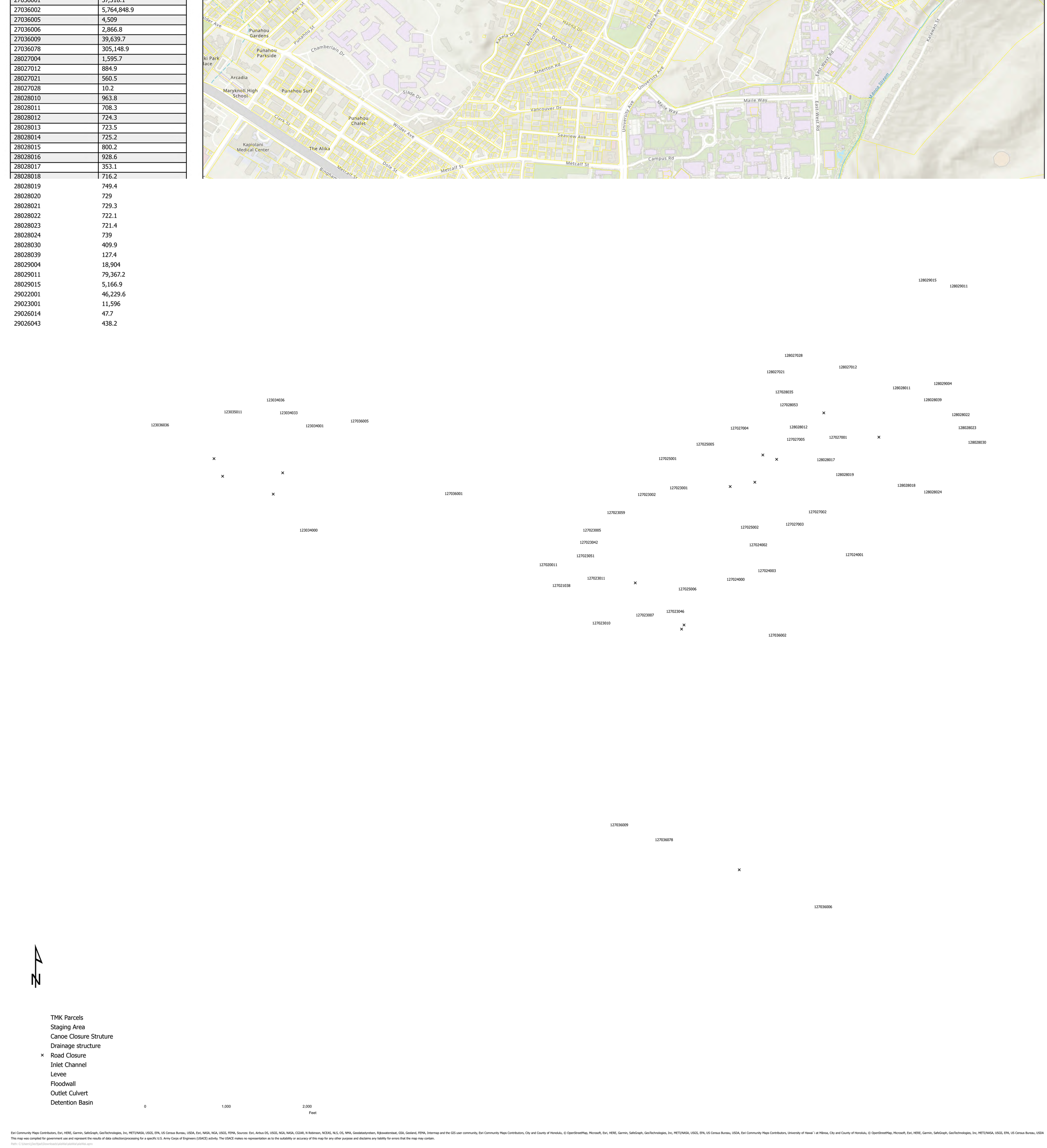
U.S. ARMY CORPS OF ENGINEERS, Honolulu District

BUILDING STRONG©

TMK	Square Footage
	142,161.7
23034000	4,111
23034001	25.2
23034033	7,976.9
23034036	350.2
23035011	9,420
23036036	11,701.6
27020011	13,833.2
27021038	3,592.3
27023001	925.6
27023002	901.6
27023005	1,075.1
27023007	538.8
27023010	538.5
27023011	5.8
27023042	1,033.6
27023046	550
27023051	1,267.7
27023059	1,603.3
27024000	5,509.7
27024001	116,995.1
27024002	532.8
27024003	1,679.7
27025001	903
27025002	1,455
27025003	2,995.2
27025005	2,574.2
27025006	1,345.6
27027001	22.1
27027002	713.5
27027003	1,108.5
27027004	632.6
27027005	245.2
27028035	580.7
27028053	1,113.5
27036001	37,318.1
27036002	5,764,848.9
27036005	4,509
27036006	2,866.8
27036009	39,639.7
27036078	305,148.9
28027004	1,595.7
28027012	884.9
28027021	560.5
28027028	10.2
28028010	963.8
28028011	708.3
28028012	724.3
28028013	723.5
28028014	725.2
28028015	800.2
28028016	928.6
28028017	353.1
28028018	716.2
28028019	749.4
28028020	729
28028021	729.3
28028022	722.1
28028023	721.4
28028024	739
28028030	409.9
28028039	127.4
28029004	18,904
28029011	79,367.2
28029015	5,166.9
29022001	46,229.6
29023001	11,596
29026014	47.7
29026043	438.2

Name	area_sqft
Ala Wai Golf Course Detention Basin	5,590,790.5
Inlet Culvert	9,018.3
Ala Wai Canal Floodwall	297,728.5
Koali Floodwall	30,414.1
Woodlawn Floodwall	16,023
Ala Wai Golf Course Levee	377,196.7
Outlet Culvert	13,638.8
Staging Area (Kanaka Floodwall)	94,651.6
Staging Area (Koali Road)	98,269.8
Staging Area (Woodlawn Floodwall)	42,995.6
Staging Area (Ala Wai Golf Course)	99,899.3





TMK Parcels
Staging Area
Canoe Closure Struture
Drainage structure
Road Closure
Inlet Channel
Levee
Floodwall
Outlet Culvert
Detention Basin

0 1,000 2,000
Feet

Esri Community Maps Contributors, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, US Census Bureau, USDA, Esri, NASA, NGA, USGS, FEMA, Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community, Esri Community Maps Contributors, City and County of Honolulu, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, US Census Bureau, USDA, Esri Community Maps Contributors, University of Hawai`i at Mānoa, City and County of Honolulu, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, US Census Bureau, USDA
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US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix J — Hazardous, Toxic, and Radioactive Waste

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Report Status: Draft, November 2023

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Acronyms

ASTM	American Society for Testing of Materials
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CORRACTS	RCRA Corrective Action Sites
EDR	Environmental Data Resources, Inc.
ER	Engineering Regulation
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FIFRA	Federal Insecticide, Fungicide, Rodenticide Act
FTTS	FIFRA/TSCA Tracking System
FUDS	Formerly Used Defense Site
HAR	Hawaii Administrative Rules
HiDEM	Hawaii Department of Environmental Management
HiDOH	Hawaii Department of Health
HRS	Hawaii Revised Statutes
HTRW	Hazardous, Toxic, and Radioactive Waste
iHEER	Hazard Evaluation and Emergency Response information system
LUST	Leaking Underground Storage Tank
NFA	No Further Action
NFRAP	No Further Remedial Action Planned
NPL	National Priority List
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
ROE	Right of Entry
SHWS	State Hazardous Waste Site
SRP	Site Remediation Program
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, Disposal facility
USC	United States Code
USGS	United States Geological Survey
UST	Underground Storage Tank
WWTP	Wastewater Treatment Plant

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1. Introduction

The purpose of this report is to discuss the hazardous, toxic, and radioactive waste (HTRW) investigation for the Ala Wai Canal General Reevaluation Report. This report identifies both HTRW and non-HTRW environmental issues and presents appropriate measures to avoid or resolve these issues. The methods used in performing the investigation are described below. Conclusions and recommendations regarding potential impacts due to HTRW, non-HTRW, and recognized environmental conditions (RECs) associated with the project site are provided.

The Tentatively Selected Plan (TSP) is the proposed action. The TSP is made up of measures, also referred to as project features, to minimize the extent of flooding within the Ala Wai watershed during frequent storm events.

The project site, also referred to as the project footprint in other parts of this report, encompasses the physical location of the proposed action and all included measures or project features, either individually or collectively, which includes the Ala Wai Canal and Manoa-Palolo Canal and portions of adjacent uplands along these areas as well as upland areas along Manoa Stream (Woodlawn Drive floodwall) and the Manoa and Palolo streams (Koali Road floodwall) that will be impacted to facilitate construction associated with the TSP shown in Figure 29: Conceptual Diagram of Alternative 5.3 in the main body of the report.

2. Authority

Engineer Regulation (ER) 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works projects, requires that a site investigation be conducted as early as possible to identify and evaluate potential HTRW problems. According to ER 1165-2-132, non-HTRW issues that do not comply with the federal, state, and local regulations should be discussed in the HTRW investigation along with HTRW issues. Therefore, HTRW and non-HTRW issues identified are discussed in this report.

The HTRW investigation presented in this report was conducted during the evaluation of alternatives phase of the project. This investigation relies on existing information, observations made through database research, and a historical aerial photograph and topographic map review. As stated in the ER- 1165-2-132, an initial assessment as appropriate for a Reconnaissance Study should be conducted as a first priority for projects with no prior HTRW consideration. If the initial assessment indicated the potential for HTRW, testing, as warranted, and analysis similar to a Feasibility Study, or Phase II Environmental Site Assessment (ESA), should be conducted prior to proceeding with the project design.

No HTRW investigation can wholly eliminate uncertainty regarding the potential for HTRW associated with a project area. Performance of the HTRW investigation is intended to reduce, but not eliminate, uncertainty regarding the potential for HTRW in connection with a project area, and this practice recognizes time and cost constraints.

3. Guidance

Supplemental guidance was provided by the Standard Practice for Environmental Assessments: Phase I Environmental Site Assessment Process (Designation: E 1527-21) prepared by the American Society for Testing of Materials (ASTM). The purpose of this guidance is to define

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good commercial and customary practice in the United States of America for conducting an environmental site assessment of a parcel of commercial real estate with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. §9601) and petroleum products. These standards include a records review, site visit, interviews, and report preparation. This report followed many of the ASTM E 1527-21 guidelines but not to the same level of detail described by the ASTM E 1527-21 guidance.

3.1. Hazardous, Toxic, and Radioactive Waste

The objective of ER 1165-2-132 is to outline procedures to facilitate early identification and appropriate consideration of HTRW problems. This investigation, therefore, identifies potential HTRW problems and discusses resolutions and/or provides recommendations regarding the HTRW problems identified.

3.2. Non-Hazardous, Toxic, and Radioactive Waste

According to ER 1165-2-132, non-HTRW environmental issues that do not comply with federal, state, and local regulations should be discussed in the HTRW investigation along with HTRW issues. For example, solid waste is a non-HTRW issue considered, in addition to petroleum releases from Leaking Underground Storage Tanks (LUSTs), because of the potential to impose environmental hazards. Non-HTRW and RECs identified during the investigation are also discussed in this report, along with resolutions and/or recommendations for resolving any open issues.

3.3. Recognized Environmental Condition

For the purposes of this investigation, the term REC may be used interchangeably with HTRW to identify a potential HTRW or non-HTRW environmental issue. ASTM defines a recognized environmental condition (REC) as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. *De minimis* conditions are not RECs.

4. Laws and Regulations

4.1. Federal

The definition of HTRW according to ER 1165-2-132, page 1, paragraph 4(a) is as follows: “Except for dredged material and sediments beneath navigable waters proposed for dredging, for purposes of this guidance, HTRW includes any material listed as a ‘hazardous substance’ under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq (CERCLA). (See 42 U.S.C. 9601(14).) Hazardous substances regulated under CERCLA include ‘hazardous wastes’ under Sec. 3001 of the Resource Conservation and Recovery Act, 42 U.S.C. 6921 et seq; ‘hazardous substances’ identified under Section 311 of the Clean Air Act, 33 U.S.C. 1321, ‘toxic pollutants’ designated under Section 307 of the Clean Water Act, 33 U.S.C. 1317, ‘hazardous air pollutants’ designated under Section 112 of the Clean Air Act, 42 U.S.C. 7412; and ‘imminently hazardous chemical substances or mixtures’ on which EPA has taken action under Section 7 of the Toxic Substance Control Act, 15 U.S.C. 2606; these do not include petroleum or natural gas unless already included in the above categories. (See 42 U.S.C. 9601(14).)”

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As noted in 42 U.S.C. 9601(14), the term “hazardous substance” does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance, nor does the term include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel. Underground Storage Tanks (USTs) are federally regulated under 40 CFR Part 280, which includes technical standards and corrective action requirements for owner and operators of USTs.

4.2. State

The Hawaii State regulations were examined to determine which regulations governed the state specific hazardous waste disposal, release, and cleanup requirements. Hawaii regulates underground storage tanks under the Hawaii Administrative Rules (HAR) Title 11, Chapter 11-280.1 Underground Storage Tanks. This rule regulates all underground storage tanks except those that hold hazardous waste (regulated under chapter 342J of the Hawaii Revised Statutes (HRS), wastewater treatment tank systems regulated under Chapter 342D of the HRS, equipment or machinery tanks, any UST system smaller than 110 gallon capacity, any UST that contains a *de minimis* concentration of regulated substances, or any emergency spill or overflow containment that is expeditiously emptied after use. The rule also partially excludes aboveground storage tanks associated with airport hydrant fuel distribution or UST systems with field-constructed tanks, UST systems containing radioactive material regulated under the Atomic Energy Act of 1954, and any UST that is part of an emergency generator system at nuclear power generation facilities. “Underground storage tank" or "UST" is defined as any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which {including the volume of underground pipes connected thereto) is ten percent or more beneath the surface of the ground. The Hawaii Department of Health (HiDOH) administers the UST program.

Solid waste in Hawaii is covered under HAR Title 11, Chapter 11-58.1 Solid Waste Management Control. The rule establishes minimum standards for the design, construction, installation, operation and maintenance of solid waste disposal, recycling, reclamation and transfer systems. Under this rule "solid waste" or "waste" means garbage, refuse, and other discarded materials, including solid, liquid, semi-solid, or contained gaseous materials resulting from industrial, commercial, mining, and agricultural operations, sludge from waste treatment plants and water supply treatment plants, and residues from air pollution control facilities and community activities, but does not include solid or dissolved materials in domestic sewage or other substances in water sources such as silt, dissolved or suspended solids in industrial waste water effluents, dissolved materials in irrigation return flows, or other common water pollutants, or source, special nuclear, or by-product material as defined by the federal Atomic Energy Act of 1954. "Hazardous waste" means regulated hazardous waste as defined in 40 CFR 261 or the State of Hawaii's rules or statutes, whichever is more stringent.

Hazardous Waste is regulated under HAR Title 11, Chapter 11-260.1 Hazardous Waste Management. The hazardous waste rules follow the federal regulations, with some changes in terminology and with state specific reporting requirements. Similar to the federal regulations, Hawaii regulates specific (listed) wastes, characteristic wastes, waste oil and universal wastes. Hawaii has established liability requirements and permitting procedures for the handling, transportation and disposal of hazardous wastes.

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5. Study Description

The Ala Wai Watershed is located on the southeastern side of the island of Oahu, Hawaii. The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Koolau Mountains to the nearshore waters of Mamala Bay (Figure 5-1). It includes the Makiki, Manoa, and Palolo streams, which flow to the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920's to drain extensive coastal wetlands. The construction and subsequent draining allowed the development of the Waikiki District.

The proposed action involves project improvements planned at several urban locations within the lower reach of Manoa stream and the Ala Wai Canal to manage flood waters and reduce the risk of flood-related effects to residential and commercial communities. The project is considered the proposed action to convey flood waters through the watershed and Ala Wai Canal and includes a number of individual features. The alternatives that were under consideration at the time of this HTRW investigation are described below. The designs for the individual features included in the alternatives are not fully developed, but in general it is expected that some level of earth disturbing activities would be needed at each location. Because the design details, including the alignment of features, are expected to change during the development of the design, it is recommended that the HTRW investigation be reviewed during design phase, to document any new impacts due to changes in the project features and/or from condition changes at adjacent properties.

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Figure 5-1: Ala Wai Watershed (Study Area)

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6. Alternatives Description

The alternatives being evaluated in this study are described very briefly below, for context. Full descriptions of the features can be found in the main report. The areas around the identified features were evaluated for this investigation. There are three main alternatives; some features are common across the alternatives, but the details of individual features may differ.

6.1. Storage Cornerstone Alternative.

The Storage Cornerstone alternative includes several temporary storage basins which would hold waters until the downstream drainage features could transport the flow. Implementation of this alternative would include the construction of several detention basins and floodwalls in strategic locations. Figure 6-1 shows the feature locations. The proposed features include:

- The Makiki District Park detention basin
- The Manoa Valley District Park detention basin
- The Ala Wai Golf Course detention basin
- The Kaimuki High School berm/floodwall
- The Kanaha floodwall
- The Woodlawn Drive floodwall
- The Koali Road floodwall
- Inlet and outlet culverts at detention ponds

6.2. Conveyance Cornerstone Alternative

The Conveyance Cornerstone alternative focuses on improving stormwater conveyance by the addition of floodwalls and culverts. The proposed features are shown in Figure 6-2 and include:

- The Woodlawn Drive floodwall
- The Ala Wai Canal floodwall
- The Kanaha floodwall
- The Makiki District Park detention basin
- The Koali Road floodwall
- The Kaimuki High School berm/floodwall
- Inlet and outlet culvers at several locations

6.3. Hybrid Alternative

They Hybrid Alternative focuses on a combination of increasing storage and increasing conveyance throughout the watershed to reduce flood risk. Implementation of this alternative would include the construction of several detention basins and floodwalls in strategic locations. Figure 6-3 shows the proposed features; all these features are also included in at least one of the other alternatives. The list of features for the Hybrid Alternative includes:

- The Manoa Valley District Park detention basin
- The Ala Wai Canal floodwall
- The Woodlawn Drive floodwall
- The Kanaha floodwall

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- The Makiki District Park detention basin
- The Koali Road floodwall
- The Ala Wai Golf Course detention basin
- Inlet and outlet culvers at several locations

6.4. Non-structural Alternative

Non-structural solutions are also being evaluated. It is important to note that non-structural alternatives would not include any in-stream work or nearshore work. Non-structural alternatives include measures such as floodproofing, removing structures from the floodplain, dry proofing structures, and early flood warning systems. The locations for non-structural alternatives are not yet determined, and the details of this alternative would be developed during a later project phase. Phase I HTRW investigations would need to be conducted for those locations and specific actions, depending on the proposed measure. Non-structural alternatives are not considered further in this evaluation.

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Figure 6-1: Storage Cornerstone Alternative Features

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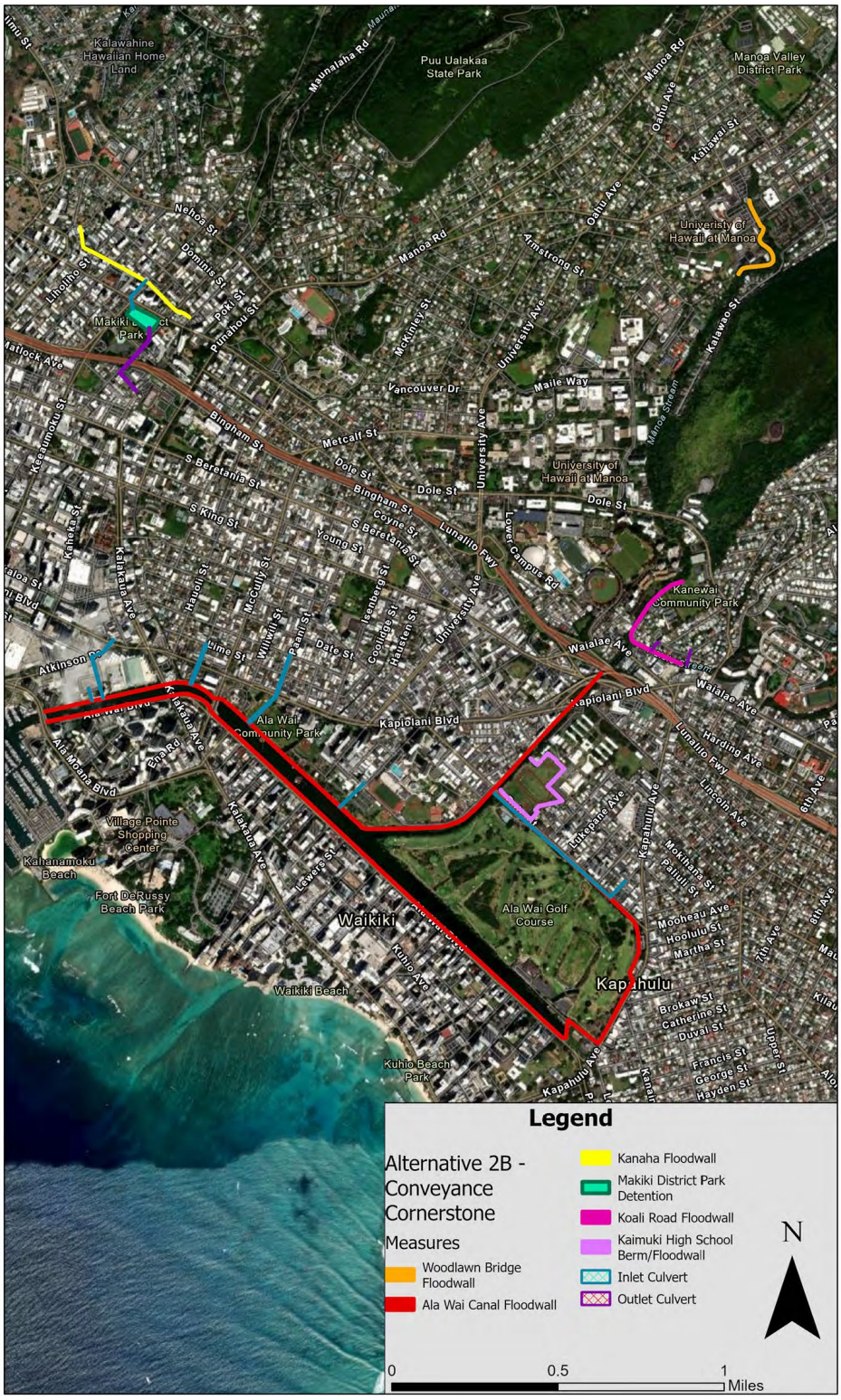

Figure 6-2: Conveyance Cornerstone Alternative Features

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Figure 6-3: Hybrid Alternative Features

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7. General Methods

The following sections contain information that was gathered in accordance with ER 1165-2-132 for this assessment. The information was obtained from:

- Regulatory documentation
- Existing information review
- Historic topographic map and aerial photograph review
- Database research

This information was used to determine if proposed actions are likely to encounter HTRW or other environmental issues which would require resolution prior to project implementation, or which could prevent project implementation. The information gathered from the above list of sources is detailed in the following sections.

8. Records Review

8.1. Historical Map and Aerial Photography Review

Historical maps and aerial photos were reviewed to determine changes in land use or development that would indicate the potential for legacy pollution issues or that may indicate unresolved environmental conditions. It is noted that the Ala Wai Canal was developed earlier than the oldest available historical maps and photos; the project area was already an urban environment by the 1920's, when documentation begins.

8.1.1. Historical Topographic Maps

Historical U.S. Geological Survey (USGS) maps from 1928, 1953, 1954, 1959, 1969, 1970, 1978, 1983, 1998, 2013, and 2017 were reviewed for changes in the project area. The review focused on the locations of the specific project features for the three alternatives, and also noted general trends in land use over time.

8.1.1.1. 1928

The Ala Wai Canal is in the current, channelized condition by 1928. The area around the canal outlet is much less developed, and current marinas and infrastructure do not exist. South of the canal, the Kapiolani Park exists in approximately the current boundary. The city has a much smaller footprint than the current conditions. Lands in the Manoa Valley and around Punch Bowl crater and the Round Top Forrest Preserve contain only a few structures. The land that is currently the Ala Wai Golf Course is undeveloped. An area is designated "University of Hawaii" but is largely undeveloped land.

8.1.1.2. 1953/1954

By 1953, the Ala Wai Golf Course is noted on the map, and additional roads have extended into the foothills, particularly in the Manoa Valley and east of Punch Bowl crater. The developed area east of Punch Bowl crater is now labeled Makiki Heights The Kaimuki High School is shown in the current location, adjacent to the golf course. Northwest of the high school and connecting to the Ala Wai Canal is a constructed drainage canal (Manoa-Palolo drainage canal in later maps). North of the high school and across the "Malika Arterial" (now Interstate H-1) is

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the Mõ'ili'ili quarry, adjacent to the south side of the University of Hawaii. It does not appear that the drainage canal is connected to the quarry. Development has filled in around the university. The Ala Wai Canal now has a yacht harbor at the outlet, smaller than the current marina but in a similar orientation. Starting in 1953, the map indicates beach and offshore reef areas along the coast and south of the Ala Wai Canal. The main difference between the 1953 and 1954 maps appears to be coloration, with the 1954 map using different shading that is somewhat more legible.

8.1.1.3. 1959

The 1959 map is similar to the 1954 map. Additional development is shown, for example in the area of the quarry which now includes several larger structures, a grouping of small structures along roads, and includes the sub-designation of "athletic field." Development continues to extend outward along the valleys. Near Diamond Head, some additional developed areas are shown; these locations previously contained some structures but are now incorporated into the city development. Overall, there do not appear to be dramatic changes to the area.

8.1.1.4. 1969/1970

By 1969, the Manoa Valley has filled in, and former open areas are now developed. The area of the University has also developed and the quarry area, still labeled "quarry (athletic field)," is further developed. The yacht club at the Ala Wai Canal outlet has expanded to something similar to the current condition, and the shoreline south of the outlet has additional beach areas designated; former parks and beaches remain in the same configuration. The 1970 map appears to contain the same information as the 1969 map, but with different coloration and fonts; the 1970 map is less legible than the 1969 map. In the 1970 map, the former quarry area is no longer designated as a quarry.

8.1.1.5. 1978

The 1978 map is actual a black and white aerial photo. The photo is unlabeled. Aside from the Punchbowl crater, Makiki hills, and St. Louis Heights, the project area appears densely developed by this time.

8.1.1.6. 1983

The 1983 map returns to the more typical USGS topographic map format. Major features appear the same, with no apparent changes to the Ala Wai canal, drainage canal, golf course, parks or other features. The proposed project areas appear to be in similar condition to current conditions. A few new areas appear to have been incorporated into the city, but these areas were already at least partly developed by 1970 and do not represent a large change in land use. The former quarry is again designated "quarry (athletic field)" and appears to be fully developed for non-quarry purposes.

8.1.1.7. 1998

The 1998 map has new coloration, but few other apparent changes. The "Mõ'ili'ili quarry (athletic field)" is still labeled as such, although clearly developed. The drainage canal is now labeled "Mãnoa-Pãlolo Drainage Canal."

8.1.1.8. 2013

The 2013 map has again changed coloration, and additional shoreline features (beaches) are labeled. Upland the labeling is streamlines; schools and parks are no longer titled on the map but symbols denote their presence. The quarry and university are not labeled.

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8.1.1.9. 2017

The 2017 map is very similar to the 2013 map. The Ala Wai golf course is labeled “Hawaii Administrative Site” in this map. Punchbowl crater is now labeled “National Memorial Cemetery of the Pacific.” The University of Hawaii Manoa is labeled. Overall the map shows the project area in the current configuration. In general, the project location was developed by the 1970’s and major features and land uses appear to date from that time period.

8.1.1.10. Historical Map Conclusions

The project area was largely developed by the time of the first map. Major features, including the Ala Wai canal, the Ala Wai golf course, Kapiolani Park, and Manoa Park District were present in the current locations since 1928 – 1953. These major features do not appear to have previous land uses. The project area is an urban area, and the historical maps show multiple changes within the city. Proposed floodwalls and other project features are within the urban footprint.

8.1.2. Historical Aerial Photographs

Aerial photographs from 1951, 1959, 1968, 1974, 1975, 1978, 1985, 1992, 2006, 2011, 2015, and 2017 were reviewed. The project area is sufficiently large that three photos were needed to cover the entire area. Except as noted below, three images covering the same extents were available for all years.

8.1.2.1. 1951

The 1951 photographs are black and white, of good quality. By 1951, the project area is already quite developed, and many features appear in their current configuration. The Ala Wai canal, the Manoa-Palolo drainage canal and Manoa stream appear to be in the same configuration (channelized and altered) as currently. The Ala Wai golf course is clearly a golf course, with sand bunkers, greens and other typical features clearly visible. Kapiolani Park is also clearly visible. The former quarry area (now part of the University of Hawaii land) is visible as an empty, disturbed area; there is no development in the area but no clear evidence of active open pit mining. The marina at the outlet of the Ala Wai Canal is a developed marina, but smaller than the current configuration.

8.1.2.2. 1959

The 1959 photographs are black and white, of good quality. By 1959, the marina at the outlet of the Ala Wai Canal has expanded, and the adjacent shoreline (to the south) has been filled in and developed. The former quarry area now has a large building on the north side, and a cluster of small buildings (houses) on the southwest side, with the center area appearing to be vegetated with dirt roads or trails. Some small areas within the city appear to be infilled.

8.1.2.3. 1968

The 1968 photographs are in black and white, of good quality. The marina has further developed and expanded by 1968. Major roadways (what is now Interstate H-1) appears expanded. The former quarry is further developed, with a track and large parking areas; much of the remaining area appears to be mowed grass or other maintained surface. The Manoa Valley area has filled in further; roads were already laid out in the area by 1951 but are now more fully developed with housing. The golf course and Kapiolani Park appear to have more and larger trees.

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8.1.2.4. 1974/1975

The 1974 photographs are colored with the vegetation appearing red (due to the reflection of infrared light). The marina at the Ala Wai Canal outlet is again expanded slightly, with more dense boat docking. Development at the former quarry site has expanded to include additional athletic fields. The portion of the photograph over Kapiolani Park is obscured by clouds and shadows. A small drainage channel has been added to the south end of the golf course (connecting to the Ala Wai Canal). The remainder of the project area appears similar to current conditions. The 1975 aerial photographs are very similar to the 1974 photos, except that the southern extent of the photos is not obscured by clouds and is much clearer.

8.1.2.5. 1978

The 1978 photographs are black and white, of good quality. Major features appear unchanged. The golf course is still clearly a golf course. The interior of Kapiolani Park has changed configuration, but the park limits remain the same. Overall, few changes are noted.

8.1.2.6. 1985

The 1985 aerial photos are black and white but are of poor quality. One of the photographs is badly faded for half of the photo; a second is cut off and only shows part of the extent. The visible features appear similar to the 1978 photos.

8.1.2.7. 1992

The 1992 aerial photographs are in black and white. The images are distorted on the top (north) side of the photos, and the northwestern corner is cut off one photo. Because the 1985 images are of poor quality, the 1992 photos were compared to the 1978 photos for identifying changes to the project area. The only significant new development is a new road into the foothills northeast of the University of Hawaii, in the St. Louis Heights area, and several large buildings and some new infrastructure. There appear to be few other changes to the project area.

8.1.2.8. 2006

The 2006 aerial photographs are in color. One of the three photos is a partial image. Overall, the images are quite similar to the 1992 photographs. With close examination, small changes (new buildings or redevelopments) are visible, however the general land use appears unchanged from earlier photos. The major watercourses and park/open areas appear the same as current configurations.

8.1.2.9. 2011/2015/2017

The aerial photographs from 2011, 2015, and 2017 are color images of good quality. Overall, the project area shows little change from previous photographs, and the major features are in a similar configuration as the current conditions.

8.1.2.10. Historical Photograph Conclusions

The project area was already largely developed by the time of the first aerial photos. Major features, such as the Ala Wai canal and golf course, and Kapiolani Park are visible in their current locations. Aside from regular urban development (and redevelopment), there are no land use changes or apparent major land impacts visible.

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8.2. Database Search

The project area is a large extent and contains a number of proposed features spread at some distance from each other. To facilitate the database search, instead of conducting a separate search using the standard search distances for each possible project feature, a single search covering the extent of the alternatives was conducted. Figure 8-1 shows the limits of the search.

For any database search, ASTM recommends minimum search distances depending on the nature of the site and regulatory program. Table 8-1 shows the recommended search distances. There were no sites listed on the National Priority List (NPL, also known as the Superfund list) or state equivalent within the project area. Based on the lack of those facilities, the evaluation of database returns focused on sites within approximately 1/2 mile of a proposed project feature.

Table 8-1: Minimum Search Distance for Federal and State Databases

Database	Approximate Minimum Search Distance (mi)
Federal NPL Site List	1.0
Federal CERCLIS List	0.5
Federal CERCLIS NFRAP site list	Property and Adjoining Properties
Federal RCRA CORRACTS	0.5
Facilities List	1.0
Federal RCRA non-CORRACTS	0.5
TSD Facilities List	0.5
Federal RCRA Generators List	Property and Adjoining Properties
Federal ERNS List	Property Only
State Equivalent NPL	1.0
State Equivalent CERCLIS	0.5
State Landfill/Solid Waste Disposal	0.5
Site Lists	0.5
State LUST Lists	0.5
State registered UST List	Property and Adjoining Properties

There were numerous database returns, which is expected in an urban area. To evaluate the significance of the potential sites, each individual feature included in any alternative was evaluated for impacts from the nearby sites. Note that due to the proximity of features, some database sites were evaluated for impacts to multiple features. Sites within approximately ½ mile of a feature were considered for impacts and are listed in a table summarizing returns for that feature.

Sites that were identified in the database return were also investigated using the Hawaii Department of Health “iHEER” (Hazard Evaluation and Emergency Response) system, which includes a portal of publicly available information. Additional details found on this website were used to evaluate the nature and extent of environmental issues, and to determine whether a

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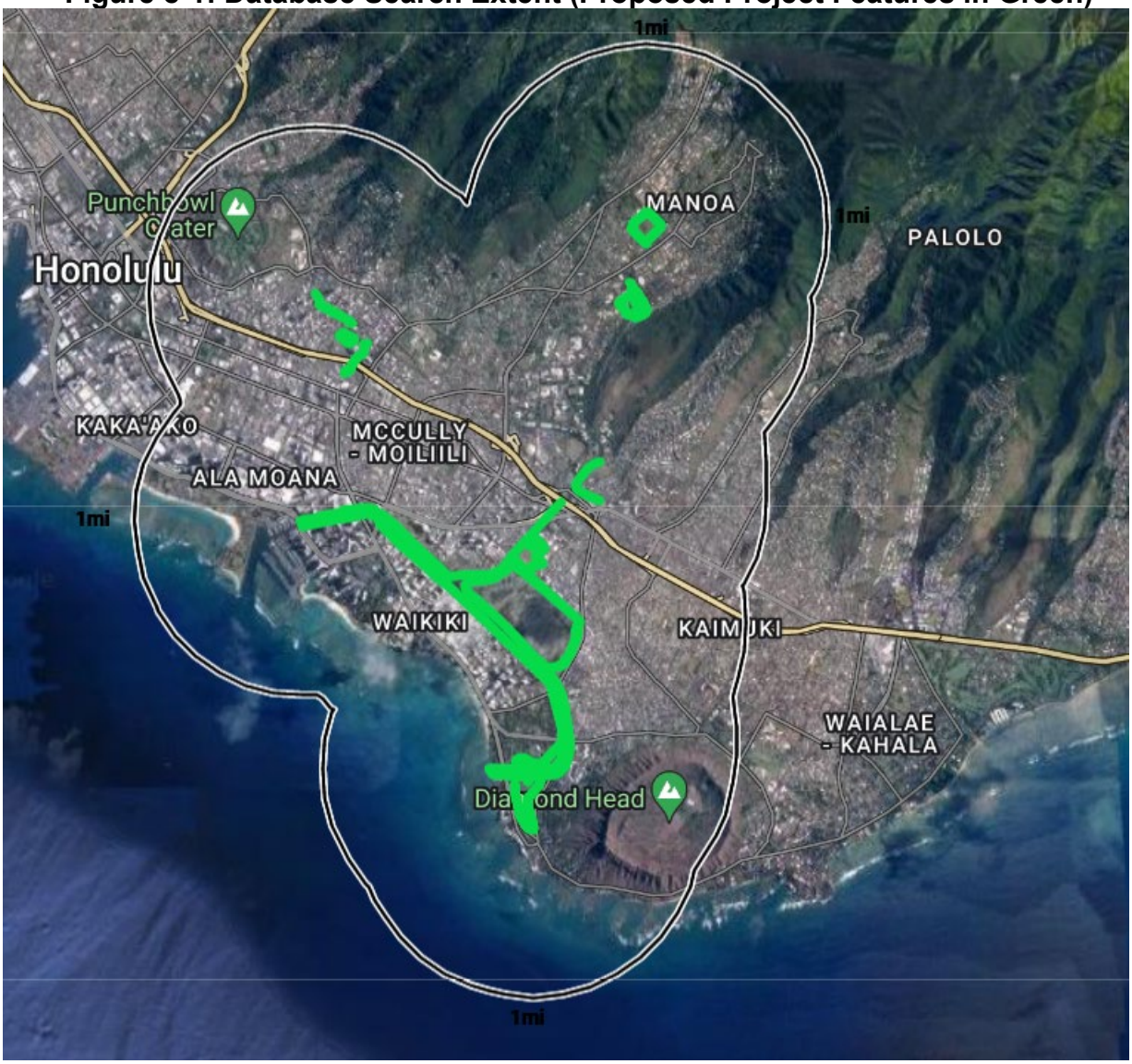
given site represents a potential impact to the proposed project activities. Information was not available on all sites.

Figure 8-1: Database Search Extent (Proposed Project Features in Green)



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8.2.1. The Makiki District Park Detention Basin

Makiki District Park is currently open land. The park is bordered on three sides by roads, and on the fourth side by office buildings. Construction of a detention basin would require excavation of the open land, conceptually up to a 10' depth. Sites within approximately ½ mile of the feature are shown in Figure 8-2. Database returns are listed in Table 8-2.

Figure 8-2: Makiki District Park Detention Basin Database Search Area

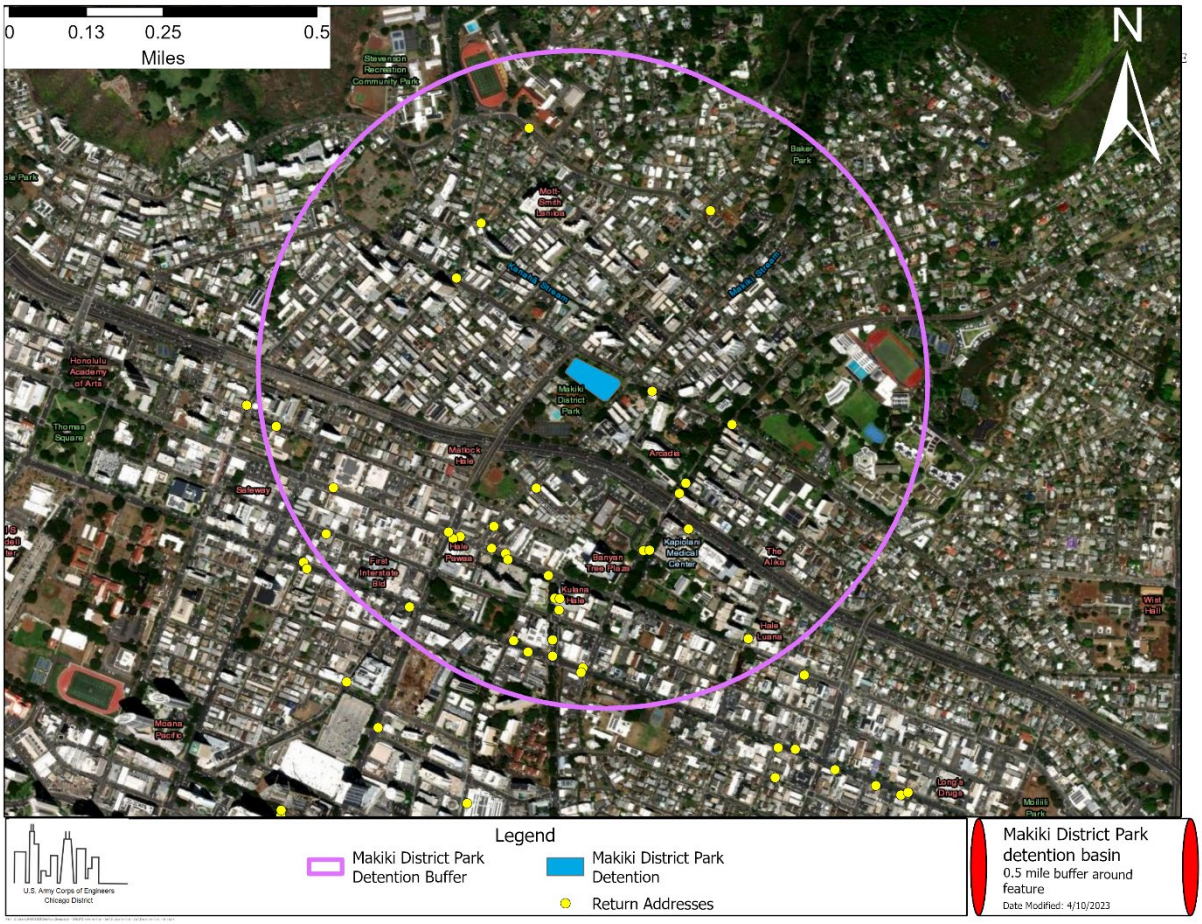

Table 8-2: Makiki District Park Detention Basin Database Returns

Site Name and address	Distance	Program or Issue	Status	Comments
Punchbowl Camp	1878 ft	FUDS	Site was a temporary housing for the Army Engineers battalion. The site contained an administrative office space for camp, two mess halls, a motor pool vehicle wash rack, latrines, barracks, tents, a supply room and post exchange. The site	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
			was returned to the state in 1944; there are no known installation or munitions related issues for the property.	
1653 Mott Smith Drive	1319 ft	SPILLS	1994 paint spill	Based on the nature of the spill there is likely no impact to the project.
Roosevelt High School Firing Range 1120 Nehoa St.	1956 ft	SHWS	Hazard undetermined; listed as a low priority brownfield site.	No impact to project.
Makiki Fire Station #3 1202 Wilder Ave	1190 ft	LUST, UST	LUST clean up complete 1995, 1 1000 gal UST in use, 1 500 gal UST permanently closed in 1991	No impact to project.
1911 Keeaumoku Street	1720 ft	SHWS	Pesticide and lead contaminated soils were removed in preparation for the expansion of the Hanahauoli School.	No impact to project.
Parish of St. Clement (St. Clement School) 1515 Wilder Ave	379 ft	RCRA, FFTS, Historic FFTS, ECHO, FINDS	Non RCRA generator as of 2021, former lead waste,	No impact to project.
Fire Hydrant Installations at Makiki St, Kamaia Dr, Manoa Rd, Oahu Ave, Pamoa	550 ft	NPDES	Point discharge locations	No impact to project.
Maryknoll High School 1402 Punahou St	725 ft	RCRA	CESQG	No impact to project.
Arcadia Retirement 1434 Punahou St	926 ft	LUST, UST	LUST clean up complete in 1999, 300 gal diesel tank permanently out of use in 1998	No impact to project.
Punahou School (Punahou School Firing Range) 1601 Punahou St	1394 ft	RCRA, LUST, UST, SHWS	CESQG (2017), LUST clean up complete 2007, confirmed release 2020, several UST permanently out of use with the last closure in 2020, hazards identified on site with controls required to manage contamination	No impact to project.
Punahou School	2468 ft	FUDS	The Punahou School was used by the Army Division as he headquarters for all aspects of the AED Administrative operations and including a medical unit, machine shop, supply storage, and motor transportation unit. There are no known installation or munitions related issues for the property.	No impact to project.
Kapiolani Medical Center for Women & Children 1637 Bingham St	1471 ft	UST	Two 20,000 gal diesel tanks in use	No impact to project.
Kapiolani Women's & Children's Medical Center 1319 Punahou St	1206 ft	SHWS, UST, AIRS, RCRA.	Two permanently out of service diesel tanks, boiler system using natural gas and fuel oil, CESQG with minor past violations	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
		FINDS, ECHO		
Shriners Hospital 1310 Punahou St	1217 ft	LUST, UST	LUST clean up complete 1998, 3 UST permanently out of service	No impact to project.
Rogers Chevron 1403 Makiki St	987 ft	Historical auto	Former gasoline service station	No impact to project.
SJD Radiator Service 1218 Makiki St	1424 ft	RCRA	CESQG, last waste generation in 2000	No impact to project.
Cartwright Neighborhood Park Keeaumoku St & Matlock Ave	1158 ft	SHWS	Transformer oil (no PCBs) found on site; no further action letter 2005.	No impact to project.
Richards Chevron 1509 S Beretania St	1579 ft	UST	4 UST permanently out of service by 1987	No impact to project.
Pflueger Acura 1450 S Beretania St	1526 ft	RCRA, UST, FINDS, ECHO	CESQG with last generation in 2002, 3 UST permanently out of service in 1991	No impact to project.
Honolulu Police Dept. 801 S Beretania S Honolulu Police Dept Pawaa Annex 1455 Beretania St	1628 ft	RCRA, PADS, LUST, UST	SQG for mercury, solvents, used oil, universal waste, LUST clean up complete 2000, 4 UST permanently out of service 1998, the PADS listing is related to historical PCB activity	No impact to project.
Makiki Shell 1436 S Beretania	1547 ft	RCRA, FINDS, ECHO, LUST, UST, SWRCY	Historical SQG (halogenated solvents), 3 LUST with cleanup complete, numerous UST now all permanently out of service (no longer service station), former recycling operation	No impact to project.
Don's Makiki #111 (Unocal 76) 1406 S Beretania	1600 ft	LUST, UST, RCRA	2 LUST clean up complete, 3 UST in service (gasohol and diesel) and numerous out of service UST, former LQG	No impact to project.
Pawaa Building 1401 S Beretania St	1755 ft	Meadow Gold Ice Cream Plant – SHWS Longs Drug Store – RCRA	fuel oil spill former waste generator	Multistory building containing separate businesses. No impact to project.
Beretania Texaco (IES Retail) 1378 S Beretania St	1689 ft	LUST, UST, RCRA	4 LUST all clean up complete, 3 UST in use (gasohol and diesel), CESQG	No impact to project.
Schuman Carriage Motors 1234 S Beretania St	2216 ft	SHWS, LUST, UST, INST CONTROL, SPILLS	transmission fluid and hydraulic fluid spills, 2 LUST clean up complete, 6 UST permanently out of use by 2005, site hazards managed by institutional controls	No impact to project.
Kaahumanu Elementary School 1141 Kinau St	2419 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
One Kalakaua Partners 1314 Kalakaua Ave	1788 ft	UST	1 UST permanently out of service	No impact to project.
Outrigger Hotels 1315 Kalakaua Ave	1812 ft	UST	1 UST permanently out of service as of 1991	No impact to project.
76 Kalakaua/Young 7-11 1323 Kalakaua Ave	1904 st	SHWS, UST	past waste issue with no further action letter, 2 UST in service (gasohol), several UST permanently closed	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
1414 Kalakaua Ave	2104 ft	SHWS, ENG CONTROLS, INST CONTROLS	Past soil and groundwater contamination issues, managed with on-going engineering and institutional controls. Site was remediated and closed in 2011.	This is now a multistory building site. Any issues appear to be under control. No impact to project.
Gas Plus 1524 S King St	2097 ft	LUST, UST	1 LUST clean up complete, 3 UST permanently out of use by 1995	No impact to project.
Mid Pac Petroleum (previously Lionel's Unocal) 1505 S King St	2321 ft	LUST, UST	3 LUST clean up complete, 5 UST permanently out of use by 2007	No impact to project.
1003 and 1013 Kaheka St	2149 ft	SHWS	Lead in ground (2-3' below ground surface), no further action letter issued since sampling indicates that exceedance is isolated and below parking lot.	No impact to project.
Punahou Repair Shop 1558 S King St	2266 ft	LUST, UST	LUST clean up complete, 3 UST permanently out of service by 1992	No impact to project.
Hele Kin Kalakaua 1549 S King St	2425 ft	LUST, UST	LUST clean up complete, 3 UST in use (gasohol), several UST permanently out of use	No impact to project.
Yajima Oil 1375 S King St	2525 ft	LUST, UST	LUST clean up complete, 3 UST in use (gasohol)	No impact to project.
Grace Otsuka Apartment 1233 Young St	2505 ft	SHWS, ENG CONTROLS, INST CONTROLS	Soil contamination with diesel (former UST location), engineering controls used to manage hazard; it is estimated that 10 cy of contaminated soil remain adjacent to and below the building.	No impact to project.
Cal's Cleaners 1234 S King St	2701 ft	SHWS	Dry cleaners, no apparent violations, apparently closed as of July 2022	No impact to project.

Based on a review of the database returns for sites within approximately ½ mile, there do not appear to be environmental impacts to the Makiki District Park site. Due to the depth and extent of excavation, it is recommended that the status of the detention basin site be reviewed during design phase. Soil re-use could require testing to ensure that the soils are suitable; soil re-use requirements were not evaluated here but should be considered during design.

8.2.2. The Manoa Valley District Park Detention Basin

The Manoa Valley District Park land is currently open land, surrounded by a school complex and residential development. Construction of the detention basis would conceptually include excavation up to 8' depth. Sites within approximately ½ mile of the feature are shown in Figure 8-3. The closest database returns (within approximately ½ mile) are listed in Table 8-3.

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Figure 8-3: Manoa Valley District Park Detention Basin Database Search Area

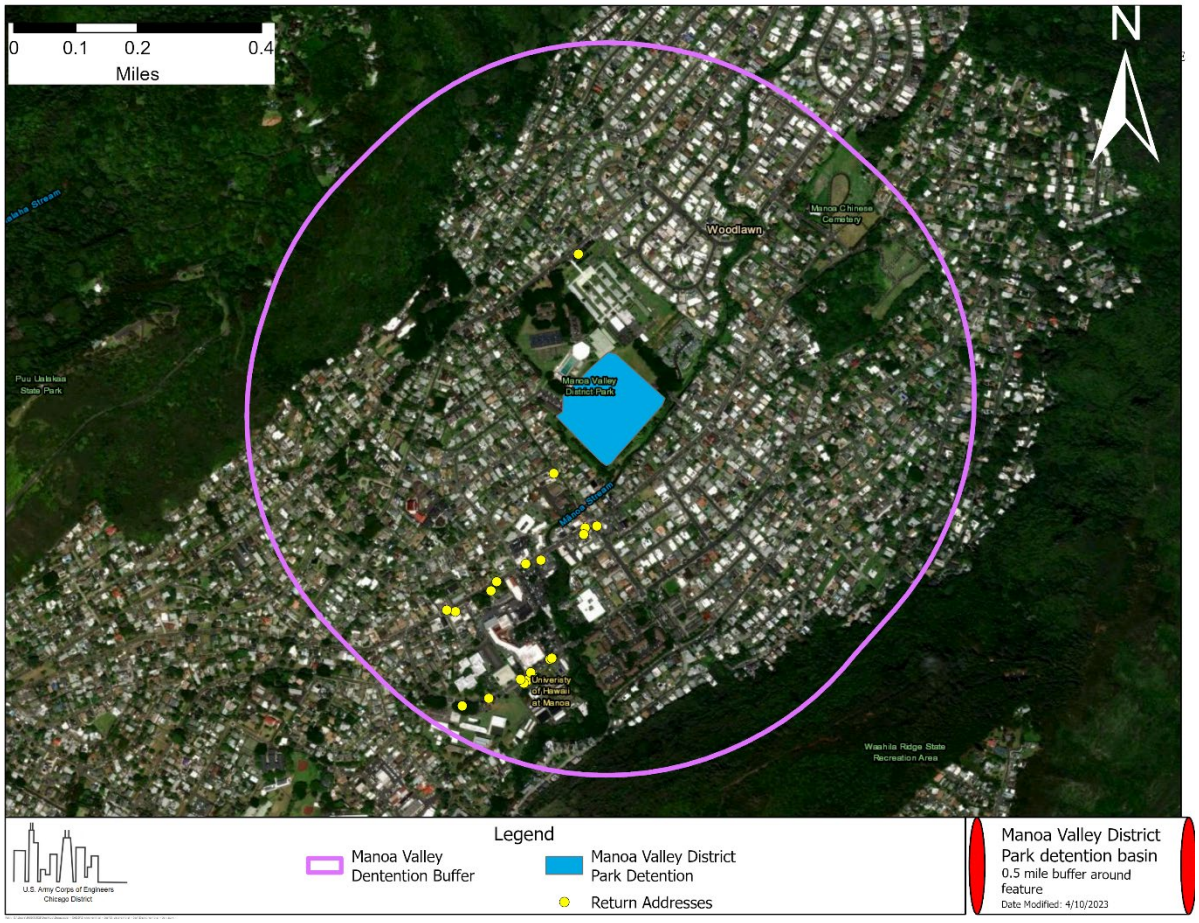

Table 8-3: Manoa Valley District Park Detention Basin Database Returns

Site Name and address	Distance	Program or Issue	Status	Comments
Hawaii Telcom Manoa Central Office 2803 Lowrey Ave.	392 ft	Underground Storage Tank (UST) (500 gallon diesel)	Active, in compliance	**No impact to project at this time; reevaluate status during design phase.**
Aloha Manoa (Manoa Village Mart) 3001 E Manoa Rd.	507 ft	USTs and LUSTs, historical auto	Several tanks in use as of 009/15/2021. 4 tank closures; three with cleanup completed (2 NFA; one restrictions) and 1 with cleanup initiated.	**Reevaluate status during design phase.**
Enivel Inc. 2966 E Manoa Rd	569 ft	Historical dry cleaner (before 2000)	No longer exists; no contamination documented	No impact to project.
Manoa Mart (Manoa Liquor; former Tengan Phillips 66) 2955 E Manoa Rd	647 ft	Historical auto, UST/LUST	All tanks closed with NFA or (historical) documented out of use.	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Manoa Elementary School 3155 Manoa Rd	844 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
IES Retail Manoa (former Manoa Service; Manoa Chevron Service) 2927 E Manoa Rd, Unit B	992 ft	Conditionally exempt small quantity generator (CESQG); historical auto, USTs	No current hazardous waste activity (last waste generation 2016); multiple closed tanks, 2 USTs currently in use; leaking hoist now closed (2017); one LUST with NFA	No impact to project.
Masa Gas Shack 2914 E Manoa Rd	1050 ft	Historical auto	No records; closed by 1982	No impact to project.
Safeway Store #204 2855 E Manoa Rd	1299 ft	CESQG	Active waste handler, no violations	No impact to project.
C&CH Manoa Fire Station 2850 E Manoa Rd	1365 ft	UST/LUST	One closed LUST (NFA); 1 previously closed 550 gallon diesel tank	No impact to project.
Mid Pac Petroleum (Tanabe's Service; Unocal SS No. 3923) 2809 E Manoa Rd	1667 ft	LUST, RCRA	3 closed LUSTs (2 NFA; 1 EHE); several permanently out of service UST; historical RCRA generator	No impact to project.
Manoa Valley Veterinary Clinic 2764 Woodlawn Drive (mis-listed as located at 2752 Woodlawn Drive)		AIRS	Operates a small crematory unit, which is regulated as an emissions source.	No impact to project.
2752 Woodlawn Drive	1694 ft		This address is a strip mall with multiple businesses listed for various programs. Each individual business is described separately, below.	
Globeteck Group 2752 Woodlawn Dr, Suite 5-204A		LEAD	Globeteck Group is an environmental consulting firm that conducts lead based paint training activities	No impact to project.
KZOO Radio Station Polynesian Studio		Historical auto	No known issues	No impact to project.
Manoa Marketplace (YY Varsity Bakery), 2752 Woodlawn Dr, Suite 5-207		UST	Permanently out of use	No impact to project.
Fendu Boulangerie (Bakery), 2752 Woodlawn Dr, Suite 5-119		FINDS/OSHA	Listed for OSHA investigation	No impact to project.
Cherrywood-Manoa 2752 Woodlawn Dr. Building 5		historical dry cleaner	No known issues	No impact to project.
Longs Drug Store #116 2750 Woodlawn Drive	1750 ft	FTTS, historical FTTS, RCRA, FIFRA	CEVSQG (last waste in 2021), historical LQG and SQG, no violations, historical investigation for pesticide issues (no issues noted)	No impact to project.
USDA ARS (Hawaii Dept of Agriculture Tropical Fruit and Vegetable) 2727 Woodlawn Dr	1804 ft	RCRA, ECHO, FINDS, SPILLS	Historic SQG (1997), undetermined spill	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Shell Service Station (Tenney's Manoa Shell) 2740 E Manoa Rd	1808 ft	UST/LUST, RCRA	1 closed LUST (NFA), 4 permanently closed UST, 1 reported antifreeze spill, historical RCRA generator	Property is now a restaurant. Due to distance and status of tanks, no impact to project.
University of Hawaii at Manoa 2721 Woodlawn Dr	1900 ft	AIRS	Pathological waste incinerator, permit ended in 2016	No impact to project.
Magoon Agricultural Research Facility 2717 Woodlawn Dr	1926 ft	RCRA, FINDS, ECHO	CESQG, last activity in 2007 (pesticide and related wastes), former LQG, former violations in compliance since 2000.	Due to distance and limited nature of issues, no impact to project.
VCA University Animal Hospital 2728 Woodlawn Dr	1916 ft	MLTS	Facility holds a license for nuclear materials (presumably for diagnostic testing)	No impact to project.
Manoa Public Library 2716 Woodlawn Dr	2062 ft	FINDS, ECHO, SPILLS	Spill of an infectious waste container, listed as a minor NPDES violation for unpermitted discharges (in compliance as of 2022)	Localized incidents. No impact to project.
Noelani Elementary School 2655 Woodlawn Dr	2375 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
University of Hawaii Institute for Astronomy 2680 Woodlawn Dr	2375 ft	RCRA	CESQG, no violations, last generation 2019	Appears to be laboratory related wastes. No impact to proposed project.
Manoa Hillside Estates Kalawao St	2291 ft	FINDS, NPDES, ECHO	Terminated discharge permit	Appears to be a former permitted water discharge location. No impact to proposed project.

Two potential sites of concern within 500 ft of the project were identified: Hawaii Telcom Manoa at 2803 Lowrey Ave and Aloha Manoa at 3001 E Manoa Rd. Both of these sites have active underground storage tank use and/or former leaking underground storage tanks. Although it does not appear that these businesses have impacted the future detention basin location, re-evaluation of the site conditions at the time of design is warranted since the proposed project would include significant excavation. Due to the depth and extent of excavation for construction of a detention basin, it is recommended that the status of the detention basin site be reviewed during design phase. Soil re-use could require testing to ensure that the soils are suitable; soil re-use requirements were not evaluated here but should be considered during design.

8.2.3. The Ala Wai Golf Course Detention Basin

The Ala Wai Golf Course detention basin is a component of all three alternatives, however there are differences in alignment and configuration between the alternatives. Conservatively, it is assumed that the entire golf course footprint would be used for the selected plan, with earthwork and excavation required across the golf course and (mostly) at numerous perimeter locations

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(for drainage); the actual detention basin would be constructed by building a berm surrounding the site as opposed to excavating the golf course.

A previous investigation of conditions at the Ala Wai Golf Course (EA, 2019) indicates several RECs and data gaps associated with the site. An apparently abandoned oil-water separator exists adjacent to the maintenance buildings; the condition and status of the facility require confirmation. Equipment storage areas (unpaved and paved) have stained soils and may have existing contamination. Several USTs were removed from the site in the 1990's; monitoring wells were installed in several locations. Although soil contamination issues associated with the UST removals appear to have been addressed, the unmaintained monitoring wells represent a data gap in the groundwater condition documentation. And finally, the site has been used as a golf course since at least the late 1940's; over that time, various fertilizers and pesticides have been applied to the property. The current soil conditions are unknown.

The golf course is bounded on the northwest and southwest by the Ala Wai Drainage Canal and Manoa-Palolo Canal. Sites across the canal are hydraulically isolated from the golf course and are unlikely to impact the proposed project property; these sites are not considered further. Sites within approximately ½ mile of the golf course and on the east side are shown in Figure 8-4. The database returns for sites within ½ mile are listed in Table 8-4.

Figure 8-4: Ala Wai Golf Course Detention Basin Database Search Area

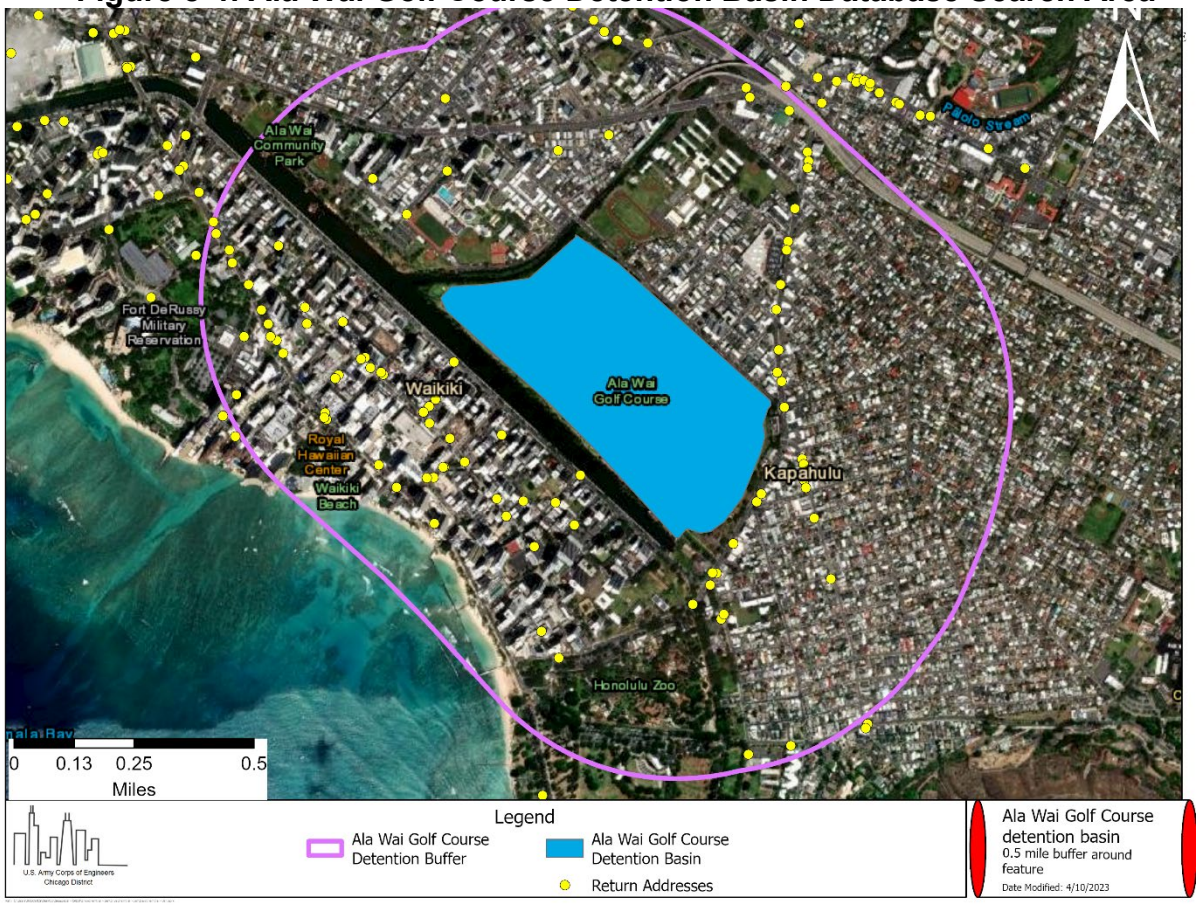

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Table 8-4: Ala Wai Golf Course Detention Basin Database Returns

Site Name and address	Distance	Program or Issue	Status	Comments
Ala Wai Field (Ala Wai Airport)	0 ft	FUDS, SHWS	This site is located on the current Ala Wai Golf Course. The Ala Wia (Air) field was apparently used as an emergency landing strip during WWII. An earthen (turf) landing strip was prepared on the existing golf course property; it is unclear whether it was used. There are no wastes or site impacts related military use of the site.	No impact to project.
Ala Wai Golf Course 484 Kapahulu Ave	0 ft	LUST, UST	LUST cleanup complete, 3 UST permanently out of service.	**This site (the maintenance yard) is also listed as 404 Kapahulu Ave. The site is on the southeast side of the golf course and is adjacent to the Ala Wai Canal. Due to the project proximity, it should be reviewed during design phase.**
Ala Wai Golf Course Maintenance Yard 404 Kapahulu Ave	400 ft	SHWS, UST, RCRA	1 UST currently in use, CESQG	**See above listing. The maintenance yard is also listed as 484 Kapahulu Ave.**
BWS Kaimuki Pump Station 2951 Harding Ave	2543 ft	SHWS, SPILLS	UST closure, no further action.	No Impact to project.
IES Retail (Kapiolani Texaco 91919, Sunrise Service Station) 2969 S King Street.	2318 ft	RCRA, UST, historical auto	CESQG (no violations), multiple UST in use (gasohol, diesel, used oil)	No Impact to project.
Pacific Laundromat & Service 2919 Kapiolani Blvd	2173 ft	Historic cleaner	Former dry cleaning establishment	No Impact to project.
Davenroye Dry Cleaners 1042 Kapahulu Ave	2386 ft	SHWS, LUST, UST, RCRA	LUST cleanup complete with EHE/EHMP, multiple UST permanently out of service, not a generator	No Impact to project.
Longs Drug Store #10851 1029 Kapahulu Ave, Suite 303	2394 ft	RCRA	CESQG (no violations)	No Impact to project.
AIM Kapahulu 1001 Kapahulu Ave	1976 ft	LUST, UST	LUST cleanup completed with EHE/EHMP, 2 UST in use, multiple UST permanently closed	No Impact to project.
Service Cleaners 936 Kapahulu Ave	1728 ft	SHWS	Former dry cleaners.	No Impact to project.
Safeway Inc (formerly Dunkin Doughnuts) 900 Kapahulu Ave	1365 ft	RCRA, LUST, UST	Historic generator, LLUST cleanup complete, multiple UST permanently out of use	No Impact to project.
Safeway Store #2747 888 Kapahulu Ave	1285 ft	RCRA	CESQG (no violations)	No Impact to project.
Manoa-Palolo Drainage Canal at Moiliili	0 ft		This database listing has no information available.	The canal itself is part of the project and conditions in the canal

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Site Name and address	Distance	Program or Issue	Status	Comments
				will be considered during design.
Loves Bakery 836 Kapahulu Ave	1176 ft	SHWS, LUST, UST	LUST cleanup complete, multiple UST permanently out of use since 1981	No impact to project.
Kuhio Cleaners 810 Kapahulu Ave	849 ft	UST	UST permanently out of service since 1991	No impact to project.
Winam Shell Service (Goose's Edge, Inc, Winam Auto Service) 755 Kapahulu Ave	591 ft	RCRA, LUST, UST, AIRS, Historic Auto	Historic generator, historic auto service, multiple LUST cleanup complete, multiple UST all permanently out of service by 2010, former air permit for soil vapor extraction system expired in 2000	Area is currently an open field. No impact to project.
Kapahulu Pumping Station	851 ft	FUDS	Unclear history; the land was apparently acquired by GSA in 1967. The site is considered closed and no remediation activities are planned. The plotted database site is a residential neighborhood.	No impact to project.
Eldon Drapery Cleaner 716 Kapahulu Ave	225 ft	Historic Cleaner	No additional documentation available. Site is now a store.	No impact to project.
Tesoro Hawaii Corporation (Hele Kapahulu #61013, Pacific Resources Inc) 707 Kapahulu Ave	291 ft	Historic Auto, LUST, UST	Historic service station (and operating gas station), LUST cleanup complete, 3 UST in use (gasohol and diesel), several UST permanently out of use	No impact to project.
Diamond Service, Inc 629 Kapahulu Ave	192 ft	Historic Auto	Historic service station	No impact to project.
RRR Recycling – Kapahulu Ave 548 Kapahulu Ave	142 ft	SWRCY	Solid waste recycling collection point (paper, non-ferrous scrap)	No impact to project.
Campbell Clothes Cleaners 3306 Campbell Ave	484 ft	Historic cleaner	Historic dry cleaner prior to 1971. Property is now used by a roofing company.	No impact to project.
Island Triathlon & Bike, Inc 3312 Campbell Ave	516 ft	RCRA	Not a waste generator verified by inspection in 1995.	No impact to project.
Aloha Campbell 3327 Campbell Ave	504 ft	LUST, UST, SPILLS	LUST clean up complete, 3 UST in use (gasohol, diesel) and several permanently out of use, reported transformer release	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Campbell Avenue Service Station (Mal Mat Auto Leasing, JH Sakamoto & Associates) 3335 Campbell Ave	582 ft	Historic Auto, RCRA, UST	Historic service station, former waste handler (no violations), 3 UST permanently out of service in 1992. Now a car audio shop.	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Kim Chau Launderette 517 Kapahulu Ave	207 ft	UST	1 UST permanently out of service since 1992.	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Georges Union Service (Unocal 76 SS L 4573, George's Union Service	198 ft	Historic Auto, RCRA, SHWS, LUST, UST	Historic service station, historic waste generator, residual petroleum hydrocarbons in former hoist	**No impact to project, however due to proximity to the**

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Site Name and address	Distance	Program or Issue	Status	Comments
#4573, 76 Kapahulu 7-11 #116) 505 Kapahulu Ave			area. LUST cleanup complete, 2 UST in use (gasohol), multiple UST permanently out of service.	**project, re-evaluate during design.**
Green Thumb Incorporated 3363 Campbell Ave	777 ft	UST	2 UST permanently out of service in 1998.	No impact to project.
Dorothy Tanaka 3423 Campbell Ave	1344 ft	UST	1 UST permanently out of service in 1985.	No impact to project.
Tonys Auto Service Ltd 449 Kapahulu Ave	269 ft	Historic Auto, Historic Cleaner	Historic service station and dry cleaner; the property is now occupied by a multistory building that appears more recent than the service station (closed in 80's) and cleaners (closed in 90's)	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Ala Wai Service Inc (Ala Wai Boat Harbor Slot 61 & 62) 407 Kapahulu Ave	523 ft	SHWS, SPILLS, LUST, UST, historic auto, RCRA	LUST cleanup complete, 3 UST in use (gasohol) and multiple UST permanently closed, CESQG	**No impact to project, however due to proximity to the project, re-evaluate during design.**
BKM Enterprises LTD. VS. Elsie Tome, DPB Tsuru Ka Kapahulu Ave	678 ft	SPILLS	No information available.	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Waikiki Fire Station #7 381 Kapahulu Ave	726 ft	SPILLS, UST	Several UST in service and permanently out of service. No information available on the reported spill.	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Kapiolani Regional Park Service Center 3447 Leahi Ave	764 ft	LUST, UST, RCRA	LUST cleanup complete, UST permanently out of service. CESQG, historic generator, no violations.	No impact to project.
Hawaii School for the Deaf and Blind	863 ft	SHWS	Building exterior soils. Part of a DOE study of schools. Low concentration of lead found at one location, considered a low risk and below action levels.	No impact to project.
Jefferson Elementary School 324 Kapahulu Ave	1097 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
Base Yard No 16 & 17	1483 ft	FUDS	The site was used to store office supplies (Yard 16) and refrigeration equipment and steel (Yard 17) during WWII. The site is now part of the Honolulu Zoo and a parking lot. There are no environmental issues associated with the site.	No impact to project.
Heco Transformer V8425 151 Kapahulu Ave	1872 ft	SHWS	A release from a (non-PCB) transformer was reported; the site was addressed and received an NFA letter.	No impact to project.

The Ala Wai Golf Course was apparently used by the military as an emergency landing strip during WWII. There is no record of impacts to the site due to military use.

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A number of businesses including service stations, dry cleaners or former service stations are located along Kapahulu Avenue, which runs along the southeast side of the golf course. Although these sites do not currently have issues, due to the on-going presence of underground storage tanks and the proximity to the proposed detention basin, it is recommended that these sites be reviewed during design phase.

The Ala Wai Golf Course maintenance yard is located along Kapahulu Ave on the southwest side of the golf course. A former LUST was remediated and USTs were taken out of service. Depending on the final alignment, the maintenance yard area could be within the project footprint; the site should be reviewed at the time of design. The Ala Wai Golf Course itself has a history of fertilizer and pesticide use. It is recommended that a Phase II investigation be conducted on any areas that would be excavated during project construction, to determine the appropriate disposition of excess soils.

8.2.4. The Kaimuki High School Berm/Floodwall

The Kaimuki High School berm and floodwall is included in all three alternatives under consideration, but there are differences in the alignment and construction. The floodwall includes sections of sheetpile wall as well as floodwall with piles, and ties into berms in some configurations. For the purposes of this evaluation, the Alternative 1 alignment (the longest option) is used as the assumed location. Sites within approximately ½ mile of the feature are shown in Figure 8-5. Table 8-5 lists the database returns within ½ mile of the Kaimuki High School Berm/Floodwall. Only sites south of Palolo Stream and southeast of the Ala Wai Canal are included in the table. Due to the presence of the stream and canal, sites on the other side are hydraulically isolated from the proposed berm/floodwall and are unlikely to represent a source of contamination for the project area.

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Figure 8-5: Kaimuki High School Floodwall Database Search Area

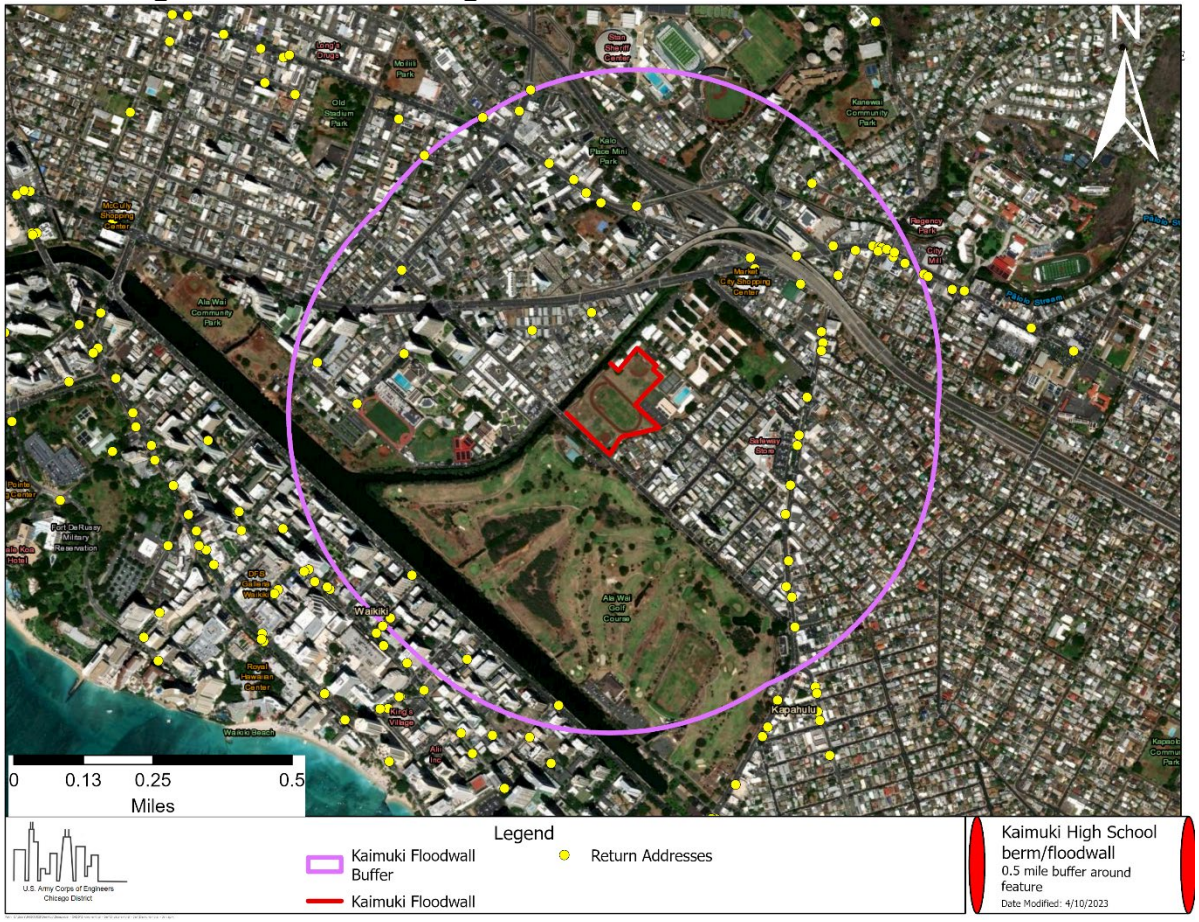

Table 8-5: Kaimuki High School Berm/Floodwall Database Returns

Site Name and address	Distance	Program or Issue	Status	Comments
Kee-Thema Inc 3060 Kapiolani Blvd	1733 ft	UST	One UST permanently out of use in 2005	No Impact to project.
Esquire Shell Service (Monster Hi-5 & Tires, Seven Hawaiians Corp) 2960 Waialae Ave	2073 ft	Historical auto, RCRA, SWRCY, UST	Historical auto shop, former waste generator (no violations), ferrous waste and catalytic converter recycling, permanently closed used oil UST. Property appears to be used for staging/storing trucks and general construction materials.	No Impact to project.
Serai's Union Service L-4922 (Unocal 76 SS L 4922) 3011 Waialae Ave	2102 ft	Historic auto, LUST, UST, RCRA	Historic gas station, LUST cleanup complete, multiple UST permanently out of service, historic RCRA generator	No Impact to project.
Berger Autohaus 3030 Waialae Ave	2354 ft	SHWS, LUST, UST, SPILLS, RCRA, ENG	LUST cleanup complete, UST permanently closed, gasoline spill, CESQG (no	No Impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
		CONTROLS, RCRA, INST CONTROLS,	violations) residual petroleum and lead contamination in soil, engineering and inst controls, restricted use land	
Frederick Fong M.D. 3034 and 3036 Waialae Ave	2476 ft	LUST, UST	LUST cleanup complete, 2 UST permanently out of service since 2007	No Impact to project.
Consumer Tire Warehouse (Robert M Miwa) 3040 Waialae Ave	2313 ft	RCRA, historic auto	Historic generator, no violations, historic gas station	No Impact to project.
Dana Labels Co 3035 Waialae Ave	2377 ft	UST	UST permanently out of service in 1989	No Impact to project.
Midas 3051 Waialae Ave	2451 ft	RCRA, UST	CESQG (no violations), UST permanently out of service since 1999.	No Impact to project.
Rogers Chevron (Chevron 93778) 3048 Waialae Ave	2579 ft	Historic auto, SHWS, LUST, UST, RCRA	Historic gas station, LUST cleanup complete, multiple UST permanently out of service, residual petroleum compounds in soil below clean up levels, CESQG (no violations)	No Impact to project.
Aloha Petroleum: St. Louis Shell (2nd Avenue Shell) 3075 Waialae Ave	2568 ft	RCRA, LUST, UST	CESQG (no violations), LUST cleanup complete, 2 UST in use (gasohol) and multiple permanently closed UST	No Impact to project.
Furumoto Family Partners (Veterans of Foreign Wars) 1135 Kapahulu	2060 ft	RCRA	Historic small quantity generator, not a generator since 2000, no violations	No Impact to project.
BWS Kaimuki Pump Station 2951 Harding Ave	1690 ft	SHWS, SPILLS	UST closure, no further action.	No Impact to project.
IES Retail (Kapiolani Texaco 91919, Sunrise Service Station) 2969 S King St	1259 ft	RCRA, UST, historical auto	CESQG (no violations), multiple UST in use (gasohol, diesel, used oil)	No Impact to project.
Pacific Laundromat & Service 2919 Kapiolani Blvd	1176 ft	Historic cleaner	Former dry cleaning establishment	No Impact to project.
Davenroye Dry Cleaners 1042 Kapahulu Ave	1643 ft	SHWS, LUST, UST, RCRA	LUST cleanup complete with EHE/EHMP, multiple UST permanently out of service, not a generator	No Impact to project.
Longs Drug Store #10851 1029 Kapahulu Ave, Suite 303	1714 ft	RCRA	CESQG (no violations)	No Impact to project.
AIM Kapahulu 1001 Kapahulu Ave	1506 ft	LUST, UST	LUST cleanup completed with EHE/EHMP, 2 UST in use, multiple UST permanently closed	No Impact to project.
Service Cleaners 936 Kapahulu Ave	1374 ft	SHWS	Former dry cleaners.	No Impact to project.
Safeway Inc (formerly Dunkin Doughnuts) 900 Kapahulu Ave	1229 ft	RCRA, LUST, UST	Historic generator, LLUST cleanup complete, multiple UST permanently out of use	No Impact to project.
Safeway Store #2747 888 Kapahulu Ave	1306 ft	RCRA	CESQG (no violations)	No Impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Manoa-Palolo Drainage Canal at Moiliili			This database listing has no information available.	The canal itself is part of the project and conditions in the canal will be considered during design.
Loves Bakery 836 Kapahulu Ave	1330 ft	SHWS, LUST, UST	LUST cleanup complete, multiple UST permanently out of use since 1981	No impact to project.
Kuhio Cleaners 810 Kapahulu Ave	1432 ft	UST	UST permanently out of service since 1991	No impact to project.
Winam Shell Service (Goose's Edge, Inc, Winam Auto Service) 755 Kapahulu Ave	1713 ft	RCRA, LUST, UST, AIRS, Historic Auto	Historic generator, historic auto service, multiple LUST cleanup complete, multiple UST all permanently out of service by 2010, former air permit for soil vapor extraction system expired in 2000	Area is currently an open field. No impact to project.
Kapahulu Pumping Station	1789 ft	FUDS	Unclear history; the land was apparently acquired by GSA in 1967. The site is considered closed and no remediation activities are planned. The plotted database site is a residential neighborhood.	No impact to project.
Eldon Drapery Cleaner 716 Kapahulu Ave	2029 ft	Historic Cleaner	No additional documentation available. Site is now a store.	No impact to project.
Tesoro Hawaii Corporation (Hele Kapahulu #61013, Pacific Resources Inc) 707 Kapahulu Ave	2123 ft	Historic Auto, LUST, UST	Historic service station (and operating gas station), LUST cleanup complete, 3 UST in use (gasohol and diesel), several UST permanently out of use	No impact to project.
Diamond Service, Inc 629 Kapahulu Ave	2420 ft	Historic Auto	Historic service station	No impact to project.
Ala Wai Field (Ala Wai Airport)	1451	FUDS, SHWS	This site is located on the current Ala Wai Golf Course. The Ala Wia (Air) field was apparently used as an emergency landing strip during WWII. An earthen (turf) landing strip was prepared on the existing golf course property; it is unclear whether it was used. There are no wastes or site impacts related military use of the site.	No impact to project.

Although multiple potentially impacted sites were identified, there do not appear to be any potential impacts to the proposed project footprint. Due to the urban nature of the site, it is recommended that the area be reviewed during design phase to confirm that there are no potential impacts.

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8.2.5. The Kanaha Floodwall

The Kanaha Stream flows through an urban area; the Kanaha Floodwall alignment is proposed to be an approximately 2200 ft long L-wall that runs between properties in this commercial area. Sites within approximately ½ mile of the feature are shown in Figure 8-6. Table 8-6 lists the database returns within approximately ½ mile of the alignment.

Figure 8-6: Kanaha Floodwall Database Search Area

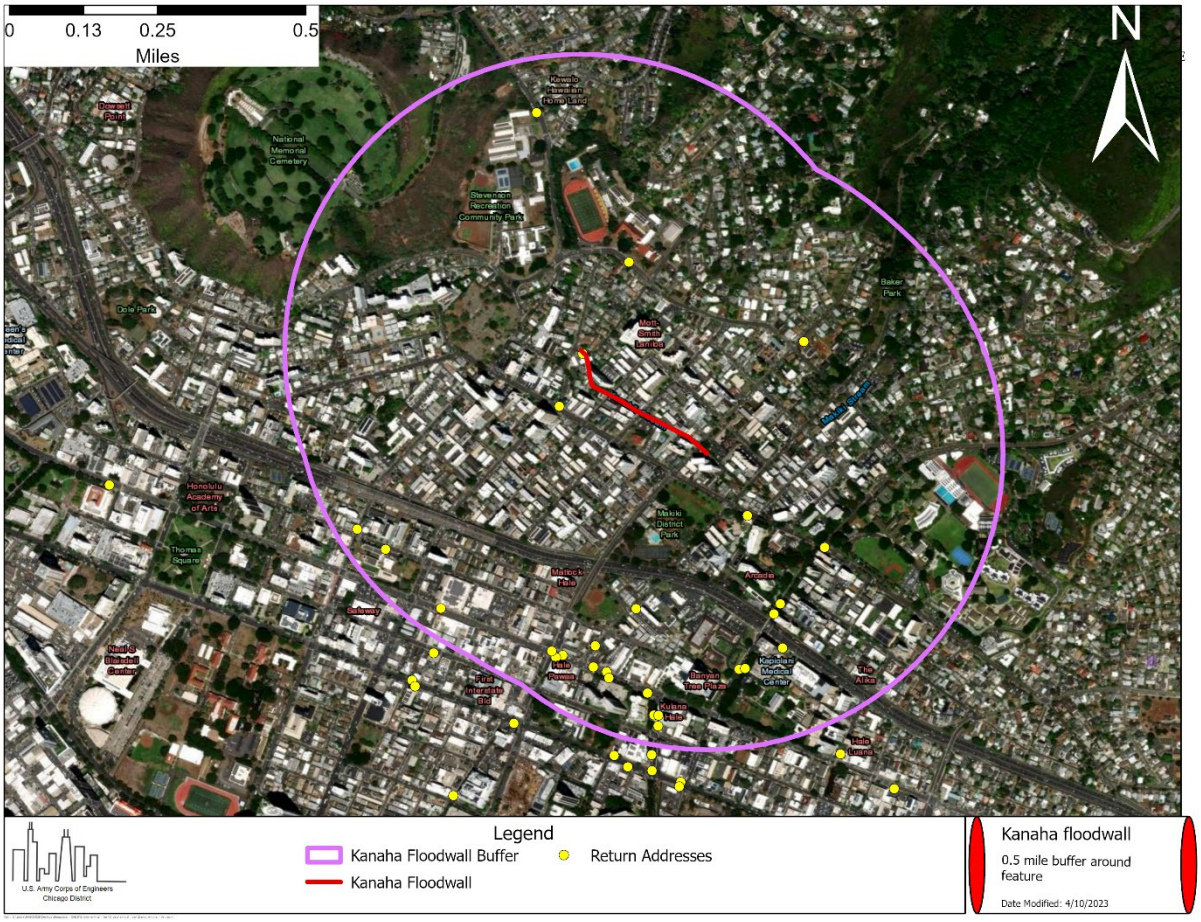

Table 8-6: Kanaha Floodwall Database Returns

Site Name and address	Distance	Program or Issue	Status	Comments
Lincoln Elementary School 615 Auwaiolimu St	1542 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
Punchbowl Camp	475 ft	FUDS	Site was a temporary housing for the Army Engineers battalion. The site contained an administrative office space for camp, two mess halls, a motor pool vehicle wash rack, latrines, barracks, tents, a supply room	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
			and post exchange. The site was returned to the state in 1944; there are no known installation or munitions related issues for the property.	
1653 Mott Smith Drive	0 ft	SPILLS	1994 paint spill	**Although within the project alignment, based on the nature of the spill there is likely no impact to the project. Reevaluate during design phase.**
Roosevelt High School Firing Range 1120 Nehoa St.	899 ft	SHWS	Hazard undetermined; listed as a low priority brownfield site.	No impact to project.
Makiki Fire Station #3 1202 Wilder Ave	309 ft	LUST, UST	LUST clean up complete 1995, 1 1000 gal UST in use, 1 500 gal UST permanently closed in 1991	No impact to project.
1911 Keeaumoku Street	1375 ft	SHWS	Pesticide and lead contaminated soils were removed in preparation for the expansion of the Hanahauoli School.	No impact to project.
Parish of St. Clement (St. Clement School) 1515 Wilder Ave	717 ft	RCRA, FFTS, Historic FFTS, ECHO, FINDS	Non RCRA generator as of 2021, former lead waste,	No impact to project.
Fire Hydrant Installations at Makiki St, Kamaia Dr, Manoa Rd, Oahu Ave, Pamoa	1067 ft	NPDES	Point discharge locations	No impact to project.
Maryknoll High School 1402 Punahou St	1276 ft	RCRA	CESQG	No impact to project.
Arcadia Retirement 1434 Punahou St	1432 ft	LUST, UST	LUST clean up complete in 1999, 300 gal diesel tank permanently out of use in 1998	No impact to project.
Punahou School (Punahou School Firing Range) 1601 Punahou St	1523 ft	RCRA, LUST, UST, SHWS	CESQG (2017), LUST clean up complete 2007, confirmed release 2020, several UST permanently out of use with the last closure in 2020, hazards identified on site with controls required to manage contamination	No impact to project.
Punahou School	2753 ft	FUDS	The Punahou School was used by the Army Division as he headquarters for all aspects of the AED Administrative operations and including a medical unit, machine shop, supply storage, and motor transportation unit. There are no known installation or munitions related issues for the property.	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Kapiolani Medical Center for Women & Children 1637 Bingham St	2021 ft	UST	Two 20,000 gal diesel tanks in use	No impact to project.
Kapiolani Women's & Children's Medical Center 1319 Punahou St	1807 ft	SHWS, UST, AIRS, RCRA. FINDS, ECHO	Two permanently out of service diesel tanks, boiler system using natural gas and fuel oil, CESQG with minor past violations	No impact to project.
Shriners Hospital 1310 Punahou St	1818 ft	LUST, UST	LUST clean up complete 1998, 3 UST permanently out of service	No impact to project.
Rogers Chevron 1403 Makiki St	1593 ft	Historical auto	Former gasoline service station	No impact to project.
SJD Radiator Service 1218 Makiki St	1975 ft	RCRA	CESQG, last waste generation in 2000	No impact to project.
Cartwright Neighborhood Park Keeaumoku St & Matlock Ave	1705 ft	SHWS	Transformer oil (no PCBs) found on site; no further action letter 2005.	No impact to project.
Richards Chevron 1509 S Beretania St	2211 ft	UST	4 UST permanently out of service by 1987	No impact to project.
Pflueger Acura 1450 S Beretania St	2102 ft	RCRA, UST, FINDS, ECHO	CESQG with last generation in 2002, 3 UST permanently out of service in 1991	No impact to project.
Honolulu Police Dept. 801 S Beretania S Honolulu Police Dept Pawaa Annex 1455 Beretania St	2217 ft	RCRA, PADS, LUST, UST	SQG for mercury, solvents, used oil, universal waste, LUST clean up complete 2000, 4 UST permanently out of service 1998, the PADS listing is related to historical PCB activity	No impact to project.
Makiki Shell 1436 S Beretania	2111 ft	RCRA, FINDS, ECHO, LUST, UST, SWRCY	Historical SQG (halogenated solvents), 3 LUST with cleanup complete, numerous UST now all permanently out of service (no longer service station), former recycling operation	No impact to project.
Don's Makiki #111 (Unocal 76) 1406 S Beretania	2154 ft	LUST, UST, RCRA	2 LUST clean up complete, 3 UST in service (gasohol and diesel) and numerous out of service UST, former LQG	No impact to project.
Pawaa Building 1401 S Beretania St	2293 ft	Meadow Gold Ice Cream Plant – SHWS Longs Drug Store – RCRA	fuel oil spill former waste generator	Multistory building containing separate businesses. No impact to project.
Beretania Texaco (IES Retail) 1378 S Beretania St	2215 ft	LUST, UST, RCRA	4 LUST all clean up complete, 3 UST in use (gasohol and diesel), CESQG	No impact to project.
Schuman Carriage Motors 1234 S Beretania St	2400 ft	SHWS, LUST, UST, INST CONTROL, SPILLS	transmission fluid and hydraulic fluid spills, 2 LUST clean up complete, 6 UST permanently out of use by 2005, site hazards managed by institutional controls	No impact to project.
Kaahumanu Elementary School 1141 Kinau St	2283 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
1310 Pensacola St	2410 ft	SHWS	UST closure; residual contaminants left on site below pavement and buildings.	No impact to project.

One potential impact to the project, a former paint spill location, was identified within the limits of the proposed project. Although no additional details on the size and nature of the spill were found, the paint spill appears to be an isolated issue. It occurred many years ago. It is recommended that the site be re-evaluated during design, to determine if there do appear to be impacts from the spill.

8.2.6. The Woodlawn Drive Floodwall

The Manoa Stream meanders along a residential area. The Woodlawn Drive Floodwall would be constructed along the stream, downstream of Woodlawn Drive. The land immediately adjacent to the stream is undeveloped (a corridor approximately 150 feet wide). Sites within approximately ½ mile of the feature are shown in Figure 8-7. Table 8-7 gives a summary of database returns within approximately ½ mile of the proposed floodwall alignment.

Figure 8-7: Woodlawn Drive Floodwall Database Search Area

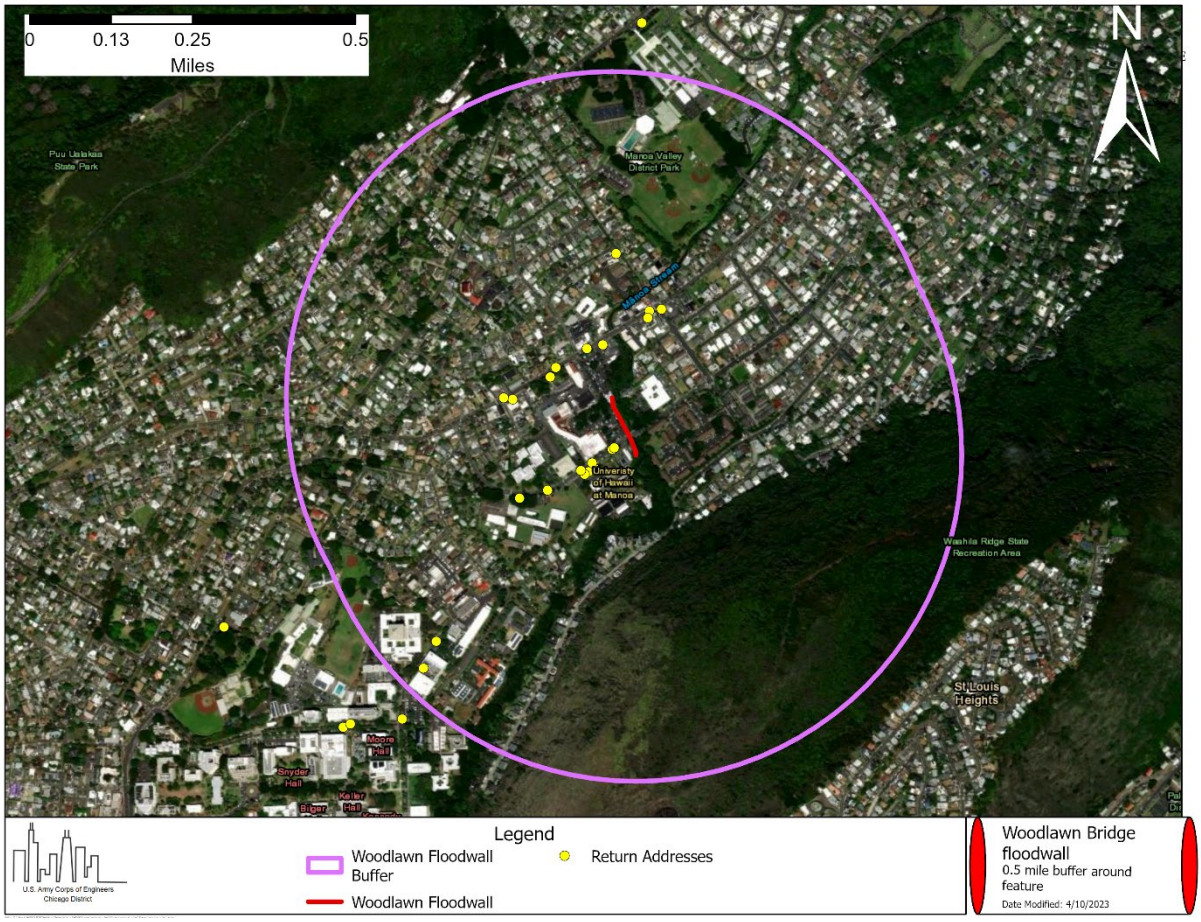

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Table 8-7: Woodlawn Drive Floodwall Database Returns

Site Name and address	Distance	Program or Issue	Status	Comments
Hawaii Telcom Manoa Central Office 2803 Lowrey Ave.	1475 ft	Underground Storage Tank (UST) (500 gallon diesel)	Active, in compliance	Due to distance, unlikely to impact project.
Aloha Manoa (Manoa Village Mart) 3001 E Manoa Rd.	1067 ft	USTs and LUSTs, historical auto	Several tanks in use as of 009/15/2021. 4 tank closures; three with cleanup completed (2 NFA; one EHE/EHMP) and 1 with cleanup initiated.	Due to distance, unlikely to impact project.
Enivel Inc. 2966 E Manoa Rd	1010 ft	Historical dry cleaner (before 2000)	No longer exists; no contamination documented	No impact to project.
Manoa Mart (Manoa Liquor; former Tengan Phillips 66) 2955 E Manoa Rd	895 ft	Historical auto, UST/LUST	All tanks closed with NFA or (historical) documented out of use.	No impact to project.
IES Retail Manoa (former Manoa Service; Manoa Chevron Service) 2927 E Manoa Rd, Unit B	724 ft	Conditionally exempt small quantity generator (CESQG); historical auto, USTs	No current hazardous waste activity (last waste generation 2016); multiple closed tanks, 2 USTs currently in use; leaking hoist now closed (2017); one LUST with NFA	No impact to project.
Masa Gas Shack 2914 E Manoa Rd	861 ft	Historical auto	No records; closed by 1982	No impact to project.
Safeway Store #204 2855 E Manoa Rd	767 ft	CESQG	Active waste handler, no violations	No impact to project.
C&CH Manoa Fire Station 2850 E Manoa Rd	885 ft	UST/LUST	One closed LUST (NFA); 1 previously closed 550 gallon diesel tank	No impact to project.
Mid Pac Petroleum (Tanabe's Service; Unocal SS No. 3923) 2809 E Manoa Rd	881 ft	LUST, RCRA	3 closed LUSTs (2 NFA; 1 EHE); several permanently out of service UST; historical RCRA generator	No impact to project.
Manoa Valley Veterinary Clinic 2764 Woodlawn Drive (mis-listed as located at 2752 Woodlawn Drive)	200 ft	AIRS	Operates a small crematory unit, which is regulated as an emissions source.	No impact to project.
2752 Woodlawn Drive	201 ft		This address is a strip mall with multiple businesses listed for various programs. Each individual business is described separately, below.	
Globeteck Group 2752 Woodlawn Dr, Suite 5-204A		LEAD	Globeteck Group is an environmental consulting firm that conducts lead based paint training activities	No impact to project.
KZOO Radio Station Polynesian Studio		Historical auto	No known issues	No impact to project.
Manoa Marketplace (YY Varsity Bakery), 2752 Woodlawn Dr, Suite 5-207		UST	Permanently out of use	No impact to project.
Fendu Boulangerie (Bakery), 2752		FINDS/OSHA	Listed for OSHA investigation	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Woodlawn Dr, Suite 5-119				
Cherrywood-Manoa 2752 Woodlawn Dr. Building 5		historical dry cleaner	No known issues	No impact to project.
Longs Drug Store #116 2750 Woodlawn Drive	245 ft	FTTS, historical FTTS, RCRA, FIFRA	CEVSQG (last waste in 2021), historical LQG and SQG, no violations, historical investigation for pesticide issues (no issues noted)	No impact to project.
USDA ARS (Hawaii Dept of Agriculture Tropical Fruit and Vegetable) 2727 Woodlawn Dr	217 ft	RCRA, ECHO, FINDS, SPILLS	Historic SQG (1997), undetermined spill	No impact to project.
Shell Service Station (Tenney's Manoa Shell) 2740 E Manoa Rd	1125 ft	UST/LUST, RCRA	1 closed LUST (NFA), 4 permanently closed UST, 1 reported antifreeze spill, historical RCRA generator	Property is now a restaurant. Due to distance and status of tanks, no impact to project.
University of Hawaii at Manoa 2721 Woodlawn Dr	246 ft	AIRS	Pathological waste incinerator, permit ended in 2016	No impact to project.
Magoon Agricultural Research Facility 2717 Woodlawn Dr	267 ft	RCRA, FINDS, ECHO	CESQG, last activity in 2007 (pesticide and related wastes), former LQG, former violations in compliance since 2000.	Due to distance and limited nature of issues, no impact to project.
VCA University Animal Hospital 2728 Woodlawn Dr	421 ft	MLTS	Facility holds a license for nuclear materials (presumably for diagnostic testing)	No impact to project.
Manoa Public Library 2716 Woodlawn Dr	503 ft	FINDS, ECHO, SPILLS	Spill of an infectious waste container, listed as a minor NPDES violation for unpermitted discharges (in compliance as of 2022)	Localized incidents. No impact to project.
Noelani Elementary School 2655 Woodlawn Dr	936 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
University of Hawaii Institute for Astronomy 2680 Woodlawn Dr	937 ft	RCRA	CESQG, no violations, last generation 2019	Appears to be laboratory related wastes. No impact to proposed project.
Manoa Hillside Estates Kalawao St	50 ft	FINDS, NPDES, ECHO	Terminated discharge permit	Appears to be a former permitted water discharge location. No impact to proposed project.
UH Manoa Facilities Management Shop 2002 East-West Rd	1795 ft	SHWS, SPILLS	Spill of 25 gallons of oil in 2010	Localized incident. No impact to project.
UH Motor Pool 2027 East West Rd	1864 ft	LUST, UST	One LUST closed in 2001, several UST permanently closed in 1998	No impact to project.
UH Manoa Bilger Addition Compressor Room 2040 East West Rd	1870 ft	SHWS	Oil spill (<1 gallon) within building. Spill was contained and issue was closed.	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Mid Pacific Institute 2445 Kaala St	2557 ft	SHWS, LUST, UST,	One LUST closed in 1999, UST permanently closed in 1998	No impact to project.

Two sites of potential concern for the Makiki District Park detention basin are also within ½ mile of the Woodlawn Drive floodwall: Hawaii Telcom Manoa at 2803 Lowrey Ave and Aloha Manoa at 3001 E Manoa Rd. Both of these sites have active underground storage tank use and/or former leaking underground storage tanks. These businesses are farther away from the Woodlawn Drive floodwall, and would be less likely to impact the proposed project. Since it is already recommended that these sites be re-evaluated at the time of design for impacts to the proposed detention basin, the potential impact to the floodwall could also be considered.

8.2.7. The Koali Road Floodwall

The Koali Road floodwall is a proposed approximately 2500 ft L-wall on micropiles, running along Koali Road and Palolo Stream. The northern end of the wall would be within the Kãnewai Community Park. The remainder of the land use is predominantly residential. Many sites are physically separated from the proposed floodwall area by the Manoa Stream; due to hydraulic separation, those sites are unlikely to impact the proposed project area and were not evaluated further. Sites within approximately ½ mile of the feature are shown in Figure 8-8. Database returns are listed in Table 8-8.

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Figure 8-8: Koali Road Floodwall Database Search Area

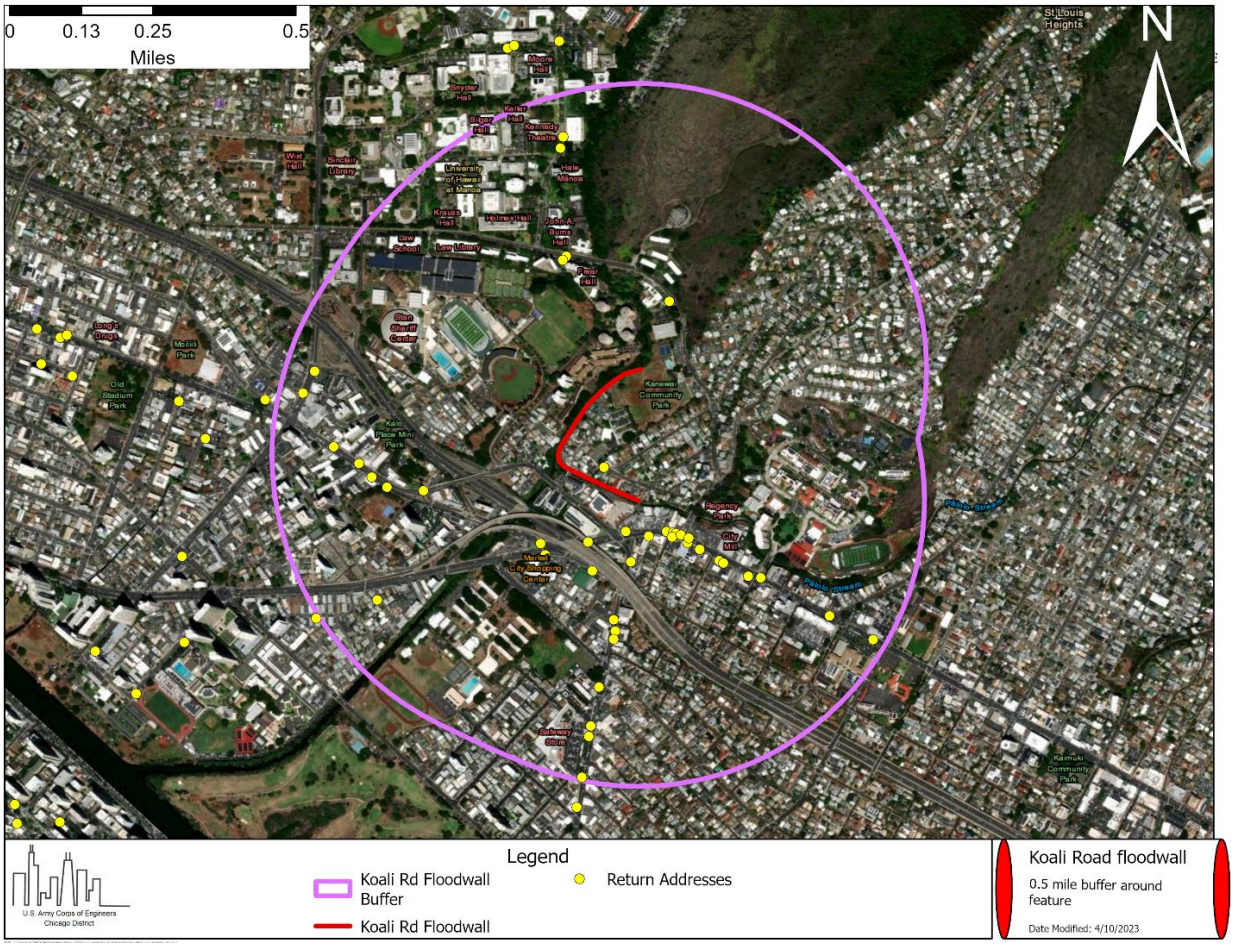

Table 8-8: Koali Road Floodwall Database Returns

Site Name and address	Distance	Program or Issue	Status	Comments
Texaco Station 611000550 1119 University Avenue	2289 ft	LUST, UST, RCRA	LUST cleanup complete, numerous tanks out of use by 1996, historic waste generator	No impact to project.
Reynolds Recycling University Ave Trailer 1106 University Ave	2466 ft	SWRCY	Recycling collection point	No impact to project.
2700 South King St.	1885 ft	SHWS, ENG CONTROLS, INST CONTROL, SPILLS	Lead in soil and groundwater present under pavement, property is limited to commercial use.	No impact to project.
76 University 7-11 #168 2646 S King St	2067 ft	LUST, UST	LUST cleanup complete, 2 UST (gasohol) in use, several permanently closed UST	No impact to project.
Sherwin-Williams Store #8240 2733 S King St	1768 ft	RCRA	CESQG, ignitable waste, no violations	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Kuhio Elementary School 2759 S King St	1578 ft	SHWS, SPILLS	Reported spill within school building of 2 mL mercury. Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
Hawaiian Humane Society 2700 Waialae Ave	1337 ft	UST	UST permanently out of use since 1989.	No impact to project.
UH Manoa Frear Hall Construction Project 2569 Dole St	1591 ft	SHWS	Chlordane found in soils; contaminated material removed during construction.	No impact to project.
Barbers Point Naval Air Station, 21.296188/-157.813873	1170 ft		Appears to be mis-plotted	No impact to project.
NOAA – Honolulu Laboratory 2570 Dole St	1054 ft	LUST, UST	LUST cleanup complete, 2 small UST permanently out of service since 1997	No impact to project.
UH Kennedy Theater 1770 East-West Rd	2282 ft	SHWS, SPILLS	Oil leak (hydraulic oil), low priority brownfield site.	No impact to project.
UH Manoa Henke Hall 1800 East-West Rd	2484 ft	SHWS	Controls required to manage contamination; chlordane in soils encountered during construction.	No impact to project.
UH Manoa Lower Campus Tennis Courts 2693 Dole St	579 ft	SHWS	Soil contamination due to a leaking transformer; remediation complete.	No impact to project.
Manoa Str at Kanewai Field	45 ft	PFAS WQP	Kanewai Field is a park bordered on the north by Manoa Stream. Manoa Stream has been the focus of environmental monitoring (water chemistry, sediment chemistry, biota). Manoa Stream is on Hawaii's 303d list of impaired waters.	No impact to project.
Saint Louis College Hospital	992 ft	FUDS	The site was used by the military as a hospital during World War II. The site is now used as a school. Four USTs installed by the Army were removed by the school in 1990. There is no further action identified for the property.	No Impact to project.
Hokulani Elementary School 2940 Kamakini St	169 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No Impact to project.
St Louis College (Kalaepohaku)	2008 ft	SHWS	FUDS. Part of the St. Louis College Hospital site.	No Impact to project.

Although multiple potentially impacted sites were identified, there do not appear to be any potential impacts to the proposed project site. Due to the urban nature of the site, it is recommended that the area be reviewed during design phase to confirm that there are no potential impacts.

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8.2.8. The Ala Wai Canal Floodwall

The Ala Wai Canal floodwall is included in both the Conveyance Alternative and the Hybrid Alternative. The alignment and proposed design differ between the two alternatives, but in both cases the proposal is for a wall up to 6' high to be constructed along the length of the canal (at the edge of the canal). The wall is on both sides of the canal and would tie into the Ala Wai Golf Course berm and/or the Kaimuki High School berm or floodwall. The total length of the wall would be approximately 24,000 – 25,000 ft. A number of drainage structures would also be constructed. Because floodwall is proposed for both sides of the canal, database returns within approximately ½ mile of either side of the canal, and for the length of the canal from Highway H-1 to Ala Moana Avenue, including the stretch of canal along the Ala Wai Boulevard, were considered for impacts. The database returns are summarized in Table 8-9. Sites within approximately ½ mile of the feature are shown in Figure 8-9.

Figure 8-9: Ala Wai Canal Floodwall Database Search Area

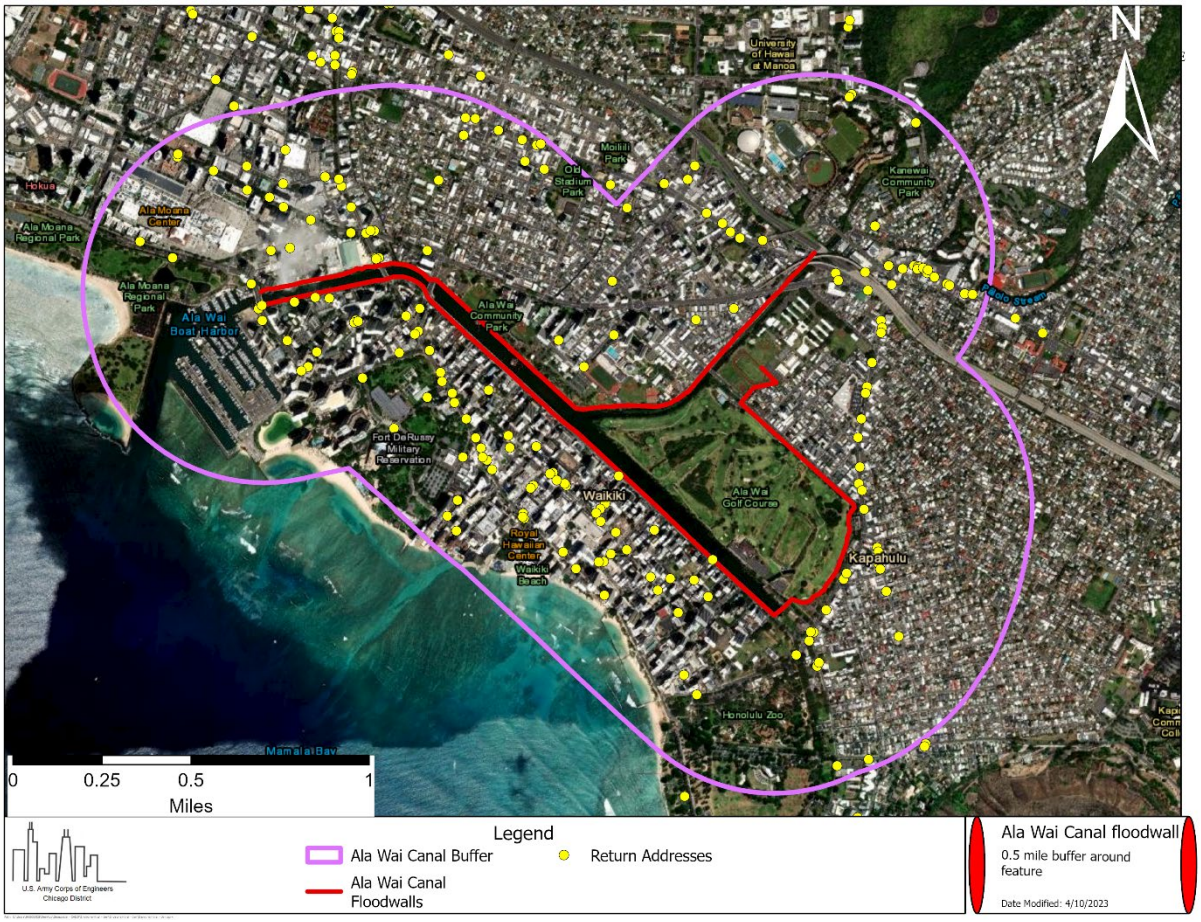

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Table 8-9: Ala Wai Canal Floodwall Database Returns

Site Name and address	Distance	Program or Issue	Status	Comments
AIM Kapahulu 1001 Kapahulu Ave	2311 ft	LUST, UST	LUST cleanup completed with EHE/EHMP, 2 UST in use, multiple UST permanently closed	No Impact to project.
Service Cleaners 936 Kapahulu Ave	2111 ft	SHWS	Former dry cleaners.	No Impact to project.
Safeway Inc (formerly Dunkin Doughnuts) 900 Kapahulu Ave	1737 ft	RCRA, LUST, UST	Historic generator, LLUST cleanup complete, multiple UST permanently out of use	No Impact to project.
Safeway Store #2747 888 Kapahulu Ave	1600 ft	RCRA	CESQG (no violations)	No Impact to project.
Manoa-Palolo Drainage Canal at Moiliili	0 ft		This database listing has no information available.	The canal itself is part of the project and conditions in the canal will be considered during design.
Loves Bakery 836 Kapahulu Ave	1428 ft	SHWS, LUST, UST	LUST cleanup complete, multiple UST permanently out of service	No Impact to project.
Kuhio Cleaners 810 Kapahulu Ave	1068 ft	UST	One UST permanently out of service in 1991	No impact to project.
Kapahulu Pumping Station	899 ft	FUDS	Unclear history; the land was apparently acquired by GSA in 1967. The site is considered closed and no remediation activities are planned. The plotted database site is a residential neighborhood.	No impact to project.
Winam Shell Service (Goose's Edge, Inc, Winam Auto Service) 755 Kapahulu Ave	691 ft	RCRA, LUST, UST, AIRS, Historic Auto	Historic generator, historic auto service, multiple LUST cleanup complete, multiple UST all permanently out of service by 2010, former air permit for soil vapor extraction system expired in 2000	Area is currently an open field. No impact to project.
Eldon Drapery Cleaner 716 Kapahulu Ave	246 ft	Historic Cleaner	No additional documentation available. Site is now a store.	No impact to project.
Tesoro Hawaii Corporation (Hele Kapahulu #61013, Pacific Resources Inc) 707 Kapahulu Ave	292 ft	Historic Auto, LUST, UST	Historic service station (and operating gas station), LUST cleanup complete, 3 UST in use (gasohol and diesel), several UST permanently out of use	No impact to project.
Diamond Service, Inc 629 Kapahulu Ave	196 ft	Historic Auto	Historic service station	No impact to project.
Ala Wai Field (Ala Wai Airport)	0 ft	FUDS, SHWS	This site is located on the current Ala Wai Golf Course. The Ala Wia (Air) field was apparently used as an emergency landing strip during WWII. An earthen (turf) landing strip was prepared on the existing golf course property; it is unclear whether it was used. There are no wastes or site impacts related military use of the site.	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
RRR Recycling – Kapahulu Ave 548 Kapahulu Ave	141 ft	SWRCY	Solid waste recycling collection point (paper, non-ferrous scrap)	No impact to project.
Campbell Clothes Cleaners 3306 Campbell Ave	490 ft	Historic cleaner	Historic dry cleaner prior to 1971. Property is now used by a roofing company.	No impact to project.
Island Triathlon & Bike, Inc 3312 Campbell Ave	522 ft	RCRA	Not a waste generator verified by inspection in 1995.	No impact to project.
Aloha Campbell 3327 Campbell Ave	512 ft	LUST, UST, SPILLS	LUST clean up complete, 3 UST in use (gasohol, diesel) and several permanently out of use, reported transformer release	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Campbell Avenue Service Station (Mal Mat Auto Leasing, JH Sakamoto & Associates) 3335 Campbell Ave	588 ft	Historic Auto, RCRA, UST	Historic service station, former waste handler (no violations), 3 UST permanently out of service in 1992. Now a car audio shop.	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Green Thumb Incorporated 3363 Campbell Ave	806 ft	UST	2 UST permanently out of service in 1998.	No impact to project.
Dorothy Tanaka 3423 Campbell Ave	1323 ft	UST	1 UST permanently out of service in 1985.	No impact to project.
Dick's Monsarrat Service 3206 Monsarrat Ave	1413 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of service. Site is now a coffee shop.	No impact to project.
AIM Diamond Head 3203 Monsarrat Ave	1432 ft	LUST, UST	LUST with active remediation as of 2020, multiple UST in use (gasohol, gasoline, diesel) and multiple UST permanently closed.	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Kim Chau Launderette 517 Kapahulu Ave	208 ft	UST	1 UST permanently out of service since 1992.	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Georges Union Service (Unocal 76 SS L 4573, George's Union Service #4573, 76 Kapahulu 7-11 #116) 505 Kapahulu Ave	201 ft	Historic Auto, RCRA, SHWS, LUST, UST	Historic service station, historic waste generator, residual petroleum hydrocarbons in former hoist area. LUST cleanup complete, 2 UST in use (gasohol), multiple UST permanently out of service.	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Tonys Auto Service Ltd 449 Kapahulu Ave	258 ft	Historic Auto, Historic Cleaner	Historic service station and dry cleaner; the property is now occupied by a multistory building that appears more recent than the service station (closed in 80's) and cleaners (closed in 90's)	**No impact to project, however due to proximity to the project, re-evaluate during design.**
Ala Wai Golf Course 484 Kapahulu Ave	0 ft	LUST, UST	LUST cleanup complete, 3 UST permanently out of service.	**This site (the maintenance yard) is also listed as 404 Kapahulu Ave. The site is on the southeast side of the golf course and is adjacent to the Ala**

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Site Name and address	Distance	Program or Issue	Status	Comments
				Wai Canal. Due to the project proximity, it should be reviewed during design phase.
Ala Wai Golf Course Maintenance Yard 404 Kapahulu Ave	400 ft	SHWS, UST, RCRA	1 UST currently in use, CESQG	**See above listing. The maintenance yard is also listed as 484 Kapahulu Ave.**
Ala Wai Service Inc (Ala Wai Boat Harbor Slot 61 & 62) 407 Kapahulu Ave	525 ft	SHWS, SPILLS, LUST, UST, historic auto, RCRA	LUST cleanup complete, 3 UST in use (gasohol) and multiple UST permanently closed, CESQG	No impact to project.
BKM Enterprises LTD. VS. Elsie Tome, DPB Tsuru Ka Kapahulu Ave	704 ft	SPILLS	No information available.	No impact to project.
Waikiki Fire Station #7 381 Kapahulu Ave	727 ft	SPILLS, UST	Several UST in service and permanently out of service. No information available on the reported spill.	No impact to project.
Kapiolani Regional Park Service Center 3447 Leahi Ave	862 ft	LUST, UST, RCRA	LUST cleanup complete, UST permanently out of service. CESQG, historic generator, no violations.	No impact to project.
Hawaii School for the Deaf and Blind	863 ft	SHWS	Building exterior soils. Part of a DOE study of schools. Low concentration of lead found at one location, considered a low risk and below action levels.	No impact to project.
Jefferson Elementary School 324 Kapahulu Ave	919 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
Base Yard No 16 & 17	1272 ft	FUDS	The site was used to store office supplies (Yard 16) and refrigeration equipment and steel (Yard 17) during WWII. The site is now part of the Honolulu Zoo and a parking lot. There are no environmental issues associated with the site.	No impact to project.
Heco Transformer V8425 151 Kapahulu Ave	1661 ft	SHWS	A release from a (non-PCB) transformer was reported; the site was addressed and received an NFA letter.	No impact to project.
ABC Store Underground Storage Tank Removal 2546 Lemon Rd	1458 ft	SHWS, SPILLS	UST removal and remedial activities. Cleanup is complete, NFA. Site is a convenience store.	No impact to project.
Ala Wai Blvd and Wai Nani	0 ft	ERNS	In 2017, a “thick brown substance” with “no odor” was observed on the water surface of the Ala Wai Canal. The source of the issue is unknown.	**Multiple spills are listed along and within the Ala Wai Canal. These appear transitory but may have left soil or sediment impacts. Reevaluate during design.**

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Site Name and address	Distance	Program or Issue	Status	Comments
Hawaii Amalgamated Ventures 311 Ohua St	227 ft	Historic Auto	Historic service station; the site now holds a multi-story apartment building.	No impact to project.
Prince Kuhio Hotel Report 2500 Kuhio Ave	838 ft	SHWS, AIRS	Air permit for large boilers, past release of petroleum which appears to have not been addressed.	**Reevaluate status during design.**
HECO Transformer 27266 Self Implementing PCB Cleanup 249 Liliuokalani Ave	415 ft	SHWS, SPILLS	Spill of transformer oil that contained PCBs, site has been remediated	No impact to project.
2500 Ala Wai Boulevard	0 ft	SPILLS	No data found	**Multiple spills are listed along and within the Ala Wai Canal. These appear transitory but may have left soil or sediment impacts. Reevaluate during design.**
Kuhio Village Resort AOAO 3463 Kuhio Ave	965 ft	SPILLS, RCRA	CESQG (no violations), reported spill of waste oil	No impact to project.
Waikiki Central Office 214 Kapuni St	740 ft	LUST, UST	LUST cleanup complete, UST (diesel) in use, multiple UST permanently closed	No impact to project.
Remediation Specialists 2440 Kuhio Ave Ste 1903	775 ft	RCRA	Historic waste generator	No impact to project.
Hertz Rent-a-car (area 2602-10) 2424 Kalakaua Ave	1456 ft	LUST, UST	LUST cleanup complete, UST permanently out of service	No impact to project.
Waikiki Sand Villa II 250 Kaiulani Ave	281 ft	SHWS	Low priority hazard, petroleum in groundwater, soil. An assessment in 2021 indicated that contaminant concentrations are below action levels. The site was issued an NFA.	**Due to proximity to project, reevaluate during design.**
Ala Wai Boulevard & Kanekapolei Street – Ala Wai Canal	0 ft	SPILLS	Oil Sheen (2011)	**Multiple spills are listed along and within the Ala Wai Canal. These appear transitory but may have left soil or sediment impacts. Reevaluate during design.**
ABC Store 21 2394 Kuhio Ave	702 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project.
Waikiki Kuhio Collection 2370 Kuhio Ave	673 ft	SHWS	Petroleum in soil, site has NFA.	No impact to project.
Outrigger East 150 Kaiulani Ave	893 ft	RCRA, HAZNET	CESQG, historic generator (no violations), aged organic compounds	No impact to project.
Avis Ren-a-car System 148 Kaiulani Ave	1052 ft	LUST, UST	LUST cleanup complete, UST permanently out of service	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Sand Island Waste Water Treatment Plant 120 Kaiulani Ave	1146 ft	RCRA	CESQG, historic generator, no violations	No impact to project.
Azabu USA Corp DBA Kings Village (King's Village Shopping Center) 131 Kaiulani Ave	1118 ft	RCRA, LUST, UST	CESQG, historic generator, no violations, LUST cleanup complete, UST permanently closed	No impact to project.
Moana Surfrider Hotel 2365 Kalakaua Ave	1545 ft	LUST, UST	LUST cleanup complete, 1 UST in use and 1 UST permanently closed	No impact to project.
Sean Shinkawn Inc 2330 Kalakaua Ave	1418 ft	SEMS archive, SHWS	Not on the NPL, no hazard identified. Small quantities of cyanide and sulfuric acid are used at this site for jewelry manufacturing.	No impact to project.
Miramar Hotel International Market Place Redevelop 2345 Kuhio Ave	765 ft	SHWS, LUST, UST, Eng controls, INST controls	Hazard (lead, PAHs) managed with controls, multiple UST permanently out of use.	No impact to project.
Budget Rent-a-car Systems 2330 Kuhio Ave	649 ft	UST	UST permanently out of use	No impact to project.
Honolulu Prince 415 Nahua St	491 ft	UST	UST permanently out of use	No impact to project.
The Palms, Inc 431 Nahua St	353 ft	RCRA	Not a generator, no violations	No impact to project.
2319 Ala Wai Blvd	122 ft	SHWS	Former UST release, low concentrations of petroleum compounds in soil, site has NFA.	**Due to proximity to project, reevaluate during design.**
Royal Hawaiian Hotel 2259 Kalakaua Ave	1932 ft	RCRA, LUST, UST, HAZNET	CESQG, historic generator (no violations), LUST cleanup complete, UST permanently out of use	No impact to project.
Sheraton Waikiki Resort 2255 Kalakaua Ave	2236 ft	LUST, UST, SPILLS	LUST cleanup complete, UST in use (diesel), multiple UST permanently out of use, reported spill of diesel	No impact to project.
Waikiki Trade Ctr 2255 Kuhio Ave	792 ft	RCRA	CESQG, historic generator, no violations	No impact to project.
S.W.A.T. Gun Club 2266 Kuhio Ave	672 ft	RCRA	Historic generator, lead waste, no violations	No impact to project.
Rock Star Tattoos	590 ft	RCRA	Historic generator, mercury waste, no violations	No impact to project.
Waikiki Sidewalk Improvements, Phase 2 Kalakaua Ave	0 ft	NPDES	Discharge associated with construction.	No impact to project.
Royal Kuhio Condominiums 2240 Kuhio Ave	656 ft	LUST, UST	LUST cleanup complete, UST permanently out of service	No impact to project.
Western Gun School of Hawaii (Hawaii Gun Club) 339 Royal Hawaiian Ave	1013 ft	RCRA	Historic generator, lead waste, no violations	No impact to project.
Royal Hawaiian Market Place 333 Royal Hawaiian Ave	1065 ft	UST	UST permanently out of use	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Waikiki Shopping Plaza 2250 Kalakaua Ave	1217 ft	UST, LUST	USTs permanently out of use, LUST cleanup complete	No impact to project.
Fort Shafter Building 346 Moanalua Chlorine Release 2199 Kalia Rd	2456 ft	RCRA, SHWS, SPILLS, HAZNET	CESQG, historic generator (no violations), dry cleaner, gasoline spill reported	No impact to project.
Masushita Investment and Development 2237 Kuhio Ave	907 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project.
Ala Wai Canal at Ala Wai Blvd	0 ft	SPILLS	Multiple spill reports from different times -Report of unknown sheen -Report of white liquid on canal surface -Report of used syringe -Sewage spill at Kaiolu St	**Multiple spills are listed along and within the Ala Wai Canal. These appear transitory but may have left soil or sediment impacts. Reevaluate during design.**
Lilangs Guitar Shellcraft 412 Lewers St	470 ft	Historic auto	Historic service station	No impact to project.
Beach Walk Wastewater Pump Station 377 Kaiolu St	730 ft	UST	UST currently in use (diesel)	No impact to project.
Ritz Carlton Waikiki Residence & Resort 2139 Kuhio Ave	708 ft	SHWS	Medium priority hazard, pesticides in shallow soils. Site is developed now.	No impact to project.
CM&D 2112 Kalakaua Ave	1100 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project.
Waikiki Gun Club 2142 Kalakaua Ave	1150 ft	RCRA	CESQG, historic generator, lead waste, no violations	No impact to project.
Longs Drug Store #10621 2155 Kalakaua Ave	1294 ft	RCRA	CESQG, no violations	No impact to project.
Kyotaru Hawaii Corporation 2160 Kalakaua Ave	1222 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project.
Yoneoka and Associates (Waikiki Bazaar) 2174/2190 Kalakaua Ave	1242 ft	LUST, UST, SHWS, SPILLS	LUST cleanup complete, UST permanently out of use. Reported petroleum spill. Petroleum in soil, cleanup complete.	No impact to project.
Hale Pua Nui UST Removal 228 Beach Walk	1922 ft	SHWS, SPILLS	UST release at former Hale Pua Nui Hotel. Contaminated soil was excavated.	No impact to project.
205 Beach Walk Ave	2200 ft	SHWS, INST control, SPILLS	Fuel oil (diesel) release, low levels of contaminants below action level.	No impact to project.
U.S. Postal Service – Waikiki 330 Saratoga Rd	1487 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project.
Rehabilitation of Streets, Unit 62 – Job No. 23-08 Ala Wai Blvd	0 ft	NPDES	Construction discharge.	No impact to project.
King Kalakaua Plaza 2080 Kalakaua Ave	924 ft	SHWS, LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Fort Derussy, Former Leaking UST Site (Building 10)	1189 ft	SHWS	Low concentrations of petroleum compounds, below action levels.	No impact to project.
Royal Gardens Hotel Diesel 440 Olohana St	271 ft	SHWS, SPILLS	Diesel in soil at less than action levels, minor soil removal for diesel fuel	**Due to proximity to project, reevaluate during design.**
Waikiki Gateway Park Explosion 2044 Kalakaua Ave	820 ft	SHWS, SPILLS	Gas explosion, low level of petroleum compounds in soil	No impact to project.
2051 – 2057 Kalakaua Ave	1001 ft	SHWS	Low priority hazard; lead in soil, arsenic in groundwater, unresolved.	Due to distance and low concentrations of compounds, no impact to project.
Hale Koa Hotel 2055 Kalia Rd	1722 ft	RCRA, SHWS, HAZNET	CESQG, no violations.	No impact to project.
Fort Derussy Transformers by Building T-111 and 20 2058 Maluhia Rd	1380 ft	SHWS	No additional information available.	Due to distance, no impact to project.
AIM Waikiki 2025 Kalakaua Ave	854 ft	LUST, UST, SPILLS	Several LUSTs all cleanup complete, several UST in use (gasohol, diesel), several UST permanently out of use, past styrene in soil – source unknown.	Due to distance, no impact to project.
Chevron USA Inc (Daio USA Corp) 2002 Kalakaua Ave	644 ft	SHWS, LUST, RCRA, UST, Historic auto	Petroleum compounds, PAHS, metals and PCBs present in soil below action levels, LUST cleanup complete, historic generator (no violations), multiple UST permanently out of use, historic service station (now a store only)	No impact to project.
Jimmy's Chevron Service 1958 Kalakaua Ave	471 ft	UST, LUST, RCRA, Historic auto	Multiple UST permanently out of use, LUST cleanup complete, historic generator (no violations), no longer a service station (currently a parking lot)	No impact to project
Mill Camouflage 1.2	1251 ft	FUDS	Site is part of the Fort Derussy Military Reservation and adjacent properties. The site was used to dye and weave camouflage nets and other articles. The site usage ceased in 1945; there are no remnants of the operation and no further action is required.	No impact to project.
Fort Derussy Central Office Ala Moana Blvd & Kalia Rd	1283 ft	UST	UST permanently out of use.	No impact to project
Waikiki Marina Hotel 1956 Ala Moana Blvd	852 ft	RCRA	Historic generator, no violations.	No impact to project
The Pavillon 1925 Kalakaua Ave	583 ft	SHWS, SPILLS	Gasoline contaminated soil, no response needed	No impact to project
Waikiki Texaco Service 1922 Kalakaua Ave	381 ft	Historic Auto	Historic service station; site is now a strip mall	No impact to project

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Site Name and address	Distance	Program or Issue	Status	Comments
Clabir Investment C3 224 McCully St	396 ft	Historic cleaner	Historic dry cleaner; building no longer exists	No impact to project
Richards 66 Service Inc 1901 Kalakaua Ave	533 ft	Historic Auto	Historic service station; site now contains a multi-business building	No impact to project
Robinson Corp 444 Hobron Ln, Ste 5A	476 ft	Historic cleaner	Past dry cleaning operation in Eaton Square shopping center.	No impact to project
Cosmos Jewelry Ltd 438 Hobron Ln #202	429 ft	RCRA	Past generator with violation in 2012, within Eaton Square shopping center.	No impact to project
WIHC, LLC DBA Aloha Toxicology 438 Hobron Ln #302	429 ft	RCRA	CESQG, past generator, no violations, within Eaton Square shopping center.	No impact to project
Ling Brothers, Ltd 1819 E Lipeepee St	265 ft	LUST	LUST cleanup complete	No impact to project
1609 Ala Wai Blvd	95 ft	SHWS, SPILLS	Diesel spill; diesel contaminated soil; clean up complete	No impact to project
Hobron Hotel 1744 Kaioo Dr	880 ft	SHWS	Diesel fuel from leaking UST, response complete.	No impact to project
Discovery Bay 1778 Ala Moana Blvd	956 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project
Ilikai Hotel 1777 Ala Moana Blvd	1188 ft	RCRA, LUST, UST	Historic generator, no violations, LUST cleanup complete, UST permanently out of use	No impact to project
O&J Service, Inc 1720 Ala Moana Blvd	559 ft	Historic auto	Historic service station; property is now a multi story residential property.	No impact to project.
The Watermark Waikiki 1551 Ala Wai Blvd	110 ft	LUST, UST	UST in use, confirmed release in 2008. No additional information available.	**Due to proximity to project, reevaluate during design.**
Prince Waikiki 100 Holomoana St	509 ft	UST	UST (diesel) currently in use.	No impact to project.
Ala Moana Crash Boat Base	433 ft	FUDS	Site was used by military in WWII for air/sea rescue. Property was demolished by 1946 tidal wave. No issues on property identified.	No impact to project.
Ala Wai Harbor Boat Repair Yard Ala Moana Blvd	100 ft	SHWS, Historic Auto, RCRA (multiple listings under different names), ICIS, HAZNET, LUST, UST	These returns appear to refer to the same parcel but under various names/addresses. Property is currently undeveloped. Petroleum, PAH, lead found in soil and groundwater below residential use levels. Historic marine service station. CESQG, waste oil generation, historic generator (no violations). NPDES permit, LUST cleanup complete, USTs permanently out of use	**Due to proximity to project, reevaluate during design.**
Pilot Marine Inc 1651 Ala Moana Blvd				
State of Hawaii DLNR DOBOR Ala Wai Small Boat Harbor				
Ala Wai Marine Ltd 1651 Ala Moana Blvd				
Aloha Marine 1651 Ala Moana Blvd				
Waikiki Yacht Club 1599 Ala Moana Blvd	140 ft	RCRA	CESQG, historic generator, no violations	No impact to project.
Yacht Harbor Towers 1600 Ala Moana Blvd	216 ft	SHWS, Eng Controls, Inst Control, SPILLS, RCRA	CESQG, historic generator, generator and concrete pad cover diesel spill site and represent satisfactory institutional control	**Due to proximity to project, reevaluate during design.**

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Site Name and address	Distance	Program or Issue	Status	Comments
Moana Park Wastewater pump station 1501 Ala Moana Blvd	910 ft	UST	UST (diesel) in use	No impact to project.
Seaars Roebuck & Company 1158 1450 Ala Moana Blvd #1000	1667 ft	LUST, UST, SPILLS, SHWS	LUST cleanup complete, multiple UST permanently out of use, reported spill of cleaning chemicals, release of hydraulic fluid at hoist in auto care facility; cleanup complete.	No impact to project.
Cutter Chevrolet 1391 Kapiolani Blvd	2369 ft	SHWS, LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project.
Sky Ala Moana 1388 Kapiolani Blvd	2430 ft	SHWS	Pesticide impacted soils, partial cleanup complete.	No impact to project
New Office Lounge 1551 Kapiolani Blvd	1793 ft	SHWS, LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project
Ala Moana Hotel Condominium 410 Atkinson Dr	638 ft	UST, RCRA	UST (diesel) in use, CESQG, no violations	No impact to project
I L W U Local 142 451 Atkinson Dr	427 ft	RCRA	Historic generator, no violations	No impact to project
Walgreens Store #12072 1460 Kapiolani Blvd	1957 ft	SHWS	Petroleum in soil, cleanup complete, NFA.	No impact to project
Pan Am Bldg 1600 Kapiolani Blvd	1266 ft	RCRA	CESQG, historic generator, no violations	No impact to project
Kapiolani Residence 1631 Kapiolani Blvd	1103 ft	UST, LUST	Multiple UST permanently out of use, LUST cleanup complete	No impact to project.
JCRA Investments 1685 Kapiolani Blvd	845 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project
Aloha Motors (First Development Inc) 1777 Kapiolani Blvd	569 ft	SHWS, SEMS, RCRA	Petroleum contamination of soil and groundwater, cleanup complete.	No impact to project.
B&S Automotive Technicians 1789 Kapiolani Blvd	539 ft	RCRA	Not a generator, no violations	No impact to project
Aloha Motors Kapiolani Blvd & Kalakaua Ave	421 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project
1801 Kalakaua Ave Businesses listed: 1 - Dollar Rent-a-car 2 - Hawaii Convention Center Operations 3 – Hawaii Convention Center Fuji Photo Film 4 – Jims Aloha Chevron 5 – Hawaii Convention Center	494 ft	 1 – UST 2 – RCRA 3 – RCRA 4 – Historic auto 5 – SHWS	Convention center housing multiple businesses 1 - UST permanently out of use. 2 – CESQG 3 – Historic generator, no violations 4 – Historic service station, predates convention center 5 – Transite pipe disposal, action complete	No impact to project
Funai's Union Service L-5583 1810 Kapiolani Blvd	583 ft	LUST, UST, historic auto	LUST cleanup complete, multiple UST permanently out of use, former service station, site is now a parking lot	No impact to project
Unocal 76 SS L 5583 1818 Kapiolani Blvd	561 ft	RCRA	Historic generator, no violations, site is now a parking lot	No impact to project
Kalakaua Gardens 1723 Kalakaua Ave	851 ft	UST	UST (diesel) in use	No impact to project

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Site Name and address	Distance	Program or Issue	Status	Comments
Rogers Repair Inc 1687 Kalakaua Ave	1102 ft	RCRA, SHWS	CESQG, historic generator, no violations, low concentrations of petroleum in soil	No impact to project
Kalakaua Transmission 1665 Kalakaua Ave	1366 ft	SHWS, Eng controls, Inst controls	Petroleum compounds in soil and groundwater below building. No action unless site is redeveloped.	Due to distance, no impact to project.
Gas 'n Glo 1670 Makaloa St	1430 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project
C&CH PAWAA Fire Station 1610 Makaloa St	1490 ft	LUST	LUST cleanup complete	No impact to project
HECO Substation: Makaloa Substation 1544 Makaloa St	1906 ft	SHWS, Inst controls	Low levels of contaminants in soil; site is limited access.	No impact to project
Firestone Store 81 Kaheka St	1854 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project
Superblock Properties South Block (Bldg S20) Makaloa St	2458 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project
Superblock Properties South Block (Bldg S25) Makaloa St	2608 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project
Superblock Properties South Block (Bldg N8) Keeaumoku St	2547 ft	LUST, UST	LUST cleanup complete, UST permanently out of use	No impact to project
Superblock Project 700 Keeaumoku St	2683 ft	SHWS	Site remediation prior to redevelopment.	No impact to project
Georges Shell Service 1944 Kapiolani Blvd	335 ft	Historic auto	Historic service station; site is a strip mall now	No impact to project
Lunalilo Elementary School 810 Pumehana St	1315 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
Continental Auto Services 1918 Algaroba St	2144 ft	SHWS, SPILLS	Reported release of hydraulic fluid, cleanup complete, NFA	No impact to project.
McCully Service Station 1901 S King St	2267 ft	LUST, UST	LUST cleanup complete but residual contamination present, multiple UST permanently out of use, now an auto parts store	Due to distance, no impact to project
Hawaii Law Enforcement Federal Credit Union 1936 S King St	2453 ft	SHWS	Residual pesticides in soils on site.	Due to distance, no impact to project
University of Hawaii Federal Credit Union 2019 S King St	2374 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project.
Wiliwili and King Streets Excavation	2580 ft	SHWS	Petroleum contamination in soil, likely from former USTs on several adjacent properties.	Due to distance, no impact to project
McDonald's Restaurant 2121 S King St	2556 ft	SHWS	Soil and groundwater contamination reported, no source known issue unresolved.	Due to distance, no impact to project
76 McCully Service #136 2105 S King St	2470 ft	SHWS, LUST, UST, Eng	LUST cleanup complete with controls (concrete floor covers residual soil	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
		Controls, Inst Controls	contamination), multiple UST in use (gasohol, gasoline), multiple UST permanently out of use	
Tom Ishiis Union Service 2114 S King St	2603 ft	SHWS, LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project.
Hale Makana O Moiliili 2139 Algaroba St (also listed at 2193 Algaroba St)	2359 ft	SHWS, Brownfields	Property is being redeveloped (as of 2022); site soils contain low concentrations of metals and pesticides.	No impact to project.
FUDS Warehouse No 3 & 4	511 ft	SHWS, FUDS	Two properties used during WWII for the storage of automotive supplies (tires). Both properties are along Kapiolani Blvd, The area now contains a number of apartment buildings. There are no issues identified for the properties.	No impact to project.
Kapiolani Boulevard 12 inch water main	0 ft	NPDES		No impact to project
Green Mill Food Manufacturer Ltd 914 Coolidge St	2542 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project
Honolulu Limited 911 Hausten St	2438 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project
Kyle's Service Sta. L-0995 2550 S Beretania St	2331 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project
University of Hawaii Interchange, H-1 and University Avenue	2390 ft	SHWS	Lead contamination in soil, unremediated.	Due to distance, no impact to project.
Texaco Station 611000550 1119 University Avenue	2097 ft	LUST, UST, RCRA	LUST cleanup complete, numerous tanks out of use by 1996, historic waste generator	No impact to project.
Reynolds Recycling University Ave Trailer 1106 University Ave	22116 ft	SWRCY	Recycling collection point	No impact to project.
2700 South King St.	1390 ft	SHWS, ENG CONTROLS, INST CONTROL, SPILLS	Lead in soil and groundwater present under pavement, property is limited to commercial use.	No impact to project.
76 University 7-11 #168 2646 S King St	1640 ft	LUST, UST	LUST cleanup complete, 2 UST (gasohol) in use, several permanently closed UST	No impact to project.
Sherwin-Williams Store #8240 2733 S King St	1131 ft	RCRA	CESQG, ignitable waste, no violations	No impact to project.
Kuhio Elementary School 2759 S King St	889 ft	SHWS, SPILLS	Reported spill within school building of 2 mL mercury. Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.

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Site Name and address	Distance	Program or Issue	Status	Comments
Hawaiian Humane Society 2700 Waialae Ave	887 ft	UST	UST permanently out of use since 1989.	No impact to project.
C&CH McCully Fire Station 2425 Date St	1732 ft	LUST, UST	LUST cleanup complete, multiple UST permanently out of use	No impact to project
Ala Wai Cove Condominium Apartments 509 University Ave	583 ft	SHWS, SPILLS	Low hazard – residual soil and groundwater contamination after UST removal, unresolved.	**Due to proximity to project, reevaluate during design.**
University Avenue 12 inch water main	0 ft	NPDES	Construction discharges.	No impact to project.
Ala Wai Elementary School 503 Kamoku St	558 ft	SHWS	Building exterior soils. Part of a DOE study of schools. No issues identified.	No impact to project.
Iolani School 563 Kamoku St	0 ft	RCRA, UST, SHWS	CESQG, historic generator, multiple UST permanently out of service, high hazard with controls (petroleum in groundwater), organochlorine pesticides in soil incident resolved.	**Due to proximity to project, reevaluate during design.**
Kapiolani Village Apartments 737 Kaipuu St	669 ft	SHWS	Metals in soil and groundwater under buildings. NFA unless site is redeveloped.	No impact to project.
FUDS Base Yard N. 6 Kamoku Street	0 ft	SHWS, FUDS	A 25 acre portion of the property owned by Iolani School was used in WWII for storage of supplies, and later was designated as a plant assembly and repair yard. There are no known issues with the site.	No impact to project.
2633 Maunawai Place	0 ft	FTTS INSP	Residential property. The site was subject to a FIFRA/TSCA inspection in 2003, for undermined reasons.	**Due to proximity to project, reevaluate during design.**

Due to the urban nature of the project area and the proposed location of the Ala Wai Canal floodwall along the edge of the canal and bordering multiple roads, a number of sites near or adjacent to the proposed floodwall alignment were flagged for further investigation during future design phase. At this time, none of the sites appears to pose a specific impact to the project, however a number of locations have soil and/or groundwater contamination, or have historical spill issues. It is possible that soils in some portions of the floodwall alignment are contaminated by low concentrations of petroleum compounds, metals, pesticides or other anthropogenic compounds. If excavation is needed at specific locations, and particularly if excess soil will require disposal, a Phase II investigation may be warranted. Any investigation would need to be site specific, based on the proposed work and the nature of nearby conditions. It is not recommended that soil sampling be conducted along the entire proposed alignment of the Ala Wai Canal floodwall.

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8.2.9. In-Stream Work and Inlet and Outlet Culverts

The project features include numerous drainage structures, depending on the feature and topography. The location of these culverts would be immediately adjacent to the main feature, and as such any HTRW sites that would potentially impact the main feature could impact drainage structure construction. Because the culvert locations are within the search radius for the feature, impacts of database listed sites were not evaluated separately.

Drainage features would connect to the various streams and canals within the study area. The installation of inlets and outlets, as well as bank work adjacent to floodwalls and work within the channel to install floodwalls, may impact streams and canals and disturb existing sediment. The streams and canals are not listed as remediation sites, although some locations have identified localized impacts such as past spills. There is not a single systematic study of in-stream conditions within the watershed but based on limited available information (such as Spengler et al., 2019 and USGS, 2004), it is expected that the sediment within the waterways is impacted by human activities. Sediment may contain elevated levels of organochlorine pesticides (e.g., dieldrin, chlordane, and dichloro-dephenyl-trichloroethane [DDT]), polychlorinated biphenyls (PCBs), semivolatile organic compounds and polyaromatic hydrocarbons (PAHs) and metals (barium, cadmium, lead, tin and zinc). Based on future detailed design, it is strongly recommended that sediment sampling be conducted in areas where the project may cause sediment disturbance or where sediment removal is required. Based on sediment quality, proper (upland) disposal of any excavated sediment is likely required.

9. Summary and Recommendations

Based on a review of historical data and environmental records, there are no specific sites or issues that appear to represent an obstacle to the implementation of the project. However, the proposed work is within an urban area, and a number of RECs or sites with unresolved issues were identified in proximity to various project features. Depending on the exact alignment and on the extent of excavation, it is possible that some of the identified sites may have impacted soils or groundwater within the project footprint. In particular, the Ala Wai Golf Course has several RECs that are documented elsewhere (EA, 2019).

It is recommended that the database results be reviewed during design phase for each specific feature, to further evaluate whether there are project impacts. Impacts to excavations and to excess soils should be considered once project features are further designed. Targeted soil sampling (a Phase II investigation) is recommended for any areas requiring excavation that have identified specific impacts or potential impacts. The purpose of this sampling would be to determine if soils within the project footprint are impacted by anthropogenic compounds (pesticides, petroleum compounds, metals, etc), and to determine the proper handling for any excess soils. Similarly, sediment sampling is needed at locations where the work will involve streambed disturbance. The purpose of the sediment sampling would be to determine proper sediment disposal as well as any specific Clean Water Act compliance requirements. It is not recommended to conduct a Phase II investigation for the entire project footprint, nor for the entire footprint of any individual feature.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

10. References

ASTM E-1527, “Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process,” November 2021.

EA Engineering, Science, Technology. 2019. Phase I Environmental Site Assessment Report, Ala Wai Golf Course, 404 Kapahulu Ave, Honolulu, Hawaii 96815.

Hawaii Administrative Rules, available at: https://cca.hawaii.gov/hawaii-administrative-rules/

Hawaii Department of Education, “Soil Assessment Findings, XRF Assessment of Building Perimeter Metals, Various Schools, Oahu, HDOE Job No R61023-18,” August 17, 2021.

Spengler, S.R., M.D. Heskett, and J.I. Gray. 2019. Pesticide levels in streams and sediments on the islands of Oahu and Kauai, Hawaii. International Journal of Environmental Impacts 2(3):283-299. Accessed at: https://www.witpress.com/Secure/ejournals/papers/EI020307f.pdf

U.S. Army Corps of Engineers, ER 1165-2-132, “Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works Projects,” 1992.

U.S. Geological Survey (USGS). 2004. Water Quality on the Island of Oahu, Hawaii, 1999-2001. Circular 1239.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Appendix A Historic Maps

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

EDR Historical Topo Map Report

12/08/22

Site Name:

Ala Wai Canal
Honolulu
Honolulu, HI 96815
EDR Inquiry # 7196419.1

Client Name:

U.S. Army Corps of Engineers
231 South LaSalle Street Suite 1500
Chicago, IL 60604-0000
Contact: Jennifer Miller

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by U.S. Army Corps of Engineers were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# PRAC 423354372
Project: 498213

Coordinates:

Latitude:	21.280916 21° 16' 51" North
Longitude:	-157.821425 -157° 49' 17" West
UTM Zone:	Zone 4 North
UTM X Meters:	622263.65
UTM Y Meters:	2353694.33
Elevation:	3.00' above sea level

Maps Provided:

2017	1954
2013	1953
1998	1928
1983	
1978	
1970	
1969	
1959	

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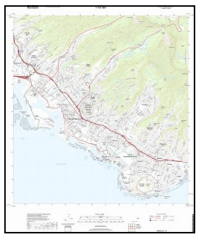
Topo Sheet Key

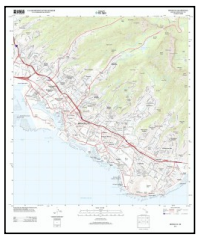
This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2017 Source Sheets



Honolulu
2017
7.5-minute, 24000

2013 Source Sheets



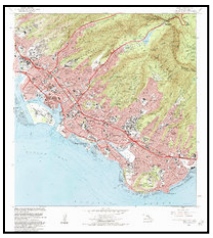
Honolulu
2013
7.5-minute, 24000

1998 Source Sheets

Honolulu
1998
7.5-minute, 24000
Aerial Photo Revised 1998

1983 Source Sheets

Honolulu
1983
7.5-minute, 24000
Aerial Photo Revised 1978



Honolua
1983
7.5-minute, 24000
Aerial Photo Revised 1978

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1978 Source Sheets

Honolulu
1978
7.5-minute, 24000
Aerial Photo Revised 1976

1970 Source Sheets

OAHU
1970
15-minute, 62500

1969 Source Sheets

Honolulu
1969
7.5-minute, 24000
Aerial Photo Revised 1968

1959 Source Sheets

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Aerial Photo Revised 1959

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

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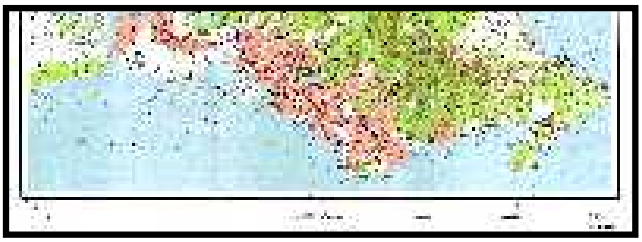


HONOLULUVICINITYSOUTH
1954
7.5-minute, 24000

1953 Source Sheets

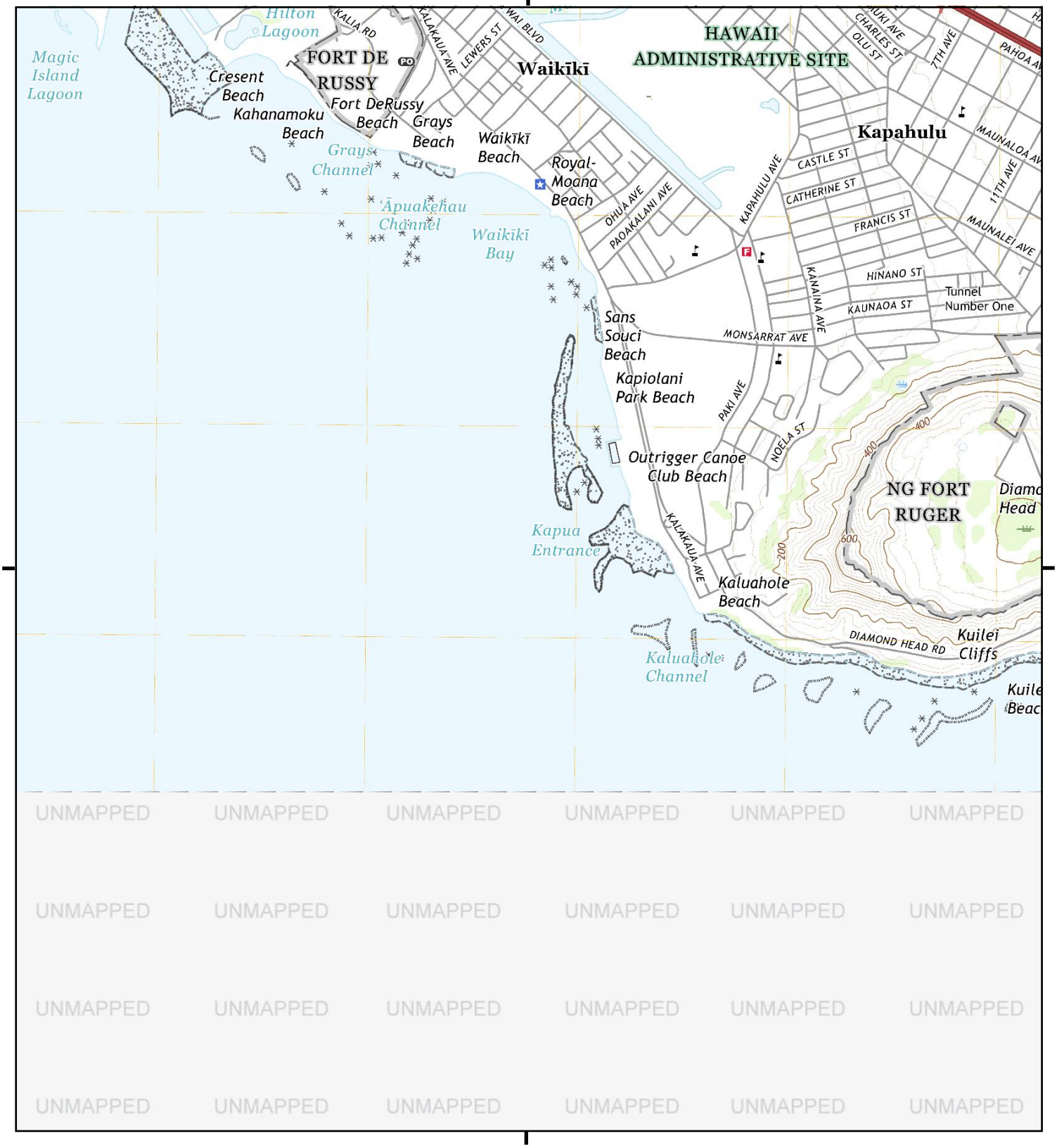
Honolulu
1953
7.5-minute, 24000
Aerial Photo Revised 1952

1928 Source Sheets

HONOLULU
1928
7.5-minute, 20000

Historical Topo Map

2017



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SW S SE

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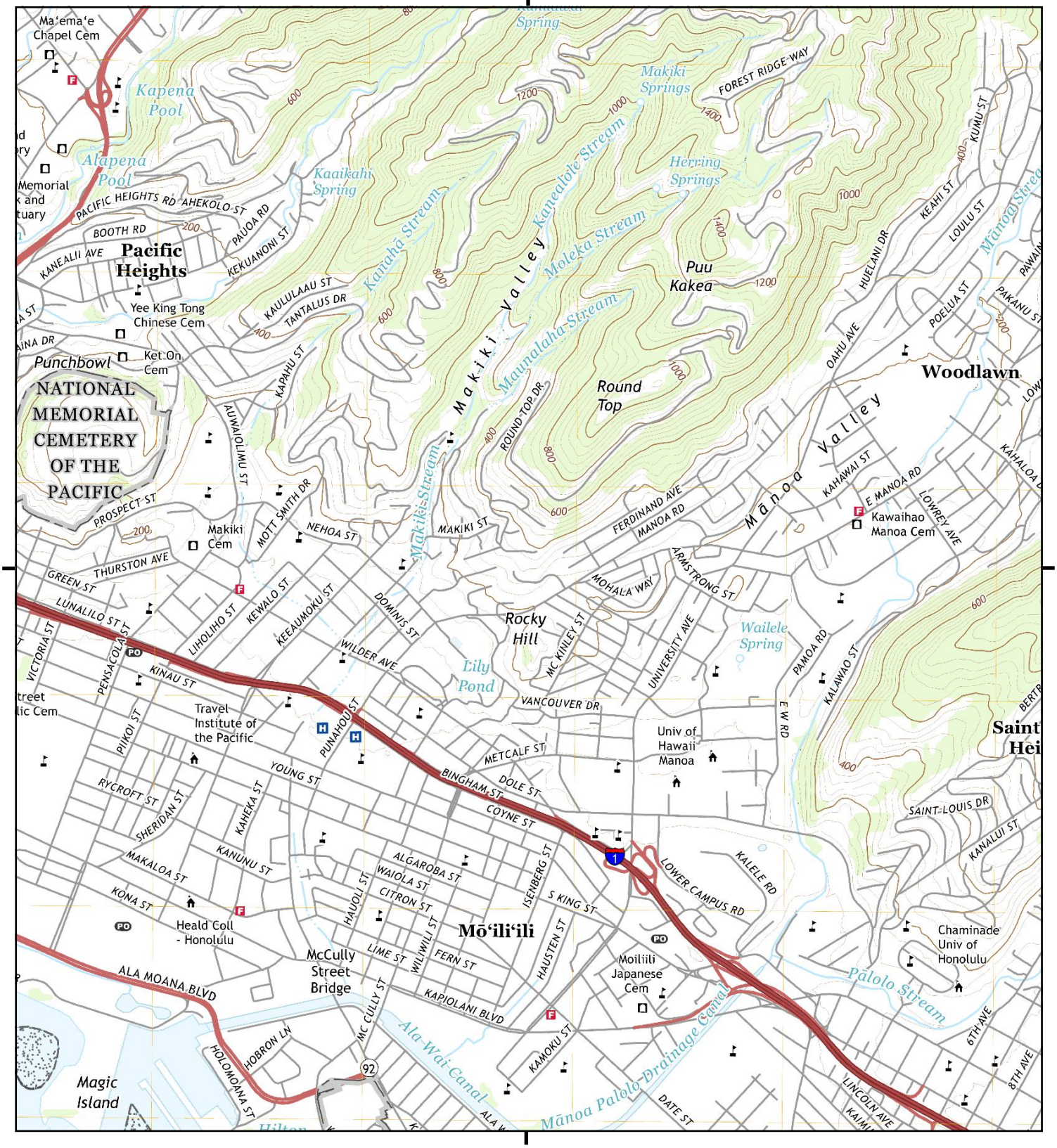
SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N

Historical Topo Map

2017



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ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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Historical Topo Map

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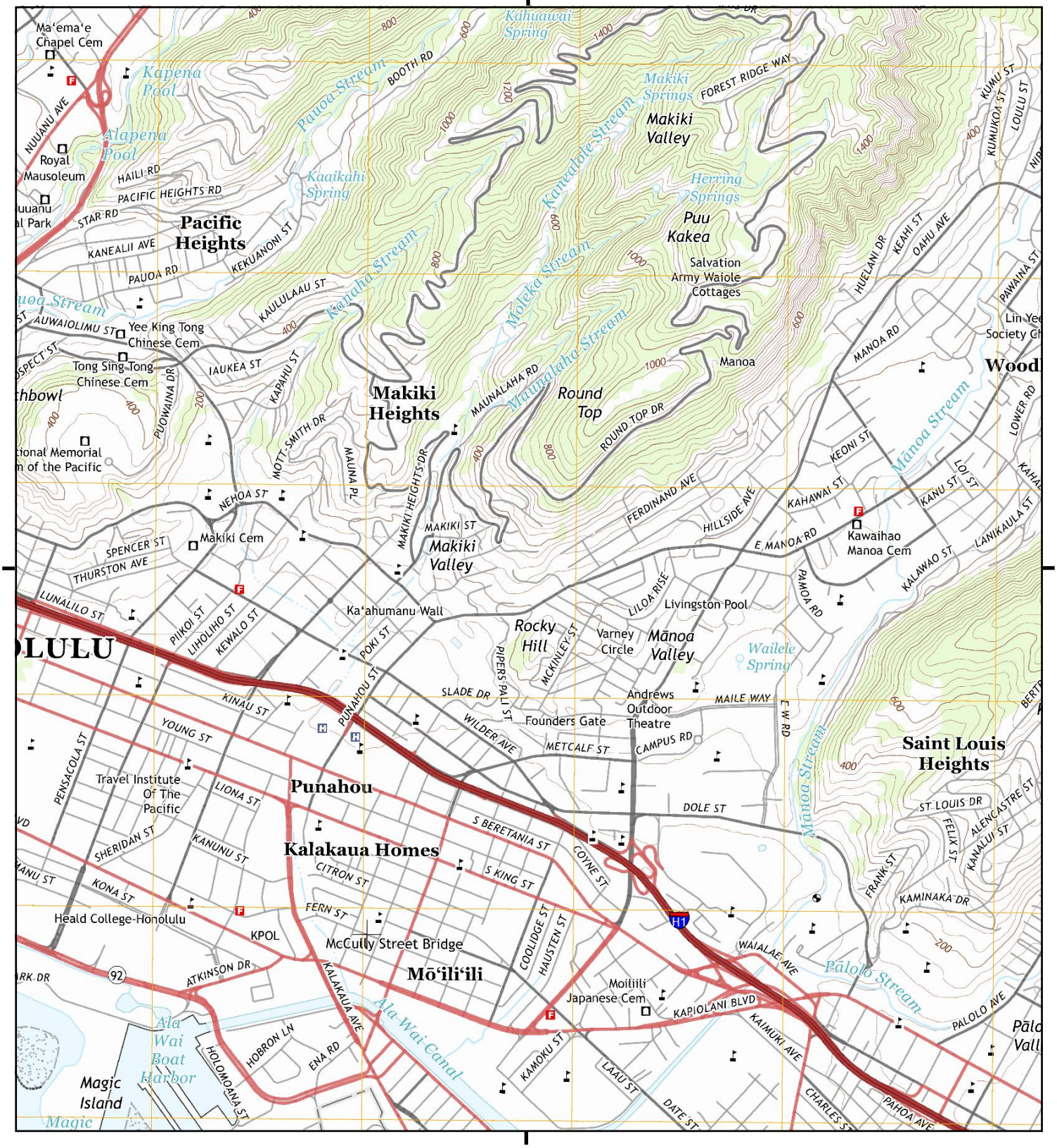

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Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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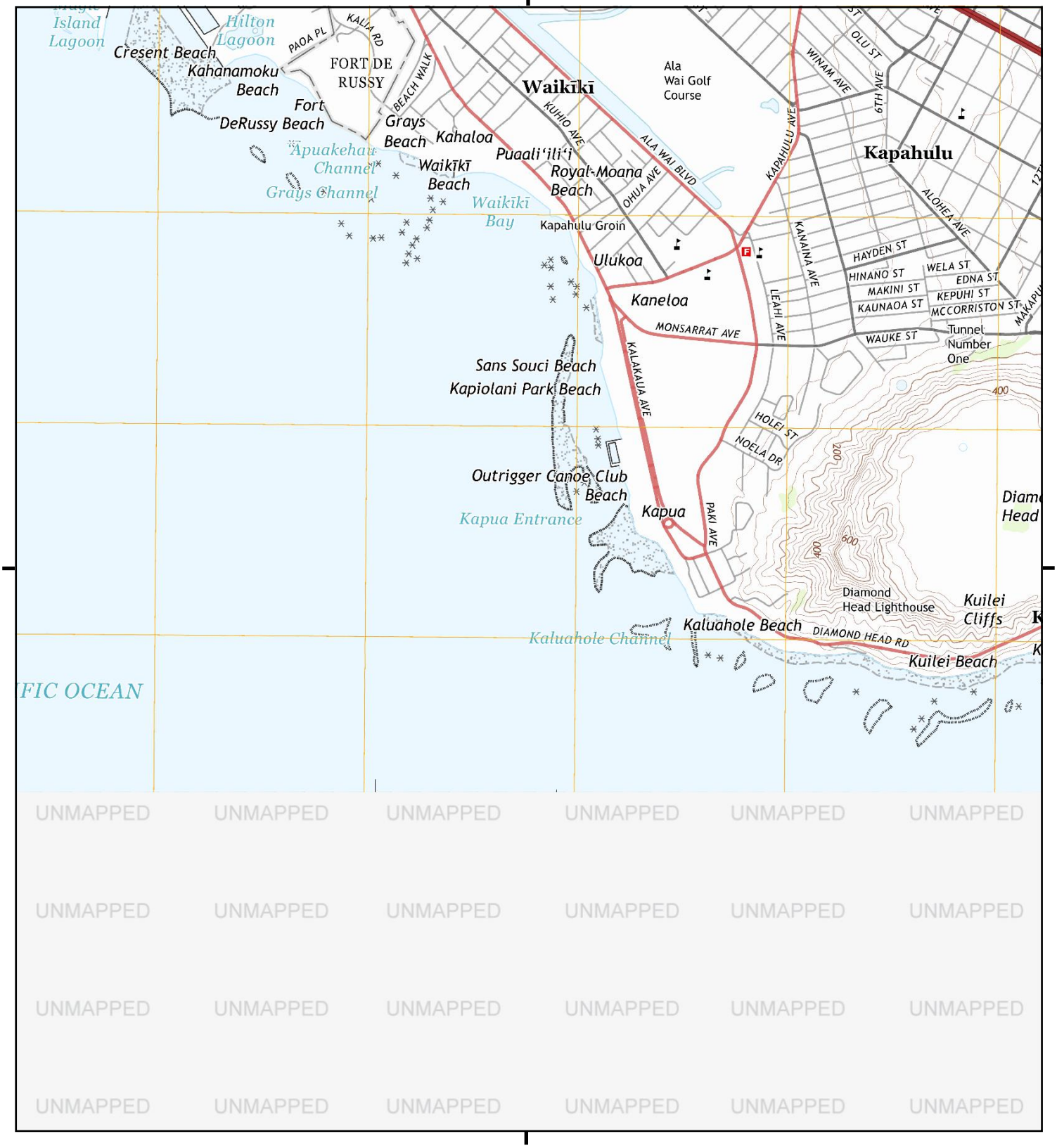

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ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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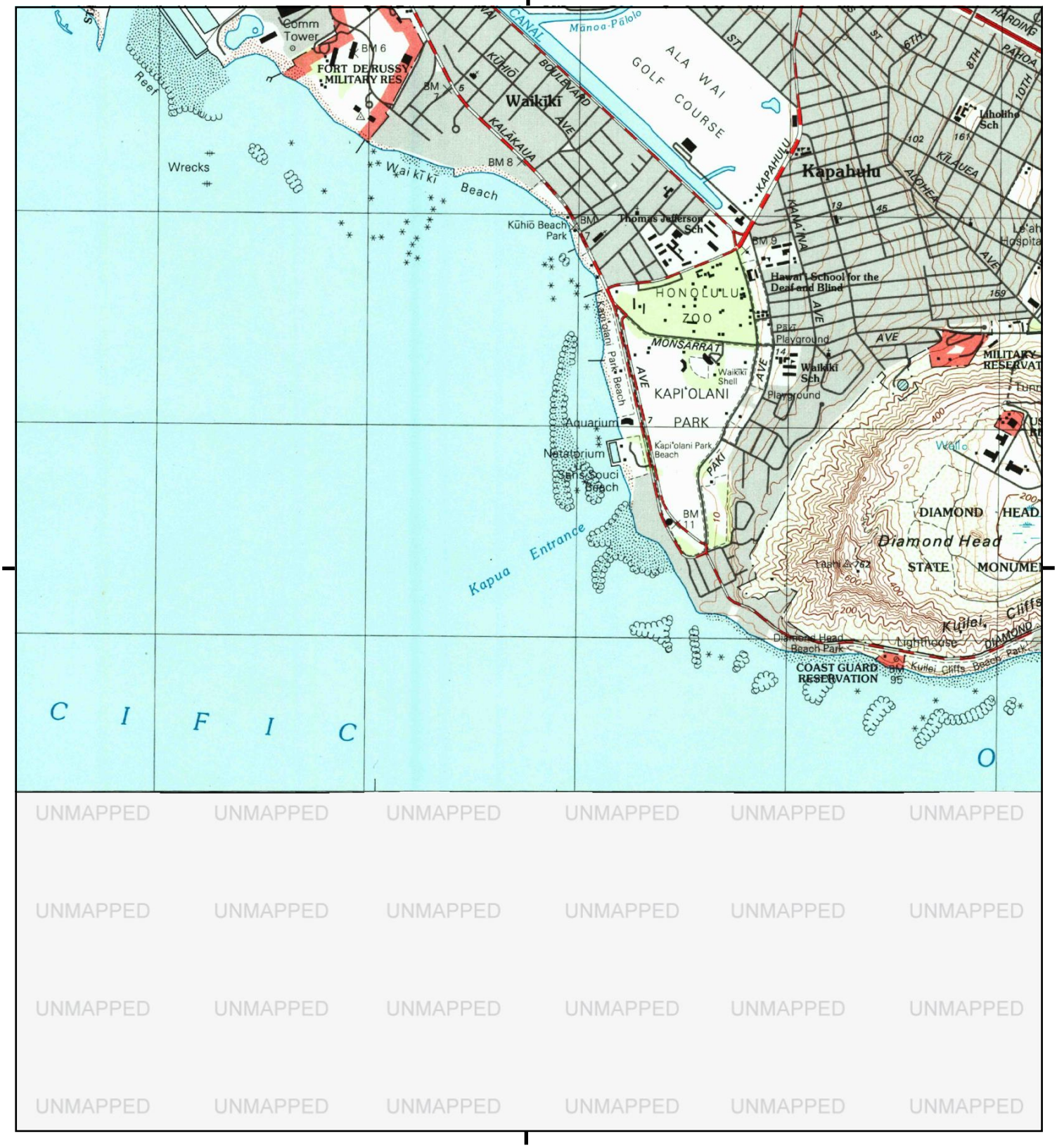

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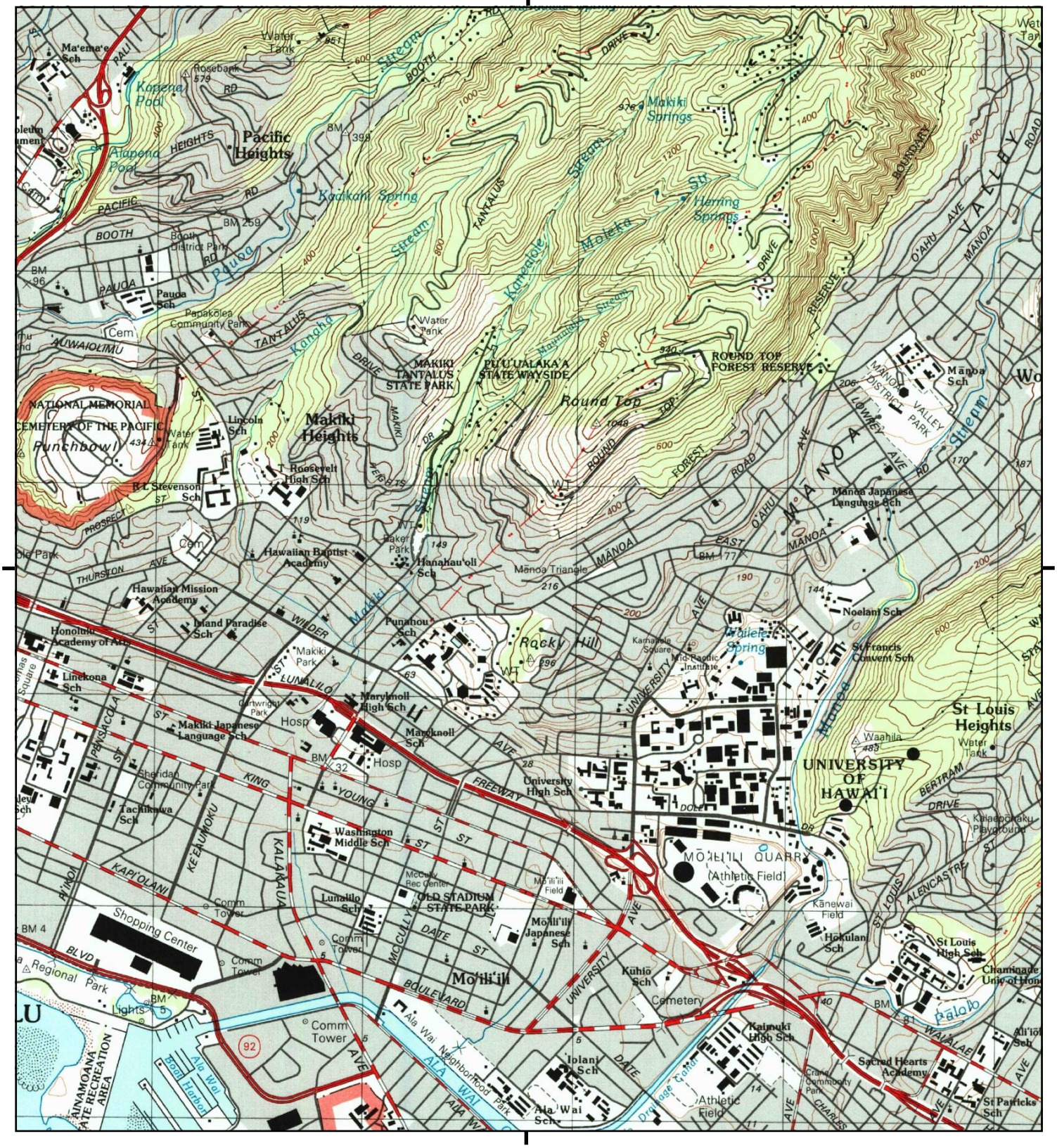
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N

Historical Topo Map

1998


Pacific Heights
Makiki Heights
Punchbowl
Round Top
Makiki Springs
Manoa Trianglo
Rocky Hill
Mo'ili'ili
UNIVERSITY OF HAWAI'I
MO'ILI'ILI QUARRY
(Athletic Field)
St Louis Heights
MANOA VALLEY
Kapena Pool
Alapena Pool
Kaukani Spring
Herring Springs
MAKIKI TANTALUS STATE PARK
PU'U'UALAKA'A STATE WAYSIDE
ROUND TOP FOREST RESERVE
NATIONAL MEMORIAL CEMETERY OF THE PACIFIC
OLD STADIUM STATE PARK
Ala Wai Canal
Ala Wai Boat Harbor
Ala Wai Neighborhood Park
Kaimuki High Sch
Manoa Sch
Noelani Sch
Washington Middle Sch
University High Sch
Lunalilo Sch
Punahou Sch
Iolani Sch
Kuhio Sch
Hokulani Sch
St Louis High Sch
Sacred Hearts Academy
St Patricks Sch
Lincoln Sch
Roosevelt High Sch
R L Stevenson Sch
Hawaiian Baptist Academy
Hawaiian Mission Academy
Island Paradise Sch
Linekona Sch
Makiki Japanese Language Sch
Marylnoll High Sch
Maryknoll Sch
Tachikawa Sch
Pauoa Sch
Hanahau'oli Sch
Manoa Japanese Language Sch
St Francis Convent Sch
Mo'ili'ili Japanese Sch
Pauoa
Kanaha
Makiki
Manoa
Waahila
Kanewai Field
Athletic Field
Cemetery
Shopping Center
Regional Park
Comm Tower
Hosp
Water Tank
Lights
Booth District Park
Papakolea Community Park
Sheridan Community Park
Makiki Park
Kaiaponaku Playground
Crane Community Park
Kamanele Square
Mid-Pacific Institute
Waiakeakua Spring
Waiakeakua Stream
Booth Stream
Makiki Stream
Manoa Stream
Kanealole Stream
Moleka Stream
Pauoa Stream
Rosebank
Ma'ema'e Sch
Booth
Pauoa
Tantalus
Round Top
Forest Road
Round Top Drive
Wilder
King
Young
Lunalilo
Punahou
Beretania
Thurston
Prospect
Pensacola
Keeaumoku
Kapiolani
Kalakaua
McCully
Date
Isenberg
Bertram
Alencastre
Waialae
Manoa
Lowrey
Valley Park
Freeway
Boulevard
Ala Wai
Dole
Metcalf
Charles
Paloko
Ali'iolani Sch
St Louis Heights
Chaminade Univ of Hon
Kalaepohaku Playground
Mo'ili'ili Field
McCully Rec Center
Drainage Canal
Ala Wai Neighborhood Park
Ala Wai Sch
Iolani Sch
Athletic Field
Cemetery
Kaimuki High Sch
Sacred Hearts Academy
St Patricks Sch
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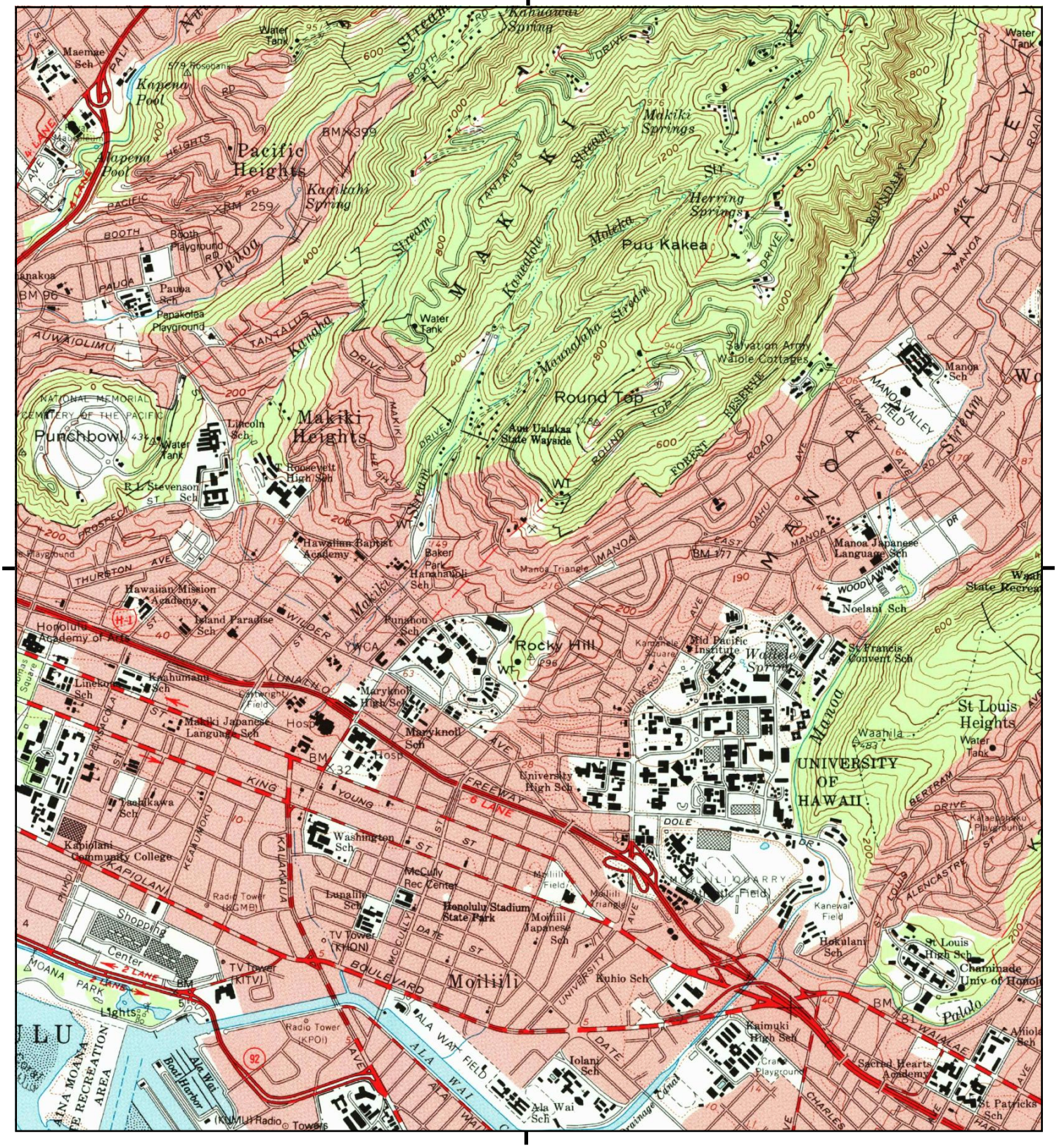

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SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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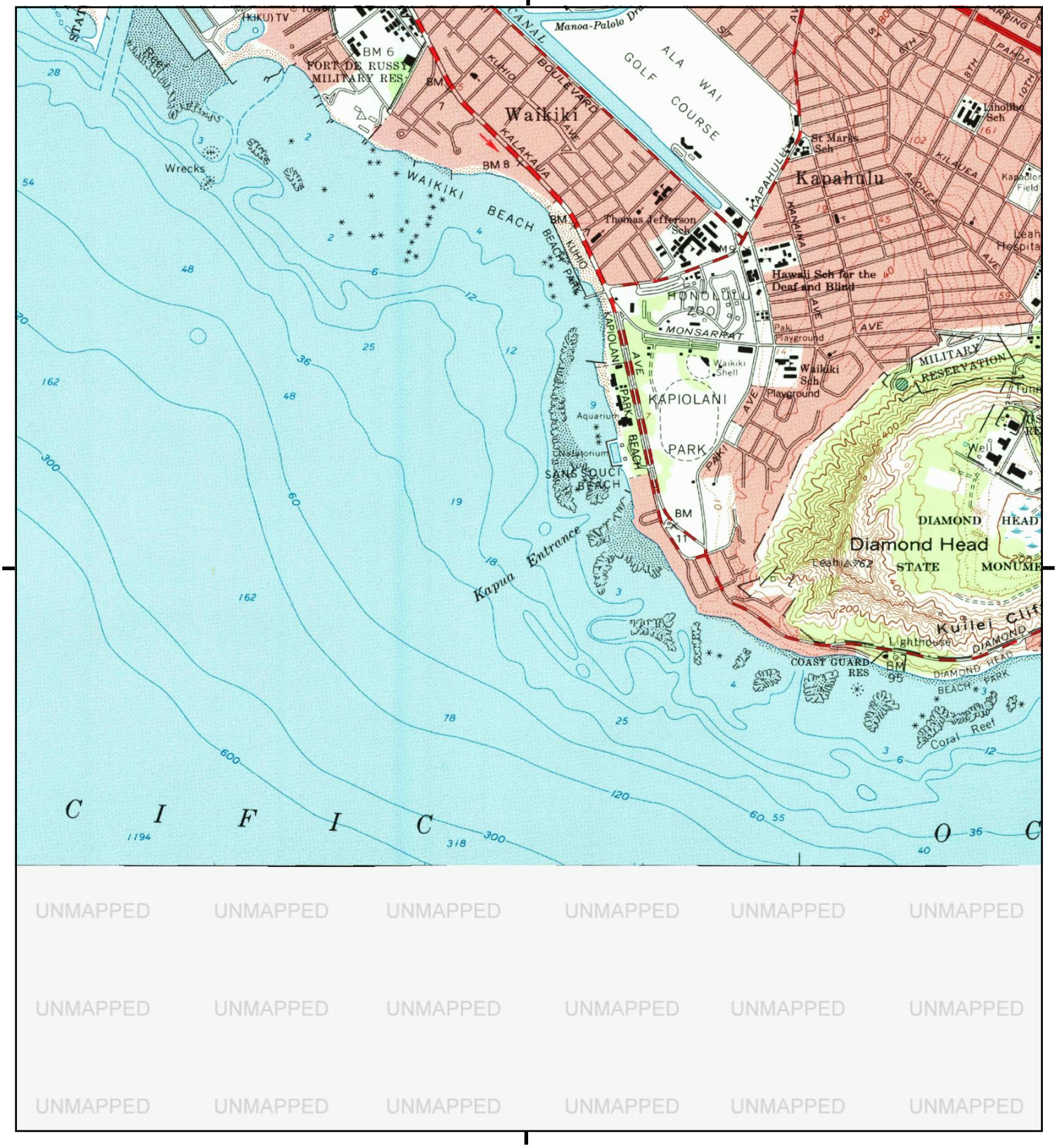

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E, Honolua, 1983, 7.5-minute

SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N

Historical Topo Map

1978

This report includes information from the following map sheet(s).

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SW S SE

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ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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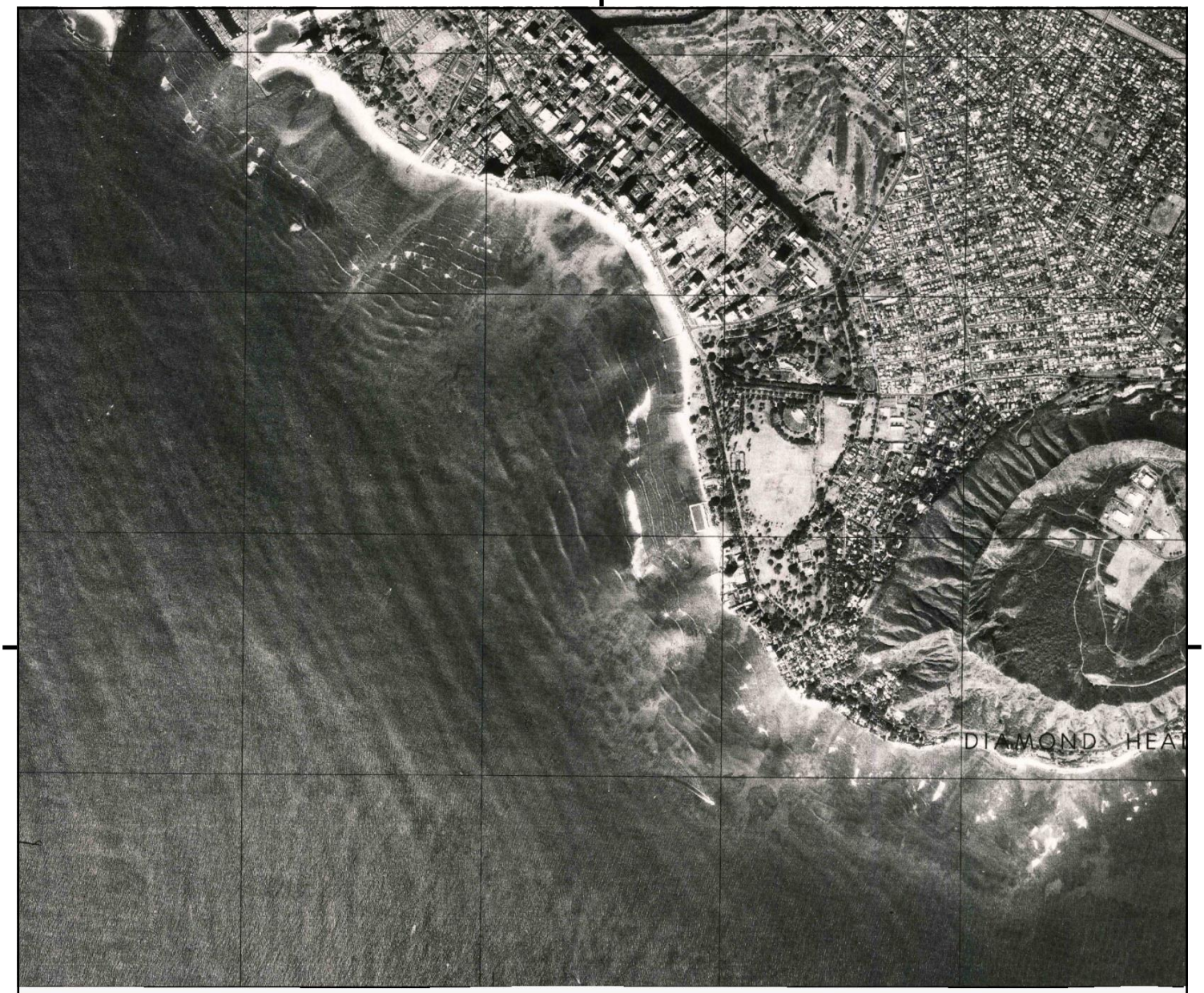

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TP, Honolulu, 1978, 7.5-minute

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ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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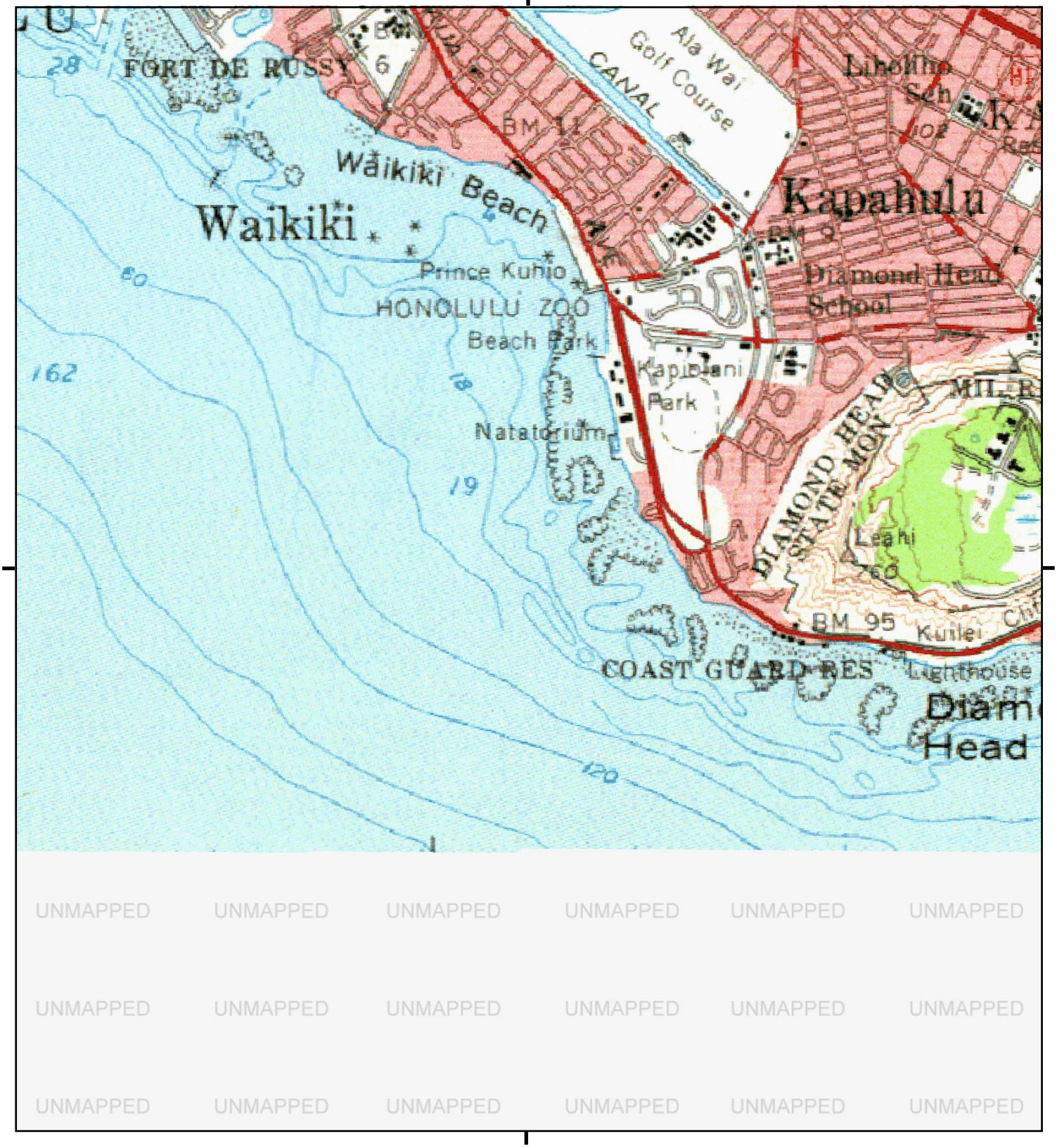

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0 Miles 0.25 0.5 1 1.5

NW N NE
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SW S SE

TP, OAHU, 1970, 15-minute

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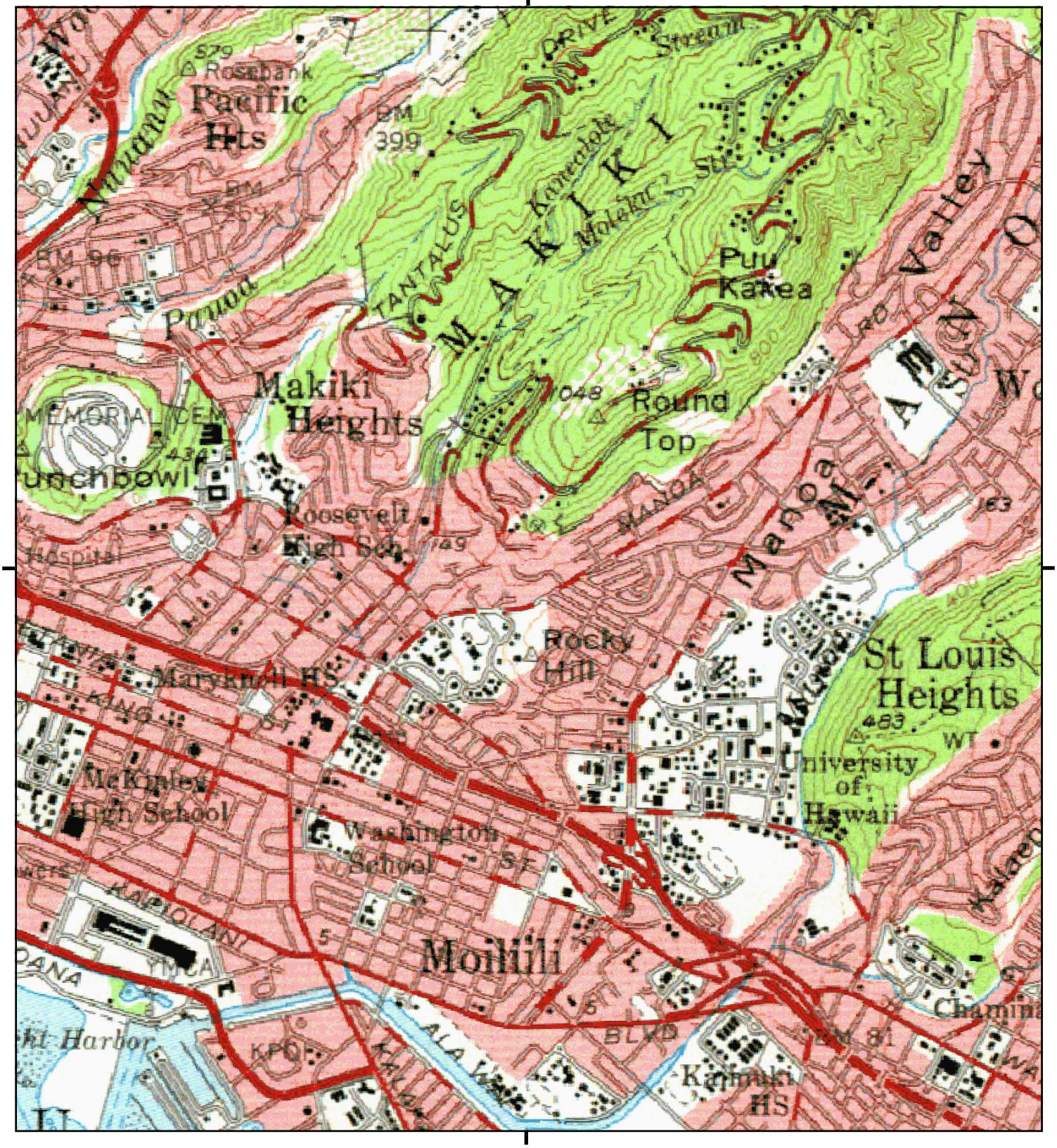
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N



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SW S SE

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ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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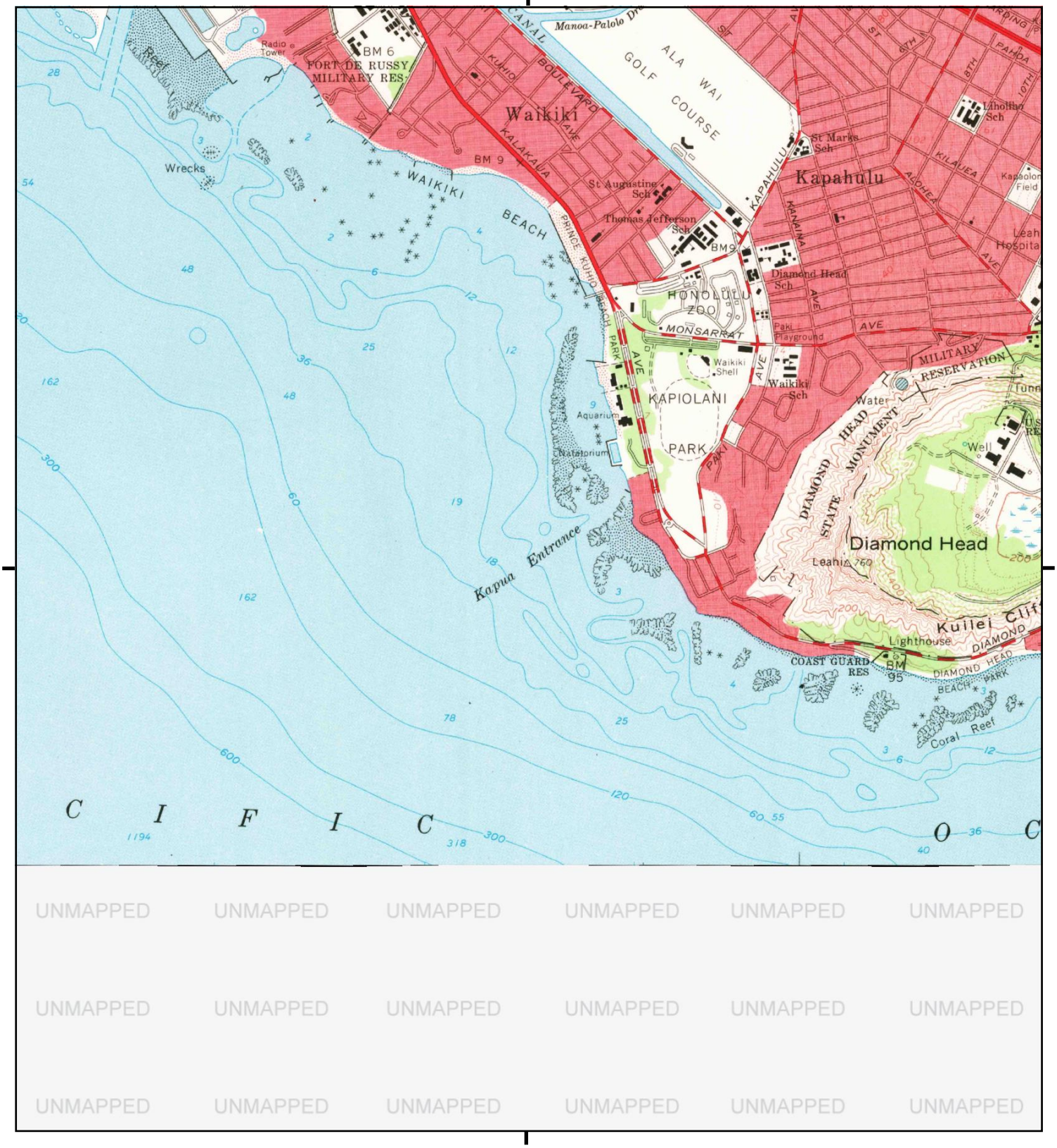

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0 Miles 0.25 0.5 1 1.5

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W E
SW S SE

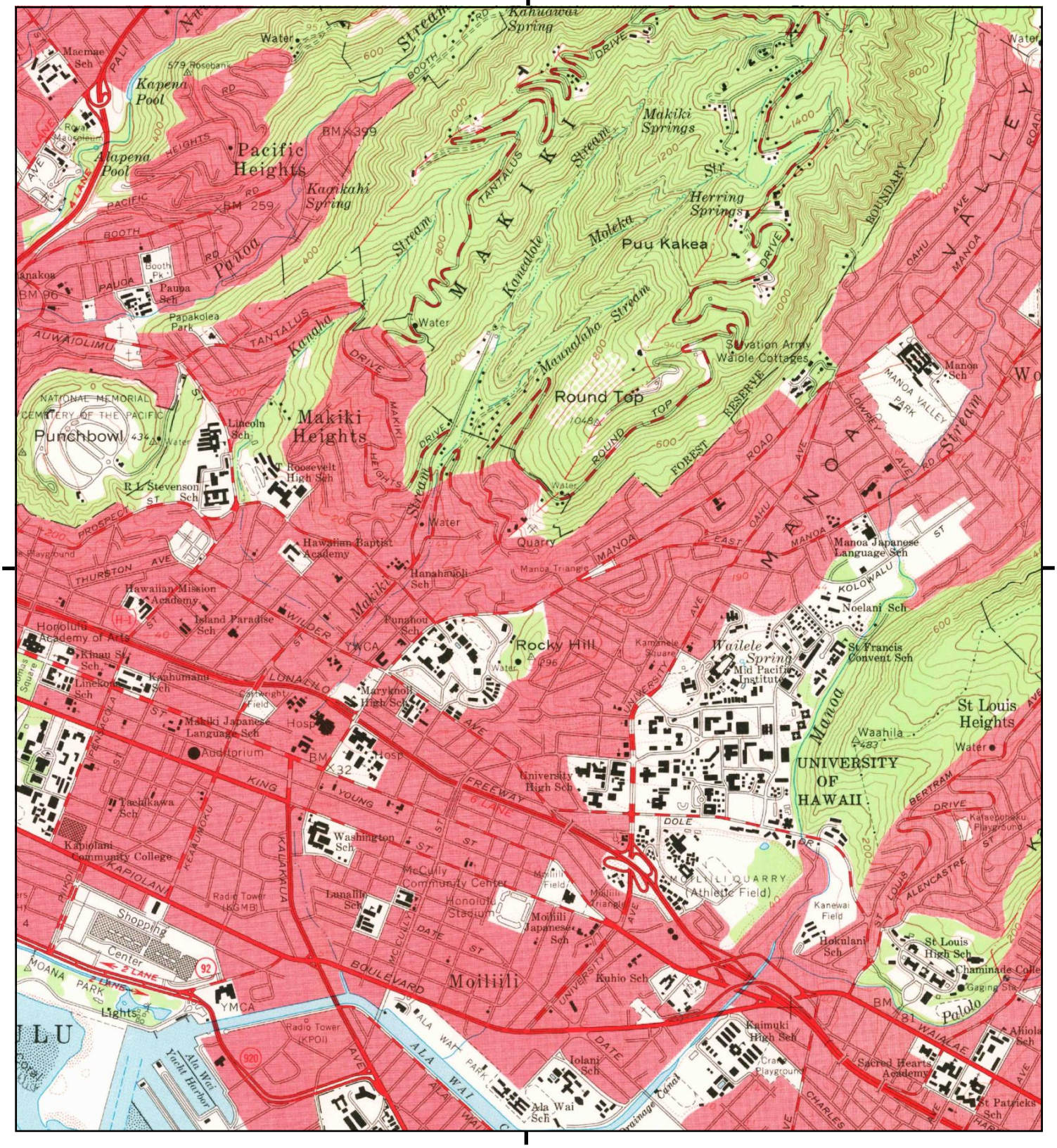
TP, Honolulu, 1969, 7.5-minute

SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N

Historical Topo Map

1969



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ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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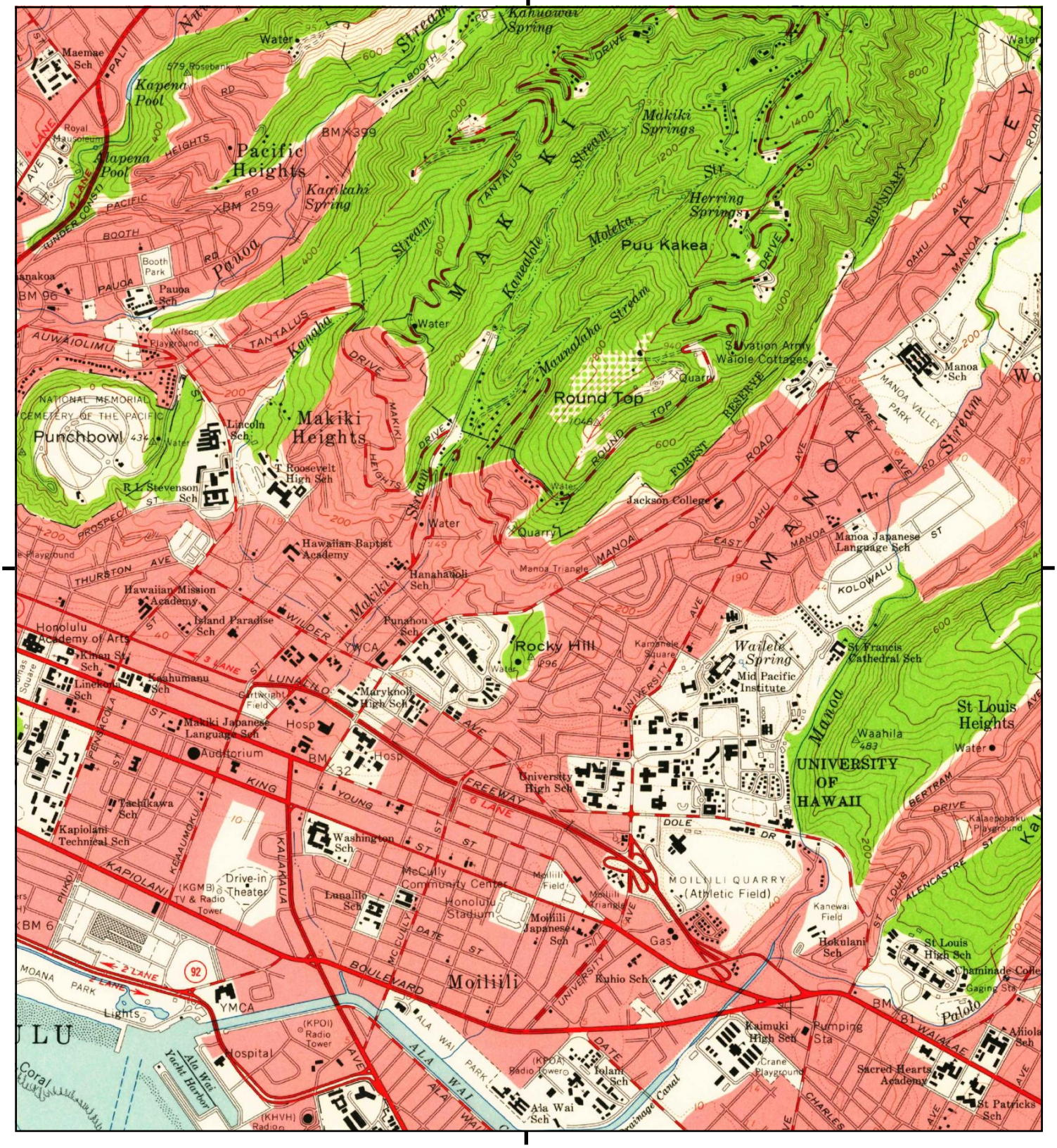

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ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

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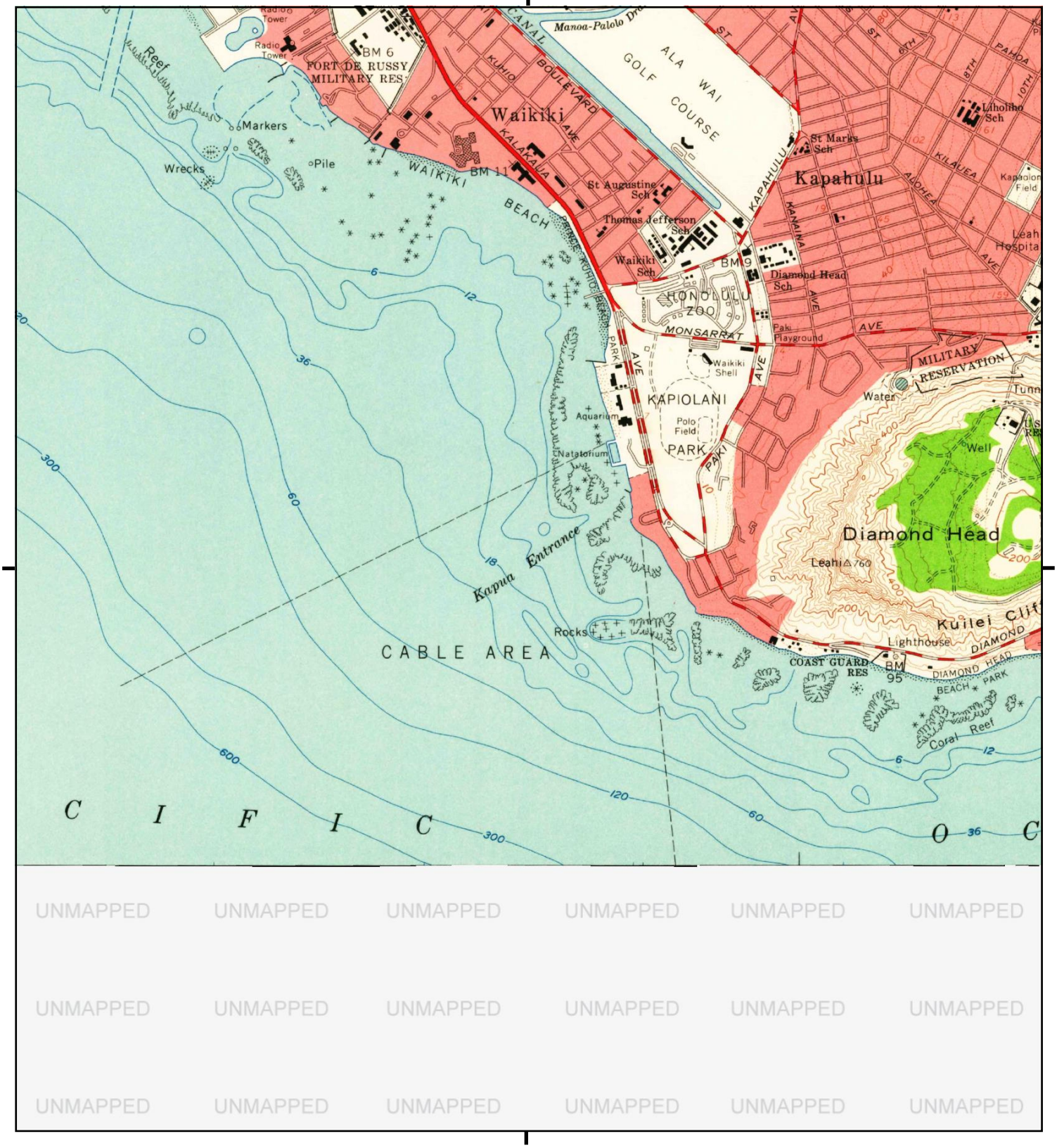

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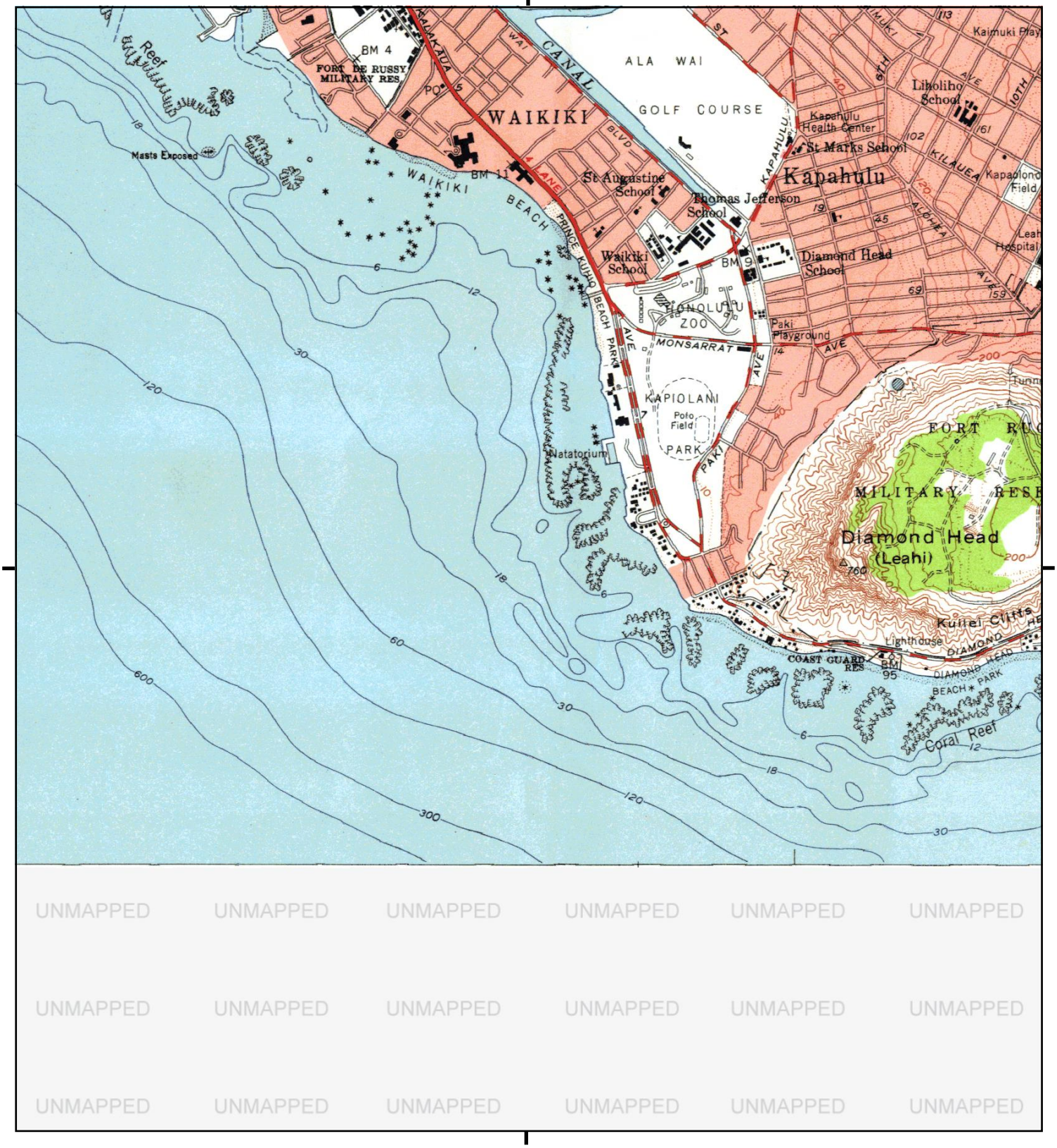
NW N NE
W E
SW S SE

TP, Honolulu, 1959, 7.5-minute

SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N



This report includes information from the following map sheet(s).

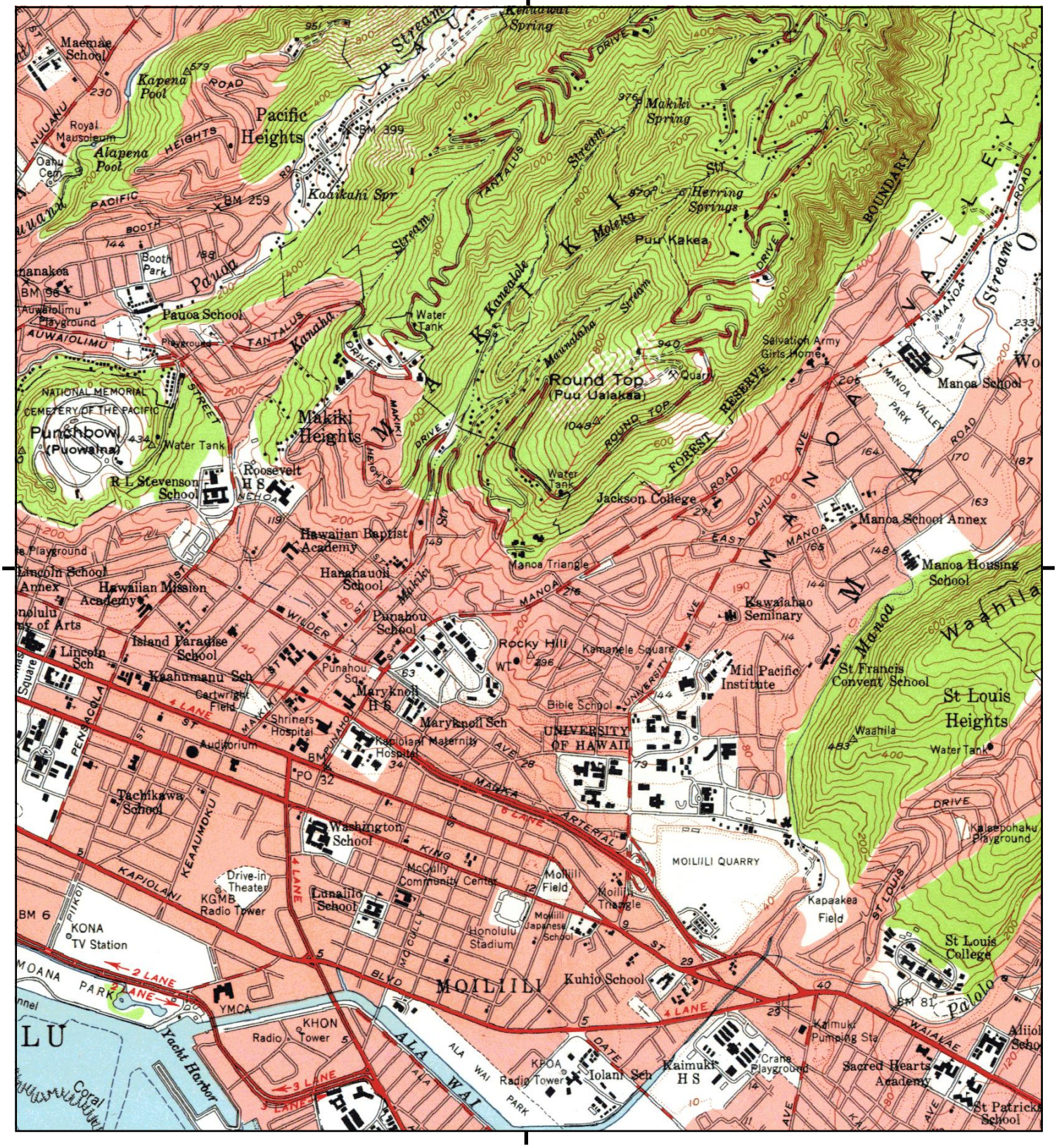
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, HONOLULUVICINITYSOUTH, 1954, 7.5-minute

SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N



This report includes information from the following map sheet(s).

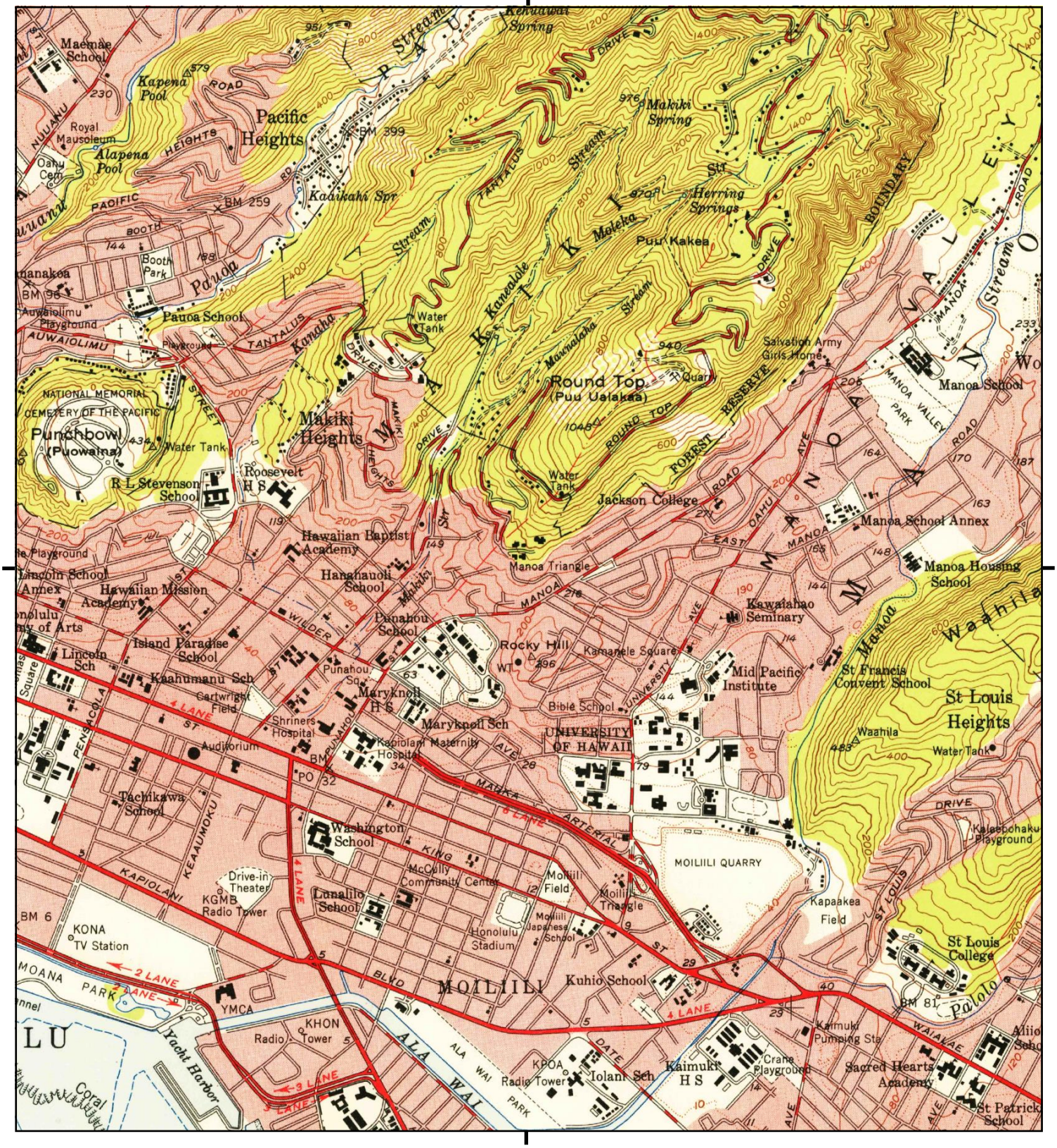
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

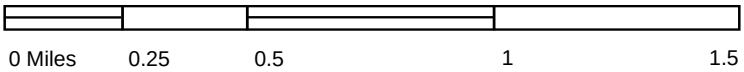
TP, HONOLULUVICINITYSOUTH, 1954, 7.5-minute

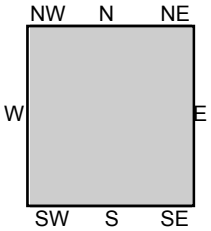
SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N



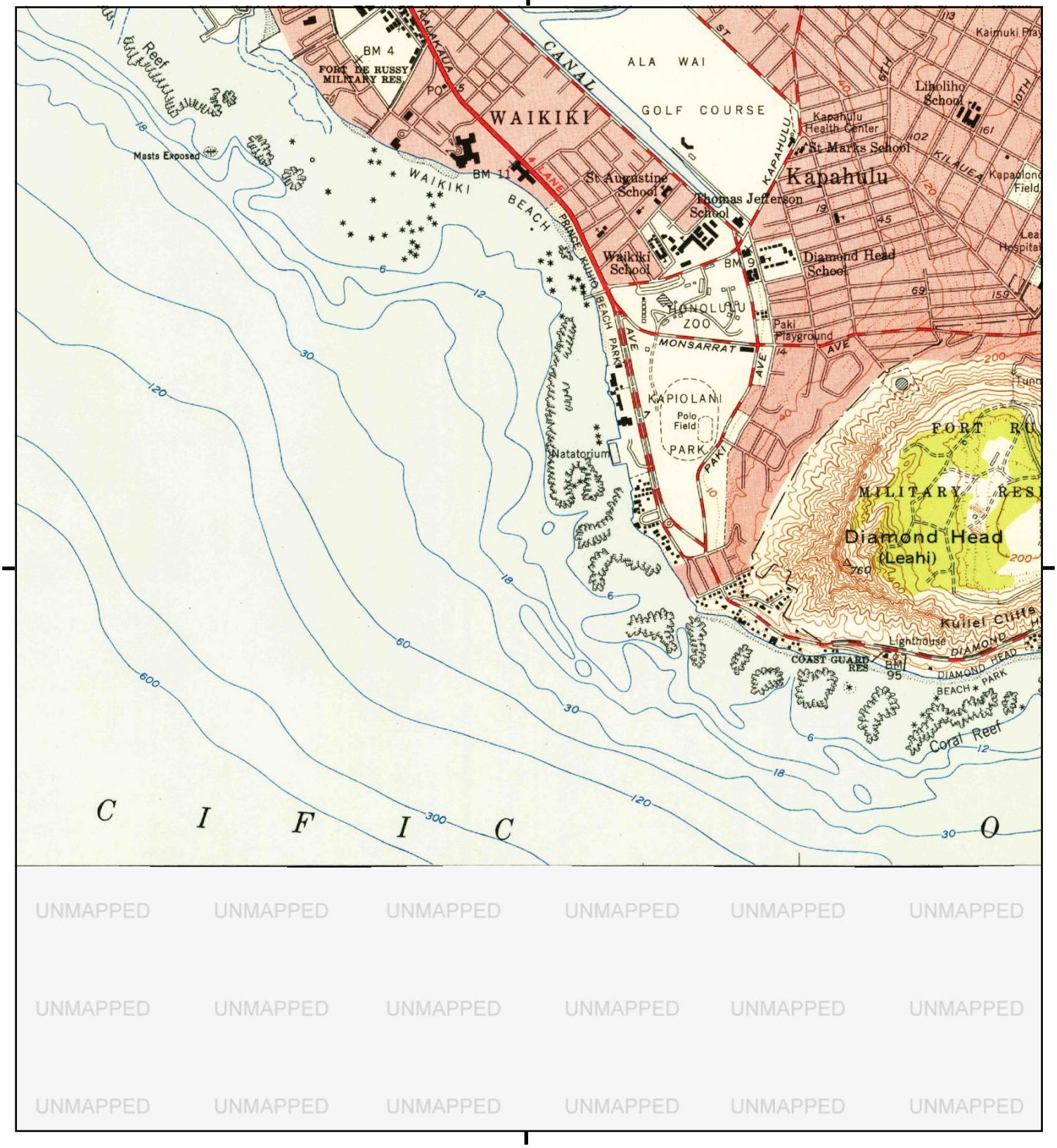
This report includes information from the following map sheet(s).





TP, Honolulu, 1953, 7.5-minute

SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers



This report includes information from the following map sheet(s).

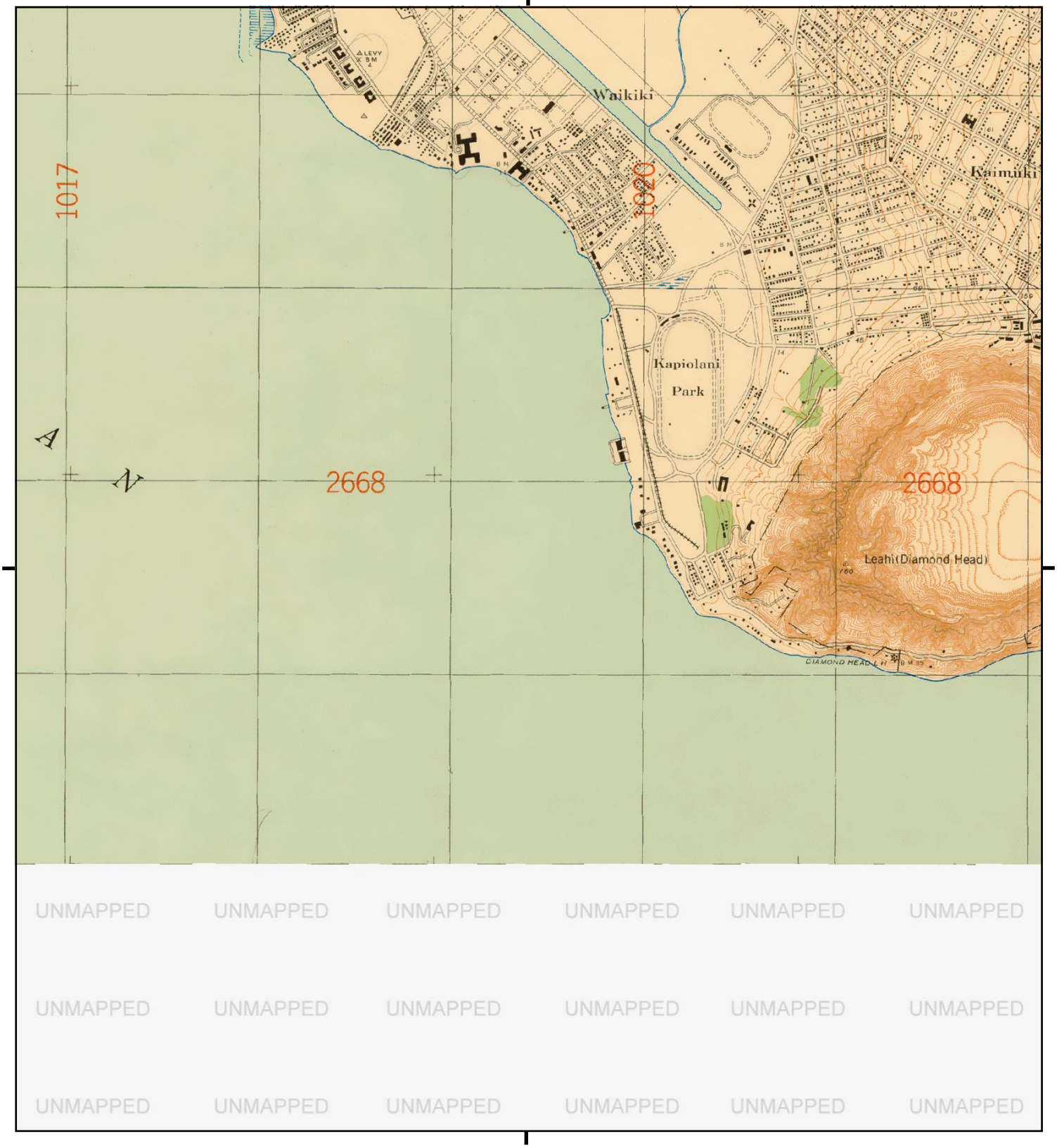
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Honolulu, 1953, 7.5-minute

SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N



This report includes information from the following map sheet(s).

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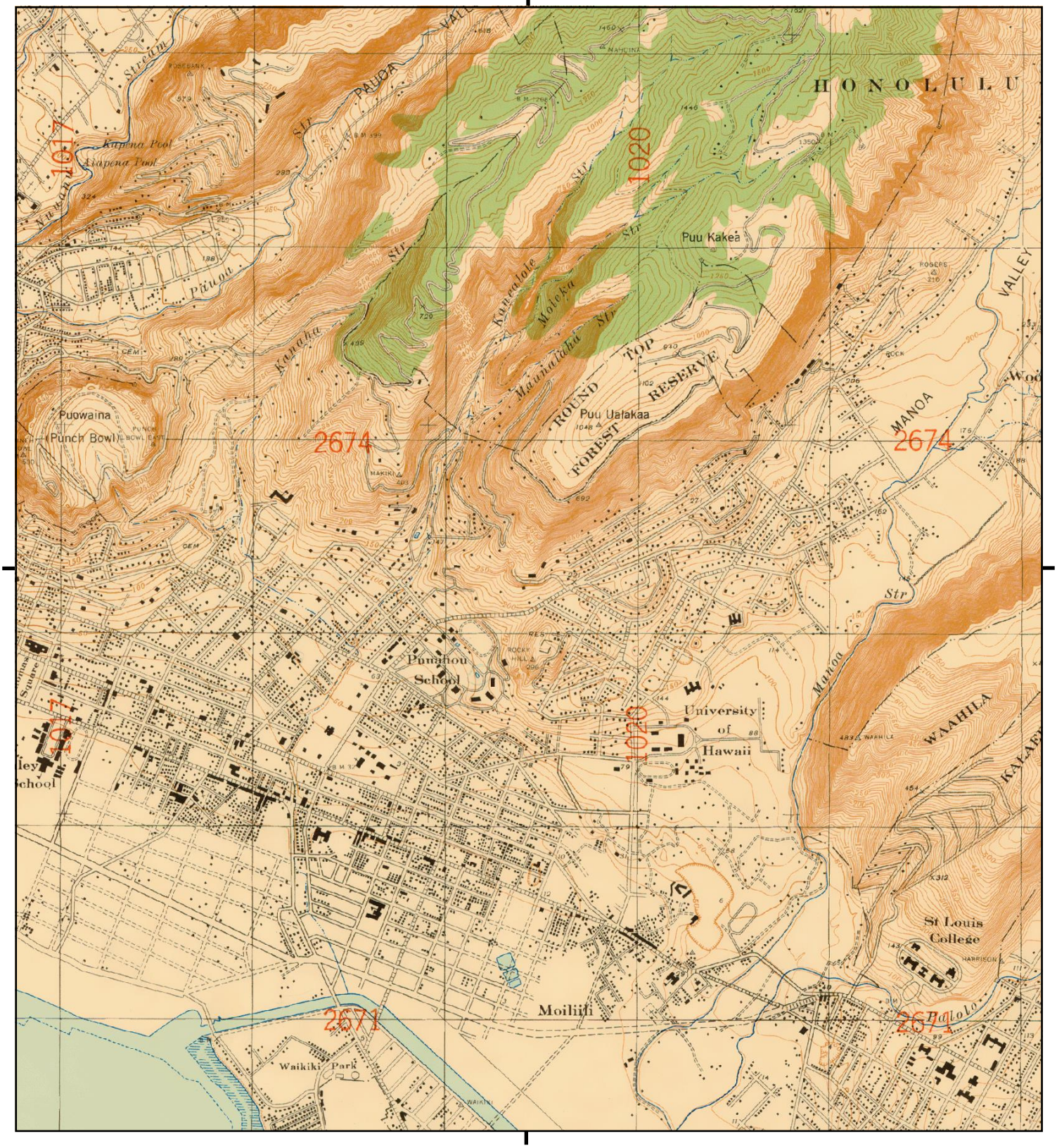
NW N NE
W E
SW S SE

TP, HONOLULU, 1928, 7.5-minute

SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, HONOLULU, 1928, 7.5-minute

SITE NAME: Ala Wai Canal
ADDRESS: Honolulu
Honolulu, HI 96815
CLIENT: U.S. Army Corps of Engineers

N

Appendix B Historic Aerial Photos

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Ala Wai Canal

Honolulu

Honolulu, HI 96815

Inquiry Number: 7196419.2

December 08, 2022

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Date EDR Searched Historical Sources:

Aerial Photography December 08, 2022

Target Property:

Honolulu

Honolulu, HI 96815

Year	***Scale***	***Details***	***Source***
1951	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1951	USGS
1959	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1959	USGS
1968	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1968	USGS
1974	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1974	USGS
1975	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1975	USGS
1978	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1978	USGS
1985	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1985	USGS
1992	Aerial Photograph. Scale: 1"=1000'	Flight Year: 1992	USGS
2006	Aerial Photograph. Scale: 1"=1000'	Flight Year: 2006	USGS
2011	Aerial Photograph. Scale: 1"=1000'	Flight Year: 2011	USDA
2015	Aerial Photograph. Scale: 1"=1000'	Flight Year: 2015	USDA
2017	Aerial Photograph. Scale: 1"=1000'	Flight Year: 2017	USDA

1
2
3
Makiki Heights
Woodlawn
St Louis Heights
Waikiki
Kapahulu
Kaimuki
Kaalawai
Wilhelmina Rise
Ala Moana Center
Ala Wai Boat Harbor
Mamala Bay
Lunalilo Fwy
Kapiolani Blvd
Ala Moana Blvd
Atkinson Dr
Maunalaha Rd
Round Top Dr
Wilder Ave
Beretania St
Dole St
Makiki District Park
Manoa Valley District Park
Puu Ualakaa State Park
Ala Wai Golf Course
Ala Wai Community Park
Kanewai Community Park
Old Stadium Park
Moiliili Park
Waahila Ridge State Recreation Area
Fort DeRussy Military Reservation
Royal Hawaiian Center
Waikiki Beach
Honolulu Zoo
Kapiolani Park
Kapiolani Community College
Diamond Head State Monument
Diamond Head Memorial Park
Fort Ruger Park
Manoa Chinese Cemetery
University of Hawai'i at Mānoa
Papakolea Hawaiian Home Land
Kewalo Hawaiian Home Land
Kalawahine Hawaiian Home Land
Baker Park
Ala Wai Canal
Manoa Stream
Makiki Stream
Palolo Stream
Punahou St
University Ave
Pali Hwy
Kalakaua Ave
Kalanianaole Hwy
Date St
Lime St
Young St
Philip St
Kanunu St
Makaloa St
Kona St
Ala Wai Blvd
Kuhio Ave
Kalaimoku St
Kaiolu St
Lewers St
Kalakaua Ave
Kalia Rd
Beach Walk
Saratoga Rd
Rainbow Dr
Paoa Pl
Maluhia Rd
Hobron Ln
Kaioo Dr
Ena Rd
Pau St
Kuamoo St
Olohana St
Launiu St
Lauula St
Royal Hawaiian Ave
Walina St
Kaiulani Ave
Koa Ave
Liliuokalani Ave
Ohua Ave
Lemon Rd
Kapahulu Ave
Kaina St
Hinano St
Makini St
Kaunaoa St
Wauke St
Monsarrat Ave
Diamond Head Cir
Kanaina Ave
Paki Ave
Hoteli St
Noela St
Gail St
La Pi'i Pl
Noela Pl
Kaiele Ave
Makaala Pl
Poka Pl
Poka St
Kulamanu St
Kaualani Dr
Pahau Pl
Iwalani Pl
Kilauea Ave
Maunaloa Ave
Pokole St
Makapuu Ave
Sierra Dr
Koko Head Ave
Wilhelmina Rise
Mahina Ave
Harding Ave
Waialae Ave
Palolo Ave
Pukele Ave
Hardesty St
Maluhia Pl
Mokuhia Pl
Paaiea St
Kaau St
Keanu St
Pehu St
Paui St
Ua Dr
Kaluaa Rd
Loke Pl
Madeira St
Kaminaka Dr
Kanaloa St
Alencastre St
Gulston St
Felix St
St Louis Dr
Frank St
Robert Pl
Kalaepohaku St
Kanewai St
Kamakini St
Kalele Rd
Kaimuki Ave
Kilihi Pl
Kaiolu St
Kamoku St
Lauki St
Mahiai St
Laau St
Kaaha St
Olokele Ave
Lukepane Ave
Ekela Ave
Makaleka Ave
Palani Ave
Paluli St
Mokihana St
Olu St
Charles St
Beise St
Lincoln Ave
6th Ave
7th Ave
8th Ave
9th Ave
10th Ave
11th Ave
12th Ave
13th Ave
14th Ave
15th Ave
16th Ave
17th Ave
18th Ave
Sunset Ave
Crater Rd
Ocean View Dr
Mooheau Ave
Hoolulu St
Martha St
Herbert St
Castle St
Niman Ave
Brokaw St
Catherine St
Campbell Ave
Esther St
Francis St
George St
Hayden St
James St
Wela St
Edna St
Kepuni St
McCorriston St
Trousseau St
Aloha Ave
Upper St
Kaiulani Ave
Lemon Rd
Kuhio Ave
Kalakaua Ave
Koa Ave
Liliuokalani Ave
Ohua Ave

INQUIRY #: 7196419.2
YEAR: 1951
SCALE: 1'"=1000'

INQUIRY #: 7196419.2
YEAR: 1951
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1951
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1959
SCALE: 1" =1000'

INQUIRY #: 7196419.2
YEAR: 1959
SCALE: 1"=1000'

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YEAR: 1959
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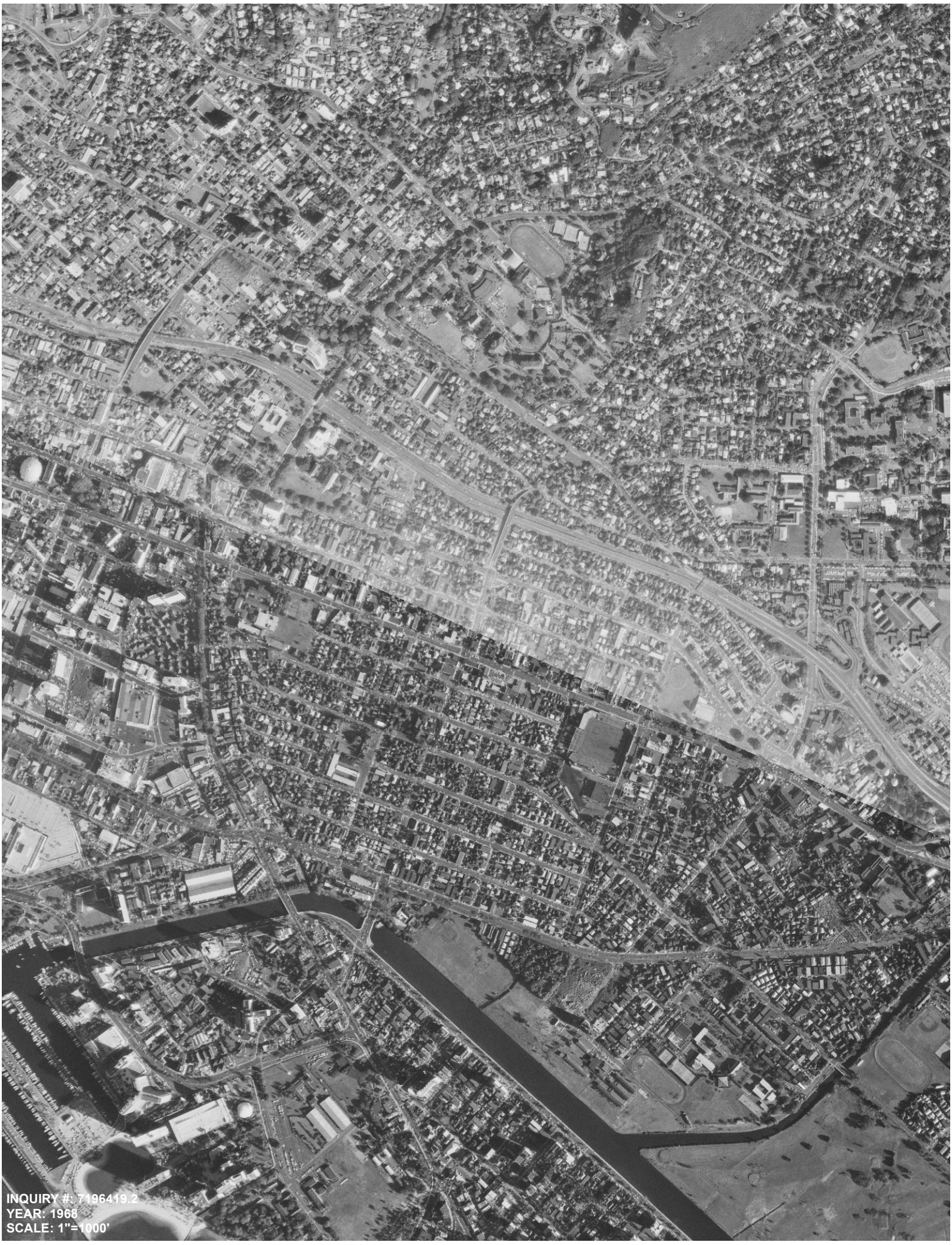

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YEAR: 1968
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INQUIRY #: 7196419.2
YEAR: 1968
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1974
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1974
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1974
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1975
SCALE: 1" =1000'

INQUIRY #: 7196419.2
YEAR: 1975
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1975
SCALE: 1"=1000'

INQUIRY #: 19641
YEAR: 1978
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1978
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1978
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1985
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1985
SCALE: 1"=1000'

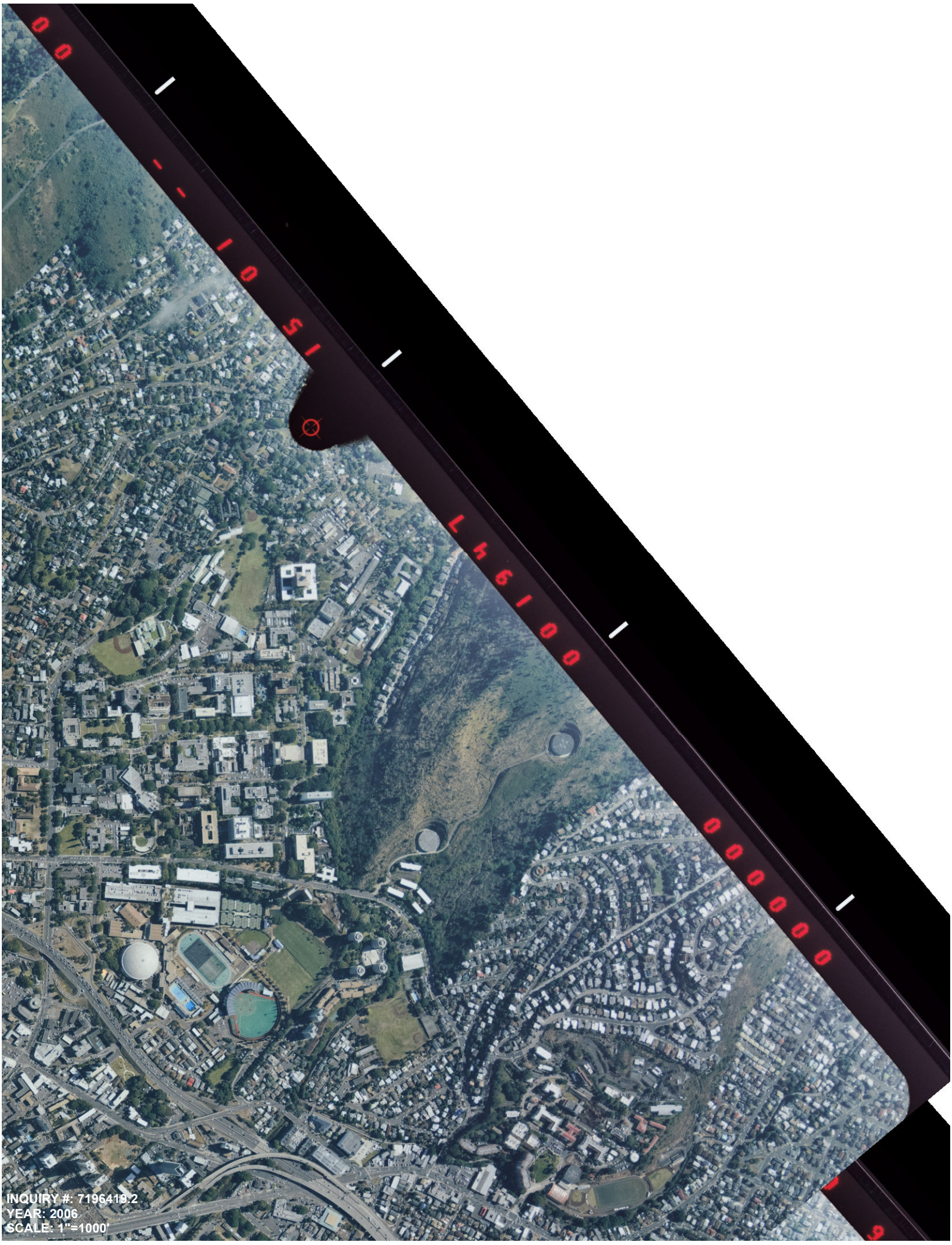
INQUIRY #: 7196419.2
YEAR: 1985
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1992
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1992
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 1992
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2006
SCALE: 1"=1000'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YEAR: 2006
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2006
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2011
SCALE: 1" =1000'

INQUIRY #: 7196419.2
YEAR: 2014
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2011
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2015
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2015
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2015
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2017
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2017
SCALE: 1"=1000'

INQUIRY #: 7196419.2
YEAR: 2017
SCALE: 1"=1000'

Appendix C Database Summary

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Ala Wai Canal
Honolulu
Honolulu, HI 96815

Inquiry Number: 7196419.5s
December 07, 2022

EDR Area / Corridor Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Key Map	14
Map Findings Summary	15
Focus Maps	19
Map Findings	53
Orphan Summary	OR-1
Government Records Searched/Data Currency Tracking	GR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E1527-21), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

SUBJECT PROPERTY INFORMATION

ADDRESS

HONOLULU
HONOLULU, HI 96815

TARGET PROPERTY SEARCH RESULTS

The Target Property was identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal RCRA generators

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

A review of the RCRA-VSQG list, as provided by EDR, and dated 11/21/2022 has revealed that there are 3 RCRA-VSQG sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
LONGS DRUG STORE #98 EPA ID:: HID984468207	***2750 WOODLAWN DR***	***A29 / 6***	***85***
MAGOON AGRICULTURAL EPA ID:: HIR000051755	***2717 WOODLAWN DR***	***A35 / 5***	***104***
KAPIOLANI REGIONAL P EPA ID:: HID981639917	***3447 LEAHI AVENUE***	***L78 / 8***	***145***

Federal ERNS list

ERNS: Emergency Response Notification System

A review of the ERNS list, as provided by EDR, and dated 06/14/2022 has revealed that there are 2 ERNS sites within the requested target property.

EXECUTIVE SUMMARY

Site	Address	Map ID / Focus Map(s)	Page
Not reported NRC Report #: 1331532 Incident Date Time: 3/20/2022 9:15	KANEKAPOLEI ST AND A	K67 / 8	136
Not reported NRC Report #: 1180719 Incident Date Time: 2017-06-09 09:00:00	ALA WAI BLVD. AND WA	72 / 8	138

Lists of state- and tribal hazardous waste facilities

HI SHWS: Sites List

A review of the HI SHWS list, as provided by EDR, and dated 02/22/2022 has revealed that there is 1 HI SHWS site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
HAWAII SCHOOL FOR TH	3440 LEAHI AVE	M81 / 8	149

Lists of state and tribal leaking storage tanks

HI LUST: Leaking Underground Storage Tank Database

A review of the HI LUST list, as provided by EDR, and dated 08/02/2022 has revealed that there is 1 HI LUST site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
KAPIOLANI REGIONAL P Facility Status: Site Cleanup Completed (NFA) Release ID: 980040 Facility Id: 9-103322	***3447 LEAHI AVE***	***L77 / 8***	***144***

Lists of state and tribal registered storage tanks

HI UST: Underground Storage Tank Database

A review of the HI UST list, as provided by EDR, and dated 08/02/2022 has revealed that there are 3 HI UST sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
MANOA MARKETPLACE Tank Status: Permanently Out of Use Facility Id: 9-100270	2752 WOODLAWN DR, SU	A12 / 6	58
WAIKIKI FIRE STATION Tank Status: Currently in Use Tank Status: Permanently Out of Use Facility Id: 9-100101	***381 KAPAHULU AVE***	***L75 / 8***	***140***

Date Closed: 01/30/1988

KAPIOLANI REGIONAL P ***3447 LEAHI AVE*** ***L77 / 8*** ***144***
Tank Status: Permanently Out of Use
Facility Id: 9-103322
Date Closed: 12/28/1997

ADDITIONAL ENVIRONMENTAL RECORDS

Records of Emergency Release Reports

HI SPILLS: Release Notifications

A review of the HI SPILLS list, as provided by EDR, and dated 05/24/2022 has revealed that there are 14 HI SPILLS sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
1653 MOTT SMITH DRIV	1653 MOTT-SMITH DR	31 / 4	98
2727 WOODLAWN DRIVE,	2727 WOODLAWN DR	A33 / 6	103
2716 WOODLAWN DRIVE	2716 WOODLAWN DR	B38 / 5	115
ALA WAI BOULEVARD &	ALA WAI BLVD & KALAK	F50 / 5	124
ALA WAI BOULEVARD &	ALA WAI BLVD & MCCUL	G52 / 8	125
ALA WAI BOULEVARD &	ALA WAI BLVD & KAIOL	J59 / 8	129
ALA WAI HARBOR G-DOC	ALA WAI BLVD	J61 / 8	130
WHITE LIQUID OBSERVE	ALA WAI BLVD	J62 / 8	131
ALA WAI BOULEVARD US	ALA WAI BLVD	J63 / 8	132
ALA WAI BOULEVARD &	ALA WAI BLVD & KANEK	K65 / 8	134
ALA WAI BOULEVARD &	ALA WAI BLVD & KANEK	K66 / 8	135
2500 ALA WAI BOULEVA	2500 ALA WAI BLVD	70 / 8	137
BKM ENTERPRISES, LTD	KAPAHULU AVE	L73 / 8	138
WAIKIKI FIRE STATION	381 KAPAHULU AVE	L74 / 8	139

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 11/21/2022 has revealed that there are 2 RCRA NonGen / NLR sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
USDA ARS	***2727 WOODLAWN DR***	***A32 / 6***	***99***
EPA ID:: HI8120590064			
THE PARISH OF ST. CL	1515 WILDER AVE	D42 / 5	117
EPA ID:: HIP000145151			

EXECUTIVE SUMMARY

FUDS: Formerly Used Defense Sites

A review of the FUDS list, as provided by EDR, and dated 08/11/2022 has revealed that there is 1 FUDS site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
BASE YARD NO. 6		60 / 8	130

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A review of the FTTS list, as provided by EDR, has revealed that there are 5 FTTS sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
LONGS DRUG STORES #1	***2750 WOODLAWN DR***	***A28 / 6***	***85***
Database: FTTS INSP, Date of Government Version: 04/09/2009			
LONGS DRUG STORES #	***2750 WOODLAWN DR***	***A30 / 6***	***97***
Database: FTTS INSP, Date of Government Version: 04/09/2009			
ST CLEMENTS SCHOOL	***1515 WILDER AV***	***D43 / 5***	***120***
Database: FTTS INSP, Date of Government Version: 04/09/2009			
2633 MAUNAWAI PLACE	***2633 MAUNAWAI PLACE***	***I54 / 8***	***127***
Database: FTTS INSP, Date of Government Version: 04/09/2009			
HAWAII SCHOOL FOR TH	3440 LEAHI AVENUE	M80 / 8	149
Database: FTTS INSP, Date of Government Version: 04/09/2009			

MLTS: Material Licensing Tracking System

A review of the MLTS list, as provided by EDR, and dated 10/26/2022 has revealed that there is 1 MLTS site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
VCA UNIVERSITY ANIMA	2728 WOODLAWN DR	B36 / 5	114
License Number:: 53-27684-01			

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A review of the HIST FTTS list, as provided by EDR, has revealed that there are 4 HIST FTTS sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
LONGS DRUG STORES #1	***2750 WOODLAWN DR***	***A28 / 6***	***85***
Database: HIST FTTS INSP, Date of Government Version: 10/19/2006			
LONGS DRUG STORES #	***2750 WOODLAWN DR***	***A30 / 6***	***97***
Database: HIST FTTS INSP, Date of Government Version: 10/19/2006			
ST CLEMENTS SCHOOL	***1515 WILDER AV***	***D43 / 5***	***120***
Database: HIST FTTS INSP, Date of Government Version: 10/19/2006			
2633 MAUNAWAI PLACE	***2633 MAUNAWAI PLACE***	***I54 / 8***	***127***
Database: HIST FTTS INSP, Date of Government Version: 10/19/2006			

EXECUTIVE SUMMARY

FINDS: Facility Index System/Facility Registry System

A review of the FINDS list, as provided by EDR, and dated 08/03/2022 has revealed that there are 25 FINDS sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
FENDU BOULANGERIE Registry ID:: 110070318654	2752 WOODLAWN DR #5-	A24 / 6	83
MANOA MARKETPLACE Registry ID:: 110055122433	2752 WOODLAWN DRIVE	A26 / 6	84
LONGS DRUG STORE #98 Registry ID:: 110005727918	***2750 WOODLAWN DR***	***A29 / 6***	***85***
USDA ARS Registry ID:: 110005722913	***2727 WOODLAWN DR***	***A32 / 6***	***99***
MAGOON AGRICULTURAL Registry ID:: 110005730334 Registry ID:: 110055123922	***2717 WOODLAWN DR***	***A35 / 5***	***104***
UH AGRICULTURAL RESE Registry ID:: 110020737069	UNKNOWN	B37 / 5	114
MANOA PUBLIC LIBRARY Registry ID:: 110056349571	***2716 WOODLAWN DRIVE***	***B39 / 5***	***116***
KALAWAO STREET: 8-I Registry ID:: 110042373393	KALAWAO STREET (MANO	C40 / 6	116
ST. CLEMENTS SCHOOL Registry ID:: 110011647281	1515 WILDER AV	D44 / 5	121
THE PARISH OF ST. CL Registry ID:: 110070244933	1515 WILDER AVE	D46 / 5	121
FIRE HYDRANT INSTALL Registry ID:: 110067365425	***MAKIKI ST.;KOMAIA DR***	***E47 / 5***	***122***
IMPROVEMENTS OF KALA Registry ID:: 110055393293		F49 / 5	124
MCCULLY & MOILIILI S Registry ID:: 110055402489	MCCULLY ST X MOILIIL	G51 / 5	125
STATE HIGHWAY ROUTES Registry ID:: 110055380519		H53 / 7	126
2633 MAUNAWAI PLACE Registry ID:: 110015784114	2633 MAUNAWAI PLACE	I55 / 8	127
KAPIOLANI BOULEVARD: Registry ID:: 110063704781	***KAPIOLANI BOULEVARD,***	***56 / 8***	***128***
UNIVERSITY AVENUE: Registry ID:: 110055121639		57 / 8	128
REHABILITATION OF ST Registry ID:: 110040077911	***ALA WAI BLVD***	***58 / 8***	***128***
WAIKIKI SIDEWALK IMP Registry ID:: 110070031185	***KALAKAUA AVENUE***	***64 / 8***	***133***
WAIKIKI SAND VILLA H ***DATE STREET*** Registry ID:: 110056346100	WAIKIKI SAND VILLA I ***UNKNOWN***	K68 / 8 ***71 / 8***	136 ***138***
WAIKIKI FIRE STATION	381 KAPAHULU AVENUE	L76 / 8	144

Registry ID:: 110046208974			
KAPIOLANI REGIONAL P Registry ID:: 110005724485 Registry ID:: 110046163682	***3447 LEAHI AVENUE***	***L78 / 8***	***145***
HAWAII SCHOOL FOR TH Registry ID:: 110025780705	3440 LEAHI AVENUE	M82 / 8	150
KAPIOLANI PARK BANDS	3840 PAKI AVE	N83 / 8	150

ECHO: Enforcement & Compliance History Information

A review of the ECHO list, as provided by EDR, and dated 06/25/2022 has revealed that there are 14 ECHO sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
LONGS DRUG STORE #98 Registry ID: 110005727918	***2750 WOODLAWN DR***	***A29 / 6***	***85***
USDA ARS Registry ID: 110005722913	***2727 WOODLAWN DR***	***A32 / 6***	***99***
MAGOON AGRICULTURAL Registry ID: 110005730334	***2717 WOODLAWN DR***	***A35 / 5***	***104***
MANOA PUBLIC LIBRARY Registry ID: 110056349571	***2716 WOODLAWN DRIVE***	***B39 / 5***	***116***
KALAWAO STREET: 8-IN Registry ID: 110042373393	KALAWAO STREET (MANO	C41 / 6	117
THE PARISH OF ST. CL Registry ID: 110070244933	1515 WILDER AVE	D45 / 5	121
FIRE HYDRANT INSTALL Registry ID: 110067365425	***MAKIKI ST.;KOMAIA DR***	***E47 / 5***	***122***
KAPIOLANI BOULEVARD: Registry ID: 110063704781	***KAPIOLANI BOULEVARD,***	***56 / 8***	***128***
REHABILITATION OF ST Registry ID: 110040077911	***ALA WAI BLVD***	***58 / 8***	***128***
WAIKIKI SIDEWALK IMP Registry ID: 110070031185	***KALAKAUA AVENUE***	***64 / 8***	***133***
WAIKIKI SAND VILLA H Registry ID: 110060953008	WAIKIKI SAND VILLA I	K69 / 8	136
DATE STREET Registry ID: 110056346100	***UNKNOWN***	***71 / 8***	***138***
KAPIOLANI REGIONAL P Registry ID: 110005724485	***3447 LEAHI AVENUE***	***L78 / 8***	***145***
KAPIOLANI PARK BANDS Registry ID: 110020719793	3840 PAKI AVE	N84 / 8	151

EXECUTIVE SUMMARY

PFAS WQP: Ambient Environmental Sampling for PFAS

A review of the PFAS WQP list, as provided by EDR, and dated 01/03/2022 has revealed that there is 1 PFAS WQP site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
MANOA STR AT KANEWAI		48 / 5	122

HI AIRS: List of Permitted Facilities

A review of the HI AIRS list, as provided by EDR, and dated 06/28/2022 has revealed that there are 2 HI AIRS sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
MANOA VALLEY VETERIN Facility Id: 0884-01-N	2752 WOODLAWN DRIVE	A4 / 6	54
UNIVERSITY OF HAWAII Facility Id: 0480-01-N	2721 WOODLAWN DRIVE	A34 / 6	104

HI Financial Assurance: Financial Assurance Information Listing

A review of the HI Financial Assurance list, as provided by EDR, and dated 08/31/2022 has revealed that there are 2 HI Financial Assurance sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
WAIKIKI FIRE STATION Alt Facility ID: 9-100101 Tank Status: Currently in Use Tank Status: Permanently Out of Use	***381 KAPAHULU AVE***	***L75 / 8***	***140***
KAPIOLANI REGIONAL P Alt Facility ID: 9-103322 Tank Status: Permanently Out of Use	***3447 LEAHI AVE***	***L77 / 8***	***144***

HI LEAD: LEAD

A review of the HI LEAD list, as provided by EDR, and dated 09/15/2022 has revealed that there are 21 HI LEAD sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
GIOBETECK GROUP. INC	2752 WOODLAWN DRIVE,	A1 / 6	53
GLOBETECK GROUP INC	2752 WOODLAWN DRIVE,	A2 / 6	53
GLOBELACK GROUP, INC	2752 WOODLAWN DOVE.	A3 / 6	54
GHDBETECK GROUP, INC	2752 WOODLAWN DRIVE.	A5 / 6	54
GLOBALE& GROUP, INC.	2752 WOODLAWN DRIVE,	A6 / 6	55
GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE.	A7 / 6	55
GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	A9 / 6	57
GLOBETECK GROUP, INC	2752 WOODIAWN DRIVE,	A10 / 6	57
GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	A11 / 6	57
GLOBELECK GROUP, INC	2752 WOODLAWN DRIVE,	A13 / 6	58
GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	A14 / 6	59
GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	A15 / 6	78
GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	A16 / 6	79

EXECUTIVE SUMMARY

Site	Address	Map ID / Focus Map(s)	Page
GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	A18 / 6	79
GLOLLETECK GROUP, IN	2752 WOODLAWN DRIVE,	A19 / 6	80
GLOBETECK GROUP. INC	2752 WOODLAWN DR,, S	A20 / 6	80
GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	A21 / 6	80
GLOBETECK GROUP, INC	2752 WOODLAWN DR.. S	A22 / 6	81
GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	A23 / 6	81
GLOBETECK GROUP. INC	2752 WOODLAWN DRIVE,	A25 / 6	84
GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	A27 / 6	84

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: EDR Exclusive Historical Auto Stations

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there is 1 EDR Hist Auto site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
KZOO RDO STN POLYNES	2752 WOODLAWN DR BLD	A8 / 6	56

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there is 1 EDR Hist Cleaner site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
CHERRYWOOD-MANOA LLC	2752 WOODLAWN DR	A17 / 6	79

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

HI RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

A review of the HI RGA LUST list, as provided by EDR, has revealed that there is 1 HI RGA LUST site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
KAPIOLANI REGIONAL P Facility ID: 9-103322	3447 LEAHI AVE	L79 / 8	148

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

EXECUTIVE SUMMARY

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

A review of the SEMS-ARCHIVE list, as provided by EDR, and dated 10/27/2022 has revealed that there are 2 SEMS-ARCHIVE sites within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
FIRST DEVELOPMENT IN Site ID: 0903612 EPA Id: HID984466060	***1777 KAPIOLANI BLVD***	***NNW 0 - 1/8 (0.104 mi.)***	***AB200 / 5***	***395***
STAN SHINKAWN INC Site ID: 0902870 EPA Id: HID980497325	2330 KALAKAUA AVE	SW 1/4 - 1/2 (0.267 mi.)	BY364 / 8	801

Lists of Federal RCRA generators

RCRA-SQG: RCRA - Small Quantity Generators

A review of the RCRA-SQG list, as provided by EDR, and dated 11/21/2022 has revealed that there is 1 RCRA-SQG site within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
HONOLULU POLICE DEPT EPA ID:: HID982495871	***801 S. BERETANIA ST.***	***SW 1/8 - 1/4 (0.160 mi.)***	***AY270 / 4***	***576***

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

A review of the RCRA-VSQG list, as provided by EDR, and dated 11/21/2022 has revealed that there are 40 RCRA-VSQG sites within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
STATE OF HAWAII DLNR EPA ID:: HIR000050146	1651 ALA MOANA BLVD	WSW 0 - 1/8 (0.019 mi.)	O88 / 7	157
ALA WAI MARINE LTD EPA ID:: HID981969983	***1651 ALA MOANA BLVD***	***WSW 0 - 1/8 (0.019 mi.)***	***O89 / 7***	***159***
WAIKIKI YACHT CLUB EPA ID:: HIR000145920	1599 ALA MOANA BLVD	WNW 0 - 1/8 (0.025 mi.)	P94 / 4	174
ALA WAI BOAT HARBOR	***407 KAPAHULU AVE***	***ENE 0 - 1/8 (0.026 mi.)***	***Q98 / 8***	***188***

EPA ID:: HID984466672				
ALA WAI GOLF COURSE EPA ID:: HID982033474	***404 KAPAHULU AVENUE***	***ENE 0 - 1/8 (0.026 mi.)***	***Q100 / 8***	***192***
UNIVERSITY OF HAWAII EPA ID:: HIR000145722	2777 KALAKAUA AVENUE	S 0 - 1/8 (0.038 mi.)	109 / 8	214
AOAO YACHT HARBOR TO EPA ID:: HIR000037002	1600_1650 ALA MOANA	NNW 0 - 1/8 (0.040 mi.)	P114 / 4	224
MARYKNOLL HIGH SCHOO EPA ID:: HIR000135830	1402 PUNAHOU ST	SE 0 - 1/8 (0.045 mi.)	E117 / 5	227
IES RETAIL S. KING S EPA ID:: HID981967250	***2969 S KING ST***	***SE 0 - 1/8 (0.050 mi.)***	***V126 / 5***	***242***
BERGERS AUTOHAUS SAL EPA ID:: HID982018475	***3030 WAIALAE AVE***	***SE 0 - 1/8 (0.066 mi.)***	***X142 / 5***	***282***
IES RETAIL MANOA EPA ID:: HIR000137604	2927 E MANOA RD UNIT	N 0 - 1/8 (0.072 mi.)	Z144 / 6	287
UNIVERSITY OF HAWAII EPA ID:: HIR000145755	2680 WOODLAWN DRIVE	WSW 0 - 1/8 (0.080 mi.)	AA160 / 5	315
WIHC, LLC DBA ALOHA EPA ID:: HIR000143263	***438 HOBRON LANE SUIT***	***SSE 0 - 1/8 (0.080 mi.)***	***AC162 / 8***	***326***
SAFEWAY STORE #204 EPA ID:: HIR000142786	2855 EAST MANOA ROAD	NW 0 - 1/8 (0.081 mi.)	AD164 / 5	330
HAWAII CONVENTION CE EPA ID:: HID981633647	1801 KALAKAUA AVENUE	N 0 - 1/8 (0.094 mi.)	AB179 / 5	350
UNOCAL 76 SS L 6352 EPA ID:: HID984468827	3045 MONSARRAT AVE	E 0 - 1/8 (0.100 mi.)	AK195 / 8	389
FIRST DEVELOPMENT IN EPA ID:: HID984466060	***1777 KAPIOLANI BLVD***	***NNW 0 - 1/8 (0.104 mi.)***	***AB200 / 5***	***395***
KAPIOLANI MEDICAL CE EPA ID:: HIR000041509	***1319 PUNAHOU STREET***	***ESE 0 - 1/8 (0.109 mi.)***	***AG208 / 5***	***410***
MIDAS EPA ID:: HID981654858	***3051 WAIALAE***	***SE 0 - 1/8 (0.115 mi.)***	***AO220 / 5***	***453***
CHEVRON 93778 EPA ID:: HIR000136853	3048 WAIALAE AVE	ESE 0 - 1/8 (0.119 mi.)	AO224 / 5	463
ALA MOANA HOTEL EPA ID:: HIR000000992	***410 ATKINSON DRIVE***	***N 0 - 1/8 (0.120 mi.)***	***AP226 / 4***	***469***
PFLUEGER ACURA EPA ID:: HID981630700	***1450 S BERETANIA ST***	***WSW 1/8 - 1/4 (0.139 mi.)***	***AY249 / 4***	***510***
WAIKIKI TRADE CTR EPA ID:: HIR000034447	***2255 KUHIO AVE***	***SW 1/8 - 1/4 (0.147 mi.)***	***AM253 / 8***	***519***
IOLANI SCHOOL EPA ID:: HID077669950	563 KAMOKU ST	N 1/8 - 1/4 (0.148 mi.)	AZ255 / 8	525
ALOHA PETROLEUM: ST. EPA ID:: HIR000137539	***3075 WAIALAE AVE***	***SE 1/8 - 1/4 (0.151 mi.)***	***AO260 / 5***	***536***
SJD RADIATOR SERVICE EPA ID:: HID981664634	***1218 MAKIKI ST***	***W 1/8 - 1/4 (0.154 mi.)***	***BB264 / 4***	***555***
OUTRIGGER EAST	***150 KAIULANI AVE***	***SW 1/8 - 1/4 (0.168 mi.)***	***AU285 / 8***	***609***

EPA ID:: HIR000094706				
KUHIO VILLAGE RESORT EPA ID:: HIR000000802	***2463 KUHIO AVE***	***SW 1/8 - 1/4 (0.180 mi.)***	***AX294 / 8***	***629***
HAWAII GUN CLUB EPA ID:: HIR000135509	339 ROYAL HAWAIIAN A	SW 1/8 - 1/4 (0.192 mi.)	BH303 / 8	662
PUNAHOU SCHOOL EPA ID:: HIR000135350	***1601 PUNAHOU STREET***	***ENE 1/8 - 1/4 (0.196 mi.)***	***BJ307 / 5***	***678***
LONGS DRUG STORES #1 EPA ID:: HIR000143438	***1029 KAPAHULU AVE ST***	***S 1/8 - 1/4 (0.205 mi.)***	***BI316 / 8***	***698***
ROGERS REPAIR INC EPA ID:: HID981615222	***1687 KALAKAUA AVE***	***NNW 1/8 - 1/4 (0.209 mi.)***	***BM320 / 5***	***706***
AZABU USA CORP DBA K EPA ID:: HIR000069344	***131 KAIULANI AVE***	***SW 1/8 - 1/4 (0.212 mi.)***	***BK322 / 8***	***710***
THE SHERWIN-WILLIAMS EPA ID:: HIR000139840	2733 S KING ST	NW 1/8 - 1/4 (0.214 mi.)	325 / 5	715
SAND ISLAND WASTE WA EPA ID:: HID984469007	***120 KAIULANI AUCNUE***	***SW 1/8 - 1/4 (0.215 mi.)***	***BK326 / 8***	***717***
WAIKIKI GUN CLUB EPA ID:: HIR000135764	2142 KALAKAUA AVE	SW 1/8 - 1/4 (0.216 mi.)	BN327 / 8	720
IES RETAIL S. BERETA EPA ID:: HIR000136960	1378 S BERETANIA ST	W 1/8 - 1/4 (0.229 mi.)	BO338 / 4	751
PAN AM BLDG EPA ID:: HIR000052431	***1600 KAPIOLANI BLVD***	***NNW 1/8 - 1/4 (0.241 mi.)***	***BL351 / 4***	***771***
LONGS DRUG STORE #10 EPA ID:: HIR000143396	***2155 KALAKAUA AVE***	***SW 1/8 - 1/4 (0.243 mi.)***	***BN352 / 8***	***774***
SAFEWAY STORE #2747 EPA ID:: HIR000142935	***888 KAPAHULU AVENUE***	***E 1/8 - 1/4 (0.245 mi.)***	***BP354 / 8***	***784***

Lists of state- and tribal hazardous waste facilities

HI SHWS: Sites List

A review of the HI SHWS list, as provided by EDR, and dated 02/22/2022 has revealed that there are 155 HI SHWS sites within approximately1 mile of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
1609 ALA WAI DIESEL	***1609 ALA WAI BLVD***	***SSE 0 - 1/8 (0.017 mi.)***	***86 / 7***	***152***
2319 ALA WAI BLVD	2319 ALA WAI BLVD	SW 0 - 1/8 (0.020 mi.)	91 / 8	172
ALA WAI SERVICE, INC	***407 KAPAHULU AVE***	***ENE 0 - 1/8 (0.026 mi.)***	***Q95 / 8***	***176***
ALA WAI GOLF COURSE	***404 KAPAHULU AVE***	***ENE 0 - 1/8 (0.026 mi.)***	***Q99 / 8***	***190***
HOKULANI ELEMENTARY	2940 KAMAKINI ST	NNE 0 - 1/8 (0.032 mi.)	103 / 5	196
GEORGE'S UNION SERVI	505 KAPAHULU AVE	ESE 0 - 1/8 (0.038 mi.)	R107 / 8	201
WAIKIKI ELEMENTARY S	***3710 LEAHI AVE***	***ESE 0 - 1/8 (0.039 mi.)***	***111 / 8***	***218***
YACHT HARBOR TOWERS	***1600 ALA MOANA BLVD***	***NNW 0 - 1/8 (0.040 mi.)***	***P113 / 4***	***220***
ROYAL GARDENS HOTEL	***440 OLOHANA ST***	***SW 0 - 1/8 (0.048 mi.)***	***120 / 8***	***232***
ALA WAI HARBOR BOAT	ALA MOANA BLVD	WSW 0 - 1/8 (0.050 mi.)	O129 / 7	254
WAIKIKI SAND VILLA I	250 KAIULANI AVE	SW 0 - 1/8 (0.050 mi.)	131 / 8	255
BERGER AUTOHAUS, INC	***3030 WAIALAE AVE***	***SE 0 - 1/8 (0.066 mi.)***	***X140 / 5***	***275***
HECO TRANSFOMER 2726	***249 LILIUOKALANI AVE***	***SW 0 - 1/8 (0.076 mi.)***	***151 / 8***	***303***

EXECUTIVE SUMMARY

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
NOELANI ELEMENTARY S	2655 WOODLAWN DR	WSW 0 - 1/8 (0.078 mi.)	AA155 / 5	310
FUDS BASE YARD NO. 6	KAMOKU STREET	NNW 0 - 1/8 (0.078 mi.)	156 / 8	311
HAWAII CONVENTION CE	1801 KALAKAUA AVE	N 0 - 1/8 (0.094 mi.)	AB182 / 5	360
FUDS WAREHOUSE NO. 3		NE 0 - 1/8 (0.097 mi.)	188 / 5	376
ALOHA MOTORS	1777 KAPIOLANI BLVD	NNW 0 - 1/8 (0.104 mi.)	AB199 / 5	395
ALA WAI ELEMENTARY S	503 KAMOKU ST	NE 0 - 1/8 (0.106 mi.)	202 / 8	400
THE PAVILLION	***1925 KALAKAUA AVE***	***SW 0 - 1/8 (0.108 mi.)***	***Y206 / 8***	***404***
KAPIOLANI WOMEN'S &	***1319 PUNAHOU ST***	***ESE 0 - 1/8 (0.109 mi.)***	***AG207 / 5***	***408***
UH MANOA LOWER CAMPU	2693 DOLE ST	NE 0 - 1/8 (0.109 mi.)	209 / 5	427
ALA WAI COVE CONDOMI	***509 UNIVERSITY AVE***	***NE 0 - 1/8 (0.110 mi.)***	***216 / 8***	***438***
ROGER'S CHEVRON	***3048 WAIALAE AVE***	***ESE 0 - 1/8 (0.119 mi.)***	***AO223 / 5***	***459***
CHEVRON U.S.A., INC.	***2002 KALAKAUA AVE***	***SW 0 - 1/8 (0.121 mi.)***	***AR228 / 8***	***474***
WAIKIKI KUHIO COLLEC	2370 KUHIO AVE	SW 1/8 - 1/4 (0.126 mi.)	AU239 / 8	498
KAPIOLANI VILLAGE AP	737 KAIPUU ST	NW 1/8 - 1/4 (0.127 mi.)	240 / 8	499
JEFFERSON ELEMENTARY	324 KAPAHULU AVE	WSW 1/8 - 1/4 (0.131 mi.)	243 / 8	501
RITZ CARLTON WAIKIKI	2139 KUHIO AVE	SW 1/8 - 1/4 (0.131 mi.)	AW244 / 8	502
MIRAMAR HOTEL INTERN	***2345 KUHIO AVE***	***SW 1/8 - 1/4 (0.145 mi.)***	***AQ250 / 8***	***514***
IOLANI SCHOOL CAMPUS	563 KAMOKU ST	N 1/8 - 1/4 (0.148 mi.)	AZ257 / 8	529
IOLANI SCHOOL PETROL	***563 KAMOKU ST***	***N 1/8 - 1/4 (0.148 mi.)***	***AZ258 / 8***	***530***
BWS KAIMUKI PUMP STA	***2951 HARDING AVE***	***SSW 1/8 - 1/4 (0.148 mi.)***	***259 / 8***	***534***
FUDS ALA WAI FIELD		NE 1/8 - 1/4 (0.152 mi.)	262 / 8	553
WAIKIKI GATEWAY PARK	***2044 KALAKAUA AVE***	***SW 1/8 - 1/4 (0.153 mi.)***	***BA263 / 8***	***553***
PRINCE KUHIO HOTEL R	***2500 KUHIO AVE***	***SW 1/8 - 1/4 (0.155 mi.)***	***265 / 8***	***558***
MANOA ELEMENTARY SCH	3155 MANOA RD	NNW 1/8 - 1/4 (0.160 mi.)	272 / 3	588
HOBRON HOTEL	1744 KAIOO DR	SSE 1/8 - 1/4 (0.166 mi.)	BD281 / 7	602
KUHIO ELEMENTARY SCH	***2759 S KING ST***	***NW 1/8 - 1/4 (0.168 mi.)***	***286 / 5***	***615***
ROOSEVELT HIGH SCHOO	1120 NEHOA ST	NNE 1/8 - 1/4 (0.170 mi.)	289 / 4	623
KING KALAKAUA PLAZA	***2080 KALAKAUA AVE***	***SW 1/8 - 1/4 (0.173 mi.)***	***292 / 8***	***626***
76 KALAKAUA/YOUNG 7-	***1323 KALAKAUA AVE***	***S 1/8 - 1/4 (0.184 mi.)***	***BE295 / 5***	***634***
CARTWRIGHT NEIGHBORH	KEEAUMOKU ST & MATLO	WNW 1/8 - 1/4 (0.186 mi.)	297 / 4	640
2051-2057 KALAKAUA A	2051-2057 KALAKAUA A	SW 1/8 - 1/4 (0.190 mi.)	BA298 / 8	641
DAVENROYE DRY CLEANE	***1042 KAPAHULU AVE***	***SSW 1/8 - 1/4 (0.194 mi.)***	***BI306 / 8***	***673***
PUNAHOU SCHOOL GRADE	1601 PUNAHOU ST	ENE 1/8 - 1/4 (0.196 mi.)	BJ310 / 5	693
PUNAHOU SCHOOL FIRIN	1601 PUNAHOU ST	ENE 1/8 - 1/4 (0.196 mi.)	BJ311 / 5	694
PUNAHOU SCHOOL WINNE	***1601 PUNAHOU ST***	***ENE 1/8 - 1/4 (0.196 mi.)***	***BJ312 / 5***	***695***
ROGER'S REPAIR INC	1687 KALAKAUA AVE	NNW 1/8 - 1/4 (0.209 mi.)	BM321 / 5	710
FUDS BASE YARD NOS.		NNW 1/8 - 1/4 (0.214 mi.)	324 / 8	714
MEADOW GOLD ICE CREA	***1401 S BERETANIA ST***	***WSW 1/8 - 1/4 (0.216 mi.)***	***BO328 / 4***	***725***
FORT DERUSSY, FORMER		SW 1/8 - 1/4 (0.223 mi.)	331 / 8	735
LOVES BAKERY	***836 KAPAHULU AVE***	***NE 1/8 - 1/4 (0.223 mi.)***	***BP332 / 8***	***735***
1414 KALAKAUA AVENUE	***1414 KALAKAUA AVE***	***SSW 1/8 - 1/4 (0.223 mi.)***	***BQ333 / 5***	***738***
WAIKIKI BAZAAR	***2174 KALAKAUA AVE***	***SW 1/8 - 1/4 (0.234 mi.)***	***BT346 / 8***	***764***
HECO POLE-MOUNT TRAN	***3133 WAIALAE AVE***	***SE 1/8 - 1/4 (0.235 mi.)***	***BU348 / 9***	***768***
1003 AND 1013 KAHEKA	1003 KAHEKA ST	SSW 1/8 - 1/4 (0.237 mi.)	BV349 / 4	769
KALAKAUA TRANSMISSIO	***1665 KALAKAUA AVE***	***NNW 1/4 - 1/2 (0.253 mi.)***	***BW355 / 5***	***788***
LUNALILO ELEMENTARY	810 PUMEHANA ST	NNE 1/4 - 1/2 (0.254 mi.)	356 / 5	789
SERVICE CLEANERS	936 KAPAHULU AVE	E 1/4 - 1/2 (0.259 mi.)	359 / 8	792
FORT DERUSSY TRANSFO	2058 MALUHIA RD	SW 1/4 - 1/2 (0.259 mi.)	360 / 8	793
1911 KEEAUMOKU STREE	1911 KEEAUMOKU ST	NE 1/4 - 1/2 (0.260 mi.)	361 / 5	793
2700 SOUTH KING STRE	***2700 S KING ST***	***NW 1/4 - 1/2 (0.263 mi.)***	***362 / 5***	***794***
STAN SHINKAWA INC	2330 KALAKAUA AVE	SW 1/4 - 1/2 (0.267 mi.)	BY365 / 8	803
ABC STORE UNDERGROUN	***2546 LEMON RD***	***SW 1/4 - 1/2 (0.271 mi.)***	***369 / 8***	***809***
UH MANOA FACILITIES	***2002 EAST-WEST RD***	***WSW 1/4 - 1/2 (0.278 mi.)***	***CA371 / 5***	***826***
ALA WAI HARBOR FUEL		SW 1/4 - 1/2 (0.281 mi.)	373 / 7	831
LINCOLN ELEMENTARY S	615 AUWAIOLIMU ST	N 1/4 - 1/2 (0.289 mi.)	378 / 4	857
UH MANOA BILGER ADDI	2040 EAST-WEST RD	WSW 1/4 - 1/2 (0.292 mi.)	CA380 / 5	861

EXECUTIVE SUMMARY

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
UH MANOA FREAR HALL	2569 DOLE ST	NW 1/4 - 1/2 (0.294 mi.)	381 / 5	862
HECO TRANSFORMER V84	***151 KAPAHULU AVE***	***NNW 1/4 - 1/2 (0.298 mi.)***	***382 / 8***	***862***
SEARS ALA MOANA	1450 ALA MOANA BLVD	WNW 1/4 - 1/2 (0.319 mi.)	CB386 / 4	875
HALE KOA HOTEL	***2055 KALIA RD***	***SW 1/4 - 1/2 (0.322 mi.)***	***387 / 8***	***876***
NEW OFFICE LOUNGE	***1551 KAPIOLANI BLVD***	***NNW 1/4 - 1/2 (0.333 mi.)***	***389 / 4***	***895***
HALE PUA NUI UST REM	***228 BEACH WALK***	***SW 1/4 - 1/2 (0.361 mi.)***	***392 / 8***	***903***
HECO SUBSTATION: MAK	***1544 MAKALOA ST***	***N 1/4 - 1/2 (0.361 mi.)***	***393 / 4***	***904***
WALGREENS STORE #120	1460 KAPIOLANI BLVD	NNW 1/4 - 1/2 (0.371 mi.)	395 / 4	911
FUDS ST LOUIS COLLEG		E 1/4 - 1/2 (0.381 mi.)	396 / 6	911
SCHUMAN CARRIAGE MOT	***1234 S BERETANIA ST***	***W 1/4 - 1/2 (0.406 mi.)***	***401 / 4***	***924***
CONTINENTAL AUTO SER	***1918 ALGAROBA ST***	***NNE 1/4 - 1/2 (0.407 mi.)***	***CD402 / 5***	***932***
205 BEACH WALK	***205 BEACH WALK AVE***	***SW 1/4 - 1/2 (0.414 mi.)***	***403 / 8***	***935***
HALE MAKANA O MOILII	***2139 ALGAROBA STREET***	***NE 1/4 - 1/2 (0.420 mi.)***	***CE405 / 5***	***938***
GRACE OTSUKA APARTME	***1233 YOUNG ST***	***W 1/4 - 1/2 (0.420 mi.)***	***CF406 / 4***	***939***
HALE MAKANA O MAILI	2193 ALGOROBA STREET	NE 1/4 - 1/2 (0.429 mi.)	CE408 / 5	944
KAAHUMANU ELEMENTARY	1141 KINAU ST	SW 1/4 - 1/2 (0.433 mi.)	410 / 4	946
MID-PACIFIC INSTITUT	***2445 KAALA ST***	***SW 1/4 - 1/2 (0.437 mi.)***	***411 / 5***	***947***
UH KENNEDY THEATER	***1770 EAST-WEST RD***	***NNW 1/4 - 1/2 (0.438 mi.)***	***CG412 / 5***	***949***
CUTTER CHEVROLET	***1391 KAPIOLANI BLVD***	***NNW 1/4 - 1/2 (0.445 mi.)***	***CH414 / 4***	***952***
76 MCCULLY SERVICE #	***2105 S KING ST***	***NNE 1/4 - 1/2 (0.449 mi.)***	***CI416 / 5***	***955***
CAL'S CLEANERS	1234 S KING ST	W 1/4 - 1/2 (0.450 mi.)	CF417 / 4	974
FORT SHAFTER BUILDIN	***2199 KALIA RD***	***SW 1/4 - 1/2 (0.452 mi.)***	***418 / 8***	***974***
UNIVERSITY OF HAWAII	H-1 AND UNIVERSITY A	NW 1/4 - 1/2 (0.453 mi.)	419 / 5	987
WALLYS GARDEN CENTER	***1935 S BERETANIA ST***	***SE 1/4 - 1/2 (0.457 mi.)***	***420 / 5***	***988***
1310 PENSACOLA STREE	1310 PENSACOLA ST	WSW 1/4 - 1/2 (0.458 mi.)	421 / 4	989
SKY ALA MOANA	1388 KAPIOLANI BLVD	NNW 1/4 - 1/2 (0.458 mi.)	CH422 / 4	990
HAWAII LAW ENFORCEME	1936 S KING ST	NNE 1/4 - 1/2 (0.463 mi.)	423 / 5	991
WILIWILI AND KING ST	KING ST & WILIWILI S	NNE 1/4 - 1/2 (0.465 mi.)	CI425 / 5	993
MCDONALD'S RESTAURAN	2121 S KING ST	NNE 1/4 - 1/2 (0.466 mi.)	CI427 / 5	994
UH MANOA HENKE HALL	1800 EAST-WEST RD	NNW 1/4 - 1/2 (0.473 mi.)	CG429 / 5	996
LIKE LIKE PLAZA PETR	745 KEEAUMOKU ST	SW 1/4 - 1/2 (0.474 mi.)	430 / 4	998
UH MANOA FOOD SCIENC	***1920 EDMONDSON RD***	***SW 1/4 - 1/2 (0.487 mi.)***	***435 / 5***	***1011***
TOM ISHIIS UNION SER	2114 S KING ST	NE 1/4 - 1/2 (0.493 mi.)	CK436 / 5	1013
SUPERBLOCK PROJECT	700 KEEAUMOKU ST	NNW 1/2 - 1 (0.508 mi.)	439 / 4	1016
ANIN-PIIKOI BUILDING	***1012 PIIKOI ST***	***W 1/2 - 1 (0.511 mi.)***	***440 / 4***	***1017***
UH MANOA BILGER HALL	2545 MCCARTHY MALL	NNW 1/2 - 1 (0.524 mi.)	CL441 / 5	1025
FORT RUGER CANNON CL	***4500 DIAMOND HEAD RD***	***E 1/2 - 1 (0.526 mi.)***	***442 / 9***	***1026***
902 ALDER STREET	***902 ALDER ST***	***WSW 1/2 - 1 (0.527 mi.)***	***443 / 4***	***1028***
UH MANOA SYNDER HALL	2538 MCCARTHY MALL	NNW 1/2 - 1 (0.536 mi.)	CL444 / 5	1030
1800 VANCOUVER DRIVE	***1800 VANCOUVER DRIVE***	***ESE 1/2 - 1 (0.537 mi.)***	***445 / 5***	***1031***
HAWAII CITY PLAZA	710 AND 730 SHERIDAN	SW 1/2 - 1 (0.540 mi.)	CM446 / 4	1032
MOTOR SUPPLY	***726 SHERIDAN ST***	***SW 1/2 - 1 (0.541 mi.)***	***CM447 / 4***	***1033***
LIHOLIHO ELEMENTARY	3430 MAUNALOA AVE	E 1/2 - 1 (0.541 mi.)	448 / 9	1034
ALOHA ALA MOANA	***451 PIIKOI ST***	***NW 1/2 - 1 (0.548 mi.)***	***449 / 4***	***1035***
GOODWILL BERETANIA S	1075 S BERETANIA ST	WSW 1/2 - 1 (0.564 mi.)	452 / 4	1038
LAUNDERLAND II	***2043 S. BERETANIA ST***	***SE 1/2 - 1 (0.577 mi.)***	***453 / 5***	***1039***
ALIIOLANI ELEMENTARY	1240 7TH AVE	ESE 1/2 - 1 (0.586 mi.)	454 / 9	1040
HAWAIIAN MACADAMIA N	3280 ROUND TOP DR	WNW 1/2 - 1 (0.586 mi.)	455 / 2	1041
FUDS BATTERY PUNCHBO		WNW 1/2 - 1 (0.599 mi.)	456 / 4	1042
CENPAC PROPERTIES -	***615 PIIKOI ST***	***NW 1/2 - 1 (0.601 mi.)***	***457 / 4***	***1043***
DURANT PROPERTIES	***1235 KONA ST***	***NW 1/2 - 1 (0.602 mi.)***	***CO458 / 4***	***1047***
UH DUKE KAHANAMOKU S	***2500 CAMPUS RD***	***NW 1/2 - 1 (0.607 mi.)***	***459 / 5***	***1048***
UNIVERSITY LABORATOR	***1776 UNIVERSITY AVEN***	***NW 1/2 - 1 (0.614 mi.)***	***460 / 5***	***1050***
MARIE LOUISE FINE GA	1221 KONA ST	NW 1/2 - 1 (0.632 mi.)	CO462 / 4	1052
KOOLANI TOWER PROJEC	***1189 WAIMANU ST***	***NW 1/2 - 1 (0.683 mi.)***	***465 / 4***	***1054***
EVERSHINE X	***1230 KAPIOLANI BLVD***	***NW 1/2 - 1 (0.688 mi.)***	***466 / 4***	***1057***

EXECUTIVE SUMMARY

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
UH MANOA SHIDLER COL	2404 MAILE WAY	WSW 1/2 - 1 (0.711 mi.)	468 / 5	1059
AUXILIARY SERVICES -	***1039 S KING ST***	***SW 1/2 - 1 (0.712 mi.)***	***469 / 4***	***1060***
FUDS SUGAR LOAF MILI		NW 1/2 - 1 (0.717 mi.)	470 / 2	1063
FORT RUGER FIRING RA	***DIAMOND HEAD RD***	***ESE 1/2 - 1 (0.721 mi.)***	***471 / 12***	***1064***
RESERVE HOUSING TOWE	***1141 WAIMANU ST***	***WNW 1/2 - 1 (0.726 mi.)***	***472 / 4***	***1065***
BOB CISCO	***1152 WAIMANU ST***	***NW 1/2 - 1 (0.730 mi.)***	***473 / 4***	***1068***
FUDS OVERSEAS ASSEMB		NW 1/2 - 1 (0.778 mi.)	475 / 4	1070
3464-3466 WAIALAE AV	***3466 WAIALAE AVE***	***ESE 1/2 - 1 (0.789 mi.)***	***477 / 9***	***1071***
FUDS ROUND TOP MILIT	NUTRIDGE ST	W 1/2 - 1 (0.854 mi.)	478 / 5	1073
HONOLULU LAUNDRY CO.	***438 KAMAKEE ST***	***NW 1/2 - 1 (0.860 mi.)***	***CP479 / 4***	***1074***
1510A FREAR STREET	***1510 FREAR ST***	***W 1/2 - 1 (0.863 mi.)***	***480 / 4***	***1076***
PAUOA ELEMENTARY SCH	2301 PAUOA RD	NNW 1/2 - 1 (0.865 mi.)	481 / 1	1079
801 SOUTH HOTEL STRE	801 S HOTEL ST	WSW 1/2 - 1 (0.881 mi.)	482 / 4	1079
SPUDS DRY CLEANERS	1065 WAIMANU ST	NW 1/2 - 1 (0.883 mi.)	CP483 / 4	1080
LEAHI HOSPITAL	***3675 KILAUEA AVE***	***ESE 1/2 - 1 (0.888 mi.)***	***485 / 9***	***1082***
JAS W GLOVER LTD	***1046 WAIMAMU ST***	***NW 1/2 - 1 (0.915 mi.)***	***CQ486 / 4***	***1084***
KAPIOLANI COMMUNITY	***4303 DIAMOND HEAD RO***	***E 1/2 - 1 (0.915 mi.)***	***487 / 9***	***1089***
ARTSPACE	***1025 WAIMANU ST***	***NW 1/2 - 1 (0.920 mi.)***	***CQ488 / 4***	***1090***
AIM PALOLO	***1841 PALOLO AVE***	***ENE 1/2 - 1 (0.931 mi.)***	***489 / 6***	***1091***
SHIZUKO HAMAOKA TRUS	***3311 SIERRA DR***	***ESE 1/2 - 1 (0.941 mi.)***	***CR490 / 9***	***1096***
PACIFICA CONDOMINIUM	***1009 KAPIOLANI BLVD***	***NW 1/2 - 1 (0.941 mi.)***	***CQ491 / 4***	***1099***
HDC PROPERTIES STAIN	***1015 KAPIOLANI BLVD***	***NW 1/2 - 1 (0.941 mi.)***	***CQ492 / 4***	***1100***
FUDS DIAMOND HEAD AM	DIAMOND HEAD RD	E 1/2 - 1 (0.945 mi.)	493 / 9	1103
SHELL SERVICE STATIO	***3562 WAIALAE AVE***	***ESE 1/2 - 1 (0.949 mi.)***	***CR494 / 9***	***1104***
WILLIAMSON RESIDENCE	4142 ROUND TOP DR	NNW 1/2 - 1 (0.950 mi.)	495 / 2	1109
HECO FORMER PALOLO S	3419 PAALEA ST	E 1/2 - 1 (0.953 mi.)	496 / 6	1109
ONE ARCHER LANE PETR	801 S KING ST	WSW 1/2 - 1 (0.954 mi.)	497 / 4	1110
JOINT TRAFFIC MANAGE	KING STREET	WSW 1/2 - 1 (0.957 mi.)	498 / 4	1111
BWS BERETANIA PUMPIN	650 S BERETANIA ST	W 1/2 - 1 (0.964 mi.)	499 / 4	1112
NEAL BLAISDELL CENTE	***777 WARD AVE***	***WSW 1/2 - 1 (0.992 mi.)***	***500 / 4***	***1113***

Lists of state and tribal leaking storage tanks

HI LUST: Leaking Underground Storage Tank Database

A review of the HI LUST list, as provided by EDR, and dated 08/02/2022 has revealed that there are 97 HI LUST sites within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
ALOHA MARINE	***1651 ALA MOANA BLVD***	***WSW 0 - 1/8 (0.019 mi.)***	***O90 / 7***	***170***
Facility Status: Site Cleanup Completed (NFA) Release ID: 110012 Facility Id: 9-100167				
THE WATERMARK WAIKIK	1551 ALA WAI BLVD	SSE 0 - 1/8 (0.021 mi.)	H92 / 7	173
Facility Status: Confirmed Release Release ID: 090003 Facility Id: 9-103868				
ALA WAI SERVICE INC.	***407 KAPAHULU AVE***	***ENE 0 - 1/8 (0.026 mi.)***	***Q96 / 8***	***182***
Facility Status: Site Cleanup Completed (NFA) Release ID: 880018 Release ID: 040012				

Facility Id: 9-101211

ALA WAI GOLF COURSE ***484 KAPAHULU AVE*** ***ESE 0 - 1/8 (0.027 mi.)*** ***101 / 8*** ***195***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 940034
Facility Id: 9-102885

76 KAPAHULU 7-11 #11 ***505 KAPAHULU AVE*** ***ESE 0 - 1/8 (0.038 mi.)*** ***R108 / 8*** ***202***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 930015
Facility Id: 9-100103

LING BROTHERS, LTD. 1819-E LIPEEPEE ST SSE 0 - 1/8 (0.050 mi.) 130 / 7 255
Facility Status: Site Cleanup Completed (NFA)
Release ID: 060020
Facility Id: 9-100819

HELE KAPAHULU #61013 ***707 KAPAHULU AVE*** ***NE 0 - 1/8 (0.055 mi.)*** ***S134 / 8*** ***257***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 070033
Facility Id: 9-100914

MAKIKI FIRE STATION ***1202 WILDER AVE*** ***WSW 0 - 1/8 (0.059 mi.)*** ***137 / 4*** ***268***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 910029
Facility Id: 9-100081

BERGERS AUTOHAUS INC ***3030 WAIALAE AVE*** ***SE 0 - 1/8 (0.066 mi.)*** ***X141 / 5*** ***277***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 960064
Facility Id: 9-101454

MANOA SERVICE 95683 ***2927 E MANOA RD*** ***N 0 - 1/8 (0.072 mi.)*** ***Z145 / 6*** ***291***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 040016
Facility Id: 9-101246

SERAI'S UNION SERVIC ***3011 WAIALAE AVE*** ***S 0 - 1/8 (0.076 mi.)*** ***U152 / 5*** ***306***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 920187
Release ID: 950025
Facility Id: 9-100044

FREDERICK FONG M.D. ***3034 AND 3036 WAIALA*** ***ESE 0 - 1/8 (0.079 mi.)*** ***X157 / 5*** ***312***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 120002
Facility Id: 9-103834

ARCADIA RETIREMENT ***1434 PUNAHOU ST*** ***SE 0 - 1/8 (0.080 mi.)*** ***158 / 5*** ***313***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 990006
Facility Id: 9-103458

ALOHA MOTORS ***KAPIOLANI BLVD X KAL*** ***NNW 0 - 1/8 (0.080 mi.)*** ***AB159 / 5*** ***314***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 890025
Facility Id: 9-102160

JIMMY'S CHEVRON SERV ***1958 KALAKAUA AVE*** ***SW 0 - 1/8 (0.089 mi.)*** ***AE172 / 8*** ***343***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 970126
Facility Id: 9-101106

SHRINERS HOSPITALS F ***1310 PUNAHOU ST*** ***SE 0 - 1/8 (0.095 mi.)*** ***AG184 / 5*** ***362***

Facility Status: Site Cleanup Completed (NFA)
Release ID: 910069
Facility Id: 9-102410

ALOHA CAMPBELL ***3327 CAMPBELL AVE*** ***ESE 0 - 1/8 (0.095 mi.)*** ***AH185 / 8*** ***364***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 980077
Facility Id: 9-101185

ALOHA MANOA ***3001 E MANOA RD*** ***S 0 - 1/8 (0.096 mi.)*** ***AI186 / 6*** ***373***
Facility Status: Site Cleanup Completed (NFA)
Facility Status: LUST Cleanup Initiated
Facility Status: Site Cleanup Completed with EHE/EHMP
Release ID: 020005
Release ID: 190005
Release ID: 050021
Release ID: 100008
Facility Id: 9-100049

STAN'S UNION SERVICE ***3045 MONSARRAT AVE*** ***E 0 - 1/8 (0.100 mi.)*** ***AK193 / 8*** ***387***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 920185
Facility Id: 9-100048

C&CH MANOA FIRE STAT ***2850 E MANOA RD*** ***WNW 0 - 1/8 (0.106 mi.)*** ***AD204 / 5*** ***403***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 930123
Facility Id: 9-100086

FUNAI'S UNION SERVIC ***1810 KAPIOLANI BLVD*** ***N 0 - 1/8 (0.110 mi.)*** ***AL213 / 5*** ***432***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 910048
Facility Id: 9-100047

GOOSE'S EDGE INC 139 ***755 KAPAHULU AVE.*** ***NE 0 - 1/8 (0.112 mi.)*** ***AN218 / 8*** ***445***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 010045
Release ID: 080034
Release ID: 950043
Facility Id: 9-101020

ROGER'S CHEVRON ***3048 WAIALAE AVE*** ***ESE 0 - 1/8 (0.119 mi.)*** ***AO223 / 5*** ***459***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 070027
Facility Id: 9-101273

CHEVRON U.S.A., INC. ***2002 KALAKAUA AVE*** ***SW 0 - 1/8 (0.121 mi.)*** ***AR228 / 8*** ***474***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 920073
Facility Id: 9-101266

ROYAL KUHIO CONDOMIN ***2240 KUHIO AVE*** ***SW 0 - 1/8 (0.122 mi.)*** ***233 / 8*** ***482***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 000065
Facility Id: 9-103574

MANOA MART/MANOA LIQ ***2955 E MANOA RD*** ***NNE 0 - 1/8 (0.123 mi.)*** ***AS235 / 6*** ***483***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 070032
Release ID: 960072
Facility Id: 9-101188

MID PAC PETROLEIM 25 ***2809 E MANOA RD*** ***W 1/8 - 1/4 (0.126 mi.)*** ***AT237 / 5*** ***490***

Facility Status: Site Cleanup Completed (NFA)
Facility Status: Site Cleanup Completed with EHE
Release ID: 140015
Release ID: 110007
Release ID: 040057
Facility Id: 9-100039

ABC STORE 21 ***2394 KUHIO AVE*** ***SW 1/8 - 1/4 (0.134 mi.)*** ***AU245 / 8*** ***503***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 040029
Facility Id: 9-100728

WAIKIKI CENTRAL OFFI ***214 KAPUNI ST.*** ***SW 1/8 - 1/4 (0.138 mi.)*** ***AX248 / 8*** ***508***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 970023
Facility Id: 9-100535

MIRAMAR HOTEL HAWAII ***2345 KUHIO AVE*** ***SW 1/8 - 1/4 (0.145 mi.)*** ***AQ251 / 8*** ***515***
Facility Status: Site Cleanup Completed with EHE
Release ID: 150002
Facility Id: 9-101531

2ND AVENUE SHELL ***3075 WAIALAE AVE*** ***SE 1/8 - 1/4 (0.151 mi.)*** ***AO261 / 5*** ***541***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 160013
Release ID: 960013
Facility Id: 9-100314

MAKIKI SHELL ***1436 S BERETANIA ST*** ***WSW 1/8 - 1/4 (0.159 mi.)*** ***AY268 / 4*** ***566***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 980196
Release ID: 930023
Release ID: 040039
Facility Id: 9-100833

HONOLULU STATION - P ***1455 S BERETANIA ST*** ***SW 1/8 - 1/4 (0.160 mi.)*** ***AY271 / 4*** ***586***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 930074
Facility Id: 9-100114

JCRA INVESTMENTS 1685 KAPIOLANI PROPE N 1/8 - 1/4 (0.160 mi.) BC274 / 4 589
Facility Status: Site Cleanup Completed (NFA)
Release ID: 080037
Facility Id: 9-103857

AIM WAIKIKI ***2025 KALAKAUA AVE.*** ***SW 1/8 - 1/4 (0.161 mi.)*** ***276 / 8*** ***590***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 980144
Release ID: 050016
Release ID: 940190
Release ID: 210002
Facility Id: 9-100328

MATSUSHITA INVESTMEN ***2237 KUHIO AVE*** ***SW 1/8 - 1/4 (0.163 mi.)*** ***279 / 8*** ***600***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 960007
Facility Id: 9-103083

SHELL SERVICE STATIO ***2740 E MANOA RD*** ***NW 1/8 - 1/4 (0.169 mi.)*** ***BF288 / 5*** ***620***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 000072

Facility Id: 9-100312

KING KALAKAUA PLAZA ***2080 KALAKAUA AVE*** ***SW 1/8 - 1/4 (0.173 mi.)*** ***292 / 8*** ***626***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 960085
Facility Id: 9-103235

DISCOVERY BAY ***1778 ALA MOANA BLVD*** ***SSE 1/8 - 1/4 (0.186 mi.)*** ***BD296 / 7*** ***639***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 900018
Facility Id: 9-101921

76 DON'S MAKIKI #111 ***1406 S BERETANIA ST*** ***WSW 1/8 - 1/4 (0.191 mi.)*** ***BB299 / 4*** ***642***
Facility Status: Site Cleanup Completed (NFA)
Facility Status: Site Cleanup Completed with EHMP
Release ID: 920175
Release ID: 000082
Facility Id: 9-100035

NOAA - HONOLULU LABO ***2570 DOLE ST*** ***NNW 1/8 - 1/4 (0.194 mi.)*** ***305 / 5*** ***672***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 970130
Facility Id: 9-103311

DAVENROYE DRY CLEANE ***1042 KAPAHULU AVE*** ***SSW 1/8 - 1/4 (0.194 mi.)*** ***BI306 / 8*** ***673***
Facility Status: Site Cleanup Completed with EHE/EHMP
Release ID: 910038
Facility Id: 9-101540

PUNAHOU SCHOOL - PHY ***1601 PUNAHOU ST.*** ***ENE 1/8 - 1/4 (0.196 mi.)*** ***BJ308 / 5*** ***684***
Facility Status: Site Cleanup Completed (NFA)
Facility Status: Confirmed Release
Release ID: 900015
Release ID: 200014
Facility Id: 9-100297
Facility Id: 9-101653

AVIS RENT- A-CAR SYS ***148 KAIULANI AVE*** ***SW 1/8 - 1/4 (0.198 mi.)*** ***BK314 / 8*** ***696***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 920032
Facility Id: 9-100173

CM&D ***2112 KALAKAUA AVE*** ***SW 1/8 - 1/4 (0.206 mi.)*** ***317 / 8*** ***704***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 020003
Facility Id: 9-103734

KAPIOLANI RESIDENCE 1631 KAPIOLANI BLVD NNW 1/8 - 1/4 (0.207 mi.) BL319 / 4 705
Facility Status: Site Cleanup Completed with EHE
Release ID: 180004
Release ID: 170014
Facility Id: 9-103963

KING'S VILLAGE SHOPP ***131 KAIULANI AVE*** ***SW 1/8 - 1/4 (0.212 mi.)*** ***BK323 / 8*** ***713***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 000038
Facility Id: 9-103611

LOVES BAKERY ***836 KAPAHULU AVE*** ***NE 1/8 - 1/4 (0.223 mi.)*** ***BP332 / 8*** ***735***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 910059
Facility Id: 9-101278

ILIKAI HOTEL ***1777 ALA MOANA BLVD*** ***SSE 1/8 - 1/4 (0.224 mi.)*** ***BR335 / 7*** ***745***

Facility Status: Site Cleanup Completed (NFA)
Release ID: 900084
Facility Id: 9-102181

GAS PLUS ***1524 S KING ST*** ***SSW 1/8 - 1/4 (0.226 mi.)*** ***BQ336 / 4*** ***745***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 960030
Facility Id: 9-100224

BERETANIA TEXACO 904 ***1378 S BERETANIA ST*** ***W 1/8 - 1/4 (0.229 mi.)*** ***BO337 / 4*** ***746***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 960076
Release ID: 170008
Release ID: 880012
Release ID: 040024
Facility Id: 9-101720

KYOTARU HAWAII CORPO ***2160 KALAKAUA AVE*** ***SW 1/8 - 1/4 (0.231 mi.)*** ***BN339 / 8*** ***754***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 010043
Facility Id: 9-103722

WAIKIKI SHOPPING PLA 2250 KALAKAUA AVE SW 1/8 - 1/4 (0.231 mi.) BH342 / 8 759
Facility Status: Site Cleanup Completed (NFA)
Release ID: 090022
Facility Id: 9-103520

FORMERLY DUNKIN DOUG ***900 KAPAHULU AVE*** ***E 1/8 - 1/4 (0.232 mi.)*** ***BS344 / 8*** ***762***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 070023
Facility Id: 9-103835

YONEOKA AND ASSOCIAT ***2174/2190 KALAKAUA A*** ***SW 1/8 - 1/4 (0.234 mi.)*** ***BT345 / 8*** ***763***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 950056
Facility Id: 9-103024

FORT DERUSSY MILITAR ***BLDG 107 AND 108*** ***SW 1/8 - 1/4 (0.245 mi.)*** ***353 / 8*** ***783***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 000068
Facility Id: 9-103512

PUNAHOU REPAIR SHOP ***1558 S KING ST*** ***S 1/4 - 1/2 (0.254 mi.)*** ***BX357 / 5*** ***790***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 920184
Facility Id: 9-101387

CHAMINADE UNIVERSITY ***3140 WAIALAE AVE*** ***ESE 1/4 - 1/2 (0.257 mi.)*** ***BU358 / 9*** ***791***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 900037
Facility Id: 9-100309

MID PAC PETROLEUM 25 ***1505 S. KING ST.*** ***SSW 1/4 - 1/2 (0.264 mi.)*** ***BV363 / 4*** ***798***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 070020
Release ID: 960074
Release ID: 930032
Facility Id: 9-100041

DICK'S MONSARRAT SER ***3206 MONSARRAT AVE*** ***E 1/4 - 1/2 (0.267 mi.)*** ***BZ366 / 8*** ***804***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 030017

Facility Id: 9-101220

HERTZ RENT- A-CAR (A	***2424 KALAKAUA AVE***	***SW 1/4 - 1/2 (0.270 mi.)***	***367 / 8***	***806***
Facility Status: Site Cleanup Completed with EHE/EHMP				
Release ID: 080004				
Release ID: 080003				
Facility Id: 9-100759				
Facility Id: 9-101527				
GAS 'N GLO INC	***1670 MAKALOA ST***	***NNW 1/4 - 1/2 (0.271 mi.)***	***BW368 / 4***	***807***
Facility Status: Site Cleanup Completed (NFA)				
Release ID: 980097				
Facility Id: 9-100834				
AIM DIAMOND HEAD	***3203 MONSARRAT AVE.***	***E 1/4 - 1/2 (0.275 mi.)***	***BZ370 / 8***	***812***
Facility Status: Site Cleanup Completed (NFA)				
Facility Status: Active Remediation				
Release ID: 060018				
Release ID: 170003				
Release ID: 050026				
Release ID: 930096				
Facility Id: 9-100337				
U.S. POSTAL SERVICE	***330 SARATOGA RD***	***SW 1/4 - 1/2 (0.279 mi.)***	***372 / 8***	***829***
Facility Status: Site Cleanup Completed (NFA)				
Release ID: 890009				
Release ID: 040067				
Facility Id: 9-101770				
C&CH PAWAA FIRE STAT	1610 MAKALOA ST	N 1/4 - 1/2 (0.282 mi.)	374 / 4	831
Facility Status: Site Cleanup Completed (NFA)				
Release ID: 940137				
Facility Id: 9-100087				
HELE KING KALAKAUA #	***1549 S KING ST***	***S 1/4 - 1/2 (0.284 mi.)***	***BX375 / 5***	***832***
Facility Status: Site Cleanup Completed (NFA)				
Release ID: 100006				
Facility Id: 9-100059				
AIM KAPAHULU	***1001 KAPAHULU AVE***	***E 1/4 - 1/2 (0.286 mi.)***	***376 / 8***	***848***
Facility Status: Site Cleanup Completed (NFA)				
Facility Status: Site Cleanup Completed with EHE/EHMP				
Release ID: 900064				
Release ID: 160008				
Release ID: 150020				
Facility Id: 9-101175				
U.H. MOTOR POOL	***2027 EAST WEST RD***	***WSW 1/4 - 1/2 (0.288 mi.)***	***CA377 / 5***	***855***
Facility Status: Site Cleanup Completed (NFA)				
Release ID: 990083				
Facility Id: 9-102443				
MOANA SURFRIDER HOTE	***2365 KALAKAUA AVE***	***SW 1/4 - 1/2 (0.289 mi.)***	***379 / 8***	***858***
Facility Status: Site Cleanup Completed (NFA)				
Release ID: 930059				
Facility Id: 9-102647				
ALEXANDER TOWER	***1226 ALEXANDER ST***	***SE 1/4 - 1/2 (0.306 mi.)***	***383 / 5***	***863***
Facility Status: Site Cleanup Completed (NFA)				
Release ID: 010007				
Facility Id: 9-103531				
76 UNIVERSITY 7-11 #	***2646 S KING ST***	***NW 1/4 - 1/2 (0.311 mi.)***	***384 / 5***	***864***

Facility Status: Site Cleanup Completed (NFA)
Release ID: 090024
Facility Id: 9-101173

SEARS ROEBUCK & COMP ***1450 ALA MOANA BLVD*** ***WNW 1/4 - 1/2 (0.319 mi.)*** ***CB385 / 4*** ***872***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 930057
Facility Id: 9-101837

C&CH MCCULLY FIRE ST ***2425 DATE ST*** ***NE 1/4 - 1/2 (0.328 mi.)*** ***388 / 5*** ***894***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 910028
Facility Id: 9-100080

NEW OFFICE LOUNGE ***1551 KAPIOLANI BLVD*** ***NNW 1/4 - 1/2 (0.333 mi.)*** ***389 / 4*** ***895***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 060033
Release ID: 060012
Facility Id: 9-103517

YAJIMA OIL OF USA IN ***1375 S KING ST*** ***WSW 1/4 - 1/2 (0.340 mi.)*** ***390 / 4*** ***897***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 030031
Release ID: 930001
Facility Id: 9-100832

FIRESTONE STORE ***801 KAHEKA ST*** ***N 1/4 - 1/2 (0.349 mi.)*** ***391 / 4*** ***900***
Facility Status: Site Cleanup Completed (NFA)
Facility Status: Site Cleanup Completed with EHE/EHMP
Release ID: 920148
Release ID: 980048
Release ID: 970086
Facility Id: 9-102403
Facility Id: 9-102591

ROYAL HAWAIIAN HOTEL ***2259 KALAKAUA AVE*** ***SW 1/4 - 1/2 (0.365 mi.)*** ***394 / 8*** ***905***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 930047
Facility Id: 9-102646

HILTON HAWAIIAN VILL ***2005 KALIA RD*** ***SSE 1/4 - 1/2 (0.382 mi.)*** ***397 / 7*** ***912***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 140024
Release ID: 900106
Facility Id: 9-100818

PALOLO AUTO SERVICE, ***3236 WAIALAE AVE*** ***ESE 1/4 - 1/2 (0.387 mi.)*** ***398 / 9*** ***914***
Facility Status: Confirmed Release
Release ID: 200018
Facility Id: 9-100939

TEXACO STATION 61100 ***1119 UNIVERSITY AVE*** ***NW 1/4 - 1/2 (0.397 mi.)*** ***CC400 / 5*** ***920***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 900103
Facility Id: 9-100342

SCHUMAN CARRIAGE MOT ***1234 S BERETANIA ST*** ***W 1/4 - 1/2 (0.406 mi.)*** ***401 / 4*** ***924***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 060001
Release ID: 900058
Facility Id: 9-101276

SHERATON WAIKIKI RES ***2255 KALAKAUA AVE*** ***SW 1/4 - 1/2 (0.421 mi.)*** ***407 / 8*** ***940***

Facility Status: Site Cleanup Completed (NFA)
Release ID: 930027
Release ID: 090001
Facility Id: 9-102650

MCCULLY SERVICE STAT ***1901 S KING ST*** ***NNE 1/4 - 1/2 (0.431 mi.)*** ***CD409 / 5*** ***945***
Facility Status: Site Cleanup Completed with EHE/EHMP
Release ID: 180016
Facility Id: 9-101274

MID-PACIFIC INSTITUT ***2445 KAALA ST*** ***SW 1/4 - 1/2 (0.437 mi.)*** ***411 / 5*** ***947***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 980213
Facility Id: 9-101480

KYLE'S SERVICE STA. ***2550 S BERETANIA ST*** ***NW 1/4 - 1/2 (0.441 mi.)*** ***413 / 5*** ***951***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 910049
Facility Id: 9-100036

CUTTER CHEVROLET ***1391 KAPIOLANI BLVD*** ***NNW 1/4 - 1/2 (0.445 mi.)*** ***CH414 / 4*** ***952***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 950131
Facility Id: 9-100185

UNIVERSITY OF HAWAII ***2019 S KING ST*** ***NNE 1/4 - 1/2 (0.448 mi.)*** ***415 / 5*** ***954***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 960056
Facility Id: 9-103157

76 MCCULLY SERVICE # ***2105 S KING ST*** ***NNE 1/4 - 1/2 (0.449 mi.)*** ***CI416 / 5*** ***955***
Facility Status: Site Cleanup Completed with EHE/EHMP
Release ID: 020038
Release ID: 940104
Facility Id: 9-100341

HONOLULU LIMITED ***911 HAUSTEN ST*** ***NW 1/4 - 1/2 (0.464 mi.)*** ***424 / 5*** ***992***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 010049
Facility Id: 9-103656

SUPERBLOCK PROPERTIE ***SOUTH BLOCK (BLDG S2*** ***NNW 1/4 - 1/2 (0.466 mi.)*** ***CJ426 / 4*** ***994***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 920143
Facility Id: 9-102602

WENS LIFE CO., INC ***808 SHERIDAN ST*** ***SW 1/4 - 1/2 (0.470 mi.)*** ***428 / 4*** ***995***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 030035
Facility Id: 9-101330

TEXACO STATION 61100 ***1239 S KING ST*** ***WSW 1/4 - 1/2 (0.475 mi.)*** ***431 / 4*** ***999***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 980250
Release ID: 980194
Facility Id: 9-100340

SUPERBLOCK PROPERTIE ***NORTH BLOCK (BLDG N8*** ***NNW 1/4 - 1/2 (0.482 mi.)*** ***CJ432 / 4*** ***1004***
Facility Status: Site Cleanup Completed (NFA)
Release ID: 920139
Facility Id: 9-102594

KAIMUKI TOYOTA ***3282 WAIALAE AVE*** ***ESE 1/4 - 1/2 (0.482 mi.)*** ***433 / 9*** ***1005***

Facility Status: Site Cleanup Completed (NFA)
Release ID: 970103
Facility Id: 9-100880

GREEN MILL FOOD MANU	***914 COOLIDGE ST***	***NE 1/4 - 1/2 (0.485 mi.)***	***434 / 5***	***1010***
Facility Status: Site Cleanup Completed (NFA) Release ID: 950127 Facility Id: 9-103103				
TOM ISHII'S UNION L-	***2114 S KING ST***	***NE 1/4 - 1/2 (0.493 mi.)***	***CK437 / 5***	***1014***
Facility Status: Site Cleanup Completed (NFA) Release ID: 900023 Facility Id: 9-100042				
SUPERBLOCK PROPERTIE	***SOUTH BLOCK (BLDG S2***	***NNW 1/4 - 1/2 (0.494 mi.)***	***CJ438 / 4***	***1015***
Facility Status: Site Cleanup Completed (NFA) Release ID: 920144 Facility Id: 9-102603				

Lists of state and tribal registered storage tanks

HI UST: Underground Storage Tank Database

A review of the HI UST list, as provided by EDR, and dated 08/02/2022 has revealed that there are 88 HI UST sites within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
ALOHA MARINE	***1651 ALA MOANA BLVD***	***WSW 0 - 1/8 (0.019 mi.)***	***O90 / 7***	***170***
Tank Status: Permanently Out of Use Facility Id: 9-100167 Date Closed: 06/01/1985				
THE WATERMARK WAIKIK	1551 ALA WAI BLVD	SSE 0 - 1/8 (0.021 mi.)	H93 / 7	173
Tank Status: Currently in Use Facility Id: 9-103868				
ALA WAI SERVICE INC.	***407 KAPAHULU AVE***	***ENE 0 - 1/8 (0.026 mi.)***	***Q96 / 8***	***182***
Tank Status: Currently in Use Tank Status: Permanently Out of Use Facility Id: 9-101211 Date Closed: 01/01/1982 Date Closed: 11/18/1994				
ALA WAI GOLF COURSE	***404 KAPAHULU AVE***	***ENE 0 - 1/8 (0.026 mi.)***	***Q99 / 8***	***190***
Tank Status: Currently In Use Facility Id: 9-103389				
ALA WAI GOLF COURSE	***484 KAPAHULU AVE***	***ESE 0 - 1/8 (0.027 mi.)***	***101 / 8***	***195***
Tank Status: Permanently Out of Use Facility Id: 9-102885 Date Closed: 10/25/1993 Date Closed: 11/16/1993				
76 KAPAHULU 7-11 #11	***505 KAPAHULU AVE***	***ESE 0 - 1/8 (0.038 mi.)***	***R108 / 8***	***202***
Tank Status: Currently In Use Tank Status: Permanently Out of Use Facility Id: 9-100103				

Date Closed: 01/01/1987
Date Closed: 11/18/1987
Date Closed: 11/18/1997

PUBLIC BATH WASTEWAT	***2729 KALAKAUA AVE***	***N 0 - 1/8 (0.038 mi.)***	***110 / 8***	***217***
Tank Status: Currently in Use Facility Id: 9-201985				
KIM CHAU LAUNDERETTE	517 KAPAHULU AVE	ESE 0 - 1/8 (0.039 mi.)	R112 / 8	220
Tank Status: Permanently Out of Use Facility Id: 9-100766 Date Closed: 11/15/1992				
SEVEN HAWAIIANS CORP	2960 WAIALAE AVE	SSW 0 - 1/8 (0.049 mi.)	U124 / 5	238
Tank Status: Permanently Out of Use Facility Id: 9-102216				
KAPIOLANI TEXACO 919	***2969 S KING ST***	***SE 0 - 1/8 (0.050 mi.)***	***V127 / 5***	***247***
Tank Status: Currently in Use Tank Status: Temporarily out of Use Facility Id: 9-101247				
HELE KAPAHULU #61013	***707 KAPAHULU AVE***	***NE 0 - 1/8 (0.055 mi.)***	***S134 / 8***	***257***
Tank Status: Currently In Use Tank Status: Permanently out of Use Facility Id: 9-100914 Date Closed: 11/18/2008				
MAKIKI FIRE STATION	***1202 WILDER AVE***	***WSW 0 - 1/8 (0.059 mi.)***	***137 / 4***	***268***
Tank Status: Currently in Use Tank Status: Permanently Out of Use Facility Id: 9-100081 Date Closed: 05/18/1991				
BERGERS AUTOHAUS INC	***3030 WAIALAE AVE***	***SE 0 - 1/8 (0.066 mi.)***	***X141 / 5***	***277***
Tank Status: Permanently Out of Use Facility Id: 9-101454 Date Closed: 05/13/1995				
MANOA SERVICE 95683	***2927 E MANOA RD***	***N 0 - 1/8 (0.072 mi.)***	***Z145 / 6***	***291***
Tank Status: Currently In Use Tank Status: Currently in Use Tank Status: Permanently Out of Use Facility Id: 9-101246 Date Closed: 03/21/1997				
MANOA CENTRAL OFFICE	***2803 LOWREY AVE***	***SW 0 - 1/8 (0.074 mi.)***	***148 / 6***	***301***
Tank Status: Currently in Use Facility Id: 9-100517				
KEE - THEMA INC	3060 KAPIOLANI BLVD	SSW 0 - 1/8 (0.076 mi.)	150 / 5	303
Tank Status: Permanently Out of Use Facility Id: 9-103795 Date Closed: 04/25/2005				
SERAI'S UNION SERVIC	***3011 WAIALAE AVE***	***S 0 - 1/8 (0.076 mi.)***	***U152 / 5***	***306***
Tank Status: Permanently Out of Use Facility Id: 9-100044 Date Closed: 05/27/1992 Date Closed: 03/30/1990				
FREDERICK FONG M.D.	***3034 AND 3036 WAIALA***	***ESE 0 - 1/8 (0.079 mi.)***	***X157 / 5***	***312***
Tank Status: Permanently out of Use				

Facility Id: 9-103834
Date Closed: 06/18/2007

ARCADIA RETIREMENT	***1434 PUNAHOU ST***	***SE 0 - 1/8 (0.080 mi.)***	***158 / 5***	***313***
Tank Status: Permanently Out of Use Facility Id: 9-103458 Date Closed: 07/07/1998				
ALOHA MOTORS	***KAPIOLANI BLVD X KAL***	***NNW 0 - 1/8 (0.080 mi.)***	***AB159 / 5***	***314***
Tank Status: Permanently Out of Use Facility Id: 9-102160 Date Closed: 08/21/1995 Date Closed: 08/24/1995 Date Closed: 10/18/1995 Date Closed: 10/29/1996				
DANA LABELS COMPANY	3035 WAIALAE AVE	SE 0 - 1/8 (0.088 mi.)	X166 / 5	337
Tank Status: Permanently Out of Use Facility Id: 9-101905 Date Closed: 12/13/1989				
JIMMY'S CHEVRON SERV	1958 KALAKAUA AVE	SW 0 - 1/8 (0.089 mi.)	AE171 / 8	342
Tank Status: Permanently Out of Use Facility Id: 9-101106				
HONOLULU PRINCE	415 NAHUA ST	SW 0 - 1/8 (0.092 mi.)	W176 / 8	347
Tank Status: Permanently Out of Use Facility Id: 9-103092 Date Closed: 06/27/1995				
DOLLAR RENT-A-CAR	1801 KALAKAUA AVE	N 0 - 1/8 (0.094 mi.)	AB178 / 5	348
Tank Status: Permanently Out of Use Facility Id: 9-101267 Date Closed: 06/15/1979				
PRINCE WAIKIKI	***100 HOLOMOANA ST***	***S 0 - 1/8 (0.094 mi.)***	***183 / 7***	***361***
Tank Status: Currently In Use Facility Id: 9-103903				
SHRINERS HOSPITALS F	***1310 PUNAHOU ST***	***SE 0 - 1/8 (0.095 mi.)***	***AG184 / 5***	***362***
Tank Status: Permanently Out of Use Tank Status: Permanently out of Use Facility Id: 9-102410 Date Closed: 06/28/1991 Date Closed: 08/10/2009				
ALOHA CAMPBELL	***3327 CAMPBELL AVE***	***ESE 0 - 1/8 (0.095 mi.)***	***AH185 / 8***	***364***
Tank Status: Currently In Use Tank Status: Permanently Out of Use Facility Id: 9-101185 Date Closed: 07/17/1997				
ALOHA MANOA	***3001 E MANOA RD***	***S 0 - 1/8 (0.096 mi.)***	***AI186 / 6***	***373***
Tank Status: Temporarily out of Use Tank Status: Currently In Use Facility Id: 9-100049				
STAN'S UNION SERVICE	***3045 MONSARRAT AVE***	***E 0 - 1/8 (0.100 mi.)***	***AK193 / 8***	***387***
Tank Status: Permanently Out of Use Facility Id: 9-100048				
C&CH MANOA FIRE STAT	***2850 E MANOA RD***	***WNW 0 - 1/8 (0.106 mi.)***	***AD204 / 5***	***403***
Tank Status: Permanently Out of Use				

Facility Id: 9-100086
Date Closed: 10/27/1993

KAPIOLANI WOMEN'S &	***1319 PUNAHOU ST***	***ESE 0 - 1/8 (0.109 mi.)***	***AG207 / 5***	***408***
Tank Status: Permanently Out of Use Tank Status: Permanently out of Use Facility Id: 9-100740 Date Closed: 04/16/1996 Date Closed: 07/23/2014				
JH SAKAMOTO & ASSOCI	3335 CAMPBELL AVE	ESE 0 - 1/8 (0.110 mi.)	AH212 / 8	431
Tank Status: Permanently Out of Use Facility Id: 9-102553 Date Closed: 02/05/1992				
FUNAI'S UNION SERVIC	***1810 KAPIOLANI BLVD***	***N 0 - 1/8 (0.110 mi.)***	***AL213 / 5***	***432***
Tank Status: Permanently Out of Use Facility Id: 9-100047 Date Closed: 06/10/1991				
GOOSE'S EDGE INC 139	***755 KAPAHULU AVE.***	***NE 0 - 1/8 (0.112 mi.)***	***AN218 / 8***	***445***
Tank Status: Permanently Out of Use Tank Status: Permanently out of Use Facility Id: 9-101020 Date Closed: 02/01/1995 Date Closed: 04/01/1996 Date Closed: 07/19/2001 Date Closed: 09/21/2010				
MIDAS MUFFLER KAIMUK	3051 WAIALAE AVE	SE 0 - 1/8 (0.115 mi.)	AO221 / 5	457
Tank Status: Permanently Out of Use Facility Id: 9-103386 Date Closed: 11/30/1999				
ROGER'S CHEVRON	***3048 WAIALAE AVE***	***ESE 0 - 1/8 (0.119 mi.)***	***AO223 / 5***	***459***
Tank Status: Permanently out of Use Facility Id: 9-101273 Date Closed: 07/01/2007				
AOAO ALA MOANA HOTEL	***410 ATKINSON DR***	***N 0 - 1/8 (0.120 mi.)***	***AP225 / 4***	***466***
Tank Status: Currently In Use Tank Status: Permanently Out of Use Facility Id: 9-101159 Date Closed: 02/22/1999				
BUDGET RENT-A-CAR SY	2330 KUHIO AVE	SW 0 - 1/8 (0.120 mi.)	AQ227 / 8	473
Tank Status: Permanently Out of Use Facility Id: 9-101361 Date Closed: 06/24/1993				
CHEVRON U.S.A., INC.	2002 KALAKAUA AVE	SW 0 - 1/8 (0.121 mi.)	AR230 / 8	479
Tank Status: Permanently Out of Use Facility Id: 9-101266				
ROYAL KUHIO CONDOMIN	***2240 KUHIO AVE***	***SW 0 - 1/8 (0.122 mi.)***	***233 / 8***	***482***
Tank Status: Permanently Out of Use Facility Id: 9-103574 Date Closed: 02/21/2000				
MANOA MART/MANOA LIQ	***2955 E MANOA RD***	***NNE 0 - 1/8 (0.123 mi.)***	***AS235 / 6***	***483***
Tank Status: Permanently Out of Use Tank Status: Permanently out of Use				

Facility Id: 9-101188
Date Closed: 06/26/1996
Date Closed: 09/17/2007

MID PAC PETROLEIM 25 ***2809 E MANOA RD*** ***W 1/8 - 1/4 (0.126 mi.)*** ***AT237 / 5*** ***490***
Tank Status: Permanently Out of Use
Tank Status: Permanently out of Use
Facility Id: 9-100039
Date Closed: 08/01/1997
Date Closed: 08/01/1987
Date Closed: 12/16/2010
Date Closed: 12/04/2013

RICHARD'S CHEVRON 1509 S BERETANIA ST SSW 1/8 - 1/4 (0.129 mi.) AV242 / 5 500
Tank Status: Permanently Out of Use
Facility Id: 9-101122
Date Closed: 11/01/1987
Date Closed: 11/01/1979

ABC STORE 21 ***2394 KUHIO AVE*** ***SW 1/8 - 1/4 (0.134 mi.)*** ***AU245 / 8*** ***503***
Tank Status: Permanently Out of Use
Tank Status: Permanently out of Use
Facility Id: 9-100728
Date Closed: 02/05/2004

BEACH WALK WASTEWATE ***377 KAIOLU ST*** ***SW 1/8 - 1/4 (0.135 mi.)*** ***AW247 / 8*** ***506***
Tank Status: Currently in Use
Facility Id: 9-101975

WAIKIKI CENTRAL OFFI ***214 KAPUNI ST.*** ***SW 1/8 - 1/4 (0.138 mi.)*** ***AX248 / 8*** ***508***
Tank Status: Currently In Use
Tank Status: Permanently Out of Use
Facility Id: 9-100535
Date Closed: 11/12/1996

PFLUEGER ACURA ***1450 S BERETANIA ST*** ***WSW 1/8 - 1/4 (0.139 mi.)*** ***AY249 / 4*** ***510***
Tank Status: Permanently Out of Use
Facility Id: 9-100192
Date Closed: 10/02/1991

MIRAMAR HOTEL HAWAII ***2345 KUHIO AVE*** ***SW 1/8 - 1/4 (0.145 mi.)*** ***AQ251 / 8*** ***515***
Tank Status: Permanently Out of Use
Tank Status: Permanently out of Use
Facility Id: 9-101531
Date Closed: 10/27/1992
Date Closed: 09/22/2014

GREEN THUMB INCORPOR ***3363 CAMPBELL AVE*** ***ESE 1/8 - 1/4 (0.147 mi.)*** ***254 / 8*** ***524***
Tank Status: Permanently Out of Use
Facility Id: 9-101368
Date Closed: 12/17/1998

IOLANI SCHOOL 563 KAMOKU ST N 1/8 - 1/4 (0.148 mi.) AZ256 / 8 528
Tank Status: Permanently Out of Use
Facility Id: 9-100774
Date Closed: 12/28/1988
Date Closed: 08/20/1998

2ND AVENUE SHELL ***3075 WAIALAE AVE*** ***SE 1/8 - 1/4 (0.151 mi.)*** ***AO261 / 5*** ***541***
Tank Status: Permanently out of Use
Tank Status: Currently In Use

Tank Status: Permanently Out of Use
Facility Id: 9-100314
Date Closed: 08/08/2016
Date Closed: 02/07/1994

MAKIKI SHELL ***1436 S BERETANIA ST*** ***WSW 1/8 - 1/4 (0.159 mi.)*** ***AY268 / 4*** ***566***
Tank Status: Permanently Out of Use
Facility Id: 9-100833
Date Closed: 07/06/1998
Date Closed: 04/12/2004
Date Closed: 01/24/1994
Date Closed: 10/31/2005

HONOLULU STATION - P ***1455 S BERETANIA ST*** ***SW 1/8 - 1/4 (0.160 mi.)*** ***AY271 / 4*** ***586***
Tank Status: Permanently Out of Use
Facility Id: 9-100114
Date Closed: 04/22/1998

JCRA INVESTMENTS 1685 KAPIOLANI PROPE N 1/8 - 1/4 (0.160 mi.) BC273 / 4 589
Tank Status: Permanently out of Use
Facility Id: 9-103857
Date Closed: 03/10/2008

KUHIO CLEANERS 810 KAPAHULU AVE NE 1/8 - 1/4 (0.161 mi.) 275 / 8 590
Tank Status: Permanently Out of Use
Facility Id: 9-100265
Date Closed: 05/02/1991

AIM WAIKIKI ***2025 KALAKAUA AVE.*** ***SW 1/8 - 1/4 (0.161 mi.)*** ***276 / 8*** ***590***
Tank Status: Currently in Use
Tank Status: Permanently Out of Use
Facility Id: 9-100328
Date Closed: 08/10/1994

KALAKAUA GARDENS ***1723 KALAKAUA AVE*** ***N 1/8 - 1/4 (0.161 mi.)*** ***278 / 5*** ***599***
Tank Status: Currently In Use
Facility Id: 9-103945

MATSUSHITA INVESTMEN ***2237 KUHIO AVE*** ***SW 1/8 - 1/4 (0.163 mi.)*** ***279 / 8*** ***600***
Tank Status: Permanently Out of Use
Facility Id: 9-103083
Date Closed: 05/10/1995

ONE KALAKAUA PARTNER 1314 KALAKAUA AVE SSW 1/8 - 1/4 (0.166 mi.) AV280 / 5 601
Tank Status: Permanently Out of Use
Facility Id: 9-103140

OUTRIGGER HOTELS 1315 KALAKAUA AVE SSW 1/8 - 1/4 (0.166 mi.) BE282 / 5 603
Tank Status: Permanently Out of Use
Facility Id: 9-101431
Date Closed: 07/03/1991

HAWAIIAN HUMANE SOCI 2700 WAIALAE AVE NW 1/8 - 1/4 (0.168 mi.) 284 / 5 608
Tank Status: Permanently Out of Use
Facility Id: 9-101528
Date Closed: 01/16/1989

SHELL SERVICE STATIO ***2740 E MANOA RD*** ***NW 1/8 - 1/4 (0.169 mi.)*** ***BF288 / 5*** ***620***
Tank Status: Permanently Out of Use
Facility Id: 9-100312
Date Closed: 02/01/2000

MOANA PARK WASTEWATE ***1501 ALA MOANA BLVD*** ***WNW 1/8 - 1/4 (0.172 mi.)*** ***290 / 4*** ***623***

Tank Status: Currently In Use
Facility Id: 9-103665

KAPIOLANI MEDICAL CE	***1637 BINGHAM ST***	***ESE 1/8 - 1/4 (0.173 mi.)***	***291 / 5***	***625***

Tank Status: Currently in Use
Facility Id: 9-103919

KING KALAKAUA PLAZA	***2080 KALAKAUA AVE***	***SW 1/8 - 1/4 (0.173 mi.)***	***292 / 8***	***626***

Tank Status: Permanently Out of Use
Facility Id: 9-103235
Date Closed: 07/24/1996

7-11 SECOND AVENUE	***3105 WAIALAE AVE***	***SE 1/8 - 1/4 (0.178 mi.)***	***BG293 / 5***	***627***

Tank Status: Permanently out of Use
Facility Id: 9-101191
Date Closed: 07/06/2009

76 KALAKAUA/YOUNG 7-	***1323 KALAKAUA AVE***	***S 1/8 - 1/4 (0.184 mi.)***	***BE295 / 5***	***634***

Tank Status: Currently in Use
Tank Status: Currently In Use
Tank Status: Permanently out of Use
Facility Id: 9-101172
Date Closed: 06/12/2009

DISCOVERY BAY	***1778 ALA MOANA BLVD***	***SSE 1/8 - 1/4 (0.186 mi.)***	***BD296 / 7***	***639***

Tank Status: Permanently Out of Use
Facility Id: 9-101921
Date Closed: 01/04/1990

76 DON'S MAKIKI #111	***1406 S BERETANIA ST***	***WSW 1/8 - 1/4 (0.191 mi.)***	***BB299 / 4***	***642***

Tank Status: Currently In Use
Tank Status: Permanently Out of Use
Facility Id: 9-100035
Date Closed: 12/30/1987
Date Closed: 10/01/1996

NOAA - HONOLULU LABO	***2570 DOLE ST***	***NNW 1/8 - 1/4 (0.194 mi.)***	***305 / 5***	***672***

Tank Status: Permanently Out of Use
Facility Id: 9-103311
Date Closed: 09/04/1997
Date Closed: 09/06/1997

DAVENROYE DRY CLEANE	***1042 KAPAHULU AVE***	***SSW 1/8 - 1/4 (0.194 mi.)***	***BI306 / 8***	***673***

Tank Status: Permanently Out of Use
Facility Id: 9-101540
Date Closed: 11/29/1990
Date Closed: 04/09/1996

PUNAHOU SCHOOL - PHY	***1601 PUNAHOU ST.***	***ENE 1/8 - 1/4 (0.196 mi.)***	***BJ308 / 5***	***684***

Tank Status: Permanently out of Use
Tank Status: Permanently Out of Use
Facility Id: 9-101653
Facility Id: 9-101654
Facility Id: 9-100297
Date Closed: 11/05/2020
Date Closed: 12/06/1990
Date Closed: 12/11/1989

AVIS RENT- A-CAR SYS	***148 KAIULANI AVE***	***SW 1/8 - 1/4 (0.198 mi.)***	***BK314 / 8***	***696***

Tank Status: Permanently Out of Use
Facility Id: 9-100173

ROYAL HAWAIIAN MARKE	333 ROYAL HAWAIIAN A	SW 1/8 - 1/4 (0.200 mi.)	BH315 / 8	697

Tank Status: Permanently Out of Use
Facility Id: 9-100874
Date Closed: 02/01/1999

CM&D ***2112 KALAKAUA AVE*** ***SW 1/8 - 1/4 (0.206 mi.)*** ***317 / 8*** ***704***
Tank Status: Permanently Out of Use
Facility Id: 9-103734
Date Closed: 10/17/2001

KAPIOLANI RESIDENCE 1631 KAPIOLANI BLVD NNW 1/8 - 1/4 (0.207 mi.) BL318 / 4 705
Tank Status: Permanently out of Use
Facility Id: 9-103963
Date Closed: 09/01/2017
Date Closed: 10/13/2017
Date Closed: 10/16/2017

KING'S VILLAGE SHOPP ***131 KAIULANI AVE*** ***SW 1/8 - 1/4 (0.212 mi.)*** ***BK323 / 8*** ***713***
Tank Status: Permanently Out of Use
Facility Id: 9-103611
Date Closed: 11/26/1999

LOVES BAKERY ***836 KAPAHULU AVE*** ***NE 1/8 - 1/4 (0.223 mi.)*** ***BP332 / 8*** ***735***
Tank Status: Permanently Out of Use
Facility Id: 9-101278
Date Closed: 12/01/1981

ILIKAI HOTEL ***1777 ALA MOANA BLVD*** ***SSE 1/8 - 1/4 (0.224 mi.)*** ***BR335 / 7*** ***745***
Tank Status: Permanently Out of Use
Facility Id: 9-102181
Date Closed: 05/15/1990

GAS PLUS ***1524 S KING ST*** ***SSW 1/8 - 1/4 (0.226 mi.)*** ***BQ336 / 4*** ***745***
Tank Status: Permanently Out of Use
Facility Id: 9-100224
Date Closed: 07/20/1995
Date Closed: 07/21/1995

BERETANIA TEXACO 904 ***1378 S BERETANIA ST*** ***W 1/8 - 1/4 (0.229 mi.)*** ***BO337 / 4*** ***746***
Tank Status: Currently In Use
Tank Status: Currently in Use
Facility Id: 9-101720

KYOTARU HAWAII CORPO ***2160 KALAKAUA AVE*** ***SW 1/8 - 1/4 (0.231 mi.)*** ***BN339 / 8*** ***754***
Tank Status: Permanently Out of Use
Facility Id: 9-103722
Date Closed: 01/01/1986

DOROTHY TANAKA 3423 CAMPBELL AVE ENE 1/8 - 1/4 (0.231 mi.) 340 / 8 755
Tank Status: Permanently Out of Use
Facility Id: 9-100947
Date Closed: 03/01/1985

WAIKIKI SHOPPING PLA ***2250 KALAKAUA AVE*** ***SW 1/8 - 1/4 (0.231 mi.)*** ***BH341 / 8*** ***755***
Tank Status: Permanently out of Use
Facility Id: 9-103520
Date Closed: 07/02/2009
Date Closed: 06/16/2018

FORMERLY DUNKIN DOUG ***900 KAPAHULU AVE*** ***E 1/8 - 1/4 (0.232 mi.)*** ***BS344 / 8*** ***762***
Tank Status: Permanently out of Use
Facility Id: 9-103835
Date Closed: 05/24/2007

Date Closed: 05/30/2007

YONEOKA AND ASSOCIAT	***2174/2190 KALAKAUA A***	***SW 1/8 - 1/4 (0.234 mi.)***	***BT345 / 8***	***763***
Tank Status: Permanently Out of Use Facility Id: 9-103024				
FORT DERUSSY CENTRAL	***ALA MOANA BLVD & KAL***	***SSE 1/8 - 1/4 (0.239 mi.)***	***350 / 8***	***770***
Tank Status: Permanently Out of Use Facility Id: 9-101787 Date Closed: 11/12/1998				
FORT DERUSSY MILITAR	***BLDG 107 AND 108***	***SW 1/8 - 1/4 (0.245 mi.)***	***353 / 8***	***783***
Tank Status: Permanently Out of Use Facility Id: 9-103512 Date Closed: 12/21/1993				

State and tribal institutional control / engineering control registries

HI ENG CONTROLS: Engineering Control Sites

A review of the HI ENG CONTROLS list, as provided by EDR, and dated 04/17/2019 has revealed that there are 8 HI ENG CONTROLS sites within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
YACHT HARBOR TOWERS	***1600 ALA MOANA BLVD***	***NNW 0 - 1/8 (0.040 mi.)***	***P113 / 4***	***220***
BERGER AUTOHAUS, INC	***3030 WAIALAE AVE***	***SE 0 - 1/8 (0.066 mi.)***	***X140 / 5***	***275***
MIRAMAR HOTEL INTERN	***2345 KUHIO AVE***	***SW 1/8 - 1/4 (0.145 mi.)***	***AQ250 / 8***	***514***
1414 KALAKAUA AVENUE	***1414 KALAKAUA AVE***	***SSW 1/8 - 1/4 (0.223 mi.)***	***BQ333 / 5***	***738***
KALAKAUA TRANSMISSIO	***1665 KALAKAUA AVE***	***NNW 1/4 - 1/2 (0.253 mi.)***	***BW355 / 5***	***788***
2700 SOUTH KING STRE	***2700 S KING ST***	***NW 1/4 - 1/2 (0.263 mi.)***	***362 / 5***	***794***
GRACE OTSUKA APARTME	***1233 YOUNG ST***	***W 1/4 - 1/2 (0.420 mi.)***	***CF406 / 4***	***939***
76 MCCULLY SERVICE #	***2105 S KING ST***	***NNE 1/4 - 1/2 (0.449 mi.)***	***CI416 / 5***	***955***

HI INST CONTROL: Sites with Institutional Controls

A review of the HI INST CONTROL list, as provided by EDR, and dated 04/17/2019 has revealed that there are 13 HI INST CONTROL sites within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
YACHT HARBOR TOWERS	***1600 ALA MOANA BLVD***	***NNW 0 - 1/8 (0.040 mi.)***	***P113 / 4***	***220***
BERGER AUTOHAUS, INC	***3030 WAIALAE AVE***	***SE 0 - 1/8 (0.066 mi.)***	***X140 / 5***	***275***
MIRAMAR HOTEL INTERN	***2345 KUHIO AVE***	***SW 1/8 - 1/4 (0.145 mi.)***	***AQ250 / 8***	***514***
PUNAHOU SCHOOL WINNE	***1601 PUNAHOU ST***	***ENE 1/8 - 1/4 (0.196 mi.)***	***BJ312 / 5***	***695***
1414 KALAKAUA AVENUE	***1414 KALAKAUA AVE***	***SSW 1/8 - 1/4 (0.223 mi.)***	***BQ333 / 5***	***738***
KALAKAUA TRANSMISSIO	***1665 KALAKAUA AVE***	***NNW 1/4 - 1/2 (0.253 mi.)***	***BW355 / 5***	***788***
2700 SOUTH KING STRE	***2700 S KING ST***	***NW 1/4 - 1/2 (0.263 mi.)***	***362 / 5***	***794***
HECO TRANSFORMER V84	***151 KAPAHULU AVE***	***NNW 1/4 - 1/2 (0.298 mi.)***	***382 / 8***	***862***
HECO SUBSTATION: MAK	***1544 MAKALOA ST***	***N 1/4 - 1/2 (0.361 mi.)***	***393 / 4***	***904***
SCHUMAN CARRIAGE MOT	***1234 S BERETANIA ST***	***W 1/4 - 1/2 (0.406 mi.)***	***401 / 4***	***924***
205 BEACH WALK	***205 BEACH WALK AVE***	***SW 1/4 - 1/2 (0.414 mi.)***	***403 / 8***	***935***
GRACE OTSUKA APARTME	***1233 YOUNG ST***	***W 1/4 - 1/2 (0.420 mi.)***	***CF406 / 4***	***939***
76 MCCULLY SERVICE #	***2105 S KING ST***	***NNE 1/4 - 1/2 (0.449 mi.)***	***CI416 / 5***	***955***

EXECUTIVE SUMMARY

Lists of state and tribal voluntary cleanup sites

HI VCP: Voluntary Response Program Sites

A review of the HI VCP list, as provided by EDR, and dated 02/22/2022 has revealed that there is 1 HI VCP site within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
1414 KALAKAUA AVENUE	***1414 KALAKAUA AVE***	***SSW 1/8 - 1/4 (0.223 mi.)***	***BQ333 / 5***	***738***

Lists of state and tribal brownfield sites

HI BROWNFIELDS: Brownfields Sites

A review of the HI BROWNFIELDS list, as provided by EDR, and dated 02/22/2022 has revealed that there is 1 HI BROWNFIELDS site within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
HALE MAKANA O MOILII	***2139 ALGAROBA STREET***	***NE 1/4 - 1/2 (0.420 mi.)***	***CE405 / 5***	***938***

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

HI SWRCY: SWRCY

A review of the HI SWRCY list, as provided by EDR, and dated 09/14/2022 has revealed that there are 5 HI SWRCY sites within approximately 0.5 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
RRR RECYCLING - KAPA	548 KAPAHULU AVE.	ESE 0 - 1/8 (0.027 mi.)	102 / 8	196
MONSTER HI-5 & TIRES	2960 WAIALAE AVENUE	SSW 0 - 1/8 (0.049 mi.)	U123 / 5	238
MAKIKI SHELL	***1436 S BERETANIA ST***	***WSW 1/8 - 1/4 (0.159 mi.)***	***AY268 / 4***	***566***
RRR RECYCLING - WAIA	3109 WAIALAE AVE.	SE 1/8 - 1/4 (0.197 mi.)	BG313 / 5	696
REYNOLDS RECYCLING -	1106 UNIVERSITY AVE.	NW 1/4 - 1/2 (0.420 mi.)	CC404 / 5	938

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 11/21/2022 has revealed that there are 37 RCRA NonGen / NLR sites within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
UNOCAL 76 SS L 4573	505 KAPAHULU AVE	ESE 0 - 1/8 (0.038 mi.)	R106 / 8	199

EPA ID:: HID984468868				
MONSTER HI-5 & TIRES EPA ID:: HIR000142380	2960 WAIALAE AVE	SSW 0 - 1/8 (0.049 mi.)	U122 / 5	234
MONSTER HI-5 & TIRES EPA ID:: HID981663230	***2960 WAIALAE AVE***	***SSW 0 - 1/8 (0.049 mi.)***	***U125 / 5***	***239***
THE PALMS, INC. EPA ID:: HIP000143727	***431 NAHUA STREET***	***SW 0 - 1/8 (0.066 mi.)***	***W139 / 8***	***271***
BERGERS AUTOHAUS INC EPA ID:: HID982017170	***3030 WAIALAE AVE***	***SE 0 - 1/8 (0.066 mi.)***	***X141 / 5***	***277***
IES RETAIL MANOA EPA ID:: HID981970478	***2927 E MANOA RD***	***N 0 - 1/8 (0.072 mi.)***	***Z147 / 6***	***298***
UNOCAL 76 SS L 4922 EPA ID:: HID984468819	3011 WAIALAE AVE	S 0 - 1/8 (0.076 mi.)	U154 / 5	308
COSMOS JEWELRY LTD. EPA ID:: HIR000141317	438 HOBRON LN #202	SSE 0 - 1/8 (0.080 mi.)	AC161 / 8	318
I L W U LOCAL 142 EPA ID:: HIP000122101	451 ATKINSON DR	NNW 0 - 1/8 (0.082 mi.)	165 / 4	334
CONSUMER TIRE WAREHO EPA ID:: HID981657125	***3040 WAIALAE AVE***	***ESE 0 - 1/8 (0.088 mi.)***	***X167 / 5***	***337***
JIMMY'S CHEVRON SERV EPA ID:: HID981661085	***1958 KALAKAUA AVE***	***SW 0 - 1/8 (0.089 mi.)***	***AE172 / 8***	***343***
HAWAII CONVENTION CE EPA ID:: HIP000040451	***1801 KALAKAUA AVE***	***N 0 - 1/8 (0.094 mi.)***	***AB180 / 5***	***356***
ISLAND TRIATHLON & B EPA ID:: HID981614472	***3312 CAMPBELL AVE***	***ESE 0 - 1/8 (0.098 mi.)***	***AF189 / 8***	***377***
FURUMOTO FAMILY PART EPA ID:: HIP000033795	1135 KAPAHULU	S 0 - 1/8 (0.098 mi.)	AJ190 / 5	381
VETERANS OF FOREIGN EPA ID:: HIR000033803	***1135 KAPAHULU***	***S 0 - 1/8 (0.098 mi.)***	***AJ191 / 5***	***384***
B & S AUTOMOTIVE TEC EPA ID:: HID981573959	***1789 KAPIOLANI***	***N 0 - 1/8 (0.102 mi.)***	***AB197 / 5***	***391***
UNOCAL 76 SS L 5583 EPA ID:: HID984468769	***1818 KAPIOLANI BLVD***	***N 0 - 1/8 (0.106 mi.)***	***AL203 / 5***	***401***
MAL MAT AUTO LEASING EPA ID:: HID981656390	***3335 CAMPBELL AVE***	***ESE 0 - 1/8 (0.110 mi.)***	***AH211 / 8***	***428***
ROCK STAR TATTOOS EPA ID:: HIP000140901	2270 B KUHIO AVE	SW 0 - 1/8 (0.110 mi.)	AM215 / 8	435
WINAM SHELL SERVICE EPA ID:: HID981977853	***755 KAPAHULU AVE***	***NE 0 - 1/8 (0.112 mi.)***	***AN217 / 8***	***441***
DAIO USA CORP EPA ID:: HID984468306	***2002 KALAKAUA AVE***	***SW 0 - 1/8 (0.121 mi.)***	***AR229 / 8***	***475***
S.W.A.T. GUN CLUB EPA ID:: HIP000145359	2266 KUHIO AVE	SW 0 - 1/8 (0.125 mi.)	AM236 / 8	487
UNOCAL S S NO 3923 EPA ID:: HIR000000414	2809 E MANOA RD	W 1/8 - 1/4 (0.126 mi.)	AT238 / 5	495
ABC STORES NO 21	2394 KUHIO AVE	SW 1/8 - 1/4 (0.134 mi.)	AU246 / 8	504

EPA ID:: HIP000135855				
REMEDIATION SPECIALI	***2440 KUHIO AVE STE 1***	***SW 1/8 - 1/4 (0.146 mi.)***	***AX252 / 8***	***516***
EPA ID:: HID982494916				
WAIKIKI MARINA HOTEL	***1956 ALA MOANA BLVD***	***SW 1/8 - 1/4 (0.158 mi.)***	***266 / 8***	***559***
EPA ID:: HID982511883				
SHELL SERVICE STATIO	***1436 S BERETANIA***	***WSW 1/8 - 1/4 (0.159 mi.)***	***AY267 / 4***	***562***
EPA ID:: HIR000109934				
MAKIKI SHELL	1436 S BERETANIA	WSW 1/8 - 1/4 (0.159 mi.)	AY269 / 4	573
EPA ID:: HIR000082081				
LA PIETRA HAWAII SCH	***2933 PONI MOI ROAD***	***E 1/8 - 1/4 (0.168 mi.)***	***283 / 11***	***603***
EPA ID:: HIR000132837				
TENNEY'S MANOA SHELL	2740 E MANOA RD	NW 1/8 - 1/4 (0.169 mi.)	BF287 / 5	616
EPA ID:: HID981159361				
UNOCAL 76 SS L 0344	***1406 S BERETANIA ST***	***WSW 1/8 - 1/4 (0.191 mi.)***	***BB300 / 4***	***656***
EPA ID:: HID984468728				
WESTERN GUN SCHOOL O	339 ROYAL HAWAIIAN A	SW 1/8 - 1/4 (0.192 mi.)	BH302 / 8	660
EPA ID:: HIP000035147				
DAVENROYE DRY CLEANE	***1042 KAPAHULU AVE***	***SSW 1/8 - 1/4 (0.194 mi.)***	***BI306 / 8***	***673***
EPA ID:: HID984467746				
PUNAHOU SCHOOL	***1601 PUNAHOU STREET***	***ENE 1/8 - 1/4 (0.196 mi.)***	***BJ309 / 5***	***688***
EPA ID:: HIR000133991				
LONGS DRUG STORE #10	***1401 S BERETANIA ST***	***WSW 1/8 - 1/4 (0.216 mi.)***	***BO329 / 4***	***727***
EPA ID:: HIR000143461				
ILIKAI	***1777 ALA MOANA BLVD***	***SSE 1/8 - 1/4 (0.224 mi.)***	***BR334 / 7***	***739***
EPA ID:: HID982402166				
SAFEWAY INC	900 KAPAHULU AVE	E 1/8 - 1/4 (0.232 mi.)	BS343 / 8	759
EPA ID:: HIP000138230				

FUDS: Formerly Used Defense Sites

A review of the FUDS list, as provided by EDR, and dated 08/11/2022 has revealed that there are 17 FUDS sites within approximately1 mile of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
ALA MOANA CRASH BOAT		SW 0 - 1/8 (0.081 mi.)	163 / 7	330
PUNCHBOWL CAMP		WNW 0 - 1/8 (0.090 mi.)	174 / 4	346
ALA WAI AIRPORT		NE 0 - 1/8 (0.101 mi.)	196 / 8	391
WAREHOUSE NOS. 3 & 4		NE 1/8 - 1/4 (0.128 mi.)	241 / 5	499
KAPAHULU PUMPING STA		NE 1/8 - 1/4 (0.161 mi.)	277 / 8	599
BASE YARD NO 16 & 17		WSW 1/8 - 1/4 (0.191 mi.)	301 / 8	659
SAINT LOUIS COLLEGE		E 1/8 - 1/4 (0.193 mi.)	304 / 6	671
MILL CAMOUFLAGE 1.2		SW 1/8 - 1/4 (0.234 mi.)	347 / 8	767
PUNAHOU SCHOOL		ESE 1/4 - 1/2 (0.392 mi.)	399 / 5	919
GUN BATTERY		W 1/2 - 1 (0.550 mi.)	CN451 / 5	1037
PUNCHBOWL MILITARY R		W 1/2 - 1 (0.617 mi.)	461 / 4	1051
OVERSEAS ASSEMBLY YA		NW 1/2 - 1 (0.633 mi.)	463 / 4	1053
MILL NO. 43		NW 1/2 - 1 (0.638 mi.)	464 / 4	1053
MCKINLEY HIGH SCHOOL		WSW 1/2 - 1 (0.701 mi.)	467 / 4	1058
FORT RUGER		ESE 1/2 - 1 (0.777 mi.)	474 / 12	1069
ROUND TOP MILITARY R		W 1/2 - 1 (0.788 mi.)	476 / 5	1071

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
BATTERY PUNCHBOWL		WNW 1/2 - 1 (0.884 mi.)	484 / 4	1081

DOD: Department of Defense Sites

A review of the DOD list, as provided by EDR, and dated 06/07/2021 has revealed that there are 2 DOD sites within approximately1 mile of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
FORT DE RUSSY		SW 0 - 1/8 (0.125 mi.)	Region / 8	52
NG FT RUGER		ESE 1/4 - 1/2 (0.374 mi.)	Region / 9,8,11,12	52

UXO: Unexploded Ordnance Sites

A review of the UXO list, as provided by EDR, and dated 12/31/2020 has revealed that there is 1 UXO site within approximately1 mile of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
NOFA RECOMMENDED		W 1/2 - 1 (0.550 mi.)	CN450 / 5	1037

PFAS WQP: Ambient Environmental Sampling for PFAS

A review of the PFAS WQP list, as provided by EDR, and dated 01/03/2022 has revealed that there is 1 PFAS WQP site within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
MANOA-PALOLO DRAINAG		NW 0 - 1/8 (0.015 mi.)	I85 / 8	151

PFAS ECHO: Facilities in Industries that May Be Handling PFAS Listing

A review of the PFAS ECHO list, as provided by EDR, and dated 01/03/2022 has revealed that there is 1 PFAS ECHO site within approximately 0.25 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
BARBERS POINT NAVAL	21.296188/-157.81387	NNW 1/8 - 1/4 (0.220 mi.)	330 / 5	733

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: EDR Exclusive Historical Auto Stations

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 32 EDR Hist Auto sites within approximately 0.125 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
PILOT MARINE INC	1651 ALA NOANA BLVD	WSW 0 - 1/8 (0.019 mi.)	O87 / 7	156

EXECUTIVE SUMMARY

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
ALA WAI SERVICE STAT	407 KAPAHULU	ENE 0 - 1/8 (0.026 mi.)	Q97 / 8	187
DIAMOND SERVICE INC	629 KAPAHULU AVE	E 0 - 1/8 (0.036 mi.)	104 / 8	197
GEORGES UNION SERVIC	505 KAPAHULU AVE	ESE 0 - 1/8 (0.038 mi.)	R105 / 8	198
HAWAII AMALGAMATED V	311 OHUA ST	SW 0 - 1/8 (0.041 mi.)	115 / 8	227
TONYS AUTO SERVICE L	449 KAPAHULU AVE	SE 0 - 1/8 (0.048 mi.)	T118 / 8	231
ESQUIRE SHELL SERVIC	2960 WAIALAE AVE	SSW 0 - 1/8 (0.049 mi.)	U121 / 5	233
SUNRISE SERVICE STAT	2969 S KING STREET	SE 0 - 1/8 (0.050 mi.)	V128 / 5	253
ROGERS CHEVRON	1403 MAKIKI ST APT 4	W 0 - 1/8 (0.054 mi.)	132 / 5	256
TESORO HAWAII CORPOR	707 KAPAHULU AVE	NE 0 - 1/8 (0.055 mi.)	S133 / 8	256
PACIFIC RESOURCES IN	707 KAPAHULA AVE	NE 0 - 1/8 (0.056 mi.)	S135 / 8	267
PACIFIC RESOURCES IN	707 KAPAHULE	NE 0 - 1/8 (0.056 mi.)	S136 / 8	267
GEORGES SHELL SERVIC	1944 KAPIOLANI BLVD	NNE 0 - 1/8 (0.063 mi.)	138 / 5	271
WAIKIKI TEXACO SERVI	1922 KALAKAUA AVE	SW 0 - 1/8 (0.071 mi.)	Y143 / 8	286
MANOA SERVICE STATIO	2927 E MANOA RD	N 0 - 1/8 (0.072 mi.)	Z146 / 6	297
SERAIS UNION SERVICE	3011 WAIALAE AVE	S 0 - 1/8 (0.076 mi.)	U153 / 5	308
MIWA ROBERT M	3040 WAIALAE AVE	ESE 0 - 1/8 (0.088 mi.)	X168 / 5	341
LILANGS GUITAR SHELL	412 LEWERS ST	SW 0 - 1/8 (0.088 mi.)	169 / 8	341
KALAKAUA CHEVRON SER	1958 KALAKAUA AVE	SW 0 - 1/8 (0.089 mi.)	AE173 / 8	346
MASAS GAS SHACK	2914 E MANOA RD	NNW 0 - 1/8 (0.093 mi.)	Z177 / 5	348
JIMS ALOHA CHEVRON	1801 KALAKAUA AVE	N 0 - 1/8 (0.094 mi.)	AB181 / 5	360
MANOA VILLAGE MART	3001 E MANOA RD	S 0 - 1/8 (0.096 mi.)	AI187 / 6	376
RICHARDS 66 SERVICE	1901 KALAKAUA AVE	SW 0 - 1/8 (0.099 mi.)	192 / 8	387
STANS UNION SERVICE	3045 MONSARRAT AVE	E 0 - 1/8 (0.100 mi.)	AK194 / 8	388
PUMP IT UP	3093 PUALEI CIR	ESE 0 - 1/8 (0.103 mi.)	198 / 8	394
O & J SERVICE INC	1720 ALA MOANA BLVD	SSE 0 - 1/8 (0.104 mi.)	201 / 7	400
CAMPBELL AVENUE SERV	3335 CAMPBELL AVE	ESE 0 - 1/8 (0.110 mi.)	AH210 / 8	428
FUNAIS UNION SERVICE	1810 KAPIOLANI BLVD	N 0 - 1/8 (0.110 mi.)	AL214 / 5	434
WINAM AUTO SERVICE I	755 KAPAHULU AVE	NE 0 - 1/8 (0.112 mi.)	AN219 / 8	452
ROGERS CHEVRON	3048 WAIALAE AVE	ESE 0 - 1/8 (0.119 mi.)	AO222 / 5	458
TRADEWIND CHEVRON SE	2002 KALAKAUA AVE	SW 0 - 1/8 (0.121 mi.)	AR231 / 8	481
TENGAN PHILLIPS 66	2955 E MANOA RD	NNE 0 - 1/8 (0.123 mi.)	AS234 / 6	483

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there are 7 EDR Hist Cleaner sites within approximately 0.125 miles of the requested target property.

Site	Address	Direction / Distance	Map ID / Focus Map(s)	Page
ELDON DRAPERY CLEANE	716 KAPAHULU AVE	NE 0 - 1/8 (0.043 mi.)	S116 / 8	227
ROBINSON CORP	449 KAPAHULU AVE	SE 0 - 1/8 (0.048 mi.)	T119 / 8	231
CLABIR INVESTMENT C3	224 MC CULLY ST	SW 0 - 1/8 (0.075 mi.)	Y149 / 8	303
ROBINSON CORP	444 HOBRON LN STE 5A	SSE 0 - 1/8 (0.089 mi.)	AC170 / 8	342
CAMPBELL CLOTHES CLE	3306 CAMPBELL AVE	ESE 0 - 1/8 (0.092 mi.)	AF175 / 8	347
ENIVEL INC	2966 E MANOA RD	SSW 0 - 1/8 (0.108 mi.)	AI205 / 6	404
PACIFIC LAUNDROMAT &	2919 KAPIOLANI BLVD	SE 0 - 1/8 (0.122 mi.)	232 / 8	482

MAPPED SITES SUMMARY

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
Reg / 8	FORT DE RUSSY		DOD	658 0.125 SW
Reg / Multiple	NG FT RUGER		DOD	1974 0.374 ESE
Reg / 9	NG FT RUGER		DOD	6228 1.180 East
Reg / 9	NG FT RUGER		DOD	6526 1.236 ESE
Reg / Multiple	NG FT RUGER		DOD	6759 1.280 ESE
A1 / 6	GIOBETECK GROUP. INC	2752 WOODLAWN DRIVE,	HI LEAD	TP
A2 / 6	GLOBETECK GROUP INC	2752 WOODLAWN DRIVE,	HI LEAD	TP
A3 / 6	GLOBELACK GROUP, INC	2752 WOODLAWN DOVE.	HI LEAD	TP
A4 / 6	MANOA VALLEY VETERIN	2752 WOODLAWN DRIVE	HI AIRS	TP
A5 / 6	GHDBETECK GROUP, INC	2752 WOODLAWN DRIVE.	HI LEAD	TP
A6 / 6	GLOBALE& GROUP, INC.	2752 WOODLAWN DRIVE,	HI LEAD	TP
A7 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE.	HI LEAD	TP
A8 / 6	KZOO RDO STN POLYNES	2752 WOODLAWN DR BLD	EDR Hist Auto	TP
A9 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP
A10 / 6	GLOBETECK GROUP, INC	2752 WOODIAWN DRIVE,	HI LEAD	TP
A11 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP
A12 / 6	MANOA MARKETPLACE	2752 WOODLAWN DR, SU	HI UST	TP
A13 / 6	GLOBELECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP
A14 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP
A15 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP
A16 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP
A17 / 6	CHERRYWOOD-MANOA LLC	2752 WOODLAWN DR	EDR Hist Cleaner	TP
A18 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP
A19 / 6	GLOLLETECK GROUP, IN	2752 WOODLAWN DRIVE,	HI LEAD	TP
A20 / 6	GLOBETECK GROUP. INC	2752 WOODLAWN DR,, S	HI LEAD	TP
A21 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP
A22 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR.. S	HI LEAD	TP
A23 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP
A24 / 6	FENDU BOULANGERIE	2752 WOODLAWN DR #5-	FINDS	TP
A25 / 6	GLOBETECK GROUP. INC	2752 WOODLAWN DRIVE,	HI LEAD	TP
A26 / 6	MANOA MARKETPLACE	2752 WOODLAWN DRIVE	FINDS	TP
A27 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP
A28 / 6	LONGS DRUG STORES #1	2750 WOODLAWN DR	FTTS, HIST FTTS	TP
A29 / 6	LONGS DRUG STORE #98	2750 WOODLAWN DR	RCRA-VSQG, FINDS, ECHO	TP
A30 / 6	LONGS DRUG STORES #	2750 WOODLAWN DR	FTTS, HIST FTTS	TP
31 / 4	1653 MOTT SMITH DRIV	1653 MOTT-SMITH DR	HI SPILLS	TP
A32 / 6	USDA ARS	2727 WOODLAWN DR	RCRA NonGen / NLR, FINDS, ECHO	TP
A33 / 6	2727 WOODLAWN DRIVE,	2727 WOODLAWN DR	HI SPILLS	TP
A34 / 6	UNIVERSITY OF HAWAII	2721 WOODLAWN DRIVE	HI AIRS	TP

MAPPED SITES SUMMARY

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
A35 / 5	MAGOON AGRICULTURAL	2717 WOODLAWN DR	RCRA-VSQG, FINDS, ECHO	TP
B36 / 5	VCA UNIVERSITY ANIMA	2728 WOODLAWN DR	MLTS	TP
B37 / 5	UH AGRICULTURAL RESE	UNKNOWN	FINDS	TP
B38 / 5	2716 WOODLAWN DRIVE	2716 WOODLAWN DR	HI SPILLS	TP
B39 / 5	MANOA PUBLIC LIBRARY	2716 WOODLAWN DRIVE	FINDS, ECHO	TP
C40 / 6	KALAWAO STREET: 8-I	KALAWAO STREET (MANO	FINDS	TP
C41 / 6	KALAWAO STREET: 8-IN	KALAWAO STREET (MANO	ECHO	TP
D42 / 5	THE PARISH OF ST. CL	1515 WILDER AVE	RCRA NonGen / NLR	TP
D43 / 5	ST CLEMENTS SCHOOL	1515 WILDER AV	FTTS, HIST FTTS	TP
D44 / 5	ST. CLEMENTS SCHOOL	1515 WILDER AV	FINDS	TP
D45 / 5	THE PARISH OF ST. CL	1515 WILDER AVE	ECHO	TP
D46 / 5	THE PARISH OF ST. CL	1515 WILDER AVE	FINDS	TP
E47 / 5	FIRE HYDRANT INSTALL	MAKIKI ST.;KOMAIA DR	FINDS, ECHO	TP
48 / 5	MANOA STR AT KANEWAI		PFAS WQP	TP
F49 / 5	IMPROVEMENTS OF KALA		FINDS	TP
F50 / 5	ALA WAI BOULEVARD &	ALA WAI BLVD & KALAK	HI SPILLS	TP
G51 / 5	MCCULLY & MOILIILI S	MCCULLY ST X MOILIIL	FINDS	TP
G52 / 8	ALA WAI BOULEVARD &	ALA WAI BLVD & MCCUL	HI SPILLS	TP
H53 / 7	STATE HIGHWAY ROUTES		FINDS	TP
I54 / 8	2633 MAUNAWAI PLACE	2633 MAUNAWAI PLACE	FTTS, HIST FTTS	TP
I55 / 8	2633 MAUNAWAI PLACE	2633 MAUNAWAI PLACE	FINDS	TP
56 / 8	KAPIOLANI BOULEVARD:	KAPIOLANI BOULEVARD,	FINDS, ECHO	TP
57 / 8	UNIVERSITY AVENUE:		FINDS	TP
58 / 8	REHABILITATION OF ST	ALA WAI BLVD	FINDS, ECHO	TP
J59 / 8	ALA WAI BOULEVARD &	ALA WAI BLVD & KAIOL	HI SPILLS	TP
60 / 8	BASE YARD NO. 6		FUDS	TP
J61 / 8	ALA WAI HARBOR G-DOC	ALA WAI BLVD	HI SPILLS	TP
J62 / 8	WHITE LIQUID OBSERVE	ALA WAI BLVD	HI SPILLS	TP
J63 / 8	ALA WAI BOULEVARD US	ALA WAI BLVD	HI SPILLS	TP
64 / 8	WAIKIKI SIDEWALK IMP	KALAKAUA AVENUE	FINDS, ECHO	TP
K65 / 8	ALA WAI BOULEVARD &	ALA WAI BLVD & KANEK	HI SPILLS	TP
K66 / 8	ALA WAI BOULEVARD &	ALA WAI BLVD & KANEK	HI SPILLS	TP
K67 / 8		KANEKAPOLEI ST AND A	ERNS	TP
K68 / 8	WAIKIKI SAND VILLA H	WAIKIKI SAND VILLA I	FINDS	TP
K69 / 8	WAIKIKI SAND VILLA H	WAIKIKI SAND VILLA I	ECHO	TP
70 / 8	2500 ALA WAI BOULEVA	2500 ALA WAI BLVD	HI SPILLS	TP
71 / 8	DATE STREET	UNKNOWN	FINDS, ECHO	TP
72 / 8		ALA WAI BLVD. AND WA	ERNS	TP
L73 / 8	BKM ENTERPRISES, LTD	KAPAHULU AVE	HI SPILLS	TP

MAPPED SITES SUMMARY

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
L74 / 8	WAIKIKI FIRE STATION	381 KAPAHULU AVE	HI SPILLS	TP		
L75 / 8	WAIKIKI FIRE STATION	381 KAPAHULU AVE	HI UST, HI Financial Assurance	TP		
L76 / 8	WAIKIKI FIRE STATION	381 KAPAHULU AVENUE	FINDS	TP		
L77 / 8	KAPIOLANI REGIONAL P	3447 LEAHI AVE	HI LUST, HI UST, HI Financial Assurance	TP		
L78 / 8	KAPIOLANI REGIONAL P	3447 LEAHI AVENUE	RCRA-VSQG, FINDS, ECHO	TP		
L79 / 8	KAPIOLANI REGIONAL P	3447 LEAHI AVE	HI RGA LUST	TP		
M80 / 8	HAWAII SCHOOL FOR TH	3440 LEAHI AVENUE	FTTS	TP		
M81 / 8	HAWAII SCHOOL FOR TH	3440 LEAHI AVE	HI SHWS	TP		
M82 / 8	HAWAII SCHOOL FOR TH	3440 LEAHI AVENUE	FINDS	TP		
N83 / 8	KAPIOLANI PARK BANDS	3840 PAKI AVE	FINDS	TP		
N84 / 8	KAPIOLANI PARK BANDS	3840 PAKI AVE	ECHO	TP		
I85 / 8	MANOA-PALOLO DRAINAG		PFAS WQP	78	0.015	NW
86 / 7	1609 ALA WAI DIESEL	1609 ALA WAI BLVD	HI SHWS, HI SPILLS	92	0.017	SSE
O87 / 7	PILOT MARINE INC	1651 ALA NOANA BLVD	EDR Hist Auto	99	0.019	WSW
O88 / 7	STATE OF HAWAII DLNR	1651 ALA MOANA BLVD	RCRA-VSQG	99	0.019	WSW
O89 / 7	ALA WAI MARINE LTD	1651 ALA MOANA BLVD	RCRA-VSQG, ICIS, CA HAZNET	99	0.019	WSW
O90 / 7	ALOHA MARINE	1651 ALA MOANA BLVD	HI LUST, HI UST	99	0.019	WSW
91 / 8	2319 ALA WAI BLVD	2319 ALA WAI BLVD	HI SHWS	106	0.020	SW
H92 / 7	THE WATERMARK WAIKIK	1551 ALA WAI BLVD	HI LUST	110	0.021	SSE
H93 / 7	THE WATERMARK WAIKIK	1551 ALA WAI BLVD	HI UST	110	0.021	SSE
P94 / 4	WAIKIKI YACHT CLUB	1599 ALA MOANA BLVD	RCRA-VSQG	130	0.025	WNW
Q95 / 8	ALA WAI SERVICE, INC	407 KAPAHULU AVE	HI SHWS, HI SPILLS	135	0.026	ENE
Q96 / 8	ALA WAI SERVICE INC.	407 KAPAHULU AVE	HI LUST, HI UST, HI Financial Assurance	135	0.026	ENE
Q97 / 8	ALA WAI SERVICE STAT	407 KAPAHULU	EDR Hist Auto	135	0.026	ENE
Q98 / 8	ALA WAI BOAT HARBOR	407 KAPAHULU AVE	RCRA-VSQG, FINDS, ECHO	135	0.026	ENE
Q99 / 8	ALA WAI GOLF COURSE	404 KAPAHULU AVE	HI SHWS, HI UST, HI Financial Assurance	136	0.026	ENE
Q100 / 8	ALA WAI GOLF COURSE	404 KAPAHULU AVENUE	RCRA-VSQG, FINDS, ECHO	136	0.026	ENE
101 / 8	ALA WAI GOLF COURSE	484 KAPAHULU AVE	HI LUST, HI UST	140	0.027	ESE
102 / 8	RRR RECYCLING - KAPA	548 KAPAHULU AVE.	HI SWRCY	142	0.027	ESE
103 / 5	HOKULANI ELEMENTARY	2940 KAMAKINI ST	HI SHWS	169	0.032	NNE
104 / 8	DIAMOND SERVICE INC	629 KAPAHULU AVE	EDR Hist Auto	192	0.036	East
R105 / 8	GEORGES UNION SERVIC	505 KAPAHULU AVE	EDR Hist Auto	198	0.038	ESE
R106 / 8	UNOCAL 76 SS L 4573	505 KAPAHULU AVE	RCRA NonGen / NLR	198	0.038	ESE
R107 / 8	GEORGE'S UNION SERVI	505 KAPAHULU AVE	HI SHWS	198	0.038	ESE
R108 / 8	76 KAPAHULU 7-11 #11	505 KAPAHULU AVE	HI LUST, HI UST, HI Financial Assurance	198	0.038	ESE
109 / 8	UNIVERSITY OF HAWAII	2777 KALAKAUA AVENUE	RCRA-VSQG	198	0.038	South
110 / 8	PUBLIC BATH WASTEWAT	2729 KALAKAUA AVE	HI UST, HI Financial Assurance	201	0.038	North
111 / 8	WAIKIKI ELEMENTARY S	3710 LEAHI AVE	HI SHWS, HI SPILLS	204	0.039	ESE
R112 / 8	KIM CHAU LAUNDERETTE	517 KAPAHULU AVE	HI UST	207	0.039	ESE

MAPPED SITES SUMMARY

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
P113 / 4	YACHT HARBOR TOWERS	1600 ALA MOANA BLVD	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	210	0.040	NNW
P114 / 4	AOAO YACHT HARBOR TO	1600_1650 ALA MOANA	RCRA-VSQG	210	0.040	NNW
115 / 8	HAWAII AMALGAMATED V	311 OHUA ST	EDR Hist Auto	217	0.041	SW
S116 / 8	ELDON DRAPERY CLEANE	716 KAPAHULU AVE	EDR Hist Cleaner	225	0.043	NE
E117 / 5	MARYKNOLL HIGH SCHOO	1402 PUNAHOU ST	RCRA-VSQG	240	0.045	SE
T118 / 8	TONYS AUTO SERVICE L	449 KAPAHULU AVE	EDR Hist Auto	252	0.048	SE
T119 / 8	ROBINSON CORP	449 KAPAHULU AVE	EDR Hist Cleaner	252	0.048	SE
120 / 8	ROYAL GARDENS HOTEL	440 OLOHANA ST	HI SHWS, HI SPILLS	253	0.048	SW
U121 / 5	ESQUIRE SHELL SERVIC	2960 WAIALAE AVE	EDR Hist Auto	261	0.049	SSW
U122 / 5	MONSTER HI-5 & TIRES	2960 WAIALAE AVE	RCRA NonGen / NLR	261	0.049	SSW
U123 / 5	MONSTER HI-5 & TIRES	2960 WAIALAE AVENUE	HI SWRCY	261	0.049	SSW
U124 / 5	SEVEN HAWAIIANS CORP	2960 WAIALAE AVE	HI UST	261	0.049	SSW
U125 / 5	MONSTER HI-5 & TIRES	2960 WAIALAE AVE	RCRA NonGen / NLR, FINDS, ECHO	261	0.049	SSW
V126 / 5	IES RETAIL S. KING S	2969 S KING ST	RCRA-VSQG, FINDS, ECHO	262	0.050	SE
V127 / 5	KAPIOLANI TEXACO 919	2969 S KING ST	HI UST, HI Financial Assurance	262	0.050	SE
V128 / 5	SUNRISE SERVICE STAT	2969 S KING STREET	EDR Hist Auto	262	0.050	SE
O129 / 7	ALA WAI HARBOR BOAT	ALA MOANA BLVD	HI SHWS	264	0.050	WSW
130 / 7	LING BROTHERS, LTD.	1819-E LIPEEPEE ST	HI LUST	265	0.050	SSE
131 / 8	WAIKIKI SAND VILLA I	250 KAIULANI AVE	HI SHWS	266	0.050	SW
132 / 5	ROGERS CHEVRON	1403 MAKIKI ST APT 4	EDR Hist Auto	283	0.054	West
S133 / 8	TESORO HAWAII CORPOR	707 KAPAHULU AVE	EDR Hist Auto	291	0.055	NE
S134 / 8	HELE KAPAHULU #61013	707 KAPAHULU AVE	HI LUST, HI UST, HI Financial Assurance	291	0.055	NE
S135 / 8	PACIFIC RESOURCES IN	707 KAPAHULA AVE	EDR Hist Auto	294	0.056	NE
S136 / 8	PACIFIC RESOURCES IN	707 KAPAHULE	EDR Hist Auto	294	0.056	NE
137 / 4	MAKIKI FIRE STATION	1202 WILDER AVE	HI LUST, HI UST, HI Financial Assurance	309	0.059	WSW
138 / 5	GEORGES SHELL SERVIC	1944 KAPIOLANI BLVD	EDR Hist Auto	335	0.063	NNE
W139 / 8	THE PALMS, INC.	431 NAHUA STREET	RCRA NonGen / NLR, FINDS, ECHO	347	0.066	SW
X140 / 5	BERGER AUTOHAUS, INC	3030 WAIALAE AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	347	0.066	SE
X141 / 5	BERGERS AUTOHAUS INC	3030 WAIALAE AVE	HI LUST, HI UST, HI SPILLS, RCRA NonGen ...	347	0.066	SE
X142 / 5	BERGERS AUTOHAUS SAL	3030 WAIALAE AVE	RCRA-VSQG, FINDS	347	0.066	SE
Y143 / 8	WAIKIKI TEXACO SERVI	1922 KALAKAUA AVE	EDR Hist Auto	377	0.071	SW
Z144 / 6	IES RETAIL MANOA	2927 E MANOA RD UNIT	RCRA-VSQG	378	0.072	North
Z145 / 6	MANOA SERVICE 95683	2927 E MANOA RD	HI LUST, HI UST, HI SPILLS, HI Financial...	378	0.072	North
Z146 / 6	MANOA SERVICE STATIO	2927 E MANOA RD	EDR Hist Auto	378	0.072	North
Z147 / 6	IES RETAIL MANOA	2927 E MANOA RD	RCRA NonGen / NLR, FINDS, ECHO	378	0.072	North
148 / 6	MANOA CENTRAL OFFICE	2803 LOWREY AVE	HI UST, HI Financial Assurance	392	0.074	SW
Y149 / 8	CLABIR INVESTMENT C3	224 MC CULLY ST	EDR Hist Cleaner	394	0.075	SW
150 / 5	KEE - THEMA INC	3060 KAPIOLANI BLVD	HI UST	399	0.076	SSW
151 / 8	HECO TRANSFOMER 2726	249 LILIUOKALANI AVE	HI SHWS, HI SPILLS	402	0.076	SW

MAPPED SITES SUMMARY

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
U152 / 5	SERAI'S UNION SERVIC	3011 WAIALAE AVE	HI LUST, HI UST	403	0.076	South
U153 / 5	SERAIS UNION SERVICE	3011 WAIALAE AVE	EDR Hist Auto	403	0.076	South
U154 / 5	UNOCAL 76 SS L 4922	3011 WAIALAE AVE	RCRA NonGen / NLR	403	0.076	South
AA155 / 5	NOELANI ELEMENTARY S	2655 WOODLAWN DR	HI SHWS	412	0.078	WSW
156 / 8	FUDS BASE YARD NO. 6	KAMOKU STREET	HI SHWS	413	0.078	NNW
X157 / 5	FREDERICK FONG M.D.	3034 AND 3036 WAIALA	HI LUST, HI UST	416	0.079	ESE
158 / 5	ARCADIA RETIREMENT	1434 PUNAHOU ST	HI LUST, HI UST	420	0.080	SE
AB159 / 5	ALOHA MOTORS	KAPIOLANI BLVD X KAL	HI LUST, HI UST	421	0.080	NNW
AA160 / 5	UNIVERSITY OF HAWAII	2680 WOODLAWN DRIVE	RCRA-VSQG	422	0.080	WSW
AC161 / 8	COSMOS JEWELRY LTD.	438 HOBRON LN #202	RCRA NonGen / NLR	425	0.080	SSE
AC162 / 8	WIHC, LLC DBA ALOHA	438 HOBRON LANE SUIT	RCRA-VSQG, FINDS, ECHO	425	0.080	SSE
163 / 7	ALA MOANA CRASH BOAT		FUDS	428	0.081	SW
AD164 / 5	SAFEWAY STORE #204	2855 EAST MANOA ROAD	RCRA-VSQG	430	0.081	NW
165 / 4	I L W U LOCAL 142	451 ATKINSON DR	RCRA NonGen / NLR	431	0.082	NNW
X166 / 5	DANA LABELS COMPANY	3035 WAIALAE AVE	HI UST	464	0.088	SE
X167 / 5	CONSUMER TIRE WAREHO	3040 WAIALAE AVE	RCRA NonGen / NLR, FINDS, ECHO	466	0.088	ESE
X168 / 5	MIWA ROBERT M	3040 WAIALAE AVE	EDR Hist Auto	466	0.088	ESE
169 / 8	LILANGS GUITAR SHELL	412 LEWERS ST	EDR Hist Auto	466	0.088	SW
AC170 / 8	ROBINSON CORP	444 HOBRON LN STE 5A	EDR Hist Cleaner	468	0.089	SSE
AE171 / 8	JIMMY'S CHEVRON SERV	1958 KALAKAUA AVE	HI UST	470	0.089	SW
AE172 / 8	JIMMY'S CHEVRON SERV	1958 KALAKAUA AVE	HI LUST, RCRA NonGen / NLR, FINDS, ECHO	470	0.089	SW
AE173 / 8	KALAKAUA CHEVRON SER	1958 KALAKAUA AVE	EDR Hist Auto	470	0.089	SW
174 / 4	PUNCHBOWL CAMP		FUDS	475	0.090	WNW
AF175 / 8	CAMPBELL CLOTHES CLE	3306 CAMPBELL AVE	EDR Hist Cleaner	484	0.092	ESE
W176 / 8	HONOLULU PRINCE	415 NAHUA ST	HI UST	487	0.092	SW
Z177 / 5	MASAS GAS SHACK	2914 E MANOA RD	EDR Hist Auto	489	0.093	NNW
AB178 / 5	DOLLAR RENT-A-CAR	1801 KALAKAUA AVE	HI UST	494	0.094	North
AB179 / 5	HAWAII CONVENTION CE	1801 KALAKAUA AVENUE	RCRA-VSQG	494	0.094	North
AB180 / 5	HAWAII CONVENTION CE	1801 KALAKAUA AVE	RCRA NonGen / NLR, FINDS, ECHO	494	0.094	North
AB181 / 5	JIMS ALOHA CHEVRON	1801 KALAKAUA AVE	EDR Hist Auto	494	0.094	North
AB182 / 5	HAWAII CONVENTION CE	1801 KALAKAUA AVE	HI SHWS	494	0.094	North
183 / 7	PRINCE WAIKIKI	100 HOLOMOANA ST	HI UST, HI Financial Assurance	497	0.094	South
AG184 / 5	SHRINERS HOSPITALS F	1310 PUNAHOU ST	HI LUST, HI UST, HI Financial Assurance	499	0.095	SE
AH185 / 8	ALOHA CAMPBELL	3327 CAMPBELL AVE	HI LUST, HI UST, HI SPILLS, HI Financial...	504	0.095	ESE
AI186 / 6	ALOHA MANOA	3001 E MANOA RD	HI LUST, HI UST, HI Financial Assurance	507	0.096	South
AI187 / 6	MANOA VILLAGE MART	3001 E MANOA RD	EDR Hist Auto	507	0.096	South
188 / 5	FUDS WAREHOUSE NO. 3		HI SHWS	511	0.097	NE
AF189 / 8	ISLAND TRIATHLON & B	3312 CAMPBELL AVE	RCRA NonGen / NLR, FINDS, ECHO	516	0.098	ESE
AJ190 / 5	FURUMOTO FAMILY PART	1135 KAPAHULU	RCRA NonGen / NLR	516	0.098	South

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MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
AJ191 / 5	VETERANS OF FOREIGN	1135 KAPAHULU	RCRA NonGen / NLR, FINDS, ECHO	516	0.098	South
192 / 8	RICHARDS 66 SERVICE	1901 KALAKAUA AVE	EDR Hist Auto	521	0.099	SW
AK193 / 8	STAN'S UNION SERVICE	3045 MONSARRAT AVE	HI LUST, HI UST	530	0.100	East
AK194 / 8	STANS UNION SERVICE	3045 MONSARRAT AVE	EDR Hist Auto	530	0.100	East
AK195 / 8	UNOCAL 76 SS L 6352	3045 MONSARRAT AVE	RCRA-VSQG	530	0.100	East
196 / 8	ALA WAI AIRPORT		FUDS	531	0.101	NE
AB197 / 5	B & S AUTOMOTIVE TEC	1789 KAPIOLANI	RCRA NonGen / NLR, FINDS, ECHO	539	0.102	North
198 / 8	PUMP IT UP	3093 PUALEI CIR	EDR Hist Auto	546	0.103	ESE
AB199 / 5	ALOHA MOTORS	1777 KAPIOLANI BLVD	HI SHWS	551	0.104	NNW
AB200 / 5	FIRST DEVELOPMENT IN	1777 KAPIOLANI BLVD	SEMS-ARCHIVE, RCRA-VSQG, FINDS, ECHO	551	0.104	NNW
201 / 7	O & J SERVICE INC	1720 ALA MOANA BLVD	EDR Hist Auto	551	0.104	SSE
202 / 8	ALA WAI ELEMENTARY S	503 KAMOKU ST	HI SHWS	558	0.106	NE
AL203 / 5	UNOCAL 76 SS L 5583	1818 KAPIOLANI BLVD	RCRA NonGen / NLR, FINDS, ECHO	561	0.106	North
AD204 / 5	C&CH MANOA FIRE STAT	2850 E MANOA RD	HI LUST, HI UST	562	0.106	WNW
AI205 / 6	ENIVEL INC	2966 E MANOA RD	EDR Hist Cleaner	569	0.108	SSW
Y206 / 8	THE PAVILLION	1925 KALAKAUA AVE	HI SHWS, HI SPILLS	571	0.108	SW
AG207 / 5	KAPIOLANI WOMEN'S &	1319 PUNAHOU ST	HI SHWS, HI UST, HI AIRS, HI Financial A...	574	0.109	ESE
AG208 / 5	KAPIOLANI MEDICAL CE	1319 PUNAHOU STREET	RCRA-VSQG, FINDS, ECHO	574	0.109	ESE
209 / 5	UH MANOA LOWER CAMPU	2693 DOLE ST	HI SHWS	578	0.109	NE
AH210 / 8	CAMPBELL AVENUE SERV	3335 CAMPBELL AVE	EDR Hist Auto	582	0.110	ESE
AH211 / 8	MAL MAT AUTO LEASING	3335 CAMPBELL AVE	RCRA NonGen / NLR, FINDS, ECHO	582	0.110	ESE
AH212 / 8	JH SAKAMOTO & ASSOCI	3335 CAMPBELL AVE	HI UST	582	0.110	ESE
AL213 / 5	FUNAI'S UNION SERVIC	1810 KAPIOLANI BLVD	HI LUST, HI UST, HI Financial Assurance	583	0.110	North
AL214 / 5	FUNAIS UNION SERVICE	1810 KAPIOLANI BLVD	EDR Hist Auto	583	0.110	North
AM215 / 8	ROCK STAR TATTOOS	2270 B KUHIO AVE	RCRA NonGen / NLR	583	0.110	SW
216 / 8	ALA WAI COVE CONDOMI	509 UNIVERSITY AVE	HI SHWS, HI SPILLS	583	0.110	NE
AN217 / 8	WINAM SHELL SERVICE	755 KAPAHULU AVE	RCRA NonGen / NLR, FINDS, ECHO	591	0.112	NE
AN218 / 8	GOOSE'S EDGE INC 139	755 KAPAHULU AVE.	HI LUST, HI UST, HI AIRS, HI Financial A...	591	0.112	NE
AN219 / 8	WINAM AUTO SERVICE I	755 KAPAHULU AVE	EDR Hist Auto	591	0.112	NE
AO220 / 5	MIDAS	3051 WAIALAE	RCRA-VSQG, FINDS, ECHO	608	0.115	SE
AO221 / 5	MIDAS MUFFLER KAIMUK	3051 WAIALAE AVE	HI UST	608	0.115	SE
AO222 / 5	ROGERS CHEVRON	3048 WAIALAE AVE	EDR Hist Auto	629	0.119	ESE
AO223 / 5	ROGER'S CHEVRON	3048 WAIALAE AVE	HI SHWS, HI LUST, HI UST, HI Financial A...	629	0.119	ESE
AO224 / 5	CHEVRON 93778	3048 WAIALAE AVE	RCRA-VSQG	629	0.119	ESE
AP225 / 4	AOAO ALA MOANA HOTEL	410 ATKINSON DR	HI UST, HI Financial Assurance	632	0.120	North
AP226 / 4	ALA MOANA HOTEL	410 ATKINSON DRIVE	RCRA-VSQG, FINDS, ECHO	632	0.120	North
AQ227 / 8	BUDGET RENT-A-CAR SY	2330 KUHIO AVE	HI UST	635	0.120	SW
AR228 / 8	CHEVRON U.S.A., INC.	2002 KALAKAUA AVE	HI SHWS, HI LUST	639	0.121	SW
AR229 / 8	DAIO USA CORP	2002 KALAKAUA AVE	RCRA NonGen / NLR, FINDS, ECHO	639	0.121	SW

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MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
AR230 / 8	CHEVRON U.S.A., INC.	2002 KALAKAUA AVE	HI UST	639	0.121	SW
AR231 / 8	TRADEWIND CHEVRON SE	2002 KALAKAUA AVE	EDR Hist Auto	639	0.121	SW
232 / 8	PACIFIC LAUNDROMAT &	2919 KAPIOLANI BLVD	EDR Hist Cleaner	643	0.122	SE
233 / 8	ROYAL KUHIO CONDOMIN	2240 KUHIO AVE	HI LUST, HI UST	645	0.122	SW
AS234 / 6	TENGAN PHILLIPS 66	2955 E MANOA RD	EDR Hist Auto	647	0.123	NNE
AS235 / 6	MANOA MART/MANOA LIQ	2955 E MANOA RD	HI LUST, HI UST, HI Financial Assurance	647	0.123	NNE
AM236 / 8	S.W.A.T. GUN CLUB	2266 KUHIO AVE	RCRA NonGen / NLR	659	0.125	SW
AT237 / 5	MID PAC PETROLEIM 25	2809 E MANOA RD	HI LUST, HI UST, HI Financial Assurance	665	0.126	West
AT238 / 5	UNOCAL S S NO 3923	2809 E MANOA RD	RCRA NonGen / NLR	665	0.126	West
AU239 / 8	WAIKIKI KUHIO COLLEC	2370 KUHIO AVE	HI SHWS	666	0.126	SW
240 / 8	KAPIOLANI VILLAGE AP	737 KAIPUU ST	HI SHWS	669	0.127	NW
241 / 5	WAREHOUSE NOS. 3 & 4		FUDS	677	0.128	NE
AV242 / 5	RICHARD'S CHEVRON	1509 S BERETANIA ST	HI UST	681	0.129	SSW
243 / 8	JEFFERSON ELEMENTARY	324 KAPAHULU AVE	HI SHWS	690	0.131	WSW
AW244 / 8	RITZ CARLTON WAIKIKI	2139 KUHIO AVE	HI SHWS	693	0.131	SW
AU245 / 8	ABC STORE 21	2394 KUHIO AVE	HI LUST, HI UST	705	0.134	SW
AU246 / 8	ABC STORES NO 21	2394 KUHIO AVE	RCRA NonGen / NLR	705	0.134	SW
AW247 / 8	BEACH WALK WASTEWATE	377 KAIOLU ST	HI UST, HI Financial Assurance	713	0.135	SW
AX248 / 8	WAIKIKI CENTRAL OFFI	214 KAPUNI ST.	HI LUST, HI UST, HI Financial Assurance	728	0.138	SW
AY249 / 4	PFLUEGER ACURA	1450 S BERETANIA ST	RCRA-VSQG, HI UST, FINDS, ECHO	735	0.139	WSW
AQ250 / 8	MIRAMAR HOTEL INTERN	2345 KUHIO AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	767	0.145	SW
AQ251 / 8	MIRAMAR HOTEL HAWAII	2345 KUHIO AVE	HI LUST, HI UST	767	0.145	SW
AX252 / 8	REMEDIATION SPECIALI	2440 KUHIO AVE STE 1	RCRA NonGen / NLR, FINDS, ECHO	772	0.146	SW
AM253 / 8	WAIKIKI TRADE CTR	2255 KUHIO AVE	RCRA-VSQG, FINDS, ECHO	775	0.147	SW
254 / 8	GREEN THUMB INCORPOR	3363 CAMPBELL AVE	HI UST, HI Financial Assurance	777	0.147	ESE
AZ255 / 8	IOLANI SCHOOL	563 KAMOKU ST	RCRA-VSQG	779	0.148	North
AZ256 / 8	IOLANI SCHOOL	563 KAMOKU ST	HI UST	779	0.148	North
AZ257 / 8	IOLANI SCHOOL CAMPUS	563 KAMOKU ST	HI SHWS	779	0.148	North
AZ258 / 8	IOLANI SCHOOL PETROL	563 KAMOKU ST	HI SHWS, HI SPILLS	779	0.148	North
259 / 8	BWS KAIMUKI PUMP STA	2951 HARDING AVE	HI SHWS, HI SPILLS	780	0.148	SSW
AO260 / 5	ALOHA PETROLEUM: ST.	3075 WAIALAE AVE	RCRA-VSQG, FINDS	798	0.151	SE
AO261 / 5	2ND AVENUE SHELL	3075 WAIALAE AVE	HI LUST, HI UST, HI Financial Assurance	798	0.151	SE
262 / 8	FUDS ALA WAI FIELD		HI SHWS	804	0.152	NE
BA263 / 8	WAIKIKI GATEWAY PARK	2044 KALAKAUA AVE	HI SHWS, HI SPILLS	806	0.153	SW
BB264 / 4	SJD RADIATOR SERVICE	1218 MAKIKI ST	RCRA-VSQG, FINDS, ECHO	811	0.154	West
265 / 8	PRINCE KUHIO HOTEL R	2500 KUHIO AVE	HI SHWS, HI AIRS	820	0.155	SW
266 / 8	WAIKIKI MARINA HOTEL	1956 ALA MOANA BLVD	RCRA NonGen / NLR, FINDS, ECHO	836	0.158	SW
AY267 / 4	SHELL SERVICE STATIO	1436 S BERETANIA	RCRA NonGen / NLR, FINDS, ECHO	837	0.159	WSW
AY268 / 4	MAKIKI SHELL	1436 S BERETANIA ST	HI LUST, HI UST, HI SWRCY, HI Financial ...	837	0.159	WSW

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AY269 / 4	MAKIKI SHELL	1436 S BERETANIA	RCRA NonGen / NLR	837	0.159	WSW
AY270 / 4	HONOLULU POLICE DEPT	801 S. BERETANIA ST.	RCRA-SQG, PADS	843	0.160	SW
AY271 / 4	HONOLULU STATION - P	1455 S BERETANIA ST	HI LUST, HI UST, HI Financial Assurance	843	0.160	SW
272 / 3	MANOA ELEMENTARY SCH	3155 MANOA RD	HI SHWS	844	0.160	NNW
BC273 / 4	JCRA INVESTMENTS	1685 KAPIOLANI PROPE	HI UST	845	0.160	North
BC274 / 4	JCRA INVESTMENTS	1685 KAPIOLANI PROPE	HI LUST	845	0.160	North
275 / 8	KUHIO CLEANERS	810 KAPAHULU AVE	HI UST	849	0.161	NE
276 / 8	AIM WAIKIKI	2025 KALAKAUA AVE.	HI LUST, HI UST, HI SPILLS, HI Financial...	851	0.161	SW
277 / 8	KAPAHULU PUMPING STA		FUDS	851	0.161	NE
278 / 5	KALAKAUA GARDENS	1723 KALAKAUA AVE	HI UST, HI Financial Assurance	851	0.161	North
279 / 8	MATSUSHITA INVESTMEN	2237 KUHIO AVE	HI LUST, HI UST	862	0.163	SW
AV280 / 5	ONE KALAKAUA PARTNER	1314 KALAKAUA AVE	HI UST	878	0.166	SSW
BD281 / 7	HOBRON HOTEL	1744 KAIOO DR	HI SHWS	878	0.166	SSE
BE282 / 5	OUTRIGGER HOTELS	1315 KALAKAUA AVE	HI UST	879	0.166	SSW
283 / 11	LA PIETRA HAWAII SCH	2933 PONI MOI ROAD	RCRA NonGen / NLR, ICIS, FINDS, ECHO	886	0.168	East
284 / 5	HAWAIIAN HUMANE SOCI	2700 WAIALAE AVE	HI UST	887	0.168	NW
AU285 / 8	OUTRIGGER EAST	150 KAIULANI AVE	RCRA-VSQG, FINDS, ECHO, CA HAZNET	888	0.168	SW
286 / 5	KUHIO ELEMENTARY SCH	2759 S KING ST	HI SHWS, HI SPILLS	889	0.168	NW
BF287 / 5	TENNEY'S MANOA SHELL	2740 E MANOA RD	RCRA NonGen / NLR	892	0.169	NW
BF288 / 5	SHELL SERVICE STATIO	2740 E MANOA RD	HI LUST, HI UST, HI SPILLS, HI Financial...	892	0.169	NW
289 / 4	ROOSEVELT HIGH SCHOO	1120 NEHOA ST	HI SHWS	899	0.170	NNE
290 / 4	MOANA PARK WASTEWATE	1501 ALA MOANA BLVD	HI UST, HI Financial Assurance	910	0.172	WNW
291 / 5	KAPIOLANI MEDICAL CE	1637 BINGHAM ST	HI UST, HI Financial Assurance	915	0.173	ESE
292 / 8	KING KALAKAUA PLAZA	2080 KALAKAUA AVE	HI SHWS, HI LUST, HI UST	916	0.173	SW
BG293 / 5	7-11 SECOND AVENUE	3105 WAIALAE AVE	HI UST, HI Financial Assurance	941	0.178	SE
AX294 / 8	KUHIO VILLAGE RESORT	2463 KUHIO AVE	RCRA-VSQG, HI SPILLS, FINDS, ECHO	952	0.180	SW
BE295 / 5	76 KALAKAUA/YOUNG 7-	1323 KALAKAUA AVE	HI SHWS, HI UST, HI Financial Assurance	971	0.184	South
BD296 / 7	DISCOVERY BAY	1778 ALA MOANA BLVD	HI LUST, HI UST	983	0.186	SSE
297 / 4	CARTWRIGHT NEIGHBORH	KEEAUMOKU ST & MATLO	HI SHWS	984	0.186	WNW
BA298 / 8	2051-2057 KALAKAUA A	2051-2057 KALAKAUA A	HI SHWS	1002	0.190	SW
BB299 / 4	76 DON'S MAKIKI #111	1406 S BERETANIA ST	HI LUST, HI UST, HI Financial Assurance	1008	0.191	WSW
BB300 / 4	UNOCAL 76 SS L 0344	1406 S BERETANIA ST	RCRA NonGen / NLR, FINDS, ECHO	1008	0.191	WSW
301 / 8	BASE YARD NO 16 & 17		FUDS	1011	0.191	WSW
BH302 / 8	WESTERN GUN SCHOOL O	339 ROYAL HAWAIIAN A	RCRA NonGen / NLR	1013	0.192	SW
BH303 / 8	HAWAII GUN CLUB	339 ROYAL HAWAIIAN A	RCRA-VSQG	1013	0.192	SW
304 / 6	SAINT LOUIS COLLEGE		FUDS	1018	0.193	East
305 / 5	NOAA - HONOLULU LABO	2570 DOLE ST	HI LUST, HI UST	1022	0.194	NNW
BI306 / 8	DAVENROYE DRY CLEANE	1042 KAPAHULU AVE	HI SHWS, HI LUST, HI UST, RCRA NonGen / ...	1024	0.194	SSW
BJ307 / 5	PUNAHOU SCHOOL	1601 PUNAHOU STREET	RCRA-VSQG, FINDS, ECHO	1035	0.196	ENE

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BJ308 / 5	PUNAHOU SCHOOL - PHY	1601 PUNAHOU ST.	HI LUST, HI UST, HI Financial Assurance	1035	0.196	ENE
BJ309 / 5	PUNAHOU SCHOOL	1601 PUNAHOU STREET	RCRA NonGen / NLR, FTTS	1035	0.196	ENE
BJ310 / 5	PUNAHOU SCHOOL GRADE	1601 PUNAHOU ST	HI SHWS	1035	0.196	ENE
BJ311 / 5	PUNAHOU SCHOOL FIRIN	1601 PUNAHOU ST	HI SHWS	1035	0.196	ENE
BJ312 / 5	PUNAHOU SCHOOL WINNE	1601 PUNAHOU ST	HI SHWS, HI INST CONTROL	1035	0.196	ENE
BG313 / 5	RRR RECYCLING - WAIA	3109 WAIALAE AVE.	HI SWRCY	1038	0.197	SE
BK314 / 8	AVIS RENT- A-CAR SYS	148 KAIULANI AVE	HI LUST, HI UST, HI Financial Assurance	1047	0.198	SW
BH315 / 8	ROYAL HAWAIIAN MARKE	333 ROYAL HAWAIIAN A	HI UST	1058	0.200	SW
BI316 / 8	LONGS DRUG STORES #1	1029 KAPAHULU AVE ST	RCRA-VSQG, FINDS, ECHO	1082	0.205	South
317 / 8	CM&D	2112 KALAKAUA AVE	HI LUST, HI UST	1089	0.206	SW
BL318 / 4	KAPIOLANI RESIDENCE	1631 KAPIOLANI BLVD	HI UST	1095	0.207	NNW
BL319 / 4	KAPIOLANI RESIDENCE	1631 KAPIOLANI BLVD	HI LUST	1095	0.207	NNW
BM320 / 5	ROGERS REPAIR INC	1687 KALAKAUA AVE	RCRA-VSQG, FINDS, ECHO	1102	0.209	NNW
BM321 / 5	ROGER'S REPAIR INC	1687 KALAKAUA AVE	HI SHWS	1102	0.209	NNW
BK322 / 8	AZABU USA CORP DBA K	131 KAIULANI AVE	RCRA-VSQG, FINDS, ECHO	1117	0.212	SW
BK323 / 8	KING'S VILLAGE SHOPP	131 KAIULANI AVE	HI LUST, HI UST	1117	0.212	SW
324 / 8	FUDS BASE YARD NOS.		HI SHWS	1130	0.214	NNW
325 / 5	THE SHERWIN-WILLIAMS	2733 S KING ST	RCRA-VSQG	1131	0.214	NW
BK326 / 8	SAND ISLAND WASTE WA	120 KAIULANI AUCNUE	RCRA-VSQG, FINDS, ECHO	1135	0.215	SW
BN327 / 8	WAIKIKI GUN CLUB	2142 KALAKAUA AVE	RCRA-VSQG	1139	0.216	SW
BO328 / 4	MEADOW GOLD ICE CREA	1401 S BERETANIA ST	HI SHWS, HI SPILLS	1143	0.216	WSW
BO329 / 4	LONGS DRUG STORE #10	1401 S BERETANIA ST	RCRA NonGen / NLR, FINDS, ECHO	1143	0.216	WSW
330 / 5	BARBERS POINT NAVAL	21.296188/-157.81387	PFAS ECHO	1161	0.220	NNW
331 / 8	FORT DERUSSY, FORMER		HI SHWS	1179	0.223	SW
BP332 / 8	LOVES BAKERY	836 KAPAHULU AVE	HI SHWS, HI LUST, HI UST	1179	0.223	NE
BQ333 / 5	1414 KALAKAUA AVENUE	1414 KALAKAUA AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	1179	0.223	SSW
BR334 / 7	ILIKAI	1777 ALA MOANA BLVD	RCRA NonGen / NLR, FINDS, ECHO	1185	0.224	SSE
BR335 / 7	ILIKAI HOTEL	1777 ALA MOANA BLVD	HI LUST, HI UST	1185	0.224	SSE
BQ336 / 4	GAS PLUS	1524 S KING ST	HI LUST, HI UST	1193	0.226	SSW
BO337 / 4	BERETANIA TEXACO 904	1378 S BERETANIA ST	HI LUST, HI UST, HI Financial Assurance	1209	0.229	West
BO338 / 4	IES RETAIL S. BERETA	1378 S BERETANIA ST	RCRA-VSQG	1209	0.229	West
BN339 / 8	KYOTARU HAWAII CORPO	2160 KALAKAUA AVE	HI LUST, HI UST	1219	0.231	SW
340 / 8	DOROTHY TANAKA	3423 CAMPBELL AVE	HI UST	1220	0.231	ENE
BH341 / 8	WAIKIKI SHOPPING PLA	2250 KALAKAUA AVE	HI UST, HI Financial Assurance	1221	0.231	SW
BH342 / 8	WAIKIKI SHOPPING PLA	2250 KALAKAUA AVE	HI LUST	1221	0.231	SW
BS343 / 8	SAFEWAY INC	900 KAPAHULU AVE	RCRA NonGen / NLR	1223	0.232	East
BS344 / 8	FORMERLY DUNKIN DOUG	900 KAPAHULU AVE	HI LUST, HI UST	1223	0.232	East
BT345 / 8	YONEOKA AND ASSOCIAT	2174/2190 KALAKAUA A	HI LUST, HI UST	1234	0.234	SW
BT346 / 8	WAIKIKI BAZAAR	2174 KALAKAUA AVE	HI SHWS, HI SPILLS	1234	0.234	SW

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347 / 8	MILL CAMOUFLAGE 1.2		FUDS	1238	0.234	SW
BU348 / 9	HECO POLE-MOUNT TRAN	3133 WAIALAE AVE	HI SHWS, HI SPILLS	1242	0.235	SE
BV349 / 4	1003 AND 1013 KAHEKA	1003 KAHEKA ST	HI SHWS	1254	0.237	SSW
350 / 8	FORT DERUSSY CENTRAL	ALA MOANA BLVD & KAL	HI UST, HI Financial Assurance	1262	0.239	SSE
BL351 / 4	PAN AM BLDG	1600 KAPIOLANI BLVD	RCRA-VSQG, FINDS, ECHO	1272	0.241	NNW
BN352 / 8	LONGS DRUG STORE #10	2155 KALAKAUA AVE	RCRA-VSQG, FINDS, ECHO	1285	0.243	SW
353 / 8	FORT DERUSSY MILITAR	BLDG 107 AND 108	HI LUST, HI UST	1294	0.245	SW
BP354 / 8	SAFEWAY STORE #2747	888 KAPAHULU AVENUE	RCRA-VSQG, FINDS	1295	0.245	East
BW355 / 5	KALAKAUA TRANSMISSIO	1665 KALAKAUA AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	1336	0.253	NNW
356 / 5	LUNALILO ELEMENTARY	810 PUMEHANA ST	HI SHWS	1340	0.254	NNE
BX357 / 5	PUNAHOU REPAIR SHOP	1558 S KING ST	HI LUST, HI UST	1341	0.254	South
BU358 / 9	CHAMINADE UNIVERSITY	3140 WAIALAE AVE	HI LUST, HI UST	1359	0.257	ESE
359 / 8	SERVICE CLEANERS	936 KAPAHULU AVE	HI SHWS	1369	0.259	East
360 / 8	FORT DERUSSY TRANSFO	2058 MALUHIA RD	HI SHWS	1370	0.259	SW
361 / 5	1911 KEEAUMOKU STREE	1911 KEEAUMOKU ST	HI SHWS	1375	0.260	NE
362 / 5	2700 SOUTH KING STRE	2700 S KING ST	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	1390	0.263	NW
BV363 / 4	MID PAC PETROLEUM 25	1505 S. KING ST.	HI LUST, HI UST, HI Financial Assurance	1396	0.264	SSW
BY364 / 8	STAN SHINKAWN INC	2330 KALAKAUA AVE	SEMS-ARCHIVE	1409	0.267	SW
BY365 / 8	STAN SHINKAWA INC	2330 KALAKAUA AVE	HI SHWS	1409	0.267	SW
BZ366 / 8	DICK'S MONSARRAT SER	3206 MONSARRAT AVE	HI LUST, HI UST, HI Financial Assurance	1412	0.267	East
367 / 8	HERTZ RENT- A-CAR (A	2424 KALAKAUA AVE	HI LUST, HI UST	1423	0.270	SW
BW368 / 4	GAS 'N GLO INC	1670 MAKALOA ST	HI LUST, HI UST	1430	0.271	NNW
369 / 8	ABC STORE UNDERGROUN	2546 LEMON RD	HI SHWS, HI SPILLS	1433	0.271	SW
BZ370 / 8	AIM DIAMOND HEAD	3203 MONSARRAT AVE.	HI LUST, HI UST, HI Financial Assurance	1451	0.275	East
CA371 / 5	UH MANOA FACILITIES	2002 EAST-WEST RD	HI SHWS, HI SPILLS	1470	0.278	WSW
372 / 8	U.S. POSTAL SERVICE	330 SARATOGA RD	HI LUST, HI UST, HI Financial Assurance	1472	0.279	SW
373 / 7	ALA WAI HARBOR FUEL		HI SHWS	1484	0.281	SW
374 / 4	C&CH PAWAA FIRE STAT	1610 MAKALOA ST	HI LUST	1490	0.282	North
BX375 / 5	HELE KING KALAKAUA #	1549 S KING ST	HI LUST, HI UST, HI Financial Assurance	1500	0.284	South
376 / 8	AIM KAPAHULU	1001 KAPAHULU AVE	HI LUST, HI UST, HI Financial Assurance	1512	0.286	East
CA377 / 5	U.H. MOTOR POOL	2027 EAST WEST RD	HI LUST, HI UST, HI Financial Assurance	1523	0.288	WSW
378 / 4	LINCOLN ELEMENTARY S	615 AUWAIOLIMU ST	HI SHWS	1526	0.289	North
379 / 8	MOANA SURFRIDER HOTE	2365 KALAKAUA AVE	HI LUST, HI UST, HI Financial Assurance	1528	0.289	SW
CA380 / 5	UH MANOA BILGER ADDI	2040 EAST-WEST RD	HI SHWS	1541	0.292	WSW
381 / 5	UH MANOA FREAR HALL	2569 DOLE ST	HI SHWS	1552	0.294	NW
382 / 8	HECO TRANSFORMER V84	151 KAPAHULU AVE	HI SHWS, HI INST CONTROL	1571	0.298	NNW
383 / 5	ALEXANDER TOWER	1226 ALEXANDER ST	HI LUST, HI UST	1618	0.306	SE
384 / 5	76 UNIVERSITY 7-11 #	2646 S KING ST	HI LUST, HI UST, HI Financial Assurance	1640	0.311	NW
CB385 / 4	SEARS ROEBUCK & COMP	1450 ALA MOANA BLVD	HI LUST, HI UST, HI SPILLS	1686	0.319	WNW

MAPPED SITES SUMMARY

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
CB386 / 4	SEARS ALA MOANA	1450 ALA MOANA BLVD	HI SHWS	1686	0.319	WNW
387 / 8	HALE KOA HOTEL	2055 KALIA RD	RCRA-VSQG, HI SHWS, CA HAZNET	1699	0.322	SW
388 / 5	C&CH MCCULLY FIRE ST	2425 DATE ST	HI LUST, HI UST, HI Financial Assurance	1732	0.328	NE
389 / 4	NEW OFFICE LOUNGE	1551 KAPIOLANI BLVD	HI SHWS, HI LUST, HI UST	1759	0.333	NNW
390 / 4	YAJIMA OIL OF USA IN	1375 S KING ST	HI LUST, HI UST, HI Financial Assurance	1797	0.340	WSW
391 / 4	FIRESTONE STORE	801 KAHEKA ST	HI LUST, HI UST	1845	0.349	North
392 / 8	HALE PUA NUI UST REM	228 BEACH WALK	HI SHWS, HI SPILLS	1905	0.361	SW
393 / 4	HECO SUBSTATION: MAK	1544 MAKALOA ST	HI SHWS, HI INST CONTROL	1906	0.361	North
394 / 8	ROYAL HAWAIIAN HOTEL	2259 KALAKAUA AVE	RCRA-VSQG, HI LUST, HI UST, FINDS, ECHO,...	1929	0.365	SW
395 / 4	WALGREENS STORE #120	1460 KAPIOLANI BLVD	HI SHWS	1957	0.371	NNW
396 / 6	FUDS ST LOUIS COLLEG		HI SHWS	2013	0.381	East
397 / 7	HILTON HAWAIIAN VILL	2005 KALIA RD	HI LUST, HI UST	2017	0.382	SSE
398 / 9	PALOLO AUTO SERVICE,	3236 WAIALAE AVE	HI LUST, HI UST, HI Financial Assurance	2042	0.387	ESE
399 / 5	PUNAHOU SCHOOL		FUDS	2072	0.392	ESE
CC400 / 5	TEXACO STATION 61100	1119 UNIVERSITY AVE	HI LUST, HI UST, RCRA NonGen / NLR	2097	0.397	NW
401 / 4	SCHUMAN CARRIAGE MOT	1234 S BERETANIA ST	HI SHWS, HI LUST, HI UST, HI INST CONTRO...	2145	0.406	West
CD402 / 5	CONTINENTAL AUTO SER	1918 ALGAROBA ST	HI SHWS, HI SPILLS	2148	0.407	NNE
403 / 8	205 BEACH WALK	205 BEACH WALK AVE	HI SHWS, HI INST CONTROL, HI SPILLS	2186	0.414	SW
CC404 / 5	REYNOLDS RECYCLING -	1106 UNIVERSITY AVE.	HI SWRCY	2216	0.420	NW
CE405 / 5	HALE MAKANA O MOILII	2139 ALGAROBA STREET	HI SHWS, HI BROWNFIELDS	2217	0.420	NE
CF406 / 4	GRACE OTSUKA APARTME	1233 YOUNG ST	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	2220	0.420	West
407 / 8	SHERATON WAIKIKI RES	2255 KALAKAUA AVE	HI LUST, HI UST, HI SPILLS, HI Financial...	2223	0.421	SW
CE408 / 5	HALE MAKANA O MAILI	2193 ALGOROBA STREET	HI SHWS	2266	0.429	NE
CD409 / 5	MCCULLY SERVICE STAT	1901 S KING ST	HI LUST, HI UST	2275	0.431	NNE
410 / 4	KAAHUMANU ELEMENTARY	1141 KINAU ST	HI SHWS	2284	0.433	SW
411 / 5	MID-PACIFIC INSTITUT	2445 KAALA ST	HI SHWS, HI LUST, HI UST, HI Financial A...	2308	0.437	SW
CG412 / 5	UH KENNEDY THEATER	1770 EAST-WEST RD	HI SHWS, HI SPILLS	2313	0.438	NNW
413 / 5	KYLE'S SERVICE STA.	2550 S BERETANIA ST	HI LUST, HI UST	2331	0.441	NW
CH414 / 4	CUTTER CHEVROLET	1391 KAPIOLANI BLVD	HI SHWS, HI LUST, HI UST, HI Financial A...	2351	0.445	NNW
415 / 5	UNIVERSITY OF HAWAII	2019 S KING ST	HI LUST, HI UST	2364	0.448	NNE
CI416 / 5	76 MCCULLY SERVICE #	2105 S KING ST	HI SHWS, HI LUST, HI UST, HI ENG CONTROL...	2371	0.449	NNE
CF417 / 4	CAL'S CLEANERS	1234 S KING ST	HI SHWS	2377	0.450	West
418 / 8	FORT SHAFTER BUILDIN	2199 KALIA RD	RCRA-VSQG, HI SHWS, HI SPILLS, FINDS, EC...	2389	0.452	SW
419 / 5	UNIVERSITY OF HAWAII	H-1 AND UNIVERSITY A	HI SHWS	2390	0.453	NW
420 / 5	WALLYS GARDEN CENTER	1935 S BERETANIA ST	HI SHWS, HI SPILLS	2413	0.457	SE
421 / 4	1310 PENSACOLA STREE	1310 PENSACOLA ST	HI SHWS	2416	0.458	WSW
CH422 / 4	SKY ALA MOANA	1388 KAPIOLANI BLVD	HI SHWS	2420	0.458	NNW
423 / 5	HAWAII LAW ENFORCEME	1936 S KING ST	HI SHWS	2444	0.463	NNE
424 / 5	HONOLULU LIMITED	911 HAUSTEN ST	HI LUST, HI UST	2452	0.464	NW

MAPPED SITES SUMMARY

Target Property:
HONOLULU
HONOLULU, HI 96815

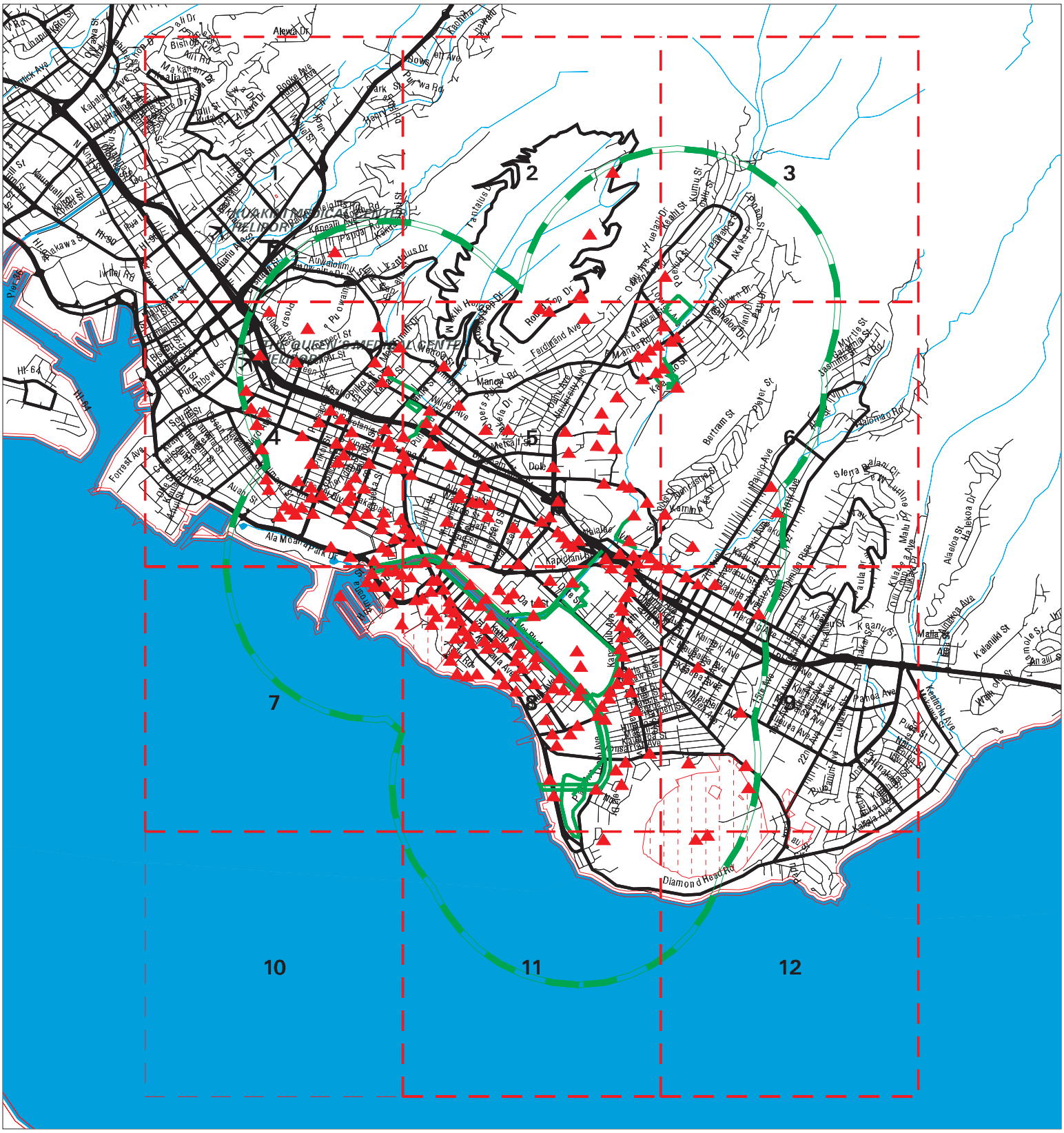
MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
CI425 / 5	WILIWILI AND KING ST	KING ST & WILIWILI S	HI SHWS	2457	0.465	NNE
CJ426 / 4	SUPERBLOCK PROPERTIE	SOUTH BLOCK (BLDG S2	HI LUST, HI UST	2458	0.466	NNW
CI427 / 5	MCDONALD'S RESTAURAN	2121 S KING ST	HI SHWS	2463	0.466	NNE
428 / 4	WENS LIFE CO., INC	808 SHERIDAN ST	HI LUST, HI UST	2479	0.470	SW
CG429 / 5	UH MANOA HENKE HALL	1800 EAST-WEST RD	HI SHWS	2497	0.473	NNW
430 / 4	LIKE LIKE PLAZA PETR	745 KEEAUMOKU ST	HI SHWS	2503	0.474	SW
431 / 4	TEXACO STATION 61100	1239 S KING ST	HI LUST, HI UST, RCRA NonGen / NLR, HI F...	2508	0.475	WSW
CJ432 / 4	SUPERBLOCK PROPERTIE	NORTH BLOCK (BLDG N8	HI LUST, HI UST	2547	0.482	NNW
433 / 9	KAIMUKI TOYOTA	3282 WAIALAE AVE	RCRA-VSQG, HI LUST, HI UST	2547	0.482	ESE
434 / 5	GREEN MILL FOOD MANU	914 COOLIDGE ST	HI LUST, HI UST	2561	0.485	NE
435 / 5	UH MANOA FOOD SCIENC	1920 EDMONDSON RD	HI SHWS, HI SPILLS	2570	0.487	SW
CK436 / 5	TOM ISHIIS UNION SER	2114 S KING ST	HI SHWS	2603	0.493	NE
CK437 / 5	TOM ISHII'S UNION L-	2114 S KING ST	HI LUST, HI UST	2603	0.493	NE
CJ438 / 4	SUPERBLOCK PROPERTIE	SOUTH BLOCK (BLDG S2	HI LUST, HI UST	2608	0.494	NNW
439 / 4	SUPERBLOCK PROJECT	700 KEEAUMOKU ST	HI SHWS	2683	0.508	NNW
440 / 4	ANIN-PIIKOI BUILDING	1012 PIIKOI ST	HI SHWS, HI SPILLS	2697	0.511	West
CL441 / 5	UH MANOA BILGER HALL	2545 MCCARTHY MALL	HI SHWS	2766	0.524	NNW
442 / 9	FORT RUGER CANNON CL	4500 DIAMOND HEAD RD	HI SHWS, HI BROWNFIELDS	2779	0.526	East
443 / 4	902 ALDER STREET	902 ALDER ST	HI SHWS, HI SPILLS, HI LEAD	2785	0.527	WSW
CL444 / 5	UH MANOA SYNDER HALL	2538 MCCARTHY MALL	HI SHWS	2832	0.536	NNW
445 / 5	1800 VANCOUVER DRIVE	1800 VANCOUVER DRIVE	HI SHWS, HI INST CONTROL, HI CDL	2835	0.537	ESE
CM446 / 4	HAWAII CITY PLAZA	710 AND 730 SHERIDAN	HI SHWS	2853	0.540	SW
CM447 / 4	MOTOR SUPPLY	726 SHERIDAN ST	HI SHWS, HI INST CONTROL	2858	0.541	SW
448 / 9	LIHOLIHO ELEMENTARY	3430 MAUNALOA AVE	HI SHWS	2859	0.541	East
449 / 4	ALOHA ALA MOANA	451 PIIKOI ST	HI SHWS, HI LUST, HI UST	2896	0.548	NW
CN450 / 5	NOFA RECOMMENDED		UXO	2903	0.550	West
CN451 / 5	GUN BATTERY		FUDS	2903	0.550	West
452 / 4	GOODWILL BERETANIA S	1075 S BERETANIA ST	HI SHWS	2979	0.564	WSW
453 / 5	LAUNDERLAND II	2043 S. BERETANIA ST	HI SHWS, HI DRYCLEANERS	3048	0.577	SE
454 / 9	ALIIOLANI ELEMENTARY	1240 7TH AVE	HI SHWS	3094	0.586	ESE
455 / 2	HAWAIIAN MACADAMIA N	3280 ROUND TOP DR	HI SHWS	3094	0.586	WNW
456 / 4	FUDS BATTERY PUNCHBO		HI SHWS	3163	0.599	WNW
457 / 4	CENPAC PROPERTIES -	615 PIIKOI ST	HI SHWS, HI LUST, HI UST, HI Financial A...	3171	0.601	NW
CO458 / 4	DURANT PROPERTIES	1235 KONA ST	HI SHWS, HI INST CONTROL	3180	0.602	NW
459 / 5	UH DUKE KAHANAMOKU S	2500 CAMPUS RD	HI SHWS, HI SPILLS	3205	0.607	NW
460 / 5	UNIVERSITY LABORATOR	1776 UNIVERSITY AVEN	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	3242	0.614	NW
461 / 4	PUNCHBOWL MILITARY R		FUDS	3259	0.617	West
CO462 / 4	MARIE LOUISE FINE GA	1221 KONA ST	HI SHWS	3335	0.632	NW
463 / 4	OVERSEAS ASSEMBLY YA		FUDS	3343	0.633	NW

MAPPED SITES SUMMARY

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
464 / 4	MILL NO. 43		FUDS	3367	0.638	NW
465 / 4	KOOLANI TOWER PROJEC	1189 WAIMANU ST	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	3607	0.683	NW
466 / 4	EVERSHINE X	1230 KAPIOLANI BLVD	HI SHWS, HI VCP	3630	0.688	NW
467 / 4	MCKINLEY HIGH SCHOOL		FUDS	3702	0.701	WSW
468 / 5	UH MANOA SHIDLER COL	2404 MAILE WAY	HI SHWS	3753	0.711	WSW
469 / 4	AUXILIARY SERVICES -	1039 S KING ST	HI SHWS, HI UST, HI ENG CONTROLS, HI INS...	3758	0.712	SW
470 / 2	FUDS SUGAR LOAF MILI		HI SHWS	3788	0.717	NW
471 / 12	FORT RUGER FIRING RA	DIAMOND HEAD RD	HI SHWS, HI PFAS	3806	0.721	ESE
472 / 4	RESERVE HOUSING TOWE	1141 WAIMANU ST	HI SHWS, HI SPILLS	3832	0.726	WNW
473 / 4	BOB CISCO	1152 WAIMANU ST	HI SHWS, HI LUST, HI UST	3852	0.730	NW
474 / 12	FORT RUGER		FUDS	4102	0.777	ESE
475 / 4	FUDS OVERSEAS ASSEMB		HI SHWS	4110	0.778	NW
476 / 5	ROUND TOP MILITARY R		FUDS	4160	0.788	West
477 / 9	3464-3466 WAIALAE AV	3466 WAIALAE AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	4168	0.789	ESE
478 / 5	FUDS ROUND TOP MILIT	NUTRIDGE ST	HI SHWS	4508	0.854	West
CP479 / 4	HONOLULU LAUNDRY CO.	438 KAMAKEE ST	HI SHWS, HI LUST, HI UST	4539	0.860	NW
480 / 4	1510A FREAR STREET	1510 FREAR ST	HI SHWS, HI SPILLS	4557	0.863	West
481 / 1	PAUOA ELEMENTARY SCH	2301 PAUOA RD	HI SHWS	4569	0.865	NNW
482 / 4	801 SOUTH HOTEL STRE	801 S HOTEL ST	HI SHWS	4654	0.881	WSW
CP483 / 4	SPUDS DRY CLEANERS	1065 WAIMANU ST	HI SHWS	4661	0.883	NW
484 / 4	BATTERY PUNCHBOWL		FUDS	4670	0.884	WNW
485 / 9	LEAHI HOSPITAL	3675 KILAUEA AVE	HI SHWS, HI LUST, HI UST, HI AIRS, HI Fi...	4689	0.888	ESE
CQ486 / 4	JAS W GLOVER LTD	1046 WAIMAMU ST	HI SHWS, HI LUST, HI UST, RCRA NonGen / ...	4830	0.915	NW
487 / 9	KAPIOLANI COMMUNITY	4303 DIAMOND HEAD RO	HI SHWS, HI LUST	4832	0.915	East
CQ488 / 4	ARTSPACE	1025 WAIMANU ST	HI SHWS, HI BROWNFIELDS	4858	0.920	NW
489 / 6	AIM PALOLO	1841 PALOLO AVE	HI SHWS, HI LUST, HI UST, HI Financial A...	4915	0.931	ENE
CR490 / 9	SHIZUKO HAMAOKA TRUS	3311 SIERRA DR	HI SHWS, HI INST CONTROL, HI SPILLS	4966	0.941	ESE
CQ491 / 4	PACIFICA CONDOMINIUM	1009 KAPIOLANI BLVD	HI SHWS, HI LUST	4968	0.941	NW
CQ492 / 4	HDC PROPERTIES STAIN	1015 KAPIOLANI BLVD	HI SHWS, HI SPILLS	4968	0.941	NW
493 / 9	FUDS DIAMOND HEAD AM	DIAMOND HEAD RD	HI SHWS	4992	0.945	East
CR494 / 9	SHELL SERVICE STATIO	3562 WAIALAE AVE	HI SHWS, HI LUST, HI UST, HI ENG CONTROL...	5012	0.949	ESE
495 / 2	WILLIAMSON RESIDENCE	4142 ROUND TOP DR	HI SHWS	5018	0.950	NNW
496 / 6	HECO FORMER PALOLO S	3419 PAALEA ST	HI SHWS	5033	0.953	East
497 / 4	ONE ARCHER LANE PETR	801 S KING ST	HI SHWS	5036	0.954	WSW
498 / 4	JOINT TRAFFIC MANAGE	KING STREET	HI SHWS	5051	0.957	WSW
499 / 4	BWS BERETANIA PUMPIN	650 S BERETANIA ST	HI SHWS	5088	0.964	West
500 / 4	NEAL BLAISDELL CENTE	777 WARD AVE	HI SHWS, HI SPILLS	5236	0.992	WSW

Key Map - 7196419.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/2 1 Miles

SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22 9:48 AM

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Lists of Federal NPL (Superfund) sites								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Lists of Federal Delisted NPL sites								
Delisted NPL	1.000		0	0	0	0	NR	0
Lists of Federal sites subject to CERCLA removals and CERCLA orders								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Lists of Federal CERCLA sites with NFRAP								
SEMS-ARCHIVE	0.500		1	0	1	NR	NR	2
Lists of Federal RCRA facilities undergoing Corrective Action								
CORRACTS	1.000		0	0	0	0	NR	0
Lists of Federal RCRA TSD facilities								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA generators								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	1	NR	NR	NR	1
RCRA-VSQG	0.250	3	21	19	NR	NR	NR	43
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP	2	NR	NR	NR	NR	NR	2
Lists of state- and tribal hazardous waste facilities								
HI SHWS	1.000	1	25	32	45	53	NR	156
Lists of state and tribal landfills and solid waste disposal facilities								
HI SWF/LF	0.500		0	0	0	NR	NR	0
Lists of state and tribal leaking storage tanks								
HI LUST	0.500	1	26	30	41	NR	NR	98

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
Lists of state and tribal registered storage tanks								
FEMA UST	0.250		0	0	NR	NR	NR	0
HI UST	0.250	3	41	47	NR	NR	NR	91
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
HI ENG CONTROLS	0.500		2	2	4	NR	NR	8
HI INST CONTROL	0.500		2	3	8	NR	NR	13
Lists of state and tribal voluntary cleanup sites								
HI VCP	0.500		0	1	0	NR	NR	1
INDIAN VCP	0.500		0	0	0	NR	NR	0
Lists of state and tribal brownfield sites								
HI BROWNFIELDS	0.500		0	0	1	NR	NR	1
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
HI SWRCY	0.500		2	2	1	NR	NR	5
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
HI CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
HI SPILLS	TP	14	NR	NR	NR	NR	NR	14
HI SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250	2	22	15	NR	NR	NR	39
FUDS	1.000	1	3	5	1	8	NR	18
DOD	1.000		1	0	1	0	NR	2

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP	5	NR	NR	NR	NR	NR	5
MLTS	TP	1	NR	NR	NR	NR	NR	1
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP	4	NR	NR	NR	NR	NR	4
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP	25	NR	NR	NR	NR	NR	25
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
ECHO	TP	14	NR	NR	NR	NR	NR	14
UXO	1.000		0	0	0	1	NR	1
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
PFAS NPL	0.250		0	0	NR	NR	NR	0
PFAS FEDERAL SITES	0.250		0	0	NR	NR	NR	0
PFAS TSCA	0.250		0	0	NR	NR	NR	0
PFAS RCRA MANIFEST	0.250		0	0	NR	NR	NR	0
PFAS ATSDR	0.250		0	0	NR	NR	NR	0
PFAS WQP	0.250	1	1	0	NR	NR	NR	2
PFAS NPDES	0.250		0	0	NR	NR	NR	0
PFAS ECHO	0.250		0	1	NR	NR	NR	1
PFAS ECHO FIRE TRAINING	0.250		0	0	NR	NR	NR	0
PFAS PART 139 AIRPORT	0.250		0	0	NR	NR	NR	0
AQUEOUS FOAM NRC	0.250		0	0	NR	NR	NR	0
HI PFAS	0.250		0	0	NR	NR	NR	0
HI AIRS	TP	2	NR	NR	NR	NR	NR	2
HI DRYCLEANERS	0.250		0	0	NR	NR	NR	0
HI Financial Assurance	TP	2	NR	NR	NR	NR	NR	2
HI LEAD	TP	21	NR	NR	NR	NR	NR	21
CA HAZNET	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
HI UIC	TP		NR	NR	NR	NR	NR	0
MINES MRDS	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125	1	32	NR	NR	NR	NR	33
EDR Hist Cleaner	0.125	1	7	NR	NR	NR	NR	8
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
HI RGA HWS	TP		NR	NR	NR	NR	NR	0
HI RGA LF	TP		NR	NR	NR	NR	NR	0
HI RGA LUST	TP	1	NR	NR	NR	NR	NR	1
- Totals --		105	186	158	103	62	0	614

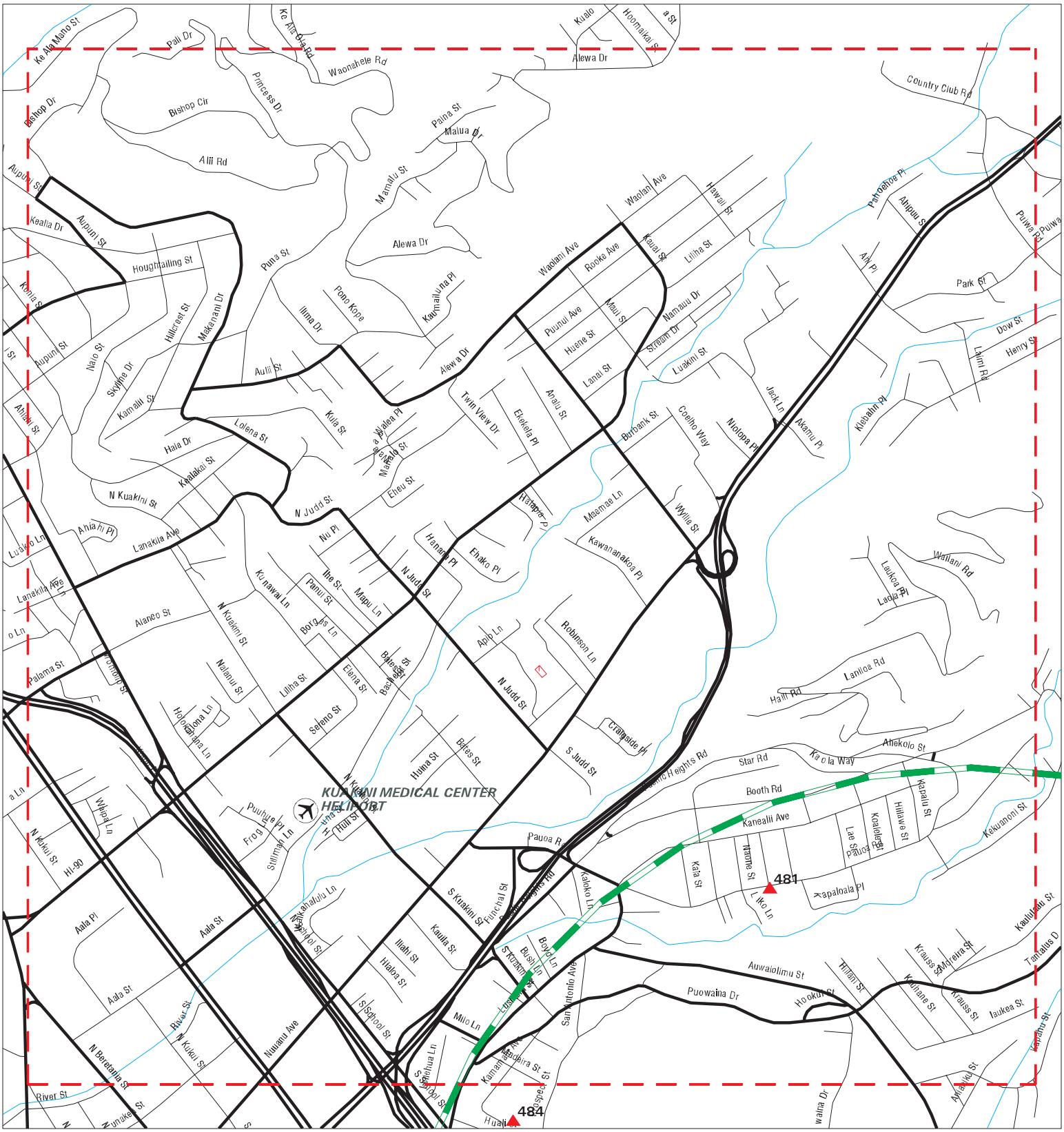
NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Focus Map - 1 - 7196419.5s



SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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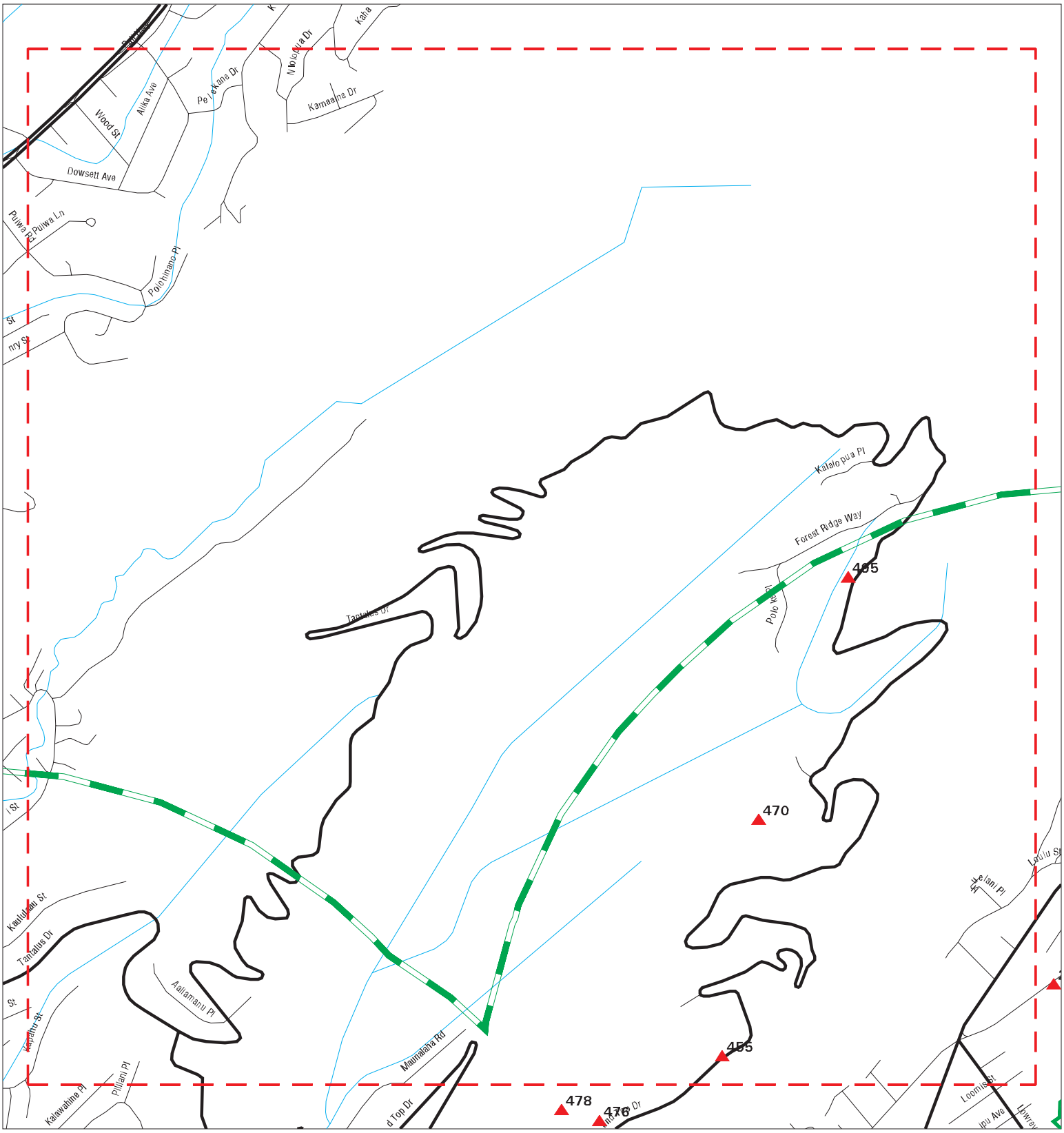
MAPPED SITES SUMMARY - FOCUS MAP 1

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
481 / 1	PAUOA ELEMENTARY SCH	2301 PAUOA RD	HI SHWS	4569 0.865 NNW

Focus Map - 2 - 7196419.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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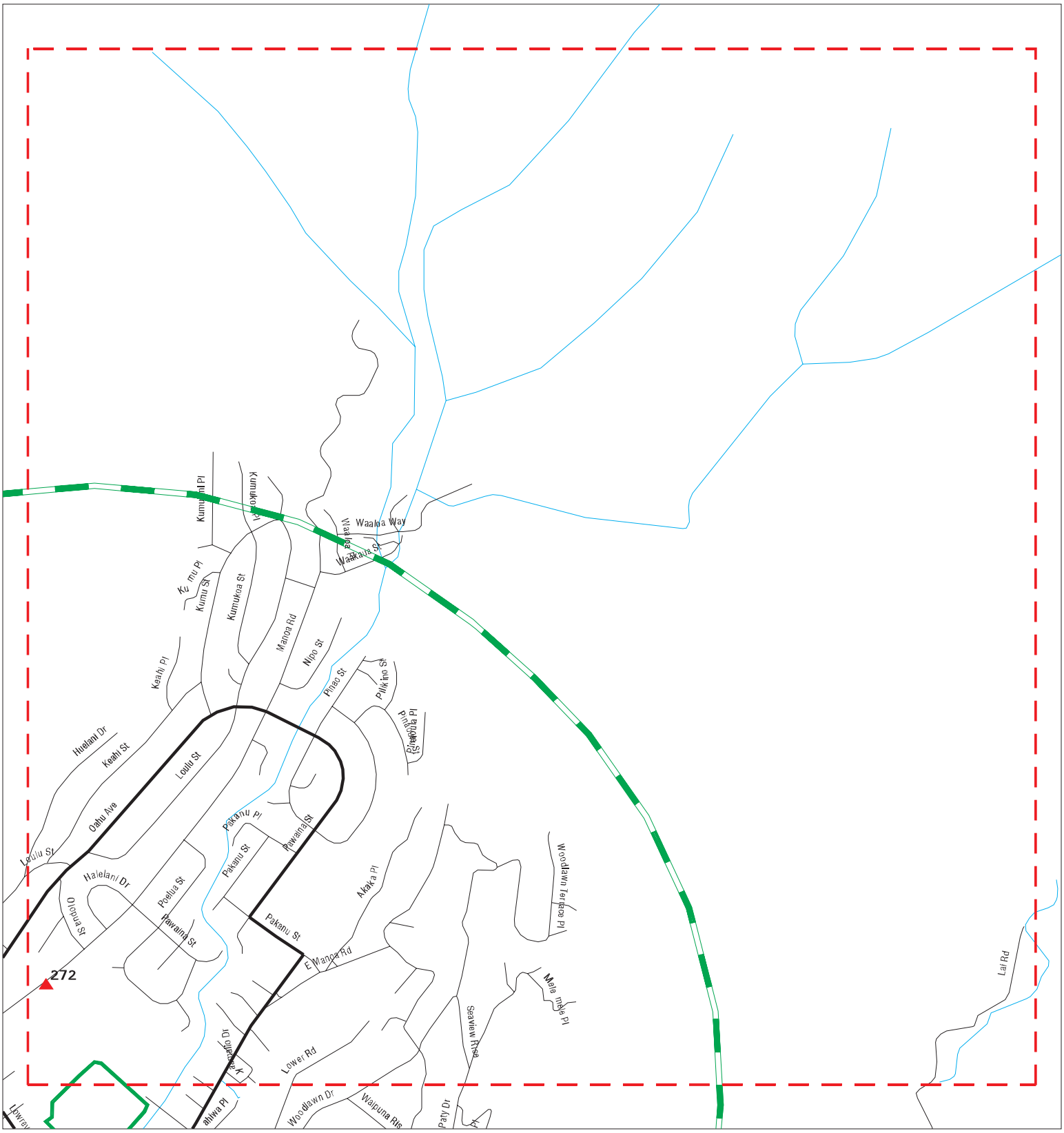
MAPPED SITES SUMMARY - FOCUS MAP 2

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
455 / 2	HAWAIIAN MACADAMIA N	3280 ROUND TOP DR	HI SHWS	3094 0.586 WNW
470 / 2	FUDS SUGAR LOAF MILI		HI SHWS	3788 0.717 NW
495 / 2	WILLIAMSON RESIDENCE	4142 ROUND TOP DR	HI SHWS	5018 0.950 NNW

Focus Map - 3 - 7196419.5s



SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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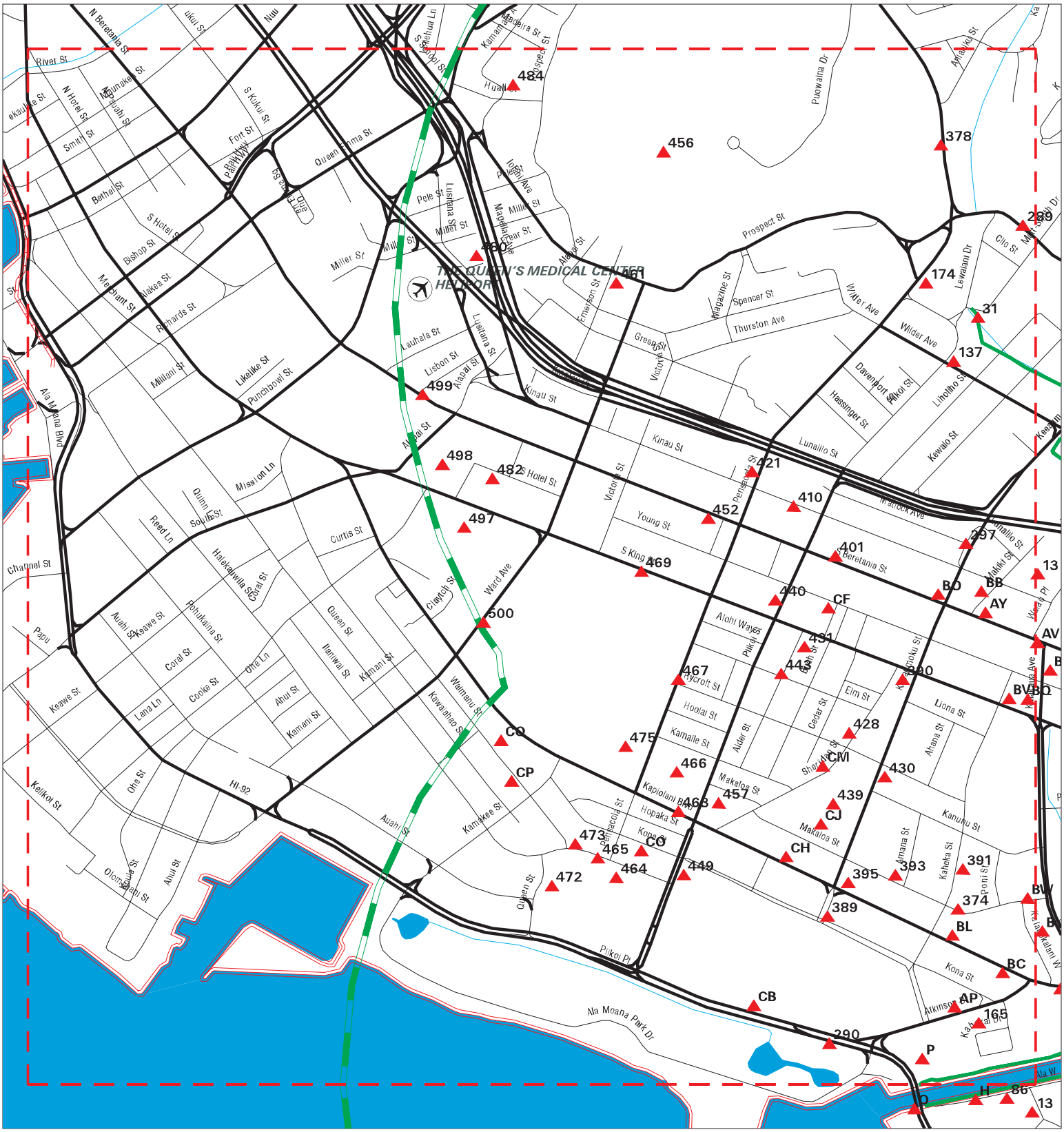
MAPPED SITES SUMMARY - FOCUS MAP 3

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
272 / 3	MANOA ELEMENTARY SCH	3155 MANOA RD	HI SHWS	844 0.160 NNW

Focus Map - 4 - 7196419.5s


THE QUEEN'S MEDICAL CENTER HELIPORT
Ala Moana Park Dr
Ala Wai Blvd
Kalakaua Ave
Kapiolani Blvd
Ward Ave
Kamakee St
Piikoi St
Pensacola St
Victoria St
Keeaumoku St
Makiki St
Punchbowl St
Likelike St
Nuuanu Pali Dr
Pali Hwy
HI-92
Prospect St
Kinau St
Young St
S King St
Beretania St
Lunalilo St
Wilder Ave
Thurston Ave
Spencer St
Lewalani Dr
Kewalo St
Hassinger St
Davenport St
Liholiho St
Piikoi St
Magazine St
Atkinson Dr
Kona St
Kaheka St
Kanunu St
Liona St
Elm St
Cedar St
Alder St
Makaloa St
Kamalle St
Hoolai St
Hopaka St
Kapiolani Blvd
Pilikoi St
Alohi Way
Hylton Pl
Ilalo St
Hylton Ln
Kaiolu St
Kaimanahila St
Kaheka St
Amana St
Ahana St
Kalia Rd
Kalahi W
Ala Wai

MAPPED SITES SUMMARY - FOCUS MAP 4

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
31 / 4	1653 MOTT SMITH DRIV	1653 MOTT-SMITH DR	HI SPILLS	TP		
P94 / 4	WAIKIKI YACHT CLUB	1599 ALA MOANA BLVD	RCRA-VSQG	130	0.025	WNW
P113 / 4	YACHT HARBOR TOWERS	1600 ALA MOANA BLVD	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	210	0.040	NNW
P114 / 4	AOAO YACHT HARBOR TO	1600_1650 ALA MOANA	RCRA-VSQG	210	0.040	NNW
137 / 4	MAKIKI FIRE STATION	1202 WILDER AVE	HI LUST, HI UST, HI Financial Assurance	309	0.059	WSW
165 / 4	I L W U LOCAL 142	451 ATKINSON DR	RCRA NonGen / NLR	431	0.082	NNW
174 / 4	PUNCHBOWL CAMP		FUDS	475	0.090	WNW
AP225 / 4	AOAO ALA MOANA HOTEL	410 ATKINSON DR	HI UST, HI Financial Assurance	632	0.120	North
AP226 / 4	ALA MOANA HOTEL	410 ATKINSON DRIVE	RCRA-VSQG, FINDS, ECHO	632	0.120	North
AY249 / 4	PFLUEGER ACURA	1450 S BERETANIA ST	RCRA-VSQG, HI UST, FINDS, ECHO	735	0.139	WSW
BB264 / 4	SJD RADIATOR SERVICE	1218 MAKIKI ST	RCRA-VSQG, FINDS, ECHO	811	0.154	West
AY267 / 4	SHELL SERVICE STATIO	1436 S BERETANIA	RCRA NonGen / NLR, FINDS, ECHO	837	0.159	WSW
AY268 / 4	MAKIKI SHELL	1436 S BERETANIA ST	HI LUST, HI UST, HI SWRCY, HI Financial ...	837	0.159	WSW
AY269 / 4	MAKIKI SHELL	1436 S BERETANIA	RCRA NonGen / NLR	837	0.159	WSW
AY270 / 4	HONOLULU POLICE DEPT	801 S. BERETANIA ST.	RCRA-SQG, PADS	843	0.160	SW
AY271 / 4	HONOLULU STATION - P	1455 S BERETANIA ST	HI LUST, HI UST, HI Financial Assurance	843	0.160	SW
BC273 / 4	JCRA INVESTMENTS	1685 KAPIOLANI PROPE	HI UST	845	0.160	North
BC274 / 4	JCRA INVESTMENTS	1685 KAPIOLANI PROPE	HI LUST	845	0.160	North
289 / 4	ROOSEVELT HIGH SCHOO	1120 NEHOA ST	HI SHWS	899	0.170	NNE
290 / 4	MOANA PARK WASTEWATE	1501 ALA MOANA BLVD	HI UST, HI Financial Assurance	910	0.172	WNW
297 / 4	CARTWRIGHT NEIGHBORH	KEEAUMOKU ST & MATLO	HI SHWS	984	0.186	WNW
BB299 / 4	76 DON'S MAKIKI #111	1406 S BERETANIA ST	HI LUST, HI UST, HI Financial Assurance	1008	0.191	WSW
BB300 / 4	UNOCAL 76 SS L 0344	1406 S BERETANIA ST	RCRA NonGen / NLR, FINDS, ECHO	1008	0.191	WSW
BL318 / 4	KAPIOLANI RESIDENCE	1631 KAPIOLANI BLVD	HI UST	1095	0.207	NNW
BL319 / 4	KAPIOLANI RESIDENCE	1631 KAPIOLANI BLVD	HI LUST	1095	0.207	NNW
BO328 / 4	MEADOW GOLD ICE CREA	1401 S BERETANIA ST	HI SHWS, HI SPILLS	1143	0.216	WSW
BO329 / 4	LONGS DRUG STORE #10	1401 S BERETANIA ST	RCRA NonGen / NLR, FINDS, ECHO	1143	0.216	WSW
BQ336 / 4	GAS PLUS	1524 S KING ST	HI LUST, HI UST	1193	0.226	SSW
BO337 / 4	BERETANIA TEXACO 904	1378 S BERETANIA ST	HI LUST, HI UST, HI Financial Assurance	1209	0.229	West
BO338 / 4	IES RETAIL S. BERETA	1378 S BERETANIA ST	RCRA-VSQG	1209	0.229	West
BV349 / 4	1003 AND 1013 KAHEKA	1003 KAHEKA ST	HI SHWS	1254	0.237	SSW
BL351 / 4	PAN AM BLDG	1600 KAPIOLANI BLVD	RCRA-VSQG, FINDS, ECHO	1272	0.241	NNW
BV363 / 4	MID PAC PETROLEUM 25	1505 S. KING ST.	HI LUST, HI UST, HI Financial Assurance	1396	0.264	SSW
BW368 / 4	GAS 'N GLO INC	1670 MAKALOA ST	HI LUST, HI UST	1430	0.271	NNW
374 / 4	C&CH PAWAA FIRE STAT	1610 MAKALOA ST	HI LUST	1490	0.282	North
378 / 4	LINCOLN ELEMENTARY S	615 AUWAIOLIMU ST	HI SHWS	1526	0.289	North
CB385 / 4	SEARS ROEBUCK & COMP	1450 ALA MOANA BLVD	HI LUST, HI UST, HI SPILLS	1686	0.319	WNW
CB386 / 4	SEARS ALA MOANA	1450 ALA MOANA BLVD	HI SHWS	1686	0.319	WNW
389 / 4	NEW OFFICE LOUNGE	1551 KAPIOLANI BLVD	HI SHWS, HI LUST, HI UST	1759	0.333	NNW

MAPPED SITES SUMMARY - FOCUS MAP 4

Target Property:
HONOLULU
HONOLULU, HI 96815

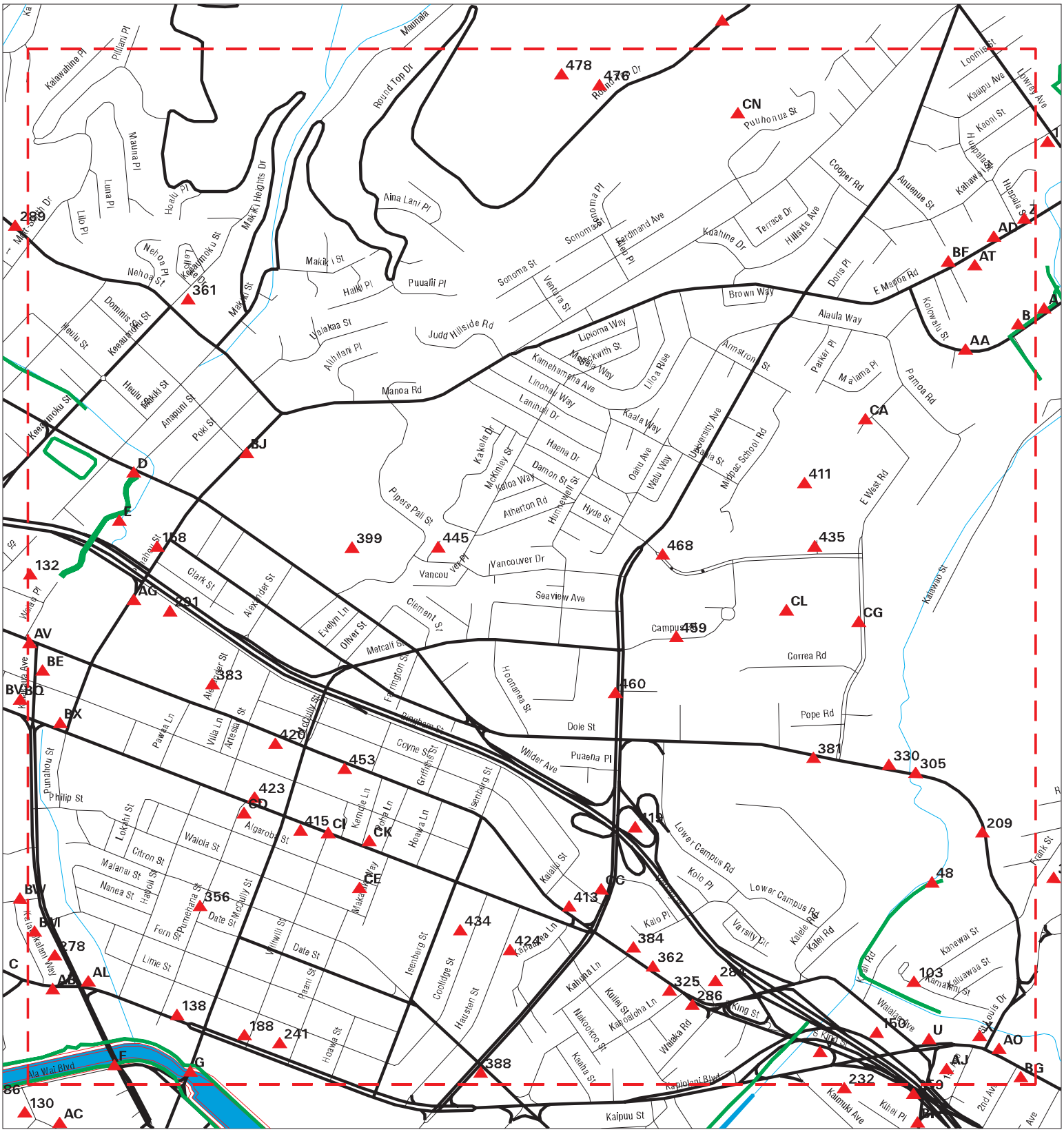
MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
390 / 4	YAJIMA OIL OF USA IN	1375 S KING ST	HI LUST, HI UST, HI Financial Assurance	1797	0.340	WSW
391 / 4	FIRESTONE STORE	801 KAHEKA ST	HI LUST, HI UST	1845	0.349	North
393 / 4	HECO SUBSTATION: MAK	1544 MAKALOA ST	HI SHWS, HI INST CONTROL	1906	0.361	North
395 / 4	WALGREENS STORE #120	1460 KAPIOLANI BLVD	HI SHWS	1957	0.371	NNW
401 / 4	SCHUMAN CARRIAGE MOT	1234 S BERETANIA ST	HI SHWS, HI LUST, HI UST, HI INST CONTRO...	2145	0.406	West
CF406 / 4	GRACE OTSUKA APARTME	1233 YOUNG ST	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	2220	0.420	West
410 / 4	KAAHUMANU ELEMENTARY	1141 KINAU ST	HI SHWS	2284	0.433	SW
CH414 / 4	CUTTER CHEVROLET	1391 KAPIOLANI BLVD	HI SHWS, HI LUST, HI UST, HI Financial A...	2351	0.445	NNW
CF417 / 4	CAL'S CLEANERS	1234 S KING ST	HI SHWS	2377	0.450	West
421 / 4	1310 PENSACOLA STREE	1310 PENSACOLA ST	HI SHWS	2416	0.458	WSW
CH422 / 4	SKY ALA MOANA	1388 KAPIOLANI BLVD	HI SHWS	2420	0.458	NNW
CJ426 / 4	SUPERBLOCK PROPERTIE	SOUTH BLOCK (BLDG S2	HI LUST, HI UST	2458	0.466	NNW
428 / 4	WENS LIFE CO., INC	808 SHERIDAN ST	HI LUST, HI UST	2479	0.470	SW
430 / 4	LIKE LIKE PLAZA PETR	745 KEEAUMOKU ST	HI SHWS	2503	0.474	SW
431 / 4	TEXACO STATION 61100	1239 S KING ST	HI LUST, HI UST, RCRA NonGen / NLR, HI F...	2508	0.475	WSW
CJ432 / 4	SUPERBLOCK PROPERTIE	NORTH BLOCK (BLDG N8	HI LUST, HI UST	2547	0.482	NNW
CJ438 / 4	SUPERBLOCK PROPERTIE	SOUTH BLOCK (BLDG S2	HI LUST, HI UST	2608	0.494	NNW
439 / 4	SUPERBLOCK PROJECT	700 KEEAUMOKU ST	HI SHWS	2683	0.508	NNW
440 / 4	ANIN-PIIKOI BUILDING	1012 PIIKOI ST	HI SHWS, HI SPILLS	2697	0.511	West
443 / 4	902 ALDER STREET	902 ALDER ST	HI SHWS, HI SPILLS, HI LEAD	2785	0.527	WSW
CM446 / 4	HAWAII CITY PLAZA	710 AND 730 SHERIDAN	HI SHWS	2853	0.540	SW
CM447 / 4	MOTOR SUPPLY	726 SHERIDAN ST	HI SHWS, HI INST CONTROL	2858	0.541	SW
449 / 4	ALOHA ALA MOANA	451 PIIKOI ST	HI SHWS, HI LUST, HI UST	2896	0.548	NW
452 / 4	GOODWILL BERETANIA S	1075 S BERETANIA ST	HI SHWS	2979	0.564	WSW
456 / 4	FUDS BATTERY PUNCHBO		HI SHWS	3163	0.599	WNW
457 / 4	CENPAC PROPERTIES -	615 PIIKOI ST	HI SHWS, HI LUST, HI UST, HI Financial A...	3171	0.601	NW
CO458 / 4	DURANT PROPERTIES	1235 KONA ST	HI SHWS, HI INST CONTROL	3180	0.602	NW
461 / 4	PUNCHBOWL MILITARY R		FUDS	3259	0.617	West
CO462 / 4	MARIE LOUISE FINE GA	1221 KONA ST	HI SHWS	3335	0.632	NW
463 / 4	OVERSEAS ASSEMBLY YA		FUDS	3343	0.633	NW
464 / 4	MILL NO. 43		FUDS	3367	0.638	NW
465 / 4	KOOLANI TOWER PROJEC	1189 WAIMANU ST	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	3607	0.683	NW
466 / 4	EVERSHINE X	1230 KAPIOLANI BLVD	HI SHWS, HI VCP	3630	0.688	NW
467 / 4	MCKINLEY HIGH SCHOOL		FUDS	3702	0.701	WSW
469 / 4	AUXILIARY SERVICES -	1039 S KING ST	HI SHWS, HI UST, HI ENG CONTROLS, HI INS...	3758	0.712	SW
472 / 4	RESERVE HOUSING TOWE	1141 WAIMANU ST	HI SHWS, HI SPILLS	3832	0.726	WNW
473 / 4	BOB CISCO	1152 WAIMANU ST	HI SHWS, HI LUST, HI UST	3852	0.730	NW
475 / 4	FUDS OVERSEAS ASSEMB		HI SHWS	4110	0.778	NW
CP479 / 4	HONOLULU LAUNDRY CO.	438 KAMAKEE ST	HI SHWS, HI LUST, HI UST	4539	0.860	NW

MAPPED SITES SUMMARY - FOCUS MAP 4

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
480 / 4	1510A FREAR STREET	1510 FREAR ST	HI SHWS, HI SPILLS	4557	0.863	West
482 / 4	801 SOUTH HOTEL STRE	801 S HOTEL ST	HI SHWS	4654	0.881	WSW
CP483 / 4	SPUDS DRY CLEANERS	1065 WAIMANU ST	HI SHWS	4661	0.883	NW
484 / 4	BATTERY PUNCHBOWL		FUDS	4670	0.884	WNW
CQ486 / 4	JAS W GLOVER LTD	1046 WAIMAMU ST	HI SHWS, HI LUST, HI UST, RCRA NonGen / ...	4830	0.915	NW
CQ488 / 4	ARTSPACE	1025 WAIMANU ST	HI SHWS, HI BROWNFIELDS	4858	0.920	NW
CQ491 / 4	PACIFICA CONDOMINIUM	1009 KAPIOLANI BLVD	HI SHWS, HI LUST	4968	0.941	NW
CQ492 / 4	HDC PROPERTIES STAIN	1015 KAPIOLANI BLVD	HI SHWS, HI SPILLS	4968	0.941	NW
497 / 4	ONE ARCHER LANE PETR	801 S KING ST	HI SHWS	5036	0.954	WSW
498 / 4	JOINT TRAFFIC MANAGE	KING STREET	HI SHWS	5051	0.957	WSW
499 / 4	BWS BERETANIA PUMPIN	650 S BERETANIA ST	HI SHWS	5088	0.964	West
500 / 4	NEAL BLAISDELL CENTE	777 WARD AVE	HI SHWS, HI SPILLS	5236	0.992	WSW

Focus Map - 5 - 7196419.5s



SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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MAPPED SITES SUMMARY - FOCUS MAP 5

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
A35 / 5	MAGOON AGRICULTURAL	2717 WOODLAWN DR	RCRA-VSQG, FINDS, ECHO	TP		
B36 / 5	VCA UNIVERSITY ANIMA	2728 WOODLAWN DR	MLTS	TP		
B37 / 5	UH AGRICULTURAL RESE	UNKNOWN	FINDS	TP		
B38 / 5	2716 WOODLAWN DRIVE	2716 WOODLAWN DR	HI SPILLS	TP		
B39 / 5	MANOA PUBLIC LIBRARY	2716 WOODLAWN DRIVE	FINDS, ECHO	TP		
D42 / 5	THE PARISH OF ST. CL	1515 WILDER AVE	RCRA NonGen / NLR	TP		
D43 / 5	ST CLEMENTS SCHOOL	1515 WILDER AV	FTTS, HIST FTTS	TP		
D44 / 5	ST. CLEMENTS SCHOOL	1515 WILDER AV	FINDS	TP		
D45 / 5	THE PARISH OF ST. CL	1515 WILDER AVE	ECHO	TP		
D46 / 5	THE PARISH OF ST. CL	1515 WILDER AVE	FINDS	TP		
E47 / 5	FIRE HYDRANT INSTALL	MAKIKI ST.;KOMAIA DR	FINDS, ECHO	TP		
48 / 5	MANOA STR AT KANEWAI		PFAS WQP	TP		
F49 / 5	IMPROVEMENTS OF KALA		FINDS	TP		
F50 / 5	ALA WAI BOULEVARD &	ALA WAI BLVD & KALAK	HI SPILLS	TP		
G51 / 5	MCCULLY & MOILIILI S	MCCULLY ST X MOILIIL	FINDS	TP		
103 / 5	HOKULANI ELEMENTARY	2940 KAMAKINI ST	HI SHWS	169	0.032	NNE
E117 / 5	MARYKNOLL HIGH SCHOO	1402 PUNAHOU ST	RCRA-VSQG	240	0.045	SE
U121 / 5	ESQUIRE SHELL SERVIC	2960 WAIALAE AVE	EDR Hist Auto	261	0.049	SSW
U122 / 5	MONSTER HI-5 & TIRES	2960 WAIALAE AVE	RCRA NonGen / NLR	261	0.049	SSW
U123 / 5	MONSTER HI-5 & TIRES	2960 WAIALAE AVENUE	HI SWRCY	261	0.049	SSW
U124 / 5	SEVEN HAWAIIANS CORP	2960 WAIALAE AVE	HI UST	261	0.049	SSW
U125 / 5	MONSTER HI-5 & TIRES	2960 WAIALAE AVE	RCRA NonGen / NLR, FINDS, ECHO	261	0.049	SSW
V126 / 5	IES RETAIL S. KING S	2969 S KING ST	RCRA-VSQG, FINDS, ECHO	262	0.050	SE
V127 / 5	KAPIOLANI TEXACO 919	2969 S KING ST	HI UST, HI Financial Assurance	262	0.050	SE
V128 / 5	SUNRISE SERVICE STAT	2969 S KING STREET	EDR Hist Auto	262	0.050	SE
132 / 5	ROGERS CHEVRON	1403 MAKIKI ST APT 4	EDR Hist Auto	283	0.054	West
138 / 5	GEORGES SHELL SERVIC	1944 KAPIOLANI BLVD	EDR Hist Auto	335	0.063	NNE
X140 / 5	BERGER AUTOHAUS, INC	3030 WAIALAE AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	347	0.066	SE
X141 / 5	BERGERS AUTOHAUS INC	3030 WAIALAE AVE	HI LUST, HI UST, HI SPILLS, RCRA NonGen ...	347	0.066	SE
X142 / 5	BERGERS AUTOHAUS SAL	3030 WAIALAE AVE	RCRA-VSQG, FINDS	347	0.066	SE
150 / 5	KEE - THEMA INC	3060 KAPIOLANI BLVD	HI UST	399	0.076	SSW
U152 / 5	SERAI'S UNION SERVIC	3011 WAIALAE AVE	HI LUST, HI UST	403	0.076	South
U153 / 5	SERAIS UNION SERVICE	3011 WAIALAE AVE	EDR Hist Auto	403	0.076	South
U154 / 5	UNOCAL 76 SS L 4922	3011 WAIALAE AVE	RCRA NonGen / NLR	403	0.076	South
AA155 / 5	NOELANI ELEMENTARY S	2655 WOODLAWN DR	HI SHWS	412	0.078	WSW
X157 / 5	FREDERICK FONG M.D.	3034 AND 3036 WAIALA	HI LUST, HI UST	416	0.079	ESE
158 / 5	ARCADIA RETIREMENT	1434 PUNAHOU ST	HI LUST, HI UST	420	0.080	SE
AB159 / 5	ALOHA MOTORS	KAPIOLANI BLVD X KAL	HI LUST, HI UST	421	0.080	NNW
AA160 / 5	UNIVERSITY OF HAWAII	2680 WOODLAWN DRIVE	RCRA-VSQG	422	0.080	WSW

MAPPED SITES SUMMARY - FOCUS MAP 5

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
AD164 / 5	SAFEWAY STORE #204	2855 EAST MANOA ROAD	RCRA-VSQG	430	0.081	NW
X166 / 5	DANA LABELS COMPANY	3035 WAIALAE AVE	HI UST	464	0.088	SE
X167 / 5	CONSUMER TIRE WAREHO	3040 WAIALAE AVE	RCRA NonGen / NLR, FINDS, ECHO	466	0.088	ESE
X168 / 5	MIWA ROBERT M	3040 WAIALAE AVE	EDR Hist Auto	466	0.088	ESE
Z177 / 5	MASAS GAS SHACK	2914 E MANOA RD	EDR Hist Auto	489	0.093	NNW
AB178 / 5	DOLLAR RENT-A-CAR	1801 KALAKAUA AVE	HI UST	494	0.094	North
AB179 / 5	HAWAII CONVENTION CE	1801 KALAKAUA AVENUE	RCRA-VSQG	494	0.094	North
AB180 / 5	HAWAII CONVENTION CE	1801 KALAKAUA AVE	RCRA NonGen / NLR, FINDS, ECHO	494	0.094	North
AB181 / 5	JIMS ALOHA CHEVRON	1801 KALAKAUA AVE	EDR Hist Auto	494	0.094	North
AB182 / 5	HAWAII CONVENTION CE	1801 KALAKAUA AVE	HI SHWS	494	0.094	North
AG184 / 5	SHRINERS HOSPITALS F	1310 PUNAHOU ST	HI LUST, HI UST, HI Financial Assurance	499	0.095	SE
188 / 5	FUDS WAREHOUSE NO. 3		HI SHWS	511	0.097	NE
AJ190 / 5	FURUMOTO FAMILY PART	1135 KAPAHULU	RCRA NonGen / NLR	516	0.098	South
AJ191 / 5	VETERANS OF FOREIGN	1135 KAPAHULU	RCRA NonGen / NLR, FINDS, ECHO	516	0.098	South
AB197 / 5	B & S AUTOMOTIVE TEC	1789 KAPIOLANI	RCRA NonGen / NLR, FINDS, ECHO	539	0.102	North
AB199 / 5	ALOHA MOTORS	1777 KAPIOLANI BLVD	HI SHWS	551	0.104	NNW
AB200 / 5	FIRST DEVELOPMENT IN	1777 KAPIOLANI BLVD	SEMS-ARCHIVE, RCRA-VSQG, FINDS, ECHO	551	0.104	NNW
AL203 / 5	UNOCAL 76 SS L 5583	1818 KAPIOLANI BLVD	RCRA NonGen / NLR, FINDS, ECHO	561	0.106	North
AD204 / 5	C&CH MANOA FIRE STAT	2850 E MANOA RD	HI LUST, HI UST	562	0.106	WNW
AG207 / 5	KAPIOLANI WOMEN'S &	1319 PUNAHOU ST	HI SHWS, HI UST, HI AIRS, HI Financial A...	574	0.109	ESE
AG208 / 5	KAPIOLANI MEDICAL CE	1319 PUNAHOU STREET	RCRA-VSQG, FINDS, ECHO	574	0.109	ESE
209 / 5	UH MANOA LOWER CAMPU	2693 DOLE ST	HI SHWS	578	0.109	NE
AL213 / 5	FUNAI'S UNION SERVIC	1810 KAPIOLANI BLVD	HI LUST, HI UST, HI Financial Assurance	583	0.110	North
AL214 / 5	FUNAIS UNION SERVICE	1810 KAPIOLANI BLVD	EDR Hist Auto	583	0.110	North
AO220 / 5	MIDAS	3051 WAIALAE	RCRA-VSQG, FINDS, ECHO	608	0.115	SE
AO221 / 5	MIDAS MUFFLER KAIMUK	3051 WAIALAE AVE	HI UST	608	0.115	SE
AO222 / 5	ROGERS CHEVRON	3048 WAIALAE AVE	EDR Hist Auto	629	0.119	ESE
AO223 / 5	ROGER'S CHEVRON	3048 WAIALAE AVE	HI SHWS, HI LUST, HI UST, HI Financial A...	629	0.119	ESE
AO224 / 5	CHEVRON 93778	3048 WAIALAE AVE	RCRA-VSQG	629	0.119	ESE
AT237 / 5	MID PAC PETROLEIM 25	2809 E MANOA RD	HI LUST, HI UST, HI Financial Assurance	665	0.126	West
AT238 / 5	UNOCAL S S NO 3923	2809 E MANOA RD	RCRA NonGen / NLR	665	0.126	West
241 / 5	WAREHOUSE NOS. 3 & 4		FUDS	677	0.128	NE
AV242 / 5	RICHARD'S CHEVRON	1509 S BERETANIA ST	HI UST	681	0.129	SSW
AO260 / 5	ALOHA PETROLEUM: ST.	3075 WAIALAE AVE	RCRA-VSQG, FINDS	798	0.151	SE
AO261 / 5	2ND AVENUE SHELL	3075 WAIALAE AVE	HI LUST, HI UST, HI Financial Assurance	798	0.151	SE
278 / 5	KALAKAUA GARDENS	1723 KALAKAUA AVE	HI UST, HI Financial Assurance	851	0.161	North
AV280 / 5	ONE KALAKAUA PARTNER	1314 KALAKAUA AVE	HI UST	878	0.166	SSW
BE282 / 5	OUTRIGGER HOTELS	1315 KALAKAUA AVE	HI UST	879	0.166	SSW
284 / 5	HAWAIIAN HUMANE SOCI	2700 WAIALAE AVE	HI UST	887	0.168	NW

MAPPED SITES SUMMARY - FOCUS MAP 5

Target Property:
HONOLULU
HONOLULU, HI 96815

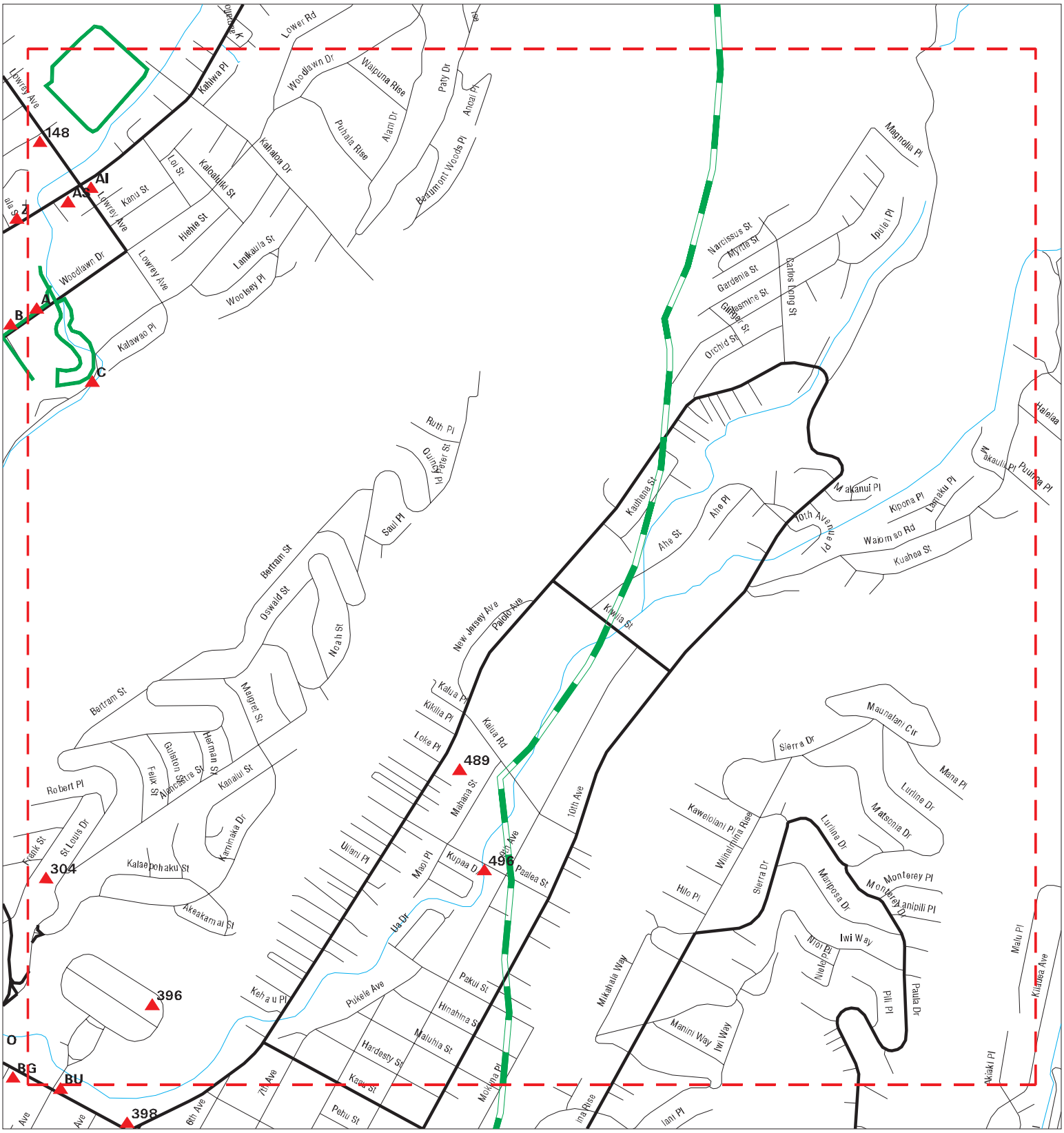
MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
286 / 5	KUHIO ELEMENTARY SCH	2759 S KING ST	HI SHWS, HI SPILLS	889	0.168	NW
BF287 / 5	TENNEY'S MANOA SHELL	2740 E MANOA RD	RCRA NonGen / NLR	892	0.169	NW
BF288 / 5	SHELL SERVICE STATIO	2740 E MANOA RD	HI LUST, HI UST, HI SPILLS, HI Financial...	892	0.169	NW
291 / 5	KAPIOLANI MEDICAL CE	1637 BINGHAM ST	HI UST, HI Financial Assurance	915	0.173	ESE
BG293 / 5	7-11 SECOND AVENUE	3105 WAIALAE AVE	HI UST, HI Financial Assurance	941	0.178	SE
BE295 / 5	76 KALAKAUA/YOUNG 7-	1323 KALAKAUA AVE	HI SHWS, HI UST, HI Financial Assurance	971	0.184	South
305 / 5	NOAA - HONOLULU LABO	2570 DOLE ST	HI LUST, HI UST	1022	0.194	NNW
BJ307 / 5	PUNAHOU SCHOOL	1601 PUNAHOU STREET	RCRA-VSQG, FINDS, ECHO	1035	0.196	ENE
BJ308 / 5	PUNAHOU SCHOOL - PHY	1601 PUNAHOU ST.	HI LUST, HI UST, HI Financial Assurance	1035	0.196	ENE
BJ309 / 5	PUNAHOU SCHOOL	1601 PUNAHOU STREET	RCRA NonGen / NLR, FTTS	1035	0.196	ENE
BJ310 / 5	PUNAHOU SCHOOL GRADE	1601 PUNAHOU ST	HI SHWS	1035	0.196	ENE
BJ311 / 5	PUNAHOU SCHOOL FIRIN	1601 PUNAHOU ST	HI SHWS	1035	0.196	ENE
BJ312 / 5	PUNAHOU SCHOOL WINNE	1601 PUNAHOU ST	HI SHWS, HI INST CONTROL	1035	0.196	ENE
BG313 / 5	RRR RECYCLING - WAIA	3109 WAIALAE AVE.	HI SWRCY	1038	0.197	SE
BM320 / 5	ROGERS REPAIR INC	1687 KALAKAUA AVE	RCRA-VSQG, FINDS, ECHO	1102	0.209	NNW
BM321 / 5	ROGER'S REPAIR INC	1687 KALAKAUA AVE	HI SHWS	1102	0.209	NNW
325 / 5	THE SHERWIN-WILLIAMS	2733 S KING ST	RCRA-VSQG	1131	0.214	NW
330 / 5	BARBERS POINT NAVAL	21.296188/-157.81387	PFAS ECHO	1161	0.220	NNW
BQ333 / 5	1414 KALAKAUA AVENUE	1414 KALAKAUA AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	1179	0.223	SSW
BW355 / 5	KALAKAUA TRANSMISSIO	1665 KALAKAUA AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	1336	0.253	NNW
356 / 5	LUNALILO ELEMENTARY	810 PUMEHANA ST	HI SHWS	1340	0.254	NNE
BX357 / 5	PUNAHOU REPAIR SHOP	1558 S KING ST	HI LUST, HI UST	1341	0.254	South
361 / 5	1911 KEEAUMOKU STREE	1911 KEEAUMOKU ST	HI SHWS	1375	0.260	NE
362 / 5	2700 SOUTH KING STRE	2700 S KING ST	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	1390	0.263	NW
CA371 / 5	UH MANOA FACILITIES	2002 EAST-WEST RD	HI SHWS, HI SPILLS	1470	0.278	WSW
BX375 / 5	HELE KING KALAKAUA #	1549 S KING ST	HI LUST, HI UST, HI Financial Assurance	1500	0.284	South
CA377 / 5	U.H. MOTOR POOL	2027 EAST WEST RD	HI LUST, HI UST, HI Financial Assurance	1523	0.288	WSW
CA380 / 5	UH MANOA BILGER ADDI	2040 EAST-WEST RD	HI SHWS	1541	0.292	WSW
381 / 5	UH MANOA FREAR HALL	2569 DOLE ST	HI SHWS	1552	0.294	NW
383 / 5	ALEXANDER TOWER	1226 ALEXANDER ST	HI LUST, HI UST	1618	0.306	SE
384 / 5	76 UNIVERSITY 7-11 #	2646 S KING ST	HI LUST, HI UST, HI Financial Assurance	1640	0.311	NW
388 / 5	C&CH MCCULLY FIRE ST	2425 DATE ST	HI LUST, HI UST, HI Financial Assurance	1732	0.328	NE
399 / 5	PUNAHOU SCHOOL		FUDS	2072	0.392	ESE
CC400 / 5	TEXACO STATION 61100	1119 UNIVERSITY AVE	HI LUST, HI UST, RCRA NonGen / NLR	2097	0.397	NW
CD402 / 5	CONTINENTAL AUTO SER	1918 ALGAROBA ST	HI SHWS, HI SPILLS	2148	0.407	NNE
CC404 / 5	REYNOLDS RECYCLING -	1106 UNIVERSITY AVE.	HI SWRCY	2216	0.420	NW
CE405 / 5	HALE MAKANA O MOILII	2139 ALGAROBA STREET	HI SHWS, HI BROWNFIELDS	2217	0.420	NE
CE408 / 5	HALE MAKANA O MAILI	2193 ALGOROBA STREET	HI SHWS	2266	0.429	NE
CD409 / 5	MCCULLY SERVICE STAT	1901 S KING ST	HI LUST, HI UST	2275	0.431	NNE

MAPPED SITES SUMMARY - FOCUS MAP 5

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
411 / 5	MID-PACIFIC INSTITUT	2445 KAALA ST	HI SHWS, HI LUST, HI UST, HI Financial A...	2308	0.437	SW
CG412 / 5	UH KENNEDY THEATER	1770 EAST-WEST RD	HI SHWS, HI SPILLS	2313	0.438	NNW
413 / 5	KYLE'S SERVICE STA.	2550 S BERETANIA ST	HI LUST, HI UST	2331	0.441	NW
415 / 5	UNIVERSITY OF HAWAII	2019 S KING ST	HI LUST, HI UST	2364	0.448	NNE
CI416 / 5	76 MCCULLY SERVICE #	2105 S KING ST	HI SHWS, HI LUST, HI UST, HI ENG CONTROL...	2371	0.449	NNE
419 / 5	UNIVERSITY OF HAWAII	H-1 AND UNIVERSITY A	HI SHWS	2390	0.453	NW
420 / 5	WALLYS GARDEN CENTER	1935 S BERETANIA ST	HI SHWS, HI SPILLS	2413	0.457	SE
423 / 5	HAWAII LAW ENFORCEME	1936 S KING ST	HI SHWS	2444	0.463	NNE
424 / 5	HONOLULU LIMITED	911 HAUSTEN ST	HI LUST, HI UST	2452	0.464	NW
CI425 / 5	WILIWILI AND KING ST	KING ST & WILIWILI S	HI SHWS	2457	0.465	NNE
CI427 / 5	MCDONALD'S RESTAURAN	2121 S KING ST	HI SHWS	2463	0.466	NNE
CG429 / 5	UH MANOA HENKE HALL	1800 EAST-WEST RD	HI SHWS	2497	0.473	NNW
434 / 5	GREEN MILL FOOD MANU	914 COOLIDGE ST	HI LUST, HI UST	2561	0.485	NE
435 / 5	UH MANOA FOOD SCIENC	1920 EDMONDSON RD	HI SHWS, HI SPILLS	2570	0.487	SW
CK436 / 5	TOM ISHIIS UNION SER	2114 S KING ST	HI SHWS	2603	0.493	NE
CK437 / 5	TOM ISHII'S UNION L-	2114 S KING ST	HI LUST, HI UST	2603	0.493	NE
CL441 / 5	UH MANOA BILGER HALL	2545 MCCARTHY MALL	HI SHWS	2766	0.524	NNW
CL444 / 5	UH MANOA SYNDER HALL	2538 MCCARTHY MALL	HI SHWS	2832	0.536	NNW
445 / 5	1800 VANCOUVER DRIVE	1800 VANCOUVER DRIVE	HI SHWS, HI INST CONTROL, HI CDL	2835	0.537	ESE
CN450 / 5	NOFA RECOMMENDED		UXO	2903	0.550	West
CN451 / 5	GUN BATTERY		FUDS	2903	0.550	West
453 / 5	LAUNDERLAND II	2043 S. BERETANIA ST	HI SHWS, HI DRYCLEANERS	3048	0.577	SE
459 / 5	UH DUKE KAHANAMOKU S	2500 CAMPUS RD	HI SHWS, HI SPILLS	3205	0.607	NW
460 / 5	UNIVERSITY LABORATOR	1776 UNIVERSITY AVEN	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	3242	0.614	NW
468 / 5	UH MANOA SHIDLER COL	2404 MAILE WAY	HI SHWS	3753	0.711	WSW
476 / 5	ROUND TOP MILITARY R		FUDS	4160	0.788	West
478 / 5	FUDS ROUND TOP MILIT	NUTRIDGE ST	HI SHWS	4508	0.854	West

Focus Map - 6 - 7196419.5s



SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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MAPPED SITES SUMMARY - FOCUS MAP 6

Target Property:
HONOLULU
HONOLULU, HI 96815

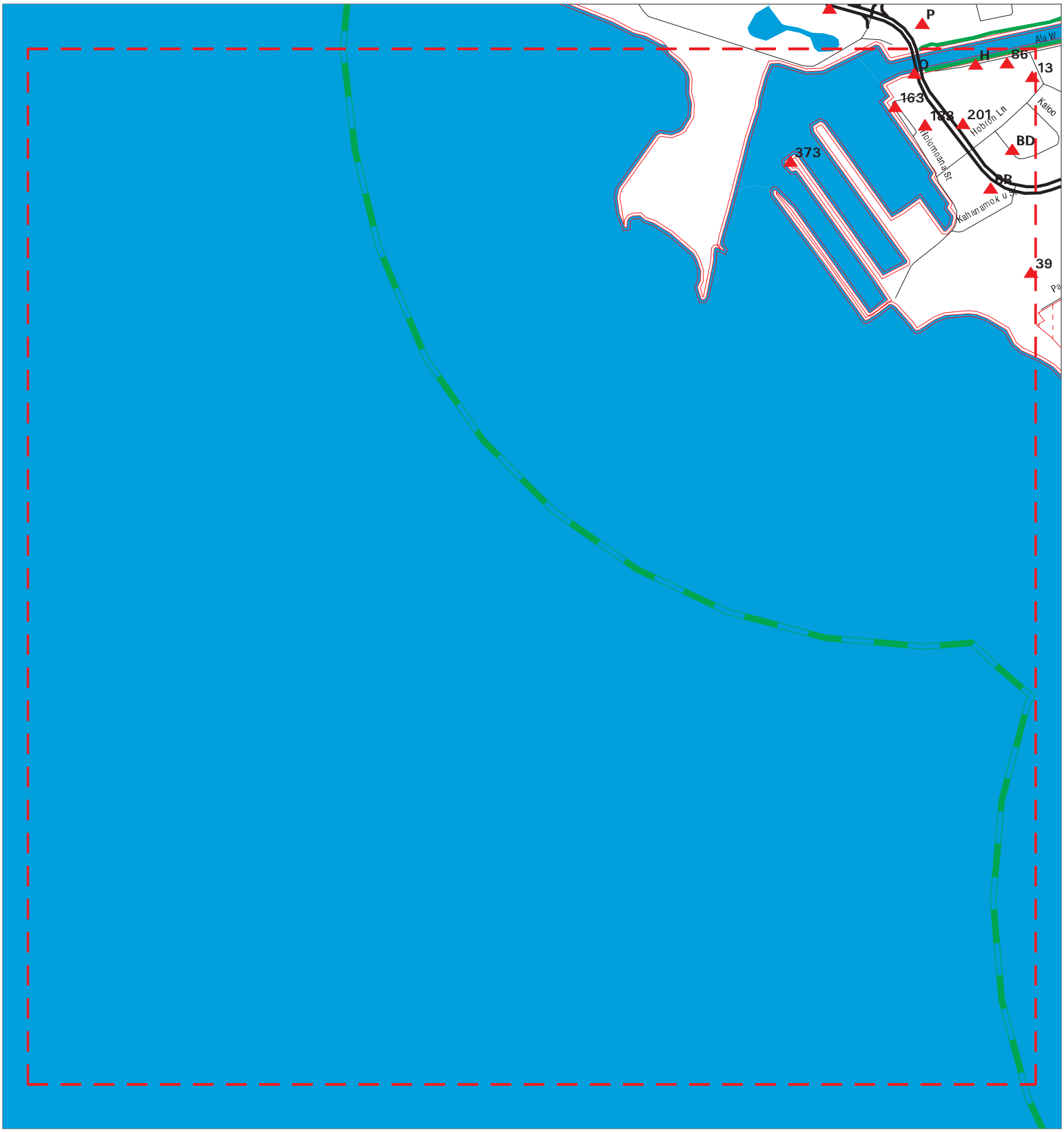
MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
A1 / 6	GIOBETECK GROUP. INC	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A2 / 6	GLOBETECK GROUP INC	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A3 / 6	GLOBELACK GROUP, INC	2752 WOODLAWN DOVE.	HI LEAD	TP		
A4 / 6	MANOA VALLEY VETERIN	2752 WOODLAWN DRIVE	HI AIRS	TP		
A5 / 6	GHDBETECK GROUP, INC	2752 WOODLAWN DRIVE.	HI LEAD	TP		
A6 / 6	GLOBALE& GROUP, INC.	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A7 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE.	HI LEAD	TP		
A8 / 6	KZOO RDO STN POLYNES	2752 WOODLAWN DR BLD	EDR Hist Auto	TP		
A9 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A10 / 6	GLOBETECK GROUP, INC	2752 WOODIAWN DRIVE,	HI LEAD	TP		
A11 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A12 / 6	MANOA MARKETPLACE	2752 WOODLAWN DR, SU	HI UST	TP		
A13 / 6	GLOBELECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A14 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A15 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP		
A16 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A17 / 6	CHERRYWOOD-MANOA LLC	2752 WOODLAWN DR	EDR Hist Cleaner	TP		
A18 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP		
A19 / 6	GLOLLETECK GROUP, IN	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A20 / 6	GLOBETECK GROUP. INC	2752 WOODLAWN DR,, S	HI LEAD	TP		
A21 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP		
A22 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR.. S	HI LEAD	TP		
A23 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP		
A24 / 6	FENDU BOULANGERIE	2752 WOODLAWN DR #5-	FINDS	TP		
A25 / 6	GLOBETECK GROUP. INC	2752 WOODLAWN DRIVE,	HI LEAD	TP		
A26 / 6	MANOA MARKETPLACE	2752 WOODLAWN DRIVE	FINDS	TP		
A27 / 6	GLOBETECK GROUP, INC	2752 WOODLAWN DR., S	HI LEAD	TP		
A28 / 6	LONGS DRUG STORES #1	2750 WOODLAWN DR	FTTS, HIST FTTS	TP		
A29 / 6	LONGS DRUG STORE #98	2750 WOODLAWN DR	RCRA-VSQG, FINDS, ECHO	TP		
A30 / 6	LONGS DRUG STORES #	2750 WOODLAWN DR	FTTS, HIST FTTS	TP		
A32 / 6	USDA ARS	2727 WOODLAWN DR	RCRA NonGen / NLR, FINDS, ECHO	TP		
A33 / 6	2727 WOODLAWN DRIVE,	2727 WOODLAWN DR	HI SPILLS	TP		
A34 / 6	UNIVERSITY OF HAWAII	2721 WOODLAWN DRIVE	HI AIRS	TP		
C40 / 6	KALAWAO STREET: 8-I	KALAWAO STREET (MANO	FINDS	TP		
C41 / 6	KALAWAO STREET: 8-IN	KALAWAO STREET (MANO	ECHO	TP		
Z144 / 6	IES RETAIL MANOA	2927 E MANOA RD UNIT	RCRA-VSQG	378	0.072	North
Z145 / 6	MANOA SERVICE 95683	2927 E MANOA RD	HI LUST, HI UST, HI SPILLS, HI Financial...	378	0.072	North
Z146 / 6	MANOA SERVICE STATIO	2927 E MANOA RD	EDR Hist Auto	378	0.072	North
Z147 / 6	IES RETAIL MANOA	2927 E MANOA RD	RCRA NonGen / NLR, FINDS, ECHO	378	0.072	North

MAPPED SITES SUMMARY - FOCUS MAP 6

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
148 / 6	MANOA CENTRAL OFFICE	2803 LOWREY AVE	HI UST, HI Financial Assurance	392	0.074	SW
AI186 / 6	ALOHA MANOA	3001 E MANOA RD	HI LUST, HI UST, HI Financial Assurance	507	0.096	South
AI187 / 6	MANOA VILLAGE MART	3001 E MANOA RD	EDR Hist Auto	507	0.096	South
AI205 / 6	ENIVEL INC	2966 E MANOA RD	EDR Hist Cleaner	569	0.108	SSW
AS234 / 6	TENGAN PHILLIPS 66	2955 E MANOA RD	EDR Hist Auto	647	0.123	NNE
AS235 / 6	MANOA MART/MANOA LIQ	2955 E MANOA RD	HI LUST, HI UST, HI Financial Assurance	647	0.123	NNE
304 / 6	SAINT LOUIS COLLEGE		FUDS	1018	0.193	East
396 / 6	FUDS ST LOUIS COLLEG		HI SHWS	2013	0.381	East
489 / 6	AIM PALOLO	1841 PALOLO AVE	HI SHWS, HI LUST, HI UST, HI Financial A...	4915	0.931	ENE
496 / 6	HECO FORMER PALOLO S	3419 PAALEA ST	HI SHWS	5033	0.953	East

Focus Map - 7 - 7196419.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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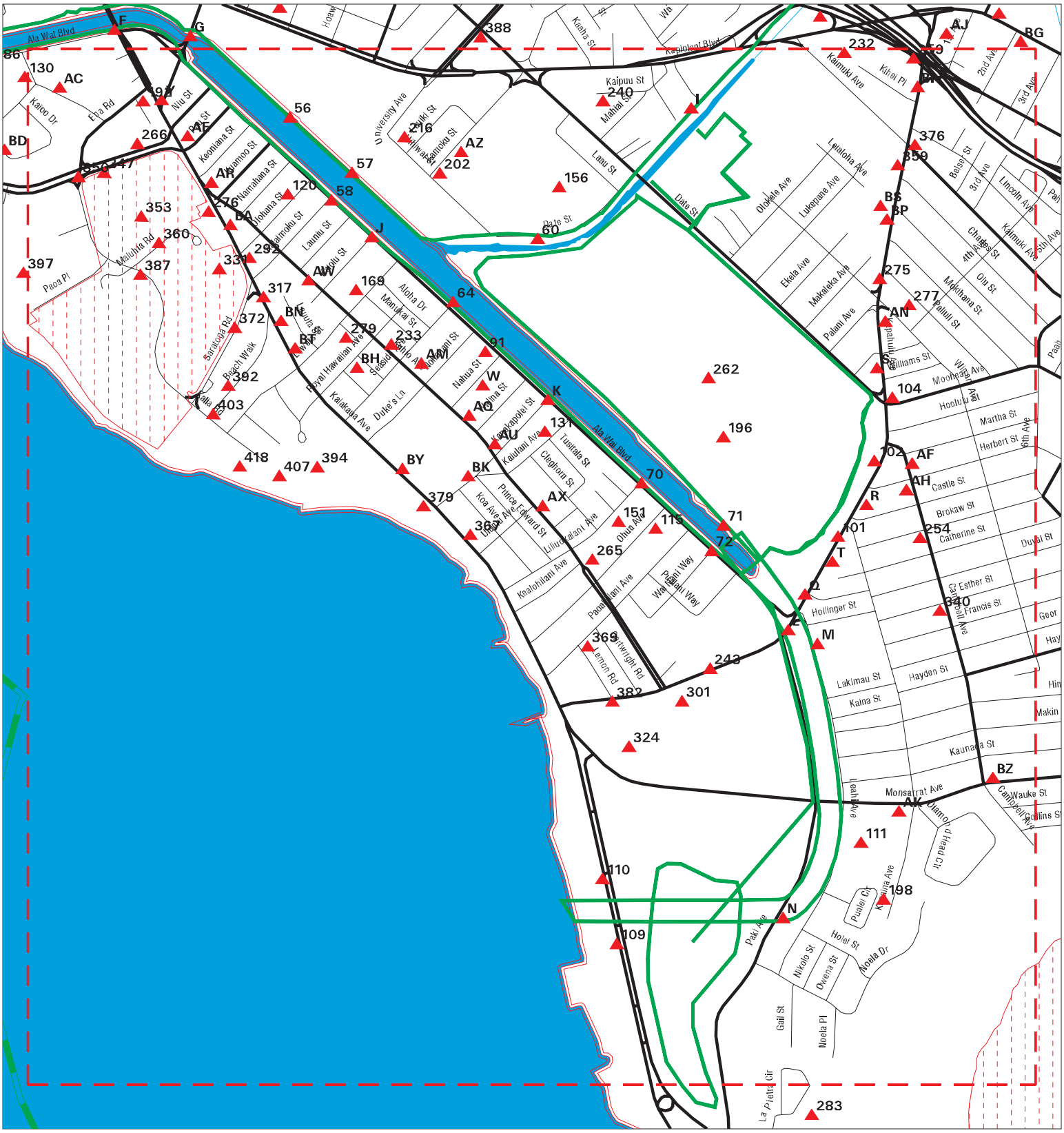
MAPPED SITES SUMMARY - FOCUS MAP 7

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
H53 / 7	STATE HIGHWAY ROUTES		FINDS	TP		
86 / 7	1609 ALA WAI DIESEL	1609 ALA WAI BLVD	HI SHWS, HI SPILLS	92	0.017	SSE
O87 / 7	PILOT MARINE INC	1651 ALA NOANA BLVD	EDR Hist Auto	99	0.019	WSW
O88 / 7	STATE OF HAWAII DLNR	1651 ALA MOANA BLVD	RCRA-VSQG	99	0.019	WSW
O89 / 7	ALA WAI MARINE LTD	1651 ALA MOANA BLVD	RCRA-VSQG, ICIS, CA HAZNET	99	0.019	WSW
O90 / 7	ALOHA MARINE	1651 ALA MOANA BLVD	HI LUST, HI UST	99	0.019	WSW
H92 / 7	THE WATERMARK WAIKIK	1551 ALA WAI BLVD	HI LUST	110	0.021	SSE
H93 / 7	THE WATERMARK WAIKIK	1551 ALA WAI BLVD	HI UST	110	0.021	SSE
O129 / 7	ALA WAI HARBOR BOAT	ALA MOANA BLVD	HI SHWS	264	0.050	WSW
130 / 7	LING BROTHERS, LTD.	1819-E LIPEEPEE ST	HI LUST	265	0.050	SSE
163 / 7	ALA MOANA CRASH BOAT		FUDS	428	0.081	SW
183 / 7	PRINCE WAIKIKI	100 HOLOMOANA ST	HI UST, HI Financial Assurance	497	0.094	South
201 / 7	O & J SERVICE INC	1720 ALA MOANA BLVD	EDR Hist Auto	551	0.104	SSE
BD281 / 7	HOBRON HOTEL	1744 KAIOO DR	HI SHWS	878	0.166	SSE
BD296 / 7	DISCOVERY BAY	1778 ALA MOANA BLVD	HI LUST, HI UST	983	0.186	SSE
BR334 / 7	ILIKAI	1777 ALA MOANA BLVD	RCRA NonGen / NLR, FINDS, ECHO	1185	0.224	SSE
BR335 / 7	ILIKAI HOTEL	1777 ALA MOANA BLVD	HI LUST, HI UST	1185	0.224	SSE
373 / 7	ALA WAI HARBOR FUEL		HI SHWS	1484	0.281	SW
397 / 7	HILTON HAWAIIAN VILL	2005 KALIA RD	HI LUST, HI UST	2017	0.382	SSE

Focus Map - 8 - 7196419.5s



SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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MAPPED SITES SUMMARY - FOCUS MAP 8

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
Reg / 8	FORT DE RUSSY		DOD	658 0.125 SW
Reg / Multiple	NG FT RUGER		DOD	1974 0.374 ESE
G52 / 8	ALA WAI BOULEVARD &	ALA WAI BLVD & MCCUL	HI SPILLS	TP
I54 / 8	2633 MAUNAWAI PLACE	2633 MAUNAWAI PLACE	FTTS, HIST FTTS	TP
I55 / 8	2633 MAUNAWAI PLACE	2633 MAUNAWAI PLACE	FINDS	TP
56 / 8	KAPIOLANI BOULEVARD:	KAPIOLANI BOULEVARD,	FINDS, ECHO	TP
57 / 8	UNIVERSITY AVENUE:		FINDS	TP
58 / 8	REHABILITATION OF ST	ALA WAI BLVD	FINDS, ECHO	TP
J59 / 8	ALA WAI BOULEVARD &	ALA WAI BLVD & KAIOL	HI SPILLS	TP
60 / 8	BASE YARD NO. 6		FUDS	TP
J61 / 8	ALA WAI HARBOR G-DOC	ALA WAI BLVD	HI SPILLS	TP
J62 / 8	WHITE LIQUID OBSERVE	ALA WAI BLVD	HI SPILLS	TP
J63 / 8	ALA WAI BOULEVARD US	ALA WAI BLVD	HI SPILLS	TP
64 / 8	WAIKIKI SIDEWALK IMP	KALAKAUA AVENUE	FINDS, ECHO	TP
K65 / 8	ALA WAI BOULEVARD &	ALA WAI BLVD & KANEK	HI SPILLS	TP
K66 / 8	ALA WAI BOULEVARD &	ALA WAI BLVD & KANEK	HI SPILLS	TP
K67 / 8		KANEKAPOLEI ST AND A	ERNS	TP
K68 / 8	WAIKIKI SAND VILLA H	WAIKIKI SAND VILLA I	FINDS	TP
K69 / 8	WAIKIKI SAND VILLA H	WAIKIKI SAND VILLA I	ECHO	TP
70 / 8	2500 ALA WAI BOULEVA	2500 ALA WAI BLVD	HI SPILLS	TP
71 / 8	DATE STREET	UNKNOWN	FINDS, ECHO	TP
72 / 8		ALA WAI BLVD. AND WA	ERNS	TP
L73 / 8	BKM ENTERPRISES, LTD	KAPAHULU AVE	HI SPILLS	TP
L74 / 8	WAIKIKI FIRE STATION	381 KAPAHULU AVE	HI SPILLS	TP
L75 / 8	WAIKIKI FIRE STATION	381 KAPAHULU AVE	HI UST, HI Financial Assurance	TP
L76 / 8	WAIKIKI FIRE STATION	381 KAPAHULU AVENUE	FINDS	TP
L77 / 8	KAPIOLANI REGIONAL P	3447 LEAHI AVE	HI LUST, HI UST, HI Financial Assurance	TP
L78 / 8	KAPIOLANI REGIONAL P	3447 LEAHI AVENUE	RCRA-VSQG, FINDS, ECHO	TP
L79 / 8	KAPIOLANI REGIONAL P	3447 LEAHI AVE	HI RGA LUST	TP
M80 / 8	HAWAII SCHOOL FOR TH	3440 LEAHI AVENUE	FTTS	TP
M81 / 8	HAWAII SCHOOL FOR TH	3440 LEAHI AVE	HI SHWS	TP
M82 / 8	HAWAII SCHOOL FOR TH	3440 LEAHI AVENUE	FINDS	TP
N83 / 8	KAPIOLANI PARK BANDS	3840 PAKI AVE	FINDS	TP
N84 / 8	KAPIOLANI PARK BANDS	3840 PAKI AVE	ECHO	TP
I85 / 8	MANOA-PALOLO DRAINAG		PFAS WQP	78 0.015 NW
91 / 8	2319 ALA WAI BLVD	2319 ALA WAI BLVD	HI SHWS	106 0.020 SW
Q95 / 8	ALA WAI SERVICE, INC	407 KAPAHULU AVE	HI SHWS, HI SPILLS	135 0.026 ENE
Q96 / 8	ALA WAI SERVICE INC.	407 KAPAHULU AVE	HI LUST, HI UST, HI Financial Assurance	135 0.026 ENE
Q97 / 8	ALA WAI SERVICE STAT	407 KAPAHULU	EDR Hist Auto	135 0.026 ENE

MAPPED SITES SUMMARY - FOCUS MAP 8

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
Q98 / 8	ALA WAI BOAT HARBOR	407 KAPAHULU AVE	RCRA-VSQG, FINDS, ECHO	135	0.026	ENE
Q99 / 8	ALA WAI GOLF COURSE	404 KAPAHULU AVE	HI SHWS, HI UST, HI Financial Assurance	136	0.026	ENE
Q100 / 8	ALA WAI GOLF COURSE	404 KAPAHULU AVENUE	RCRA-VSQG, FINDS, ECHO	136	0.026	ENE
101 / 8	ALA WAI GOLF COURSE	484 KAPAHULU AVE	HI LUST, HI UST	140	0.027	ESE
102 / 8	RRR RECYCLING - KAPA	548 KAPAHULU AVE.	HI SWRCY	142	0.027	ESE
104 / 8	DIAMOND SERVICE INC	629 KAPAHULU AVE	EDR Hist Auto	192	0.036	East
R105 / 8	GEORGES UNION SERVIC	505 KAPAHULU AVE	EDR Hist Auto	198	0.038	ESE
R106 / 8	UNOCAL 76 SS L 4573	505 KAPAHULU AVE	RCRA NonGen / NLR	198	0.038	ESE
R107 / 8	GEORGE'S UNION SERVI	505 KAPAHULU AVE	HI SHWS	198	0.038	ESE
R108 / 8	76 KAPAHULU 7-11 #11	505 KAPAHULU AVE	HI LUST, HI UST, HI Financial Assurance	198	0.038	ESE
109 / 8	UNIVERSITY OF HAWAII	2777 KALAKAUA AVENUE	RCRA-VSQG	198	0.038	South
110 / 8	PUBLIC BATH WASTEWAT	2729 KALAKAUA AVE	HI UST, HI Financial Assurance	201	0.038	North
111 / 8	WAIKIKI ELEMENTARY S	3710 LEAHI AVE	HI SHWS, HI SPILLS	204	0.039	ESE
R112 / 8	KIM CHAU LAUNDERETTE	517 KAPAHULU AVE	HI UST	207	0.039	ESE
115 / 8	HAWAII AMALGAMATED V	311 OHUA ST	EDR Hist Auto	217	0.041	SW
S116 / 8	ELDON DRAPERY CLEANE	716 KAPAHULU AVE	EDR Hist Cleaner	225	0.043	NE
T118 / 8	TONYS AUTO SERVICE L	449 KAPAHULU AVE	EDR Hist Auto	252	0.048	SE
T119 / 8	ROBINSON CORP	449 KAPAHULU AVE	EDR Hist Cleaner	252	0.048	SE
120 / 8	ROYAL GARDENS HOTEL	440 OLOHANA ST	HI SHWS, HI SPILLS	253	0.048	SW
131 / 8	WAIKIKI SAND VILLA I	250 KAIULANI AVE	HI SHWS	266	0.050	SW
S133 / 8	TESORO HAWAII CORPOR	707 KAPAHULU AVE	EDR Hist Auto	291	0.055	NE
S134 / 8	HELE KAPAHULU #61013	707 KAPAHULU AVE	HI LUST, HI UST, HI Financial Assurance	291	0.055	NE
S135 / 8	PACIFIC RESOURCES IN	707 KAPAHULA AVE	EDR Hist Auto	294	0.056	NE
S136 / 8	PACIFIC RESOURCES IN	707 KAPAHULE	EDR Hist Auto	294	0.056	NE
W139 / 8	THE PALMS, INC.	431 NAHUA STREET	RCRA NonGen / NLR, FINDS, ECHO	347	0.066	SW
Y143 / 8	WAIKIKI TEXACO SERVI	1922 KALAKAUA AVE	EDR Hist Auto	377	0.071	SW
Y149 / 8	CLABIR INVESTMENT C3	224 MC CULLY ST	EDR Hist Cleaner	394	0.075	SW
151 / 8	HECO TRANSFOMER 2726	249 LILIUOKALANI AVE	HI SHWS, HI SPILLS	402	0.076	SW
156 / 8	FUDS BASE YARD NO. 6	KAMOKU STREET	HI SHWS	413	0.078	NNW
AC161 / 8	COSMOS JEWELRY LTD.	438 HOBRON LN #202	RCRA NonGen / NLR	425	0.080	SSE
AC162 / 8	WIHC, LLC DBA ALOHA	438 HOBRON LANE SUIT	RCRA-VSQG, FINDS, ECHO	425	0.080	SSE
169 / 8	LILANGS GUITAR SHELL	412 LEWERS ST	EDR Hist Auto	466	0.088	SW
AC170 / 8	ROBINSON CORP	444 HOBRON LN STE 5A	EDR Hist Cleaner	468	0.089	SSE
AE171 / 8	JIMMY'S CHEVRON SERV	1958 KALAKAUA AVE	HI UST	470	0.089	SW
AE172 / 8	JIMMY'S CHEVRON SERV	1958 KALAKAUA AVE	HI LUST, RCRA NonGen / NLR, FINDS, ECHO	470	0.089	SW
AE173 / 8	KALAKAUA CHEVRON SER	1958 KALAKAUA AVE	EDR Hist Auto	470	0.089	SW
AF175 / 8	CAMPBELL CLOTHES CLE	3306 CAMPBELL AVE	EDR Hist Cleaner	484	0.092	ESE
W176 / 8	HONOLULU PRINCE	415 NAHUA ST	HI UST	487	0.092	SW
AH185 / 8	ALOHA CAMPBELL	3327 CAMPBELL AVE	HI LUST, HI UST, HI SPILLS, HI Financial...	504	0.095	ESE

MAPPED SITES SUMMARY - FOCUS MAP 8

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
AF189 / 8	ISLAND TRIATHLON & B	3312 CAMPBELL AVE	RCRA NonGen / NLR, FINDS, ECHO	516	0.098	ESE
192 / 8	RICHARDS 66 SERVICE	1901 KALAKAUA AVE	EDR Hist Auto	521	0.099	SW
AK193 / 8	STAN'S UNION SERVICE	3045 MONSARRAT AVE	HI LUST, HI UST	530	0.100	East
AK194 / 8	STANS UNION SERVICE	3045 MONSARRAT AVE	EDR Hist Auto	530	0.100	East
AK195 / 8	UNOCAL 76 SS L 6352	3045 MONSARRAT AVE	RCRA-VSQG	530	0.100	East
196 / 8	ALA WAI AIRPORT		FUDS	531	0.101	NE
198 / 8	PUMP IT UP	3093 PUALEI CIR	EDR Hist Auto	546	0.103	ESE
202 / 8	ALA WAI ELEMENTARY S	503 KAMOKU ST	HI SHWS	558	0.106	NE
Y206 / 8	THE PAVILLION	1925 KALAKAUA AVE	HI SHWS, HI SPILLS	571	0.108	SW
AH210 / 8	CAMPBELL AVENUE SERV	3335 CAMPBELL AVE	EDR Hist Auto	582	0.110	ESE
AH211 / 8	MAL MAT AUTO LEASING	3335 CAMPBELL AVE	RCRA NonGen / NLR, FINDS, ECHO	582	0.110	ESE
AH212 / 8	JH SAKAMOTO & ASSOCI	3335 CAMPBELL AVE	HI UST	582	0.110	ESE
AM215 / 8	ROCK STAR TATTOOS	2270 B KUHIO AVE	RCRA NonGen / NLR	583	0.110	SW
216 / 8	ALA WAI COVE CONDOMI	509 UNIVERSITY AVE	HI SHWS, HI SPILLS	583	0.110	NE
AN217 / 8	WINAM SHELL SERVICE	755 KAPAHULU AVE	RCRA NonGen / NLR, FINDS, ECHO	591	0.112	NE
AN218 / 8	GOOSE'S EDGE INC 139	755 KAPAHULU AVE.	HI LUST, HI UST, HI AIRS, HI Financial A...	591	0.112	NE
AN219 / 8	WINAM AUTO SERVICE I	755 KAPAHULU AVE	EDR Hist Auto	591	0.112	NE
AQ227 / 8	BUDGET RENT-A-CAR SY	2330 KUHIO AVE	HI UST	635	0.120	SW
AR228 / 8	CHEVRON U.S.A., INC.	2002 KALAKAUA AVE	HI SHWS, HI LUST	639	0.121	SW
AR229 / 8	DAIO USA CORP	2002 KALAKAUA AVE	RCRA NonGen / NLR, FINDS, ECHO	639	0.121	SW
AR230 / 8	CHEVRON U.S.A., INC.	2002 KALAKAUA AVE	HI UST	639	0.121	SW
AR231 / 8	TRADEWIND CHEVRON SE	2002 KALAKAUA AVE	EDR Hist Auto	639	0.121	SW
232 / 8	PACIFIC LAUNDROMAT &	2919 KAPIOLANI BLVD	EDR Hist Cleaner	643	0.122	SE
233 / 8	ROYAL KUHIO CONDOMIN	2240 KUHIO AVE	HI LUST, HI UST	645	0.122	SW
AM236 / 8	S.W.A.T. GUN CLUB	2266 KUHIO AVE	RCRA NonGen / NLR	659	0.125	SW
AU239 / 8	WAIKIKI KUHIO COLLEC	2370 KUHIO AVE	HI SHWS	666	0.126	SW
240 / 8	KAPIOLANI VILLAGE AP	737 KAIPUU ST	HI SHWS	669	0.127	NW
243 / 8	JEFFERSON ELEMENTARY	324 KAPAHULU AVE	HI SHWS	690	0.131	WSW
AW244 / 8	RITZ CARLTON WAIKIKI	2139 KUHIO AVE	HI SHWS	693	0.131	SW
AU245 / 8	ABC STORE 21	2394 KUHIO AVE	HI LUST, HI UST	705	0.134	SW
AU246 / 8	ABC STORES NO 21	2394 KUHIO AVE	RCRA NonGen / NLR	705	0.134	SW
AW247 / 8	BEACH WALK WASTEWATE	377 KAIOLU ST	HI UST, HI Financial Assurance	713	0.135	SW
AX248 / 8	WAIKIKI CENTRAL OFFI	214 KAPUNI ST.	HI LUST, HI UST, HI Financial Assurance	728	0.138	SW
AQ250 / 8	MIRAMAR HOTEL INTERN	2345 KUHIO AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	767	0.145	SW
AQ251 / 8	MIRAMAR HOTEL HAWAII	2345 KUHIO AVE	HI LUST, HI UST	767	0.145	SW
AX252 / 8	REMEDIATION SPECIALI	2440 KUHIO AVE STE 1	RCRA NonGen / NLR, FINDS, ECHO	772	0.146	SW
AM253 / 8	WAIKIKI TRADE CTR	2255 KUHIO AVE	RCRA-VSQG, FINDS, ECHO	775	0.147	SW
254 / 8	GREEN THUMB INCORPOR	3363 CAMPBELL AVE	HI UST, HI Financial Assurance	777	0.147	ESE
AZ255 / 8	IOLANI SCHOOL	563 KAMOKU ST	RCRA-VSQG	779	0.148	North

MAPPED SITES SUMMARY - FOCUS MAP 8

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
AZ256 / 8	IOLANI SCHOOL	563 KAMOKU ST	HI UST	779	0.148	North
AZ257 / 8	IOLANI SCHOOL CAMPUS	563 KAMOKU ST	HI SHWS	779	0.148	North
AZ258 / 8	IOLANI SCHOOL PETROL	563 KAMOKU ST	HI SHWS, HI SPILLS	779	0.148	North
259 / 8	BWS KAIMUKI PUMP STA	2951 HARDING AVE	HI SHWS, HI SPILLS	780	0.148	SSW
262 / 8	FUDS ALA WAI FIELD		HI SHWS	804	0.152	NE
BA263 / 8	WAIKIKI GATEWAY PARK	2044 KALAKAUA AVE	HI SHWS, HI SPILLS	806	0.153	SW
265 / 8	PRINCE KUHIO HOTEL R	2500 KUHIO AVE	HI SHWS, HI AIRS	820	0.155	SW
266 / 8	WAIKIKI MARINA HOTEL	1956 ALA MOANA BLVD	RCRA NonGen / NLR, FINDS, ECHO	836	0.158	SW
275 / 8	KUHIO CLEANERS	810 KAPAHULU AVE	HI UST	849	0.161	NE
276 / 8	AIM WAIKIKI	2025 KALAKAUA AVE.	HI LUST, HI UST, HI SPILLS, HI Financial...	851	0.161	SW
277 / 8	KAPAHULU PUMPING STA		FUDS	851	0.161	NE
279 / 8	MATSUSHITA INVESTMEN	2237 KUHIO AVE	HI LUST, HI UST	862	0.163	SW
AU285 / 8	OUTRIGGER EAST	150 KAIULANI AVE	RCRA-VSQG, FINDS, ECHO, CA HAZNET	888	0.168	SW
292 / 8	KING KALAKAUA PLAZA	2080 KALAKAUA AVE	HI SHWS, HI LUST, HI UST	916	0.173	SW
AX294 / 8	KUHIO VILLAGE RESORT	2463 KUHIO AVE	RCRA-VSQG, HI SPILLS, FINDS, ECHO	952	0.180	SW
BA298 / 8	2051-2057 KALAKAUA A	2051-2057 KALAKAUA A	HI SHWS	1002	0.190	SW
301 / 8	BASE YARD NO 16 & 17		FUDS	1011	0.191	WSW
BH302 / 8	WESTERN GUN SCHOOL O	339 ROYAL HAWAIIAN A	RCRA NonGen / NLR	1013	0.192	SW
BH303 / 8	HAWAII GUN CLUB	339 ROYAL HAWAIIAN A	RCRA-VSQG	1013	0.192	SW
BI306 / 8	DAVENROYE DRY CLEANE	1042 KAPAHULU AVE	HI SHWS, HI LUST, HI UST, RCRA NonGen / ...	1024	0.194	SSW
BK314 / 8	AVIS RENT- A-CAR SYS	148 KAIULANI AVE	HI LUST, HI UST, HI Financial Assurance	1047	0.198	SW
BH315 / 8	ROYAL HAWAIIAN MARKE	333 ROYAL HAWAIIAN A	HI UST	1058	0.200	SW
BI316 / 8	LONGS DRUG STORES #1	1029 KAPAHULU AVE ST	RCRA-VSQG, FINDS, ECHO	1082	0.205	South
317 / 8	CM&D	2112 KALAKAUA AVE	HI LUST, HI UST	1089	0.206	SW
BK322 / 8	AZABU USA CORP DBA K	131 KAIULANI AVE	RCRA-VSQG, FINDS, ECHO	1117	0.212	SW
BK323 / 8	KING'S VILLAGE SHOPP	131 KAIULANI AVE	HI LUST, HI UST	1117	0.212	SW
324 / 8	FUDS BASE YARD NOS.		HI SHWS	1130	0.214	NNW
BK326 / 8	SAND ISLAND WASTE WA	120 KAIULANI AUCNUE	RCRA-VSQG, FINDS, ECHO	1135	0.215	SW
BN327 / 8	WAIKIKI GUN CLUB	2142 KALAKAUA AVE	RCRA-VSQG	1139	0.216	SW
331 / 8	FORT DERUSSY, FORMER		HI SHWS	1179	0.223	SW
BP332 / 8	LOVES BAKERY	836 KAPAHULU AVE	HI SHWS, HI LUST, HI UST	1179	0.223	NE
BN339 / 8	KYOTARU HAWAII CORPO	2160 KALAKAUA AVE	HI LUST, HI UST	1219	0.231	SW
340 / 8	DOROTHY TANAKA	3423 CAMPBELL AVE	HI UST	1220	0.231	ENE
BH341 / 8	WAIKIKI SHOPPING PLA	2250 KALAKAUA AVE	HI UST, HI Financial Assurance	1221	0.231	SW
BH342 / 8	WAIKIKI SHOPPING PLA	2250 KALAKAUA AVE	HI LUST	1221	0.231	SW
BS343 / 8	SAFEWAY INC	900 KAPAHULU AVE	RCRA NonGen / NLR	1223	0.232	East
BS344 / 8	FORMERLY DUNKIN DOUG	900 KAPAHULU AVE	HI LUST, HI UST	1223	0.232	East
BT345 / 8	YONEOKA AND ASSOCIAT	2174/2190 KALAKAUA A	HI LUST, HI UST	1234	0.234	SW
BT346 / 8	WAIKIKI BAZAAR	2174 KALAKAUA AVE	HI SHWS, HI SPILLS	1234	0.234	SW

MAPPED SITES SUMMARY - FOCUS MAP 8

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
347 / 8	MILL CAMOUFLAGE 1.2		FUDS	1238	0.234	SW
350 / 8	FORT DERUSSY CENTRAL	ALA MOANA BLVD & KAL	HI UST, HI Financial Assurance	1262	0.239	SSE
BN352 / 8	LONGS DRUG STORE #10	2155 KALAKAUA AVE	RCRA-VSQG, FINDS, ECHO	1285	0.243	SW
353 / 8	FORT DERUSSY MILITAR	BLDG 107 AND 108	HI LUST, HI UST	1294	0.245	SW
BP354 / 8	SAFEWAY STORE #2747	888 KAPAHULU AVENUE	RCRA-VSQG, FINDS	1295	0.245	East
359 / 8	SERVICE CLEANERS	936 KAPAHULU AVE	HI SHWS	1369	0.259	East
360 / 8	FORT DERUSSY TRANSFO	2058 MALUHIA RD	HI SHWS	1370	0.259	SW
BY364 / 8	STAN SHINKAWN INC	2330 KALAKAUA AVE	SEMS-ARCHIVE	1409	0.267	SW
BY365 / 8	STAN SHINKAWA INC	2330 KALAKAUA AVE	HI SHWS	1409	0.267	SW
BZ366 / 8	DICK'S MONSARRAT SER	3206 MONSARRAT AVE	HI LUST, HI UST, HI Financial Assurance	1412	0.267	East
367 / 8	HERTZ RENT- A-CAR (A	2424 KALAKAUA AVE	HI LUST, HI UST	1423	0.270	SW
369 / 8	ABC STORE UNDERGROUN	2546 LEMON RD	HI SHWS, HI SPILLS	1433	0.271	SW
BZ370 / 8	AIM DIAMOND HEAD	3203 MONSARRAT AVE.	HI LUST, HI UST, HI Financial Assurance	1451	0.275	East
372 / 8	U.S. POSTAL SERVICE	330 SARATOGA RD	HI LUST, HI UST, HI Financial Assurance	1472	0.279	SW
376 / 8	AIM KAPAHULU	1001 KAPAHULU AVE	HI LUST, HI UST, HI Financial Assurance	1512	0.286	East
379 / 8	MOANA SURFRIDER HOTE	2365 KALAKAUA AVE	HI LUST, HI UST, HI Financial Assurance	1528	0.289	SW
382 / 8	HECO TRANSFORMER V84	151 KAPAHULU AVE	HI SHWS, HI INST CONTROL	1571	0.298	NNW
387 / 8	HALE KOA HOTEL	2055 KALIA RD	RCRA-VSQG, HI SHWS, CA HAZNET	1699	0.322	SW
392 / 8	HALE PUA NUI UST REM	228 BEACH WALK	HI SHWS, HI SPILLS	1905	0.361	SW
394 / 8	ROYAL HAWAIIAN HOTEL	2259 KALAKAUA AVE	RCRA-VSQG, HI LUST, HI UST, FINDS, ECHO,...	1929	0.365	SW
403 / 8	205 BEACH WALK	205 BEACH WALK AVE	HI SHWS, HI INST CONTROL, HI SPILLS	2186	0.414	SW
407 / 8	SHERATON WAIKIKI RES	2255 KALAKAUA AVE	HI LUST, HI UST, HI SPILLS, HI Financial...	2223	0.421	SW
418 / 8	FORT SHAFTER BUILDIN	2199 KALIA RD	RCRA-VSQG, HI SHWS, HI SPILLS, FINDS, EC...	2389	0.452	SW

Focus Map - 9 - 7196419.5s

SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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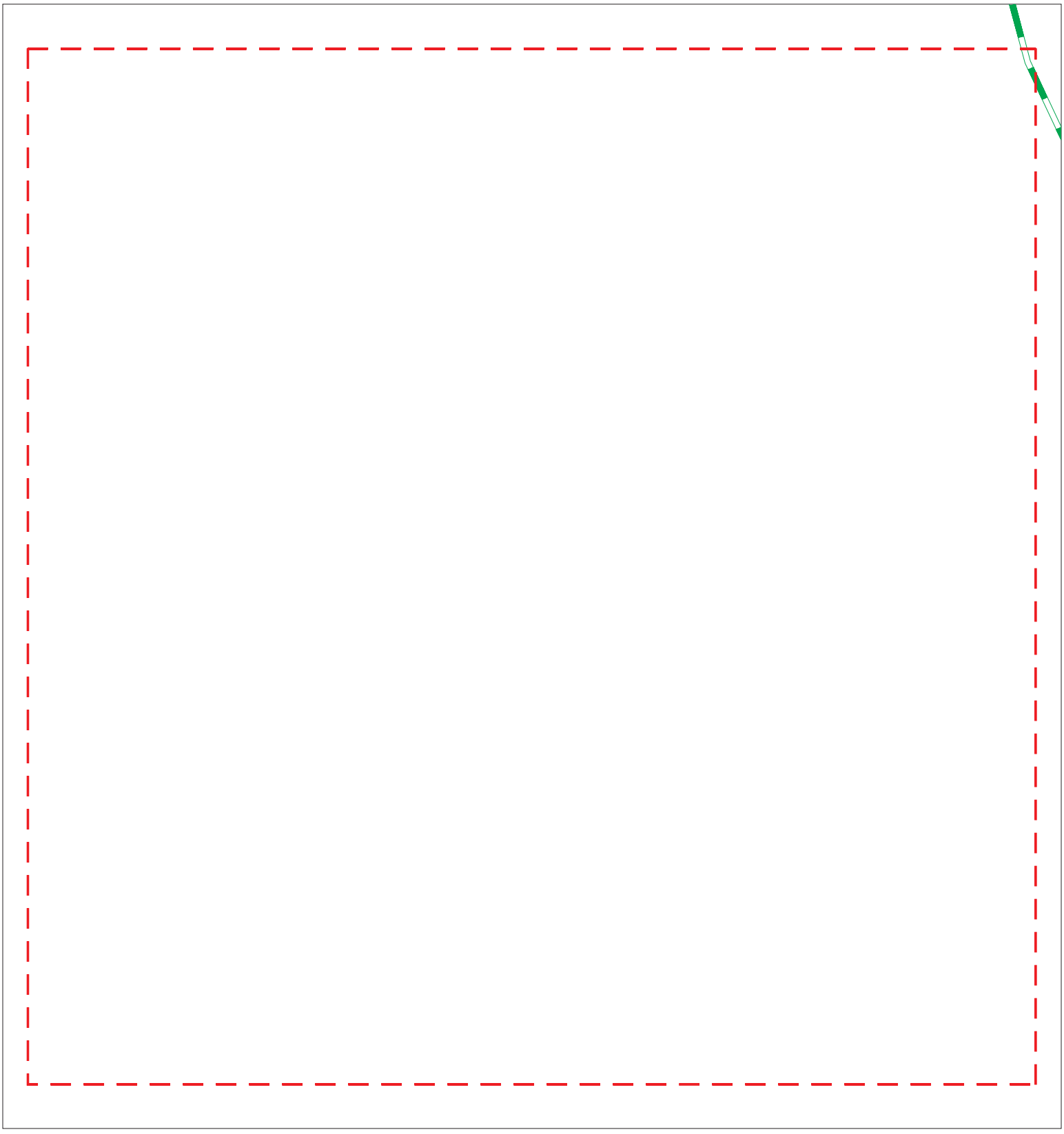
MAPPED SITES SUMMARY - FOCUS MAP 9

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION		
Reg / Multiple	NG FT RUGER		DOD	1974	0.374	ESE
Reg / 9	NG FT RUGER		DOD	6228	1.180	East
Reg / 9	NG FT RUGER		DOD	6526	1.236	ESE
Reg / Multiple	NG FT RUGER		DOD	6759	1.280	ESE
BU348 / 9	HECO POLE-MOUNT TRAN	3133 WAIALAE AVE	HI SHWS, HI SPILLS	1242	0.235	SE
BU358 / 9	CHAMINADE UNIVERSITY	3140 WAIALAE AVE	HI LUST, HI UST	1359	0.257	ESE
398 / 9	PALOLO AUTO SERVICE,	3236 WAIALAE AVE	HI LUST, HI UST, HI Financial Assurance	2042	0.387	ESE
433 / 9	KAIMUKI TOYOTA	3282 WAIALAE AVE	RCRA-VSQG, HI LUST, HI UST	2547	0.482	ESE
442 / 9	FORT RUGER CANNON CL	4500 DIAMOND HEAD RD	HI SHWS, HI BROWNFIELDS	2779	0.526	East
448 / 9	LIHOLIHO ELEMENTARY	3430 MAUNALOA AVE	HI SHWS	2859	0.541	East
454 / 9	ALIIOLANI ELEMENTARY	1240 7TH AVE	HI SHWS	3094	0.586	ESE
477 / 9	3464-3466 WAIALAE AV	3466 WAIALAE AVE	HI SHWS, HI ENG CONTROLS, HI INST CONTRO...	4168	0.789	ESE
485 / 9	LEAHI HOSPITAL	3675 KILAUEA AVE	HI SHWS, HI LUST, HI UST, HI AIRS, HI Fi...	4689	0.888	ESE
487 / 9	KAPIOLANI COMMUNITY	4303 DIAMOND HEAD RO	HI SHWS, HI LUST	4832	0.915	East
CR490 / 9	SHIZUKO HAMAOKA TRUS	3311 SIERRA DR	HI SHWS, HI INST CONTROL, HI SPILLS	4966	0.941	ESE
493 / 9	FUDS DIAMOND HEAD AM	DIAMOND HEAD RD	HI SHWS	4992	0.945	East
CR494 / 9	SHELL SERVICE STATIO	3562 WAIALAE AVE	HI SHWS, HI LUST, HI UST, HI ENG CONTROL...	5012	0.949	ESE

Focus Map - 10 - 7196419.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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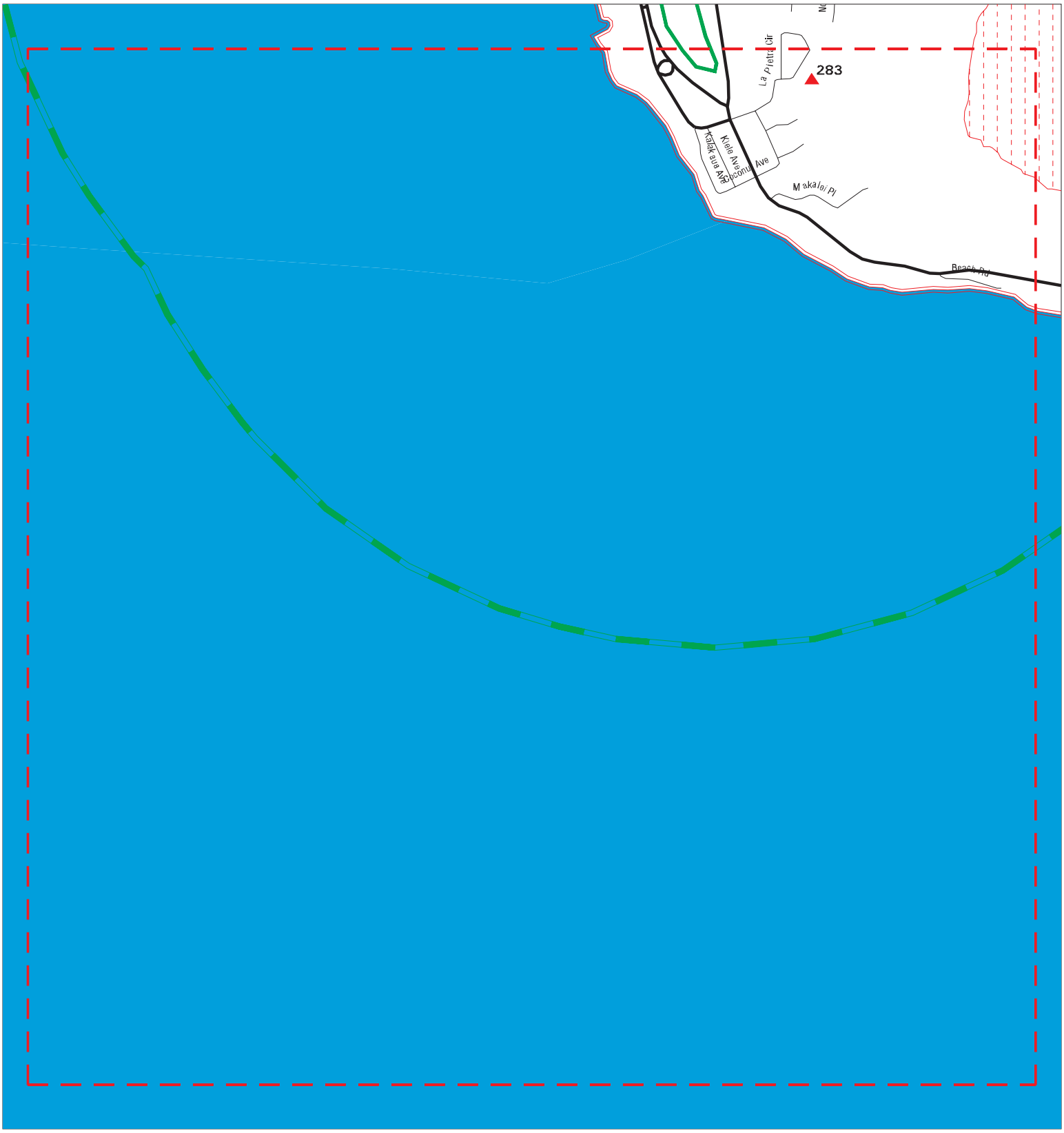
MAPPED SITES SUMMARY - FOCUS MAP 10

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 11 - 7196419.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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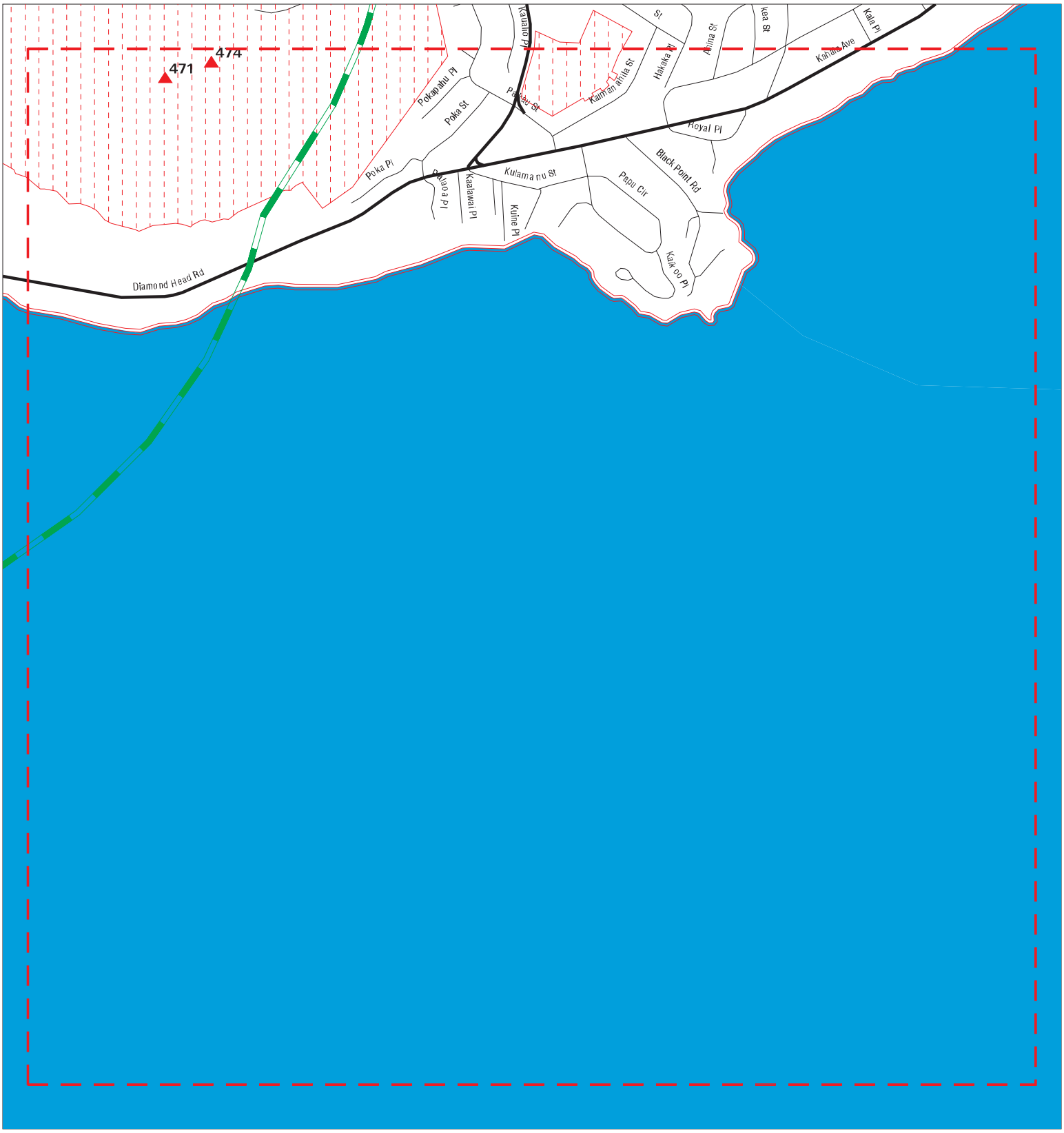
MAPPED SITES SUMMARY - FOCUS MAP 11

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
Reg / Multiple	NG FT RUGER		DOD	1974 0.374 ESE
283 / 11	LA PIETRA HAWAII SCH	2933 PONI MOI ROAD	RCRA NonGen / NLR, ICIS, FINDS, ECHO	886 0.168 East

Focus Map - 12 - 7196419.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Pipe Line
National Priority List Sites
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Ala Wai Canal	CLIENT: U.S. Army Corps of Engineers
ADDRESS: Honolulu	CONTACT: Jennifer Miller
CITY/STATE: Honolulu HI	INQUIRY #: 7196419.5s
ZIP: 96815	DATE: 12/07/22

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MAPPED SITES SUMMARY - FOCUS MAP 12

Target Property:
HONOLULU
HONOLULU, HI 96815

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
Reg / Multiple	NG FT RUGER		DOD	1974 0.374 ESE
Reg / Multiple	NG FT RUGER		DOD	6759 1.280 ESE
471 / 12	FORT RUGER FIRING RA	DIAMOND HEAD RD	HI SHWS, HI PFAS	3806 0.721 ESE
474 / 12	FORT RUGER		FUDS	4102 0.777 ESE

DOD **FORT DE RUSSY** **DOD** **CUSA402232**
Region **N/A**
SW **, HI**
< 1/8
658 ft.

Focus Map: 8

DOD:
Site Name: FORT DE RUSSY
DOD Component: Army Active
Joint Base: N/A
Operating Status: ACT (Active): Site has an on-going operational/support mission (s).

DOD **NG FT RUGER** **DOD** **CUSA402233**
Region **N/A**
ESE **, HI**
1/4-1/2
1974 ft.

Focus Map: 9,8,11,12

DOD:
Site Name: NG FT RUGER
DOD Component: Army Guard
Joint Base: N/A
Operating Status: ACT (Active): Site has an on-going operational/support mission (s).

DOD **NG FT RUGER** **DOD** **CUSA402237**
Region **N/A**
East **, HI**
> 1
6228 ft.

Focus Map: 9

DOD:
Site Name: NG FT RUGER
DOD Component: Army Guard
Joint Base: N/A
Operating Status: ACT (Active): Site has an on-going operational/support mission (s).

DOD **NG FT RUGER** **DOD** **CUSA402239**
Region **N/A**
ESE **, HI**
> 1
6526 ft.

Focus Map: 9

DOD:
Site Name: NG FT RUGER
DOD Component: Army Guard
Joint Base: N/A
Operating Status: ACT (Active): Site has an on-going operational/support mission (s).

DOD **NG FT RUGER** **DOD** **CUSA402240**
Region **N/A**
ESE
, HI
> 1
6759 ft.

Focus Map:
9,12

DOD:

Site Name:	NG FT RUGER
DOD Component:	Army Guard
Joint Base:	N/A
Operating Status:	ACT (Active): Site has an on-going operational/support mission (s).

A1 **GIOBETECK GROUP. INC.** **HI LEAD** **S123492199**
Target **2752 WOODLAWN DRIVE, STATE 5-204 (A)** **N/A**
Property **HONOLULU, HI 96822**

Site 1 of 34 in cluster A

Actual:
150 ft.

Focus Map:
6

LEAD:

Notification Number:	2018-0259
Type:	Notification
Name:	GIOBETECK GROUP. INC.
Address:	2752 WOODLAWN DRIVE, STATE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	12/4/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	LBP Rick Assessor Refresher
Status:	Not reported

A2 **GLOBETECK GROUP INC** **HI LEAD** **S121311214**
Target **2752 WOODLAWN DRIVE, SUITE 5-204 (A)** **N/A**
Property **HONOLULU, HI**

Site 2 of 34 in cluster A

Actual:
150 ft.

Focus Map:
6

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP INC
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	10/22/2015
Date Closed:	Not reported
Contact:	Mohammed Flout
Report Date:	10/26/2015
Correction Date:	10/2712f
Inspection Notes:	Notification Requirements for Lead- Based Paint Training Activities
Status:	Not reported

A3 **GLOBELACK GROUP, INC.** **HI LEAD** **S121311212**
Target Property **2752 WOODLAWN DOVE. SUITE 5-204 IA)** **N/A**
HONOLULU, HI

Site 3 of 34 in cluster A

Actual: **150 ft.**
Focus Map: 6

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBELACK GROUP, INC.
Address:	2752 WOODLAWN DOVE. SUITE 5-204 IA)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	101281/2016
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activities
Status:	Not reported

A4 **MANOA VALLEY VETERINARY CLINIC LLC** **HI AIRS** **S128064827**
Target Property **2752 WOODLAWN DRIVE** **N/A**
HONOLULU, HI

Site 4 of 34 in cluster A

Actual: **150 ft.**
Focus Map: 6

AIRS:

Name:	MANOA VALLEY VETERINARY CLINIC LLC
Address:	2752 WOODLAWN DRIVE
City,State,Zip:	HONOLULU, HI
Facility Identifier:	0884-01-N
Island:	Oahu
Mailing Address:	Not reported
Locale:	Not reported
Mailing City:	Not reported
Contact Name:	Not reported
Mailing State:	Not reported
Mailing Zip:	Not reported
Contact Phone:	Not reported
Business Phone:	Not reported
Issue Date:	07/07/2021
Expiration Date:	07/06/2026
Description:	One 150 lb/hr Matthews Environmental Solutions crematory unit, Model IEB Series 20, Serial No. TBD.

A5 **GHDBETECK GROUP, INC.** **HI LEAD** **S121311210**
Target Property **2752 WOODLAWN DRIVE. SUITE 5-204 (AL** **N/A**
HONOLULU, HI

Site 5 of 34 in cluster A

Actual: **150 ft.**
Focus Map: 6

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GHDBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE. SUITE 5-204 (AL
City,State,Zip:	HONOLULU, HI

GHDBETECK GROUP, INC. (Continued) **S121311210**

Complaint Number: Not reported
Date: 9/9/2016
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: 9/12/201
Inspection Notes: Notification Requirements for Lead- Based Paint Training Activities
Status: Not reported

A6 **GLOBALE& GROUP, INC.** **HI LEAD** **S121311211**
Target Property **2752 WOODLAWN DRIVE, SUITE 5-204 (AL** **N/A**
HONOLULU, HI 96822

Site 6 of 34 in cluster A

Actual: 150 ft.
Focus Map: 6

LEAD:
Notification Number: Not reported
Type: Not reported
Name: GLOBALE& GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (AL
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 9/4/2013
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: 9/7/2010
Inspection Notes: Notification Requirements for Lead-Based PaintTraining Activities
Status: Not reported

A7 **GLOBETECK GROUP, INC.** **HI LEAD** **S121311218**
Target Property **2752 WOODLAWN DRIVE. SUITE 5-204 (A)** **N/A**
HONOLULU, HI 96822

Site 7 of 34 in cluster A

Actual: 150 ft.
Focus Map: 6

LEAD:
Notification Number: 2018-0260
Type: Accreditation
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE. SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 12/4/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: 127/2018
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: Not reported
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE. SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI

GLOBETECK GROUP, INC. (Continued) **S121311218**

Complaint Number:	Not reported
Date:	2/9/2017
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	2/16/2017
Correction Date:	/217/201
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activitives
Status:	Not reported
Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE. SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	5/6/2017
Date Closed:	Not reported
Contact:	Mohammad Roul
Report Date:	5/15/2017
Correction Date:	5/16/201
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activitives
Status:	Not reported
Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE. SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	6/22/2017
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	7/6/2017
Correction Date:	Not reported
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activitives
Status:	Not reported

A8 **KZOO RDO STN POLYNESIAN STUDIO** **EDR Hist Auto** **1021800828**
Target **2752 WOODLAWN DR BLDG 5** **N/A**
Property **HONOLULU, HI 96822**

Site 8 of 34 in cluster A

Actual: EDR Hist Auto
150 ft.

Focus Map:
6

Year:	Name:	Type:
2007	KZOO RDO STN POLYNESIAN STUDIO	Gasoline Service Stations
2008	KZOO RDO STN POLYNESIAN STUDIO	Gasoline Service Stations
2009	KZOO RDO STN POLYNESIAN STUDIO	Gasoline Service Stations

A9 **GLOBETECK GROUP, INC.** **HI LEAD** **S121311217**
Target Property **2752 WOODLAWN DRIVE, SUITE 5-204 (AL** **N/A**
HONOLULU, HI

Site 9 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (AL
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	9/7/2016
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Notificalion Requirements for Lead- Based Paint Training Activities
Status:	Not reported

A10 **GLOBETECK GROUP, INC.** **HI LEAD** **S121311215**
Target Property **2752 WOODIAWN DRIVE, STILE 5-204 (A)** **N/A**
HONOLULU, HI

Site 10 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODIAWN DRIVE, STILE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	6/21/2017
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	7/6/2017
Correction Date:	7/7/2017
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activnlves
Status:	Not reported

A11 **GLOBETECK GROUP, INC** **HI LEAD** **S121311219**
Target Property **2752 WOODLAWN DRIVE, SUITE 5-204 (A)** **N/A**
HONOLULU, HI

Site 11 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	5/13/2017
Date Closed:	Not reported
Contact:	Mohammad Rout

GLOBETECK GROUP, INC (Continued) **S121311219**

Report Date:	5/22/2017
Correction Date:	5/23/201
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activitives
Status:	Not reported

A12 **MANOA MARKETPLACE** **HI UST** **U003221590**
Target Property **2752 WOODLAWN DR, SUITE 5-207** **N/A**
HONOLULU, HI 96822

Site 12 of 34 in cluster A

Actual: 150 ft.
Focus Map: 6

UST:

Name:	MANOA MARKETPLACE
Address:	2752 WOODLAWN DR, SUITE 5-207
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100270
Owner:	Y.Y. VARSITY BAKERY
Owner Address:	2752 WOODLAWN DR., SUITE 5-207
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	001
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	Not reported
Substance:	Not Listed

A13 **GLOBELECK GROUP, INC.** **HI LEAD** **S123492200**
Target Property **2752 WOODLAWN DRIVE, SUITE 5-204 (A)** **N/A**
HONOLULU, HI 96822

Site 13 of 34 in cluster A

Actual: 150 ft.
Focus Map: 6

LEAD:

Notification Number:	2018-0262
Type:	Other
Name:	GLOBELECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	12/4/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	12/7/2018
Correction Date:	Not reported
Inspection Notes:	Notificadon Requirements for LBP Training Activities
Status:	Not reported

A14 **GLOBETECK GROUP, INC.** **HI LEAD** **S121311216**
Target **2752 WOODLAWN DRIVE, SUITE 5-204 (A)** **N/A**
Property **HONOLULU, HI 96922**

Site 14 of 34 in cluster A

Actual: **150 ft.**

Focus Map: **6**

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96922
Complaint Number:	Not reported
Date:	1/2/2018
Date Closed:	Not reported
Contact:	Mohammad Roul
Report Date:	1/11/2018
Correction Date:	Not reported
Inspection Notes:	PBTP-0010, Lead-Based Paint Training Provider Accreditation Risk Assessor Initial
Status:	Not reported

Notification Number:	2018-0174
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	9/27/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

Notification Number:	2018-0175
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	9/27/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

Notification Number:	2018-0176
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	9/27/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0177
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 9/27/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0184
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/1/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0185
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/1/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0186
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/1/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0187
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/1/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0188
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/7/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0189
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/7/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0190
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/7/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Status: Not reported

Notification Number: 2018-0191
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/7/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0193
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/8/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0194
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/9/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0195
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/10/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Notification Number:	2018-0196
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	10/11/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

Notification Number:	2018-0197
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	10/8/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

Notification Number:	2018-0198
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	10/9/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

Notification Number:	2018-0199
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	10/10/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

Notification Number:	2018-0200

GLOBETECK GROUP, INC. (Continued) **S121311216**

Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/11/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0201
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/8/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0202
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/9/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0203
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/10/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0204
Type: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/11/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0205
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/8/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0206
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/9/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0207
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/10/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0208
Type: Not reported
Name: GLOBETECK GROUP, INC.

GLOBETECK GROUP, INC. (Continued) **S121311216**

Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/11/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0221
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/27/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0222
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/28/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0224
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/28/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0225
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)

GLOBETECK GROUP, INC. (Continued) **S121311216**

City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/27/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0226
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/28/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0227
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/27/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0228
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/28/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0235
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI

GLOBETECK GROUP, INC. (Continued) **S121311216**

Complaint Number:	Not reported
Date:	11/27/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0236
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/28/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0237
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/29/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0238
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/30/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0239
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Date:	11/27/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0240
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/28/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0241
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/29/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0242
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/30/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0243
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/27/2018

GLOBETECK GROUP, INC. (Continued) **S121311216**

Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0245
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 11/29/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0246
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 11/30/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0247
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 11/27/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0248
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 11/28/2018
Date Closed: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0249
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/29/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0250
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/30/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0089
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	6/29/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported
Notification Number:	2018-0090
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	6/29/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf

GLOBETECK GROUP, INC. (Continued) **S121311216**

Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0091
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 6/29/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0092
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 6/29/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0094
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 6/30/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0095
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 6/30/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0097
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 6/30/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0098
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/3/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0099
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/5/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0100
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/6/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0101
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/3/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0102
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/5/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0103
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/6/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0105
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/5/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Status: Not reported

Notification Number: 2018-0106
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/6/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0107
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/3/2018
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0108
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/5/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0109
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 7/6/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	12/5/2014
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	12/12/2014
Correction Date:	12/15/2(
Inspection Notes:	Nohlication Requirements for Lead- Based Paint Training Activities
Status:	Not reported

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	114)2016
Date Closed:	Not reported
Contact:	Mohammad AOuf
Report Date:	1/14/2016
Correction Date:	1/15/201
Inspection Notes:	Notification Requirements for Lead- Based Paint Training Activilies
Status:	Not reported

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	5/14/2017
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	5/22/2017
Correction Date:	5/23/201
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activitives
Status:	Not reported

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	6/20/2017
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	7/6/2017
Correction Date:	7/7/2017
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activitives
Status:	Not reported

Notification Number:	Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/12/2017
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: 10/17/2017
Correction Date: 10/18/20
Inspection Notes: Notification Requirements for Lead-Based Paint Training Activitives
Status: Not reported

Notification Number: 2018-0096
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 6/30/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: Not reported
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96922
Complaint Number: Not reported
Date: 1/3/2018
Date Closed: Not reported
Contact: Mohammad Roul
Report Date: 1/11/2018
Correction Date: Not reported
Inspection Notes: PBTP-0010, Lead-Based Paint Training Provider Accreditation Risk Assessor Initial
Status: Not reported

Notification Number: 2018-0223
Type: Not reported
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI
Complaint Number: Not reported
Date: 10/27/2018
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: Not reported
Correction Date: Not reported
Inspection Notes: Not reported
Status: Not reported

Notification Number: 2018-0104
Type: Not reported

GLOBETECK GROUP, INC. (Continued) **S121311216**

Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	7/3/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

Notification Number:	2018-0244
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	11/28/2018
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	Not reported
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

A15 **GLOBETECK GROUP, INC.** **HI LEAD** **S123492201**
Target Property **2752 WOODLAWN DR., SATE 5-204 (A)** **N/A**
HONOLULU, HI 96822

Site 15 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	2019-0011
Type:	Accreditation
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DR., SATE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	2/12/2019
Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	2/21/2019
Correction Date:	Not reported
Inspection Notes:	PBTP-0010, LBP Training Activities, Initial Inspector
Status:	Not reported

A16 **GLOBETECK GROUP, INC.** **HI LEAD** **S121797008**
Target **2752 WOODLAWN DRIVE, SUITE 5-204 (A)** **N/A**
Property **HONOLUU, HI 96822**

Site 16 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLUU, HI 96822
Complaint Number:	Not reported
Date:	2/15/2018
Date Closed:	Not reported
Contact:	Mohammad Roul
Report Date:	2/22/2018
Correction Date:	Not reported
Inspection Notes:	PBTP-0010, Lead-Based Paint Training Provider Accreditation Risk Assessor
Status:	Not reported

A17 **CHERRYWOOD-MANOA LLC** **EDR Hist Cleaner** **1018747855**
Target **2752 WOODLAWN DR** **N/A**
Property **HONOLULU, HI 96822**

Site 17 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

EDR Hist Cleaner

Year:	Name:	Type:
2004	MANOA LAUNDRY DISCOUNT CLEANIN	Drycleaning Plants, Except Rugs
2005	MANOA LAUNDRY DISCOUNT CLEANIN	Drycleaning Plants, Except Rugs
2006	MANOA LAUNDRY DISCOUNT CLEANIN	Drycleaning Plants, Except Rugs
2007	MANOA LAUNDRY DISCOUNT CLEANIN	Drycleaning Plants, Except Rugs
2008	MANOA LAUNDRY DISCOUNT CLEANIN	Drycleaning Plants, Except Rugs
2009	MANOA LAUNDRY DISCOUNT CLEANIN	Drycleaning Plants, Except Rugs

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A18 **GLOBETECK GROUP, INC** **HI LEAD** **S123492204**
Target **2752 WOODLAWN DR., SUITE 5-204 (A)** **N/A**
Property **HONOLULU, HI 96822**

Site 18 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	2019-0005
Type:	Accreditation
Name:	GLOBETECK GROUP, INC
Address:	2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	1/11/2019
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	1/15/2019
Correction Date:	Not reported
Inspection Notes:	PBTP-0010, LBP Initial Risk Assessor
Status:	Not reported

A19 **GLOLLETECK GROUP, INC.** **HI LEAD** **S123492206**
Target Property **2752 WOODLAWN DRIVE, SUITE 5-204 (A)** **N/A**
HONOLULU, HI 96822

Site 19 of 34 in cluster A

Actual: **150 ft.**
Focus Map: 6

LEAD:

Notification Number:	2018-0261
Type:	Certification
Name:	GLOLLETECK GROUP, INC.
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	12/4/2018
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	12/7/2018
Correction Date:	Not reported
Inspection Notes:	PBTP-0010
Status:	Not reported

A20 **GLOBETECK GROUP. INC.** **HI LEAD** **S123492205**
Target Property **2752 WOODLAWN DR,, SUITE 5-204 (A)** **N/A**
HONOLULU, HI 96822

Site 20 of 34 in cluster A

Actual: **150 ft.**
Focus Map: 6

LEAD:

Notification Number:	2019-0012
Type:	Accreditation
Name:	GLOBETECK GROUP. INC.
Address:	2752 WOODLAWN DR,, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	2/13/2019
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	2/21/2019
Correction Date:	Not reported
Inspection Notes:	PBTP-0010, LBP Training Activities, Initial Inspector
Status:	Not reported

A21 **GLOBETECK GROUP, INC.** **HI LEAD** **S124516437**
Target Property **2752 WOODLAWN DR., SU** **N/A**
, HI 96822

Site 21 of 34 in cluster A

Actual: **150 ft.**
Focus Map: 6

LEAD:

Notification Number:	2019-0039
Type:	Accreditation
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DR., SU
City,State,Zip:	HI 96822
Complaint Number:	Not reported
Date:	3/30/2019
Date Closed:	Not reported
Contact:	Mohammad Rout

GLOBETECK GROUP, INC. (Continued) **S124516437**

Report Date:	4/2/2019
Correction Date:	4/2/2019
Inspection Notes:	Worker Refresher, LBP Activities, Training Providers,
Status:	Not reported

A22 **GLOBETECK GROUP, INC.** **HI LEAD** **S123492203**
Target Property **2752 WOODLAWN DR.. SATE 5-204 (A)** **N/A**
HONOLULU, HI 96822

Site 22 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	2019-0003
Type:	Accreditation
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DR.. SATE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	1/912019
Date Closed:	Not reported
Contact:	Mohammad Roul
Report Date:	1/15/2019
Correction Date:	Not reported
Inspection Notes:	PBTP-0010, LBP Initial Inspector
Status:	Not reported

A23 **GLOBETECK GROUP, INC.** **HI LEAD** **S123492202**
Target Property **2752 WOODLAWN DR., SUITE 5-204 (A)** **N/A**
HONOLULU, HI 96822

Site 23 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	2019-0001
Type:	Accreditation
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	1t712019
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	1/15/2019
Correction Date:	Not reported
Inspection Notes:	PBTP-0010, LBP Initial Inspector
Status:	Not reported

Notification Number:	2019-0002
Type:	Accreditation
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	1/8/2019
Date Closed:	Not reported
Contact:	Mohammad Rout

GLOBETECK GROUP, INC. (Continued) **S123492202**

Report Date: 1/15/2019
Correction Date: Not reported
Inspection Notes: PBTP-0010. LBP Initial Inspector
Status: Not reported

Notification Number: 2019-0004
Type: Accreditation
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 1/10/2019
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: 1/15/2019
Correction Date: Not reported
Inspection Notes: PBTP-0010, LBP Initial Risk Assessor
Status: Not reported

Notification Number: 2019-0008
Type: Accreditation
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 1/29/2019
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: 2/6/2019
Correction Date: Not reported
Inspection Notes: PBTP-0010, Lead-Based Paint Risk Assessor Refresher
Status: Not reported

Notification Number: 2019-0010
Type: Accreditation
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 2/11/2019
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: 2/21/2019
Correction Date: Not reported
Inspection Notes: PBTP-0010. LBP Training Activities, Initial Inspector
Status: Not reported

Notification Number: 2019-0073
Type: Accreditation
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 6/24/2019
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: 7/6/2019

GLOBETECK GROUP, INC. (Continued) **S123492202**

Correction Date: 7/8/2019
Inspection Notes: LBP Training Provider Inspection
Status: Not reported

Notification Number: 2019-0074
Type: AC,credltatlon
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 6/25/2019
Date Closed: Not reported
Contact: Mohammad Rouf
Report Date: 7/8/2019
Correction Date: 7/8/2019
Inspection Notes: LBP Training Provider Inspectlon
Status: Not reported

Notification Number: 2019-0075
Type: Accredllatlon
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 6/26/2019
Date Closed: Not reported
Contact: Mohammad Rout
Report Date: 7/8/2019
Correction Date: 7/8/2019
Inspection Notes: LBP Training Provider Inspection
Status: Not reported

Notification Number: 2019-0076
Type: Accredltatlon
Name: GLOBETECK GROUP, INC.
Address: 2752 WOODLAWN DR., SUITE 5-204 (A)
City,State,Zip: HONOLULU, HI 96822
Complaint Number: Not reported
Date: 6/27/2019
Date Closed: Not reported
Contact: Mohammad Roul
Report Date: 7/8/2019
Correction Date: 7/8/2019
Inspection Notes: LBP Training Provider Inspection, PBF-0037, LBP Actlvltles Rnn
Status: Not reported

A24 **FENDU BOULANGERIE** **FINDS** **1024403695**
Target **2752 WOODLAWN DR #5-119** **N/A**
Property **HONOLULU, HI 96822**

Site 24 of 34 in cluster A

Actual:
150 ft.

Focus Map:
6

FINDS:
Registry ID: 110070318654

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

FENDU BOULANGERIE (Continued) **1024403695**

OSHA ESTABLISHMENT

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

A25 **GLOBETECK GROUP. INC** **HI LEAD** **S121311221**
Target **2752 WOODLAWN DRIVE, SUITE 5-204 (A)** **N/A**
Property **HONOLULU, HI**

Site 25 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	Not reported
Type:	Not reported
Name:	GLOBETECK GROUP. INC
Address:	2752 WOODLAWN DRIVE, SUITE 5-204 (A)
City,State,Zip:	HONOLULU, HI
Complaint Number:	Not reported
Date:	6/19/2017
Date Closed:	Not reported
Contact:	Mohammad Rout
Report Date:	7/6/2017
Correction Date:	7/7/2017
Inspection Notes:	Notification Requirements for Lead-Based Paint Training Activitives
Status:	Not reported

A26 **MANOA MARKETPLACE** **FINDS** **1016380419**
Target **2752 WOODLAWN DRIVE #5** **N/A**
Property **HONOLULU, HI 96822**

Site 26 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

FINDS:
Registry ID: 110055122433

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

A27 **GLOBETECK GROUP, INC.** **HI LEAD** **S124516438**
Target **2752 WOODLAWN DR., SU** **N/A**
Property **HONOLULU, HI 96822**

Site 27 of 34 in cluster A

Actual: **150 ft.**
Focus Map: **6**

LEAD:

Notification Number:	2019-0050
Type:	Accreditation
Name:	GLOBETECK GROUP, INC.
Address:	2752 WOODLAWN DR., SU
City,State,Zip:	HONOLULU, HI 96822
Complaint Number:	Not reported
Date:	3/19/2019

GLOBETECK GROUP, INC. (Continued) **S124516438**

Date Closed:	Not reported
Contact:	Mohammad Rouf
Report Date:	5/3/2019
Correction Date:	5/3/2019
Inspection Notes:	LBP Training Provider Inspection
Status:	Not reported

A28 **LONGS DRUG STORES #116** **FTTS** **1009517509**
Target **2750 WOODLAWN DR** **HIST FTTS** **N/A**
Property **HONOLULU, HI 96822**

Site 28 of 34 in cluster A

Actual: **149 ft.**

Focus Map: **6**

FTTS INSP:

Inspection Number:	19910408F2057 1
Region:	09
Inspection Date:	04/08/91
Inspector:	S. OGATA
Violation occurred:	No
Investigation Type:	Specific Product Review
Investigation Reason:	For Cause, Government
Legislation Code:	FIFRA
Facility Function:	Marketplace

HIST FTTS INSP:

Inspection Number:	19910408F2057 1
Region:	09
Inspection Date:	Not reported
Inspector:	S. OGATA
Violation occurred:	No
Investigation Type:	Specific Product Review
Investigation Reason:	For Cause, Government
Legislation Code:	FIFRA
Facility Function:	Marketplace

A29 **LONGS DRUG STORE #9835** **RCRA-VSQG** **1004465000**
Target **2750 WOODLAWN DR** **FINDS** **HID984468207**
Property **HONOLULU, HI 96822** **ECHO**

Site 29 of 34 in cluster A

Actual: **149 ft.**

Focus Map: **6**

RCRA Listings:

Date Form Received by Agency:	20210717
Handler Name:	LONGS DRUG STORE #9835
Handler Address:	2750 WOODLAWN DRIVE
Handler City,State,Zip:	HONOLULU, HI 96822
EPA ID:	HID984468207
Contact Name:	NICOLE WILKINSON
Contact Address:	CVS DR MC2340
Contact City,State,Zip:	WOONSOCKET, RI 02895
Contact Telephone:	401-770-7132
Contact Fax:	Not reported
Contact Email:	NICOLE.WILKINSON@CVSHEALTH.COM
Contact Title:	DIRECTOR, CORPORATE ENVIRONMENTAL

LONGS DRUG STORE #9835 (Continued) **1004465000**

EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	CVS DR MC2340
Mailing City,State,Zip:	WOONSOCKET, RI 02895
Owner Name:	MANOA MARKETPLACE, LLC
Owner Type:	Private
Operator Name:	LONGS DRUG STORES CALIFORNIA, L.L.C
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported

LONGS DRUG STORE #9835 (Continued) **1004465000**

Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required:	Not reported
Handler Date of Last Change:	20210721
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	H

Biennial: List of Years
Year: 2019

Click Here for Biennial Reporting System Data:
Year: 2017

Click Here for Biennial Reporting System Data:
Year: 2015

Click Here for Biennial Reporting System Data:

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D004
Waste Description:	ARSENIC
Waste Code:	D005
Waste Description:	BARIUM
Waste Code:	D006
Waste Description:	CADMIUM
Waste Code:	D007
Waste Description:	CHROMIUM
Waste Code:	D008
Waste Description:	LEAD
Waste Code:	D009
Waste Description:	MERCURY
Waste Code:	D010
Waste Description:	SELENIUM
Waste Code:	D011
Waste Description:	SILVER

LONGS DRUG STORE #9835 (Continued) **1004465000**

Waste Code: D016
Waste Description: 2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)

Waste Code: D018
Waste Description: BENZENE

Waste Code: D024
Waste Description: M-CRESOL

Waste Code: D027
Waste Description: 1,4-DICHLOROBENZENE

Waste Code: D035
Waste Description: METHYL ETHYL KETONE

Waste Code: D039
Waste Description: TETRACHLOROETHYLENE

Waste Code: P001
Waste Description: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

Waste Code: P012
Waste Description: ARSENIC OXIDE AS2O3 (OR) ARSENIC TRIOXIDE

Waste Code: P042
Waste Description: 1,2-BENZENEDIOL, 4-[1-HYDROXY-2-(METHYLAMINO)ETHYL]-, (R)- (OR) EPINEPHRINE

Waste Code: P075
Waste Description: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

Waste Code: P081
Waste Description: 1,2,3-PROPANETRIOL, TRINITRATE (R) (OR) NITROGLYCERINE (R)

Waste Code: P188
Waste Description: BENZOIC ACID, 2-HYDROXY-, COMPD. WITH (3AS-CIS)-1,2,3,3A,8,8A-HEXAHYDRO-1,3A,8-TRIMETHYLPYRROLO[2,3-B]INDOL-5-YL METHYLCARBAMATE ESTER (1:1) (OR) PHYSOSTIGMINE SALICYLATE

Waste Code: U002
Waste Description: 2-PROPANONE (I) (OR) ACETONE (I)

Waste Code: U010
Waste Description: AZIRINO [2',3':3,4]PYRROLO[1,2-A]INDOLE-4,7-DIONE, 6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1A,2,8,8A,8B-HEXAHYDRO-8A-METHOXY-5-METHYL-, [1AS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]- (OR) MITOMYCIN C

Waste Code: U031
Waste Description: 1-BUTANOL (I) (OR) N-BUTYL ALCOHOL (I)

Waste Code: U034
Waste Description: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

LONGS DRUG STORE #9835 (Continued) **1004465000**

Waste Code: U035
Waste Description: BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) CHLORAMBUCIL

Waste Code: U044
Waste Description: CHLOROFORM (OR) METHANE, TRICHLORO-

Waste Code: U058
Waste Description: 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS(2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE (OR) CYCLOPHOSPHAMIDE

Waste Code: U059
Waste Description: 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHA-L-LYXO-HEXOPYRANOSYL)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)- (OR) DAUNOMYCIN

Waste Code: U070
Waste Description: BENZENE, 1,2-DICHLORO- (OR) O-DICHLOROBENZENE

Waste Code: U072
Waste Description: BENZENE, 1,4-DICHLORO- (OR) P-DICHLOROBENZENE

Waste Code: U089
Waste Description: DIETHYLSTILBESTEROL (OR) PHENOL, 4,4'-(1,2-DIETHYL-1,2-ETHENEDIYL)BIS, (E)-

Waste Code: U122
Waste Description: FORMALDEHYDE

Waste Code: U129
Waste Description: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

Waste Code: U132
Waste Description: HEXACHLOROPHENE (OR) PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-

Waste Code: U150
Waste Description: L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) MELPHALAN

Waste Code: U151
Waste Description: MERCURY

Waste Code: U154
Waste Description: METHANOL (I) (OR) METHYL ALCOHOL (I)

Waste Code: U165
Waste Description: NAPHTHALENE

Waste Code: U188
Waste Description: PHENOL

Waste Code: U200
Waste Description: RESERPINE (OR) YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-

Waste Code: U201

LONGS DRUG STORE #9835 (Continued) **1004465000**

Waste Description: 1,3-BENZENEDIOL (OR) RESORCINOL

Waste Code: U204
Waste Description: SELENIOUS ACID (OR) SELENIUM DIOXIDE

Waste Code: U205
Waste Description: SELENIUM SULFIDE (OR) SELENIUM SULFIDE SES2 (R,T)

Waste Code: U206
Waste Description: D-GLUCOSE, 2-DEOXY-2-[[(METHYLNITROSOAMINO)-CARBONYL]AMINO]- (OR) GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-,D- (OR) STREPTOZOTOCIN

Waste Code: U210
Waste Description: ETHENE, TETRACHLORO- (OR) TETRACHLOROETHYLENE

Waste Code: U279
Waste Description: U279

Waste Code: U411
Waste Description: U411

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, L.L.C
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: MANOA MARKETPLACE, LLC
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 201 WILSHIRE BOULEVARD, SUITE A28
Owner/Operator City,State,Zip: SANTA MONICA, CA 90401
Owner/Operator Telephone: 310-395-5200
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: MANOA MARKETPLACE, LLC
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 201 WILSHIRE BOULEVARD, SUITE A28
Owner/Operator City,State,Zip: SANTA MONICA, CA 90401
Owner/Operator Telephone: 310-395-5200
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported

LONGS DRUG STORE #9835 (Continued) **1004465000**

Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, L.L.C
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE, MAIL CODE 2340
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: MANOA MARKETPLACE, LLC
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 201 WILSHIRE BLVD, SUITE A28
Owner/Operator City,State,Zip: SANTA MONICA, CA 90401
Owner/Operator Telephone: 310-395-5200
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: MANOA MARKETPLACE, LLC
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 201 WILSHIRE BOULEVARD, SUITE A28
Owner/Operator City,State,Zip: SANTA MONICA, CA 90401
Owner/Operator Telephone: 310-395-5200
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: MANOA MARKETPLACE, LLC
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 201 WILSHIRE BOULEVARD, SUITE A28
Owner/Operator City,State,Zip: SANTA MONICA, CA 90401
Owner/Operator Telephone: 310-395-5200
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: MANOA MARKETPLACE, LLC
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 201 WILSHIRE BOULEVARD, SUITE A28
Owner/Operator City,State,Zip: SANTA MONICA, CA 90401

LONGS DRUG STORE #9835 (Continued) **1004465000**

Owner/Operator Telephone: 310-395-5200
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, L.L.C
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE, MAIL CODE 2340
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, L.L.C
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: CVS PHARMACY INC
Legal Status: Private
Date Became Current: 20081020
Date Ended Current: Not reported
Owner/Operator Address: ONE CVS DR
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, L.L.C
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: MANOA MARKETPLACE, LLC
Legal Status: Private
Date Became Current: 20081022

LONGS DRUG STORE #9835 (Continued) **1004465000**

Date Ended Current:	Not reported
Owner/Operator Address:	201 WILSHIRE BLVD, SUITE A28
Owner/Operator City,State,Zip:	SANTA MONICA, CA 90401
Owner/Operator Telephone:	310-395-5200
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name:	LONGS DRUG STORES CALIFORNIA, L.L.C
Legal Status:	Private
Date Became Current:	20081022
Date Ended Current:	Not reported
Owner/Operator Address:	1 CVS DRIVE, MAIL CODE 2340
Owner/Operator City,State,Zip:	WOONSOCKET, RI 02895
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name:	CVS PHARMACY INC
Legal Status:	Private
Date Became Current:	20081020
Date Ended Current:	Not reported
Owner/Operator Address:	ONE CVS DR
Owner/Operator City,State,Zip:	WOONSOCKET, RI 02895
Owner/Operator Telephone:	401-765-1500
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	MANOA MARKETPLACE, LLC
Legal Status:	Private
Date Became Current:	20081022
Date Ended Current:	Not reported
Owner/Operator Address:	201 WILSHIRE BLVD, SUITE A28
Owner/Operator City,State,Zip:	SANTA MONICA, CA 90401
Owner/Operator Telephone:	310-395-5200
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name:	LONGS DRUG STORES CALIFORNIA, L.L.C
Legal Status:	Private
Date Became Current:	20081022
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator

LONGS DRUG STORE #9835 (Continued) **1004465000**

Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, L.L.C
Legal Status: Private
Date Became Current: 20081022
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE, MAIL CODE 2340
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: LONGS DRUG STORES CALIF INC
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 141 N CIVIC DR
Owner/Operator City,State,Zip: WALNUT CREEK, CA 94596
Owner/Operator Telephone: 510-937-1170
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20160304
Handler Name: LONGS DRUG STORE #9835
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20180228
Handler Name: LONGS DRUG STORE #9835
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20200228
Handler Name: LONGS DRUG STORE #9835
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No

LONGS DRUG STORE #9835 (Continued) **1004465000**

Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 19940906
Handler Name: LONGS DRUG STORE 116
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20101101
Handler Name: LONGS DRUG STORE NO 9835
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20121005
Handler Name: LONGS DRUG STORE NO 9835
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20150715
Handler Name: LONGS DRUG STORE #9835
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

LONGS DRUG STORE #9835 (Continued) **1004465000**

Receive Date: 20151005
Handler Name: LONGS DRUG STORE #9835
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20210118
Handler Name: LONGS DRUG STORE #9835
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20210717
Handler Name: LONGS DRUG STORE #9835
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 44611
NAICS Description: PHARMACIES AND DRUG STORES

NAICS Code: 446110
NAICS Description: PHARMACIES AND DRUG STORES

NAICS Code: 812922
NAICS Description: ONE-HOUR PHOTOFINISHING

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

LONGS DRUG STORE #9835 (Continued) **1004465000**

FINDS:
Registry ID: 110005727918

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
HAZARDOUS WASTE BIENNIAL REPORTER
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004465000
Registry ID:	110005727918
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005727918
Name:	LONGS DRUG STORE #9835
Address:	2750 WOODLAWN DR
City,State,Zip:	HONOLULU, HI 96822

A30 **LONGS DRUG STORES #116** **FTTS 1009517508**
Target Property **2750 WOODLAWN DR** **HONOLULU, HI 96822** **HIST FTTS N/A**

Site 30 of 34 in cluster A

Actual: 149 ft.
Focus Map: 6

FTTS INSP:

Inspection Number:	19910408F2057 2
Region:	09
Inspection Date:	04/08/91
Inspector:	S. OGATA
Violation occurred:	No
Investigation Type:	Specific Product Review
Investigation Reason:	For Cause, Government
Legislation Code:	FIFRA
Facility Function:	Marketplace

HIST FTTS INSP:

Inspection Number:	19910408F2057 2
Region:	09
Inspection Date:	Not reported
Inspector:	S. OGATA
Violation occurred:	No
Investigation Type:	Specific Product Review
Investigation Reason:	For Cause, Government
Legislation Code:	FIFRA

LONGS DRUG STORES #116 (Continued) **1009517508**

Facility Function: Marketplace

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31 **1653 MOTT SMITH DRIVE** **HI SPILLS** **S105263009**
Target **1653 MOTT-SMITH DR** **N/A**
Property **HONOLULU, HI 96822**

Actual:
68 ft.

Focus Map:
4

SPILLS:

Name:	1653 MOTT SMITH DRIVE
Address:	1653 MOTT-SMITH DR
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19940617
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	1653 Mott Smith Dr
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Paint
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

A32 **USDA ARS** **RCRA NonGen / NLR** **1000141641**
Target **2727 WOODLAWN DR** **FINDS** **HI8120590064**
Property **HONOLULU, HI 96822** **ECHO**

Site 31 of 34 in cluster A

Actual: **148 ft.**

Focus Map: **6**

RCRA Listings:

Date Form Received by Agency:		20210415
Handler Name:	USDA ARS	
Handler Address:		2727 WOODLAWN DR
Handler City,State,Zip:		HONOLULU, HI 96822
EPA ID:		HI8120590064
Contact Name:		PERNELL HANOA
Contact Address:		WOODLAWN DR
Contact City,State,Zip:		HONOLULU, HI 96822
Contact Telephone:		808-959-4356
Contact Fax:		Not reported
Contact Email:		PERNELL.HANOA@USDA.GOV
Contact Title:		Not reported
EPA Region:		09
Land Type:		Federal
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PO BOX 2280
Mailing City,State,Zip:		HONOLULU, HI 96804
Owner Name:	USDA ARS	
Owner Type:		Federal
Operator Name:	NOT REQUIRED	
Operator Type:		Federal
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		The land is federally-owned, The site is federally-owned, The site is federally-operated
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline

USDA ARS (Continued) **1000141641**

Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210415
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: USDA ARS	
Legal Status:	Federal
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: USDA ARS	
Legal Status:	Federal
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

USDA ARS (Continued) **1000141641**

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Federal
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Federal
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20210415
Handler Name: USDA ARS
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 19871013
Handler Name: USDA ARS
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violation:
Found Violation: No

USDA ARS (Continued) **1000141641**

Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19971209
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9STA
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110005722913

USDA ARS (Continued) **1000141641**

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000141641
Registry ID:	110005722913
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005722913
Name:	USDA ARS
Address:	2727 WOODLAWN DR
City,State,Zip:	HONOLULU, HI 96822

A33 **2727 WOODLAWN DRIVE, HI DOA TROPICAL FRUIT & VEGET** **HI SPILLS** **S106815422**
Target Property **2727 WOODLAWN DR** **N/A**
HONOLULU, HI 96822

Site 32 of 34 in cluster A

Actual: 148 ft.

Focus Map: 6

SPILLS:

Name:	2727 WOODLAWN DRIVE, HI DOA TROPICAL FRUIT & VEGETABLE LAB
Address:	2727 WOODLAWN DR
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	Manoa Area
Case Number:	19930208-3
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	2727 Woodlawn Dr, HI DOA Tropical Fruit & Vegetable Lab
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Mercury
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported

2727 WOODLAWN DRIVE, HI DOA TROPICAL FRUIT & VEGETABLE LAB (Continued) **S106815422**

Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

A34 **UNIVERSITY OF HAWAII AT MANOA** **HI AIRS** **S107769384**
Target **2721 WOODLAWN DRIVE** **N/A**
Property **HONOLULU, HI**

Site 33 of 34 in cluster A

Actual: **148 ft.**
Focus Map: **6**

AIRS:

Name:	UNIVERSITY OF HAWAII AT MANOA
Address:	2721 WOODLAWN DRIVE
City,State,Zip:	HONOLULU, HI
Facility Identifier:	0480-01-N
Island:	Oahu
Mailing Address:	2040 East-West Road
Locale:	Not reported
Mailing City:	Honolulu
Contact Name:	Stacie Cheramie
Mailing State:	Hawaii
Mailing Zip:	96822
Contact Phone:	Environmental Compliance Officer
Business Phone:	Not reported
Issue Date:	12/09/2011
Expiration Date:	12/08/2016
Description:	One (1) 175 lb/hr Pathological Waste IncineratorThis permit encompasses the following equipment and associated appurtenances:Consumat Model C-75P 175 lb/hr propane-fired Pathological Waste Incinerator.

A35 **MAGOON AGRICULTURAL RESEARCH FACILITY** **RCRA-VSQG** **1001487355**
Target **2717 WOODLAWN DR** **FINDS** **HIR000051755**
Property **HONOLULU, HI 96822** **ECHO**

Site 34 of 34 in cluster A

Actual: **148 ft.**
Focus Map: **5**

RCRA Listings:

Date Form Received by Agency:	20070419
Handler Name:	MAGOON AGRICULTURAL RESEARCH FACILITY
Handler Address:	2717 WOODLAWN DR
Handler City,State,Zip:	HONOLULU, HI 96822
EPA ID:	HIR000051755

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Contact Name:		MARK T BURCH
Contact Address:		2717 WOODLAWN DR
Contact City,State,Zip:		HONOLULU, HI 96822
Contact Telephone:		808-956-7918
Contact Fax:		Not reported
Contact Email:		BURCH@HAWAII.EDU
Contact Title:		Not reported
EPA Region:		09
Land Type:		State
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		2717 WOODLAWN DR
Mailing City,State,Zip:		HONOLULU, HI 96822
Owner Name:	UNIVERSITY OF HAWAII	
Owner Type:		State
Operator Name:	UNIVERSITY OF HAWAII	
Operator Type:		State
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20070516
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D000
Waste Description:	Not Defined
Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D013
Waste Description:	LINDANE (1,2,3,4,5,6-HEXA-CHLOROCYCLOHEXANE, GAMMA ISOMER)
Waste Code:	D016
Waste Description:	2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)
Waste Code:	D037
Waste Description:	PENTACHLOROPHENOL
Waste Code:	P039
Waste Description:	DISULFOTON (OR) PHOSPHORODITHIOIC ACID, O,O-DIETHYL S-[2-(ETHYLTHIO)ETHYL] ESTER
Waste Code:	P071
Waste Description:	METHYL PARATHION (OR) PHOSPHOROTHIOIC ACID, O,O,-DIMETHYL O-(4-NITROPHENYL) ESTER
Waste Code:	P089
Waste Description:	PARATHION (OR) PHOSPHOROTHIOIC ACID, O,O-DIETHYL-O-(4-NITROPHENYL) ESTER
Waste Code:	U051
Waste Description:	CREOSOTE
Waste Code:	U129

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Waste Description: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

Waste Code: U240
Waste Description: 2,4-D, SALTS & ESTERS (OR) ACETIC ACID, (2,4-DICHLOROPHENOXY)-, SALTS & ESTERS (OR) DICHLOROPHENOXYACETIC ACID 2,4-D

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	UNIVERSITY OF HI AT MANOA
Legal Status:	State
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	2040 EAST WEST RD
Owner/Operator City,State,Zip:	HONOLULU, HI 96822
Owner/Operator Telephone:	808-956-2198
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	UNIVERSITY OF HAWAII
Legal Status:	State
Date Became Current:	19680802
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	UNIVERSITY OF HI AT MANOA
Legal Status:	State
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	2040 EAST WEST RD
Owner/Operator City,State,Zip:	HONOLULU, HI 96822
Owner/Operator Telephone:	808-956-2198
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	UNIVERSITY OF HAWAII
Legal Status:	State
Date Became Current:	19680802
Date Ended Current:	Not reported
Owner/Operator Address:	2444 DOLE ST
Owner/Operator City,State,Zip:	HONOLULU, HI 96822
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Historic Generators:

Receive Date:	20070124
Handler Name:	MAGOON AGRICULTURE FACILITY
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	19990430
Handler Name:	MAGOON AGRICULTURE FACILITY
Federal Waste Generator Description:	Large Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20070419
Handler Name:	MAGOON AGRICULTURAL RESEARCH FACILITY
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20000320
Handler Name:	U OF HI, MANOA - MAGOON AGRICULTURE FACI
Federal Waste Generator Description:	Large Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	61131
NAICS Description:	COLLEGES, UNIVERSITIES, AND PROFESSIONAL SCHOOLS

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Facility Has Received Notices of Violation:

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	TSD - General
Date Violation was Determined:	19990324
Actual Return to Compliance Date:	20000915
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Generators - General
Date Violation was Determined:	19981123
Actual Return to Compliance Date:	20000915
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 19981123
Actual Return to Compliance Date: 20000915
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Generators - General
Date Violation was Determined:	19981123
Actual Return to Compliance Date:	20000915
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 19981123
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9STA
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20000915
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 19981123
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9STA
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20000915
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 19981123
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9STA
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20000915
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

Former Citation: Not reported

Evaluation Date: 20060907
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: AALLE
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 19981123
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9STA
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20000915
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

FINDS:
Registry ID: 110005730334

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER
Registry ID: 110055123922

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1001487355
Registry ID: 110005730334
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005730334
Name: MAGOON AGRICULTURAL RESEARCH FACILITY
Address: 2717 WOODLAWN DR

MAGOON AGRICULTURAL RESEARCH FACILITY (Continued) **1001487355**

City,State,Zip: HONOLULU, HI 96822

B36 **VCA UNIVERSITY ANIMAL HOSPITAL** **MLTS** **1003072895**
Target **2728 WOODLAWN DR** **N/A**
Property **HONOLULU, HI 96822**

Site 1 of 4 in cluster B

Actual: **147 ft.**

Focus Map: **5**

MLTS:

Contact Name:	RONALD FRICK
Contact Phone:	808-373-7009
Institution Code:	27684
Dock Number:	3035579
License Number:	53-27684-01
Lic. Expiration Date:	Not reported
Licensee:	VCA UNIVERSITY ANIMAL HOSPITAL
Licensee Line 2:	Not reported
License Contact Street 1:	2728 WOODLAWN DR
License Contact Street 2:	Not reported
License Contact Street 3:	Not reported
License Contact City:	HONOLULU
License Contact State:	HI
License Contact Zip:	96822
License Date:	2014-04-21 00:00:00
First License Date:	2000-11-29 00:00:00
Status:	Retired
Agency Code:	NRC
Authorized States:	Not reported
Authorized for Burial:	N
Approved for Storage Flag:	N
Approved for Redistrib Flag:	N
Approved for Incineration:	N
Last Inspection Date:	2011-12-09 00:00:00
Date of Nest Inspection:	2016-12-09 00:00:00
Primary RSO Full Name:	RUSSEL
Inspection Status:	Draft

B37 **UH AGRICULTURAL RESEARCH STA** **FINDS** **1008171918**
Target **UNKNOWN** **N/A**
Property **HONOLULU, HI 00000**

Site 2 of 4 in cluster B

Actual: **147 ft.**

Focus Map: **5**

FINDS:

Registry ID: 110020737069

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

UH AGRICULTURAL RESEARCH STA (Continued) **1008171918**

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

B38 **2716 WOODLAWN DRIVE** **HI SPILLS** **S106815420**
Target Property **2716 WOODLAWN DR** **N/A**
HONOLULU, HI 96822

Site 3 of 4 in cluster B

Actual: 145 ft.

Focus Map: 5

SPILLS:

Name:	2716 WOODLAWN DRIVE
Address:	2716 WOODLAWN DR
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19910808-2
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	2716 Woodlawn Dr
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	INFECTIOUS WASTE CONTAINER
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.307162999999999
Longitude:	-157.81071499999999

B39 **MANOA PUBLIC LIBRARY** **FINDS** **1016698208**
Target **2716 WOODLAWN DRIVE** **ECHO** **N/A**
Property **HONOLULU, HI 96822**

Site 4 of 4 in cluster B

Actual: **145 ft.**

FINDS:
Registry ID: 110056349571

Focus Map: **5**

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1016698208
Registry ID:	110056349571
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110056349571
Name:	MANOA PUBLIC LIBRARY
Address:	2716 WOODLAWN DRIVE
City,State,Zip:	HONOLULU, HI 96822

C40 **KALAWAO STREET: 8-INCH MAIN** **FINDS** **1016357025**
Target **KALAWAO STREET (MANOA HILLSIDE ESTATES TO KALOALUI** **N/A**
Property **HONOLULU, HI 96843**

Site 1 of 2 in cluster C

Actual: **180 ft.**

FINDS:
Registry ID: 110042373393

Focus Map: **6**

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

C41 **KALAWAO STREET: 8-INCH MAIN** **ECHO** **1017887818**
Target Property **KALAWAO STREET (MANOA HILLSIDE ESTATES TO KALOALUI** **N/A**
HONOLULU, HI 96843

Site 2 of 2 in cluster C

Actual: **180 ft.**
Focus Map: **6**

ECHO:

Envid:	1017887818
Registry ID:	110042373393
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110042373393
Name:	KALAWAO STREET: 8-INCH MAIN
Address:	KALAWAO STREET (MANOA HILLSIDE ESTATES TO KALOALUI
City,State,Zip:	HONOLULU, HI 96843

D42 **THE PARISH OF ST. CLEMENT** **RCRA NonGen / NLR** **1024879269**
Target Property **1515 WILDER AVE** **HIP000145151**
HONOLULU, HI 96822

Site 1 of 5 in cluster D

Actual: **59 ft.**
Focus Map: **5**

RCRA Listings:

Date Form Received by Agency:	20180801
Handler Name:	THE PARISH OF ST. CLEMENT
Handler Address:	1515 WILDER AVE
Handler City,State,Zip:	HONOLULU, HI 96822
EPA ID:	HIP000145151
Contact Name:	MARY A CARPENTER
Contact Address:	WILDER
Contact City,State,Zip:	HONOLULU, HI 96822
Contact Telephone:	808-221-4367
Contact Fax:	Not reported
Contact Email:	LUALIMA25@GMAIL.COM
Contact Title:	JR. WARDEN
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Not a generator, verified
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Not reported
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	WILDER AVE
Mailing City,State,Zip:	HONOLULU, HI 96822
Owner Name:	THE PARISH OF ST. CLEMENT
Owner Type:	Private
Operator Name:	THE PARISH OF ST. CLEMENT
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No

THE PARISH OF ST. CLEMENT (Continued) **1024879269**

Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20180801
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D008
Waste Description:	LEAD

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name:	THE PARISH OF ST. CLEMENT
Legal Status:	Private
Date Became Current:	19100120
Date Ended Current:	Not reported
Owner/Operator Address:	1515 WILDER

THE PARISH OF ST. CLEMENT (Continued) **1024879269**

Owner/Operator City,State,Zip: HONOLULU, HI 96822
Owner/Operator Telephone: 808-955-7745
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: 808-944-9325
Owner/Operator Email: INFO@STCLE.ORG

Owner/Operator Indicator: Owner
Owner/Operator Name: THE PARISH OF ST. CLEMENT
Legal Status: Private
Date Became Current: 19100120
Date Ended Current: Not reported
Owner/Operator Address: 1515 WILDER
Owner/Operator City,State,Zip: HONOLULU, HI 96822
Owner/Operator Telephone: 808-955-7745
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: 808-944-9325
Owner/Operator Email: INFO@STCLE.ORG

Owner/Operator Indicator: Operator
Owner/Operator Name: THE PARISH OF ST. CLEMENT
Legal Status: Private
Date Became Current: 19100120
Date Ended Current: Not reported
Owner/Operator Address: 1515 WILDER
Owner/Operator City,State,Zip: HONOLULU, HI 96822
Owner/Operator Telephone: 808-955-7745
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: 808-944-9325
Owner/Operator Email: INFO@STCLE.ORG

Owner/Operator Indicator: Owner
Owner/Operator Name: THE PARISH OF ST. CLEMENT
Legal Status: Private
Date Became Current: 19100120
Date Ended Current: Not reported
Owner/Operator Address: 1515 WILDER
Owner/Operator City,State,Zip: HONOLULU, HI 96822
Owner/Operator Telephone: 808-955-7745
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: 808-944-9325
Owner/Operator Email: INFO@STCLE.ORG

Historic Generators:
Receive Date: 20180801
Handler Name: THE PARISH OF ST. CLEMENT
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20180427

THE PARISH OF ST. CLEMENT (Continued) **1024879269**

Handler Name: THE PARISH OF ST. CLEMENT
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 813110
NAICS Description: RELIGIOUS ORGANIZATIONS

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

D43 **ST CLEMENTS SCHOOL** **FTTS** **1004464730**
Target **1515 WILDER AV** **HIST FTTS** **N/A**
Property **HONOLULU, HI 96822**

Site 2 of 5 in cluster D

Actual: **59 ft.**
Focus Map: **5**

FTTS INSP:
Inspection Number: 19950126T08HI 1
Region: 09
Inspection Date: 01/26/95
Inspector: KCHANG
Violation occurred: No
Investigation Type: AHERA, Enforcement, State Conducted
Investigation Reason: Neutral Scheme, State
Legislation Code: TSCA
Facility Function: User

HIST FTTS INSP:
Inspection Number: 19950126T08HI 1
Region: 09
Inspection Date: Not reported
Inspector: KCHANG
Violation occurred: No
Investigation Type: AHERA, Enforcement, State Conducted
Investigation Reason: Neutral Scheme, State
Legislation Code: TSCA
Facility Function: User

D44 **ST. CLEMENTS SCHOOL** **FINDS** **1016292974**
Target **1515 WILDER AV** **N/A**
Property **HONOLULU, HI 96822**

Site 3 of 5 in cluster D

Actual: FINDS:
59 ft. Registry ID: 110011647281

Focus Map:
5 Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.
ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

D45 **THE PARISH OF ST. CLEMENT** **ECHO** **1024141357**
Target **1515 WILDER AVE** **N/A**
Property **HONOLULU, HI 96822**

Site 4 of 5 in cluster D

Actual: ECHO:
59 ft.
Envid: 1024141357
Registry ID: 110070244933
Focus Map:
5 DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110070244933
Name: THE PARISH OF ST. CLEMENT
Address: 1515 WILDER AVE
City,State,Zip: HONOLULU, HI 96822

D46 **THE PARISH OF ST. CLEMENT** **FINDS** **1024239758**
Target **1515 WILDER AVE** **N/A**
Property **HONOLULU, HI 96822**

Site 5 of 5 in cluster D

Actual: FINDS:
59 ft. Registry ID: 110070244933

Focus Map:
5 Click Here for FRS Facility Detail Report:

THE PARISH OF ST. CLEMENT (Continued) **1024239758**

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

E47 **FIRE HYDRANT INSTALLATIONS AT VARIOUS LOCATIONS, P** **FINDS** **1018364706**
Target Property **MAKIKI ST.;KOMAIA DR., MANOA RD., OAHU AVE., PAMOA** **ECHO** **N/A**
HONOLULU, HI 96822

Site 1 of 2 in cluster E

Actual: 41 ft.

FINDS:
Registry ID: 110067365425

Focus Map: 5

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1018364706
Registry ID:	110067365425
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110067365425
Name:	FIRE HYDRANT INSTALLATIONS AT VARIOUS LOCATIONS, PART B
Address:	MAKIKI ST.;KOMAIA DR., MANOA RD., OAHU AVE., PAMOA
City,State,Zip:	HONOLULU, HI 96822

---

48 **MANOA STR AT KANEWAI FIELD, HONOLULU, OAHU, HI** **PFAS WQP** **1027310723**
Target Property **N/A**
, HI

PFAS WQP:

Year:	2014
Name:	MANOA STR AT KANEWAI FIELD, HONOLULU, OAHU, HI
Address:	Not reported
City,State,Zip:	HI
Latitude:	21.29322222000000
Longitude:	-157.8127222000000
Organization:	USGS Hawaii Water Science Center
Environmental Media Name:	Sediment
Activity Identifier:	nwishi.01.01400346

Actual: 32 ft.

Focus Map: 5

MANOA STR AT KANEWAI FIELD, HONOLULU, OAHU, HI (Continued) **1027310723**

Activity Type Code:	Sample-Routine
Analysis Start Date:	-
Project Identifier:	Not reported
Monitoring Location Identifier:	USGS-16242500
Result Detection:	Not Detected
PFAS Chemical Name:	Tetraconazole
Result Measure Value (ppt):	-
Result Measure Value:	-
Result Unit of Measure:	Not reported
Detection/Quantitation Limit Type:	Method Detection Limit (MDL)
Detection/Quantitation Measure Value:	1.1
Detection/Quantitation Unit of Measure:	ug/kg
Laboratory Accreditation Indicator:	Not reported
Fish Species:	Not reported
Activity Comment:	Not reported
Result Comment:	Not reported
Provider:	NWIS
EPA Region:	09
Project File URL:	-
QAPP Approval Agency Name:	-
QAPP Approved:	-
Analytical Method:	Current pesticides, bs, ASE GCMS
HUC:	20060000
EJSCREEN Report:	https://ejscreen.epa.gov/mapper/mobile/EJSCREEN_mobile.aspx?geometry=%7B%22x%22:-157.8127222000000,%22y%22:21.29322222000000,%22spatialReference%22:%7B%22wkid%22:4326%7D%7D&unit=9035&areatype=&areaid=&basemap=streets&distance=1
Count:	1
Year:	2016
Name:	MANOA STR AT KANEWAI FIELD, HONOLULU, OAHU, HI
Address:	Not reported
City,State,Zip:	HI
Latitude:	21.29322222000000
Longitude:	-157.8127222000000
Organization:	USGS Hawaii Water Science Center
Environmental Media Name:	Water
Activity Identifier:	nwishi.01.01700073
Activity Type Code:	Sample-Routine
Analysis Start Date:	12/23/2016
Project Identifier:	Not reported
Monitoring Location Identifier:	USGS-16242500
Result Detection:	Not Detected
PFAS Chemical Name:	Tetraconazole
Result Measure Value (ppt):	-
Result Measure Value:	-
Result Unit of Measure:	Not reported
Detection/Quantitation Limit Type:	Not reported
Detection/Quantitation Measure Value:	Not reported
Detection/Quantitation Unit of Measure:	Not reported
Laboratory Accreditation Indicator:	Not reported
Fish Species:	Not reported
Activity Comment:	L-3510074 RUSH
Result Comment:	Not reported
Provider:	NWIS
EPA Region:	09
Project File URL:	-

MANOA STR AT KANEWAI FIELD, HONOLULU, OAHU, HI (Continued) **1027310723**

QAPP Approval Agency Name: -
QAPP Approved: -
Analytical Method: Pesticides, wf, dir inj LC/MS/MS
HUC: 20060000
EJSCREEN Report: https://ejscreen.epa.gov/mapper/mobile/EJSCREEN_mobile.aspx?geometry=%7B%22x%22:-157.8127222000000,%22y%22:21.29322222000000,%22spatialReference%22:%7B%22wkid%22:4326%7D%7D&unit=9035&areatype=&areaid=&basemap=streets&distance=1
Count: 1

F49 **IMPROVEMENTS OF KALAKAUA AVE. FRONTING THE ALLURE** **FINDS** **1016404800**
Target Property **HONOLULU (County), HI** **N/A**

Site 1 of 2 in cluster F

Actual: **2 ft.**
Focus Map: **5**

FINDS:
Registry ID: 110055393293

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

F50 **ALA WAI BOULEVARD & KALAKAUA AVENUE** **HI SPILLS** **S107023406**
Target Property **ALA WAI BLVD & KALAKAUA AVE** **N/A**
HONOLULU, HI 96815

Site 2 of 2 in cluster F

Actual: **2 ft.**
Focus Map: **5**

SPILLS:
Name: ALA WAI BOULEVARD & KALAKAUA AVENUE
Address: ALA WAI BLVD & KALAKAUA AVE
Address 2: Not reported
City,State,Zip: HONOLULU, HI 96815
Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19910103-5
Facility Registry ID: Not reported
HID Number: Not reported
Lead and Program: HEER EP&R
ER: Not reported
Less Or Greater Than: Not reported
Units: ALA WAI & KALAKAUA
Activity Type: Response
Activity Lead: Not reported
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Not reported
Substances: OIL
Quanity: Not reported
Units: Not reported
Reported Date: Not reported
Release Date: Not reported
Release Duration: Not reported

ALA WAI BOULEVARD & KALAKAUA AVENUE (Continued) **S107023406**

Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

G51 **MCCULLY & MOILIILI ST** **FINDS** **1016405564**
Target **MCCULLY ST X MOILIILI ST** **N/A**
Property **HONOLULU, HI 96826**

Site 1 of 2 in cluster G

Actual: **2 ft.**

Focus Map: **5**

FINDS:
Registry ID: 110055402489

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

G52 **ALA WAI BOULEVARD & MCCULLY** **HI SPILLS** **S106816037**
Target **ALA WAI BLVD & MCCULLY ST** **N/A**
Property **HONOLULU, HI 96815**

Site 2 of 2 in cluster G

Actual: **3 ft.**

Focus Map: **8**

SPILLS:

Name:	ALA WAI BOULEVARD & MCCULLY
Address:	ALA WAI BLVD & MCCULLY ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19900511-2
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported

ALA WAI BOULEVARD & MCCULLY (Continued) **S106816037**

Units:	Ala Wai Blvd. & McCully
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

H53 **STATE HIGHWAY ROUTES 11, 19, 190, 250, AND 270** **FINDS** **1023194469**
Target Property **, HI** **N/A**

Site 1 of 3 in cluster H

Actual:
2 ft.

FINDS:
Registry ID: 110055380519

Focus Map:
7

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

I54 **2633 MAUNAWAI PLACE** **FTTS** **1007131302**
Target **2633 MAUNAWAI PLACE** **HIST FTTS** **N/A**
Property **HONOLULU, HI 96826**

Site 1 of 3 in cluster I

Actual:
10 ft.

Focus Map:
8

FTTS INSP:

Inspection Number:	20030729HI907 1
Region:	09
Inspection Date:	07/29/03
Inspector:	RBILAN
Violation occurred:	No
Investigation Type:	AHERA, Enforcement, State Conducted
Investigation Reason:	Neutral Scheme, State
Legislation Code:	TSCA
Facility Function:	User

HIST FTTS INSP:

Inspection Number:	20030729HI907 1
Region:	09
Inspection Date:	Not reported
Inspector:	RBILAN
Violation occurred:	No
Investigation Type:	AHERA, Enforcement, State Conducted
Investigation Reason:	Neutral Scheme, State
Legislation Code:	TSCA
Facility Function:	User

I55 **2633 MAUNAWAI PLACE** **FINDS** **1016307591**
Target **2633 MAUNAWAI PLACE** **N/A**
Property **HONOLULU, HI 96826**

Site 2 of 3 in cluster I

Actual:
10 ft.

Focus Map:
8

FINDS:

Registry ID: 110015784114

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

56 **KAPIOLANI BOULEVARD: 12-INCH WATER MAIN** **FINDS** **1017742377**
Target **KAPIOLANI BOULEVARD, BETWEEN MCCULLY STREET AND DA** **ECHO** **N/A**
Property **HONOLULU, HI 96826**

Actual: **2 ft.**

Focus Map: **8**

FINDS:
Registry ID: 110063704781

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1017742377
Registry ID: 110063704781
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110063704781
Name: KAPIOLANI BOULEVARD: 12-INCH WATER MAIN
Address: KAPIOLANI BOULEVARD, BETWEEN MCCULLY STREET AND DA
City,State,Zip: HONOLULU, HI 96826

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57 **UNIVERSITY AVENUE: 12-INCH MAIN, PART II** **FINDS** **1016380345**
Target **N/A**
Property **HONOLULU (County), HI**

Actual: **2 ft.**

Focus Map: **8**

FINDS:
Registry ID: 110055121639

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

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58 **REHABILITATION OF STREETS, UNIT 62 - JOB NO. 23-08** **FINDS** **1012302060**
Target **ALA WAI BLVD** **ECHO** **N/A**
Property **HONOLULU, HI 96815**

Actual: **3 ft.**

Focus Map: **8**

FINDS:
Registry ID: 110040077911

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain

REHABILITATION OF STREETS, UNIT 62 - JOB NO. 23-08 (Continued) **1012302060**

limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1012302060
Registry ID:	110040077911
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110040077911
Name:	REHABILITATION OF STREETS, UNIT 62 - JOB NO. 23-08
Address:	ALA WAI BLVD
City,State,Zip:	HONOLULU, HI 96815

J59 **ALA WAI BOULEVARD & KAIOLU STREET** **HI SPILLS** **S107024047**
Target Property **ALA WAI BLVD & KAIOLU ST** **N/A**
HONOLULU, HI 96815

Site 1 of 4 in cluster J

Actual: 2 ft.

Focus Map: 8

SPILLS:

Name:	ALA WAI BOULEVARD & KAIOLU STREET
Address:	ALA WAI BLVD & KAIOLU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19930227-1
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Ala Wai Blvd & Kaiolu St
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Sewage Spill
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported

ALA WAI BOULEVARD & KAIOLU STREET (Continued) **S107024047**

Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

---

60 **BASE YARD NO. 6** **FUDS** **1024901906**
Target Property **HONOLULU, HI** **N/A**

Actual: **2 ft.**
Focus Map: **8**

FUDS:

EPA Region:	09
Installation ID:	HI99799F378000
Congressional District Number:	1
Name:	BASE YARD NO. 6
FUDS Number:	H09HI0035
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	5325
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62334
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	THE U.S. ARMY LEASED FROM IOLANI SCHOOL APROXIMATELY 25.2 ACRES FOR OPERATION OF BASE YARD NO.6 AN ADDITIONAL 1.58-ACRE AREA WAS LEASED BY THE U.S. ARMY FROM THE TERRITORY OF HAWAII BASE YARD NO.6 WAS ORGANIZED IN 4 JAN. 1942 FOR STORAGE AND ISSUE OF ENGINEER SUPPLIES AND WAS REDESIGNATED 3 WKS. LATER AS A PLANT ASSEMBLY AND REPAIR YARD.
	Not reported
Project Required:	No
Feature Description:	Not reported
Latitude:	21.28333333
Longitude:	-157.82333333

J61 **ALA WAI HARBOR G-DOCK, UNKNOWN SHEEN** **HI SPILLS** **S107025952**
Target Property **ALA WAI BLVD** **N/A**
HONOLULU, HI 96815

Site 2 of 4 in cluster J

Actual: **3 ft.**
Focus Map: **8**

SPILLS:

Name:	ALA WAI HARBOR G-DOCK, UNKNOWN SHEEN
Address:	ALA WAI BLVD
Address 2:	ALA WAI HARBOR
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu

ALA WAI HARBOR G-DOCK, UNKNOWN SHEEN (Continued) **S107025952**

Supplemental Loc. Text:	Ala Wai Yacht Harbor behind Ilikai Hotel
Case Number:	20020802-1039
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Ala Wai Harbor G-Dock, unknown sheen
Activity Type:	Response
Activity Lead:	Curtis Martin
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Oil
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.282952999999999
Longitude:	-157.82729800000001

J62 **WHITE LIQUID OBSERVED FLOATING INTO ALA WAI CANAL** **HI SPILLS** **S107025068**
Target Property **ALA WAI BLVD** **N/A**
HONOLULU, HI 96815

Site 3 of 4 in cluster J

Actual: **3 ft.**
Focus Map: **8**

SPILLS:

Name:	WHITE LIQUID OBSERVED FLOATING INTO ALA WAI CANAL
Address:	ALA WAI BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	running parallel to Kanekapolei
Case Number:	19990210-1612
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R

WHITE LIQUID OBSERVED FLOATING INTO ALA WAI CANAL (Continued) **S107025068**

ER:	No
Less Or Greater Than:	Not reported
Units:	White Liquid Observed Floating into Ala Wai Canal
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2017-01-31 00:00:00
Result:	Closed Incomplete Documentation
File Under:	Not reported
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.282952999999999
Longitude:	-157.82729800000001

J63 **ALA WAI BOULEVARD USED NEEDLE** **HI SPILLS** **S106816038**
Target Property **ALA WAI BLVD** **N/A**
HONOLULU, HI 96815

Site 4 of 4 in cluster J

Actual: **3 ft.**

Focus Map: **8**

SPILLS:

Name:	ALA WAI BOULEVARD USED NEEDLE
Address:	ALA WAI BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19920726-0749
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Ala Wai Boulevard Used Needle
Activity Type:	Response
Activity Lead:	Terry Corpus

ALA WAI BOULEVARD USED NEEDLE (Continued) **S106816038**

Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	potential infectious waste (from blood or bodily fulids)
Quanity:	1
Units:	Syringe
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.282952999999999
Longitude:	-157.82729800000001

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64 **WAIKIKI SIDEWALK IMPROVEMENTS, PHASE 2** **FINDS** **1023624153**
Target **KALAKAUA AVENUE** **ECHO** **N/A**
Property **HONOLULU, HI 96815**

Actual:
1 ft.

Focus Map:
8

FINDS:
Registry ID: 110070031185

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1023624153
Registry ID:	110070031185
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110070031185
Name:	WAIKIKI SIDEWALK IMPROVEMENTS, PHASE 2

WAIKIKI SIDEWALK IMPROVEMENTS, PHASE 2 (Continued) **1023624153**

Address: KALAKAUA AVENUE
City,State,Zip: HONOLULU, HI 96815

K65 **ALA WAI BOULEVARD & KANEKAPOLEI STREET - ALA WAI C** **HI SPILLS** **S128679027**
Target Property **ALA WAI BLVD & KANEKAPOLEI ST** **N/A**
HONOLULU, HI 96815

Site 1 of 5 in cluster K

Actual: **3 ft.**
Focus Map: **8**

SPILLS:

Name:	ALA WAI BOULEVARD & KANEKAPOLEI STREET - ALA WAI CANAL
Address:	ALA WAI BLVD & KANEKAPOLEI ST
Address 2:	ALA WAI CANAL
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Ala Wai Canal at Kanekapolei
Case Number:	20110211-0930
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	Oil sheen - Kanekapolei and Ala Wai
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2011-02-11 00:00:00
Result:	Not reported
File Under:	Not reported
Substances:	Oil
Quanity:	0
Units:	Sheen
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

K66 **ALA WAI BOULEVARD & KANEKAPOLEI STREET - ALA WAI C** **HI SPILLS** **S128674690**
Target **ALA WAI BLVD & KANEKAPOLEI ST** **N/A**
Property **HONOLULU, HI 96815**

Site 2 of 5 in cluster K

Actual: **3 ft.**

Focus Map: **8**

SPILLS:

Name:	ALA WAI BOULEVARD & KANEKAPOLEI STREET - ALA WAI CANAL
Address:	ALA WAI BLVD & KANEKAPOLEI ST
Address 2:	ALA WAI CANAL
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Ala Wai Canal at Kanekapolei
Case Number:	19910118-1
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	ALA WAI BLVD & KANEKAPOLEI ST.
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	OIL
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

K67 **ERNS** **2022331532**
Target Property **KANEKAPOLEI ST AND ALA WAI BLVD** **N/A**
HONOLULU, HI

Site 3 of 5 in cluster K

Actual: **3 ft.**
Focus Map: **8**

Click this hyperlink while viewing on your computer to access additional ERNS detail in the EDR Site Report.

K68 **WAIKIKI SAND VILLA HOTEL** **FINDS** **1027109666**
Target Property **WAIKIKI SAND VILLA II** **N/A**
HONOLULU, HI 96815

Site 4 of 5 in cluster K

Actual: **3 ft.**
Focus Map: **8**

FINDS:
Registry ID: 110060953008

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

K69 **WAIKIKI SAND VILLA HOTEL** **ECHO** **1027227999**
Target Property **WAIKIKI SAND VILLA II** **N/A**
HONOLULU, HI 96815

Site 5 of 5 in cluster K

Actual: **3 ft.**
Focus Map: **8**

ECHO:

Envid:	1027227999
Registry ID:	110060953008
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110060953008
Name:	WAIKIKI SAND VILLA HOTEL
Address:	WAIKIKI SAND VILLA II
City,State,Zip:	HONOLULU, HI 96815

70 **2500 ALA WAI BOULEVARD** **HI SPILLS** **S106815405**
Target **2500 ALA WAI BLVD** **N/A**
Property **HONOLULU, HI 96815**

Actual:
3 ft.

Focus Map:
8

SPILLS:

Name:	2500 ALA WAI BOULEVARD
Address:	2500 ALA WAI BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Diamond Head Side
Case Number:	19921212-1
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	2500 Ala Wai Blvd
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Diesel Fuel (5 x 5 Sheen)
Quanity:	25
Units:	Square Feet
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

71
Target Property
DATE STREET
UNKNOWN
UNKNOWN, HI 00000

FINDS **1016697996**
ECHO **N/A**

Actual: 2 ft.

Focus Map: 8

FINDS:
Registry ID: 110056346100

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1016697996
Registry ID:	110056346100
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110056346100
Name:	DATE STREET
Address:	UNKNOWN
City,State,Zip:	UNKNOWN, HI 00000

72
Target Property
ALA WAI BLVD. AND WAI NANI
HONOLULU, HI

ERNS **2017180719**
N/A

Actual: 3 ft.

Focus Map: 8

Click this hyperlink while viewing on your computer to access additional ERNS detail in the EDR Site Report.

L73
Target Property
BKM ENTERPRISES, LTD. VS. ELSIE TOME, DBA TSURU KA
KAPAHULU AVE
HONOLULU, HI 96815

Site 1 of 7 in cluster L

HI SPILLS **S107024721**
N/A

Actual: 7 ft.

Focus Map: 8

SPILLS:

Name:	BKM ENTERPRISES, LTD. VS. ELSIE TOME, DBA TSURU KAPAHULU SAIMIN
Address:	KAPAHULU AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19973597-09
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported

BKM ENTERPRISES, LTD. VS. ELSIE TOME, DBA TSURU KAPAHULU SAI (Continued) **S107024721**

Less Or Greater Than:	Not reported
Units:	BKM Enterprises, Ltd. vs. Elsie Tome, dba Tsuru Kapahulu Saimin
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.273468000000001
Longitude:	-157.816586

L74 **WAIKIKI FIRE STATION** **HI SPILLS** **U001235047**
Target **381 KAPAHULU AVE** **N/A**
Property **HONOLULU, HI 96815**

Site 2 of 7 in cluster L

Actual: **7 ft.**

Focus Map: **8**

SPILLS:

Name:	WAIKIKI FIRE STATION
Address:	381 KAPAHULU AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20080423-1921
Facility Registry ID:	110013775218
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	Not reported
Units:	Waikiki Fire Station Picric Acid
Activity Type:	Response
Activity Lead:	Curtis Martin
Assignment End Date:	Not reported

WAIKIKI FIRE STATION (Continued) **U001235047**

Result:	Not reported
File Under:	City and County of Honolulu, Fire Department
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.273071000000002
Longitude:	-157.81635

L75 **WAIKIKI FIRE STATION #7** **HI UST** **U004223399**
Target **381 KAPAHULU AVE** **HI Financial Assurance** **N/A**
Property **HONOLULU, HI 96815**

Site 3 of 7 in cluster L

Actual: **7 ft.**

Focus Map: **8**

UST:

Name:	WAIKIKI FIRE STATION #7
Address:	381 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100101
Owner:	C&C OF HNL - HONOLULU FIRE DEPARTMENT
Owner Address:	636 South Street
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.272830
Longitude:	-157.816311
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	1
Date Installed:	12/30/1988
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	1000
Substance:	Gasoline
Name:	WAIKIKI FIRE STATION #7
Address:	381 KAPAHULU AVE

WAIKIKI FIRE STATION #7 (Continued) **U004223399**

City,State,Zip: HONOLULU, HI 96815

Tank ID: 1
Date Installed: 12/30/1988
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Gasoline

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 1
Date Installed: 12/30/1988
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Gasoline

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2
Date Installed: 12/30/1988
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2
Date Installed: 12/30/1988
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2
Date Installed: 12/30/1988
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

WAIKIKI FIRE STATION #7 (Continued) **U004223399**

Tank ID: R-001
Date Installed: 09/03/1955
Tank Status: **Permanently Out of Use**
Date Closed: 01/30/1988
Tank Capacity: 550
Substance: Gasoline

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-001
Date Installed: 09/03/1955
Tank Status: **Permanently Out of Use**
Date Closed: 01/30/1988
Tank Capacity: 550
Substance: Gasoline

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-001
Date Installed: 09/03/1955
Tank Status: **Permanently Out of Use**
Date Closed: 01/30/1988
Tank Capacity: 550
Substance: Gasoline

HI Financial Assurance:
Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Self Insured
Expiration Date: 06/30/2009
FR Archive: True

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101
Tank Id: R-001
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: 06/30/2009
FR Archive: True

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Self Insured

WAIKIKI FIRE STATION #7 (Continued) **U004223399**

Expiration Date: 06/30/2009
FR Archive: True

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101
Tank Id: R-001
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: 06/30/2016
FR Archive: True

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: 06/30/2016
FR Archive: True

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: 06/30/2016
FR Archive: True

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101
Tank Id: R-001
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: 06/30/2020
FR Archive: False

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: 06/30/2020
FR Archive: False

Name: WAIKIKI FIRE STATION #7
Address: 381 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100101

WAIKIKI FIRE STATION #7 (Continued) **U004223399**

Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: 06/30/2020
FR Archive: False

L76 **WAIKIKI FIRE STATION #7** **FINDS** **1015874252**
Target **381 KAPAHULU AVENUE** **N/A**
Property **HONOLULU, HI 96815**

Site 4 of 7 in cluster L

Actual: **7 ft.**

FINDS:
Registry ID: 110046208974

Focus Map: **8**

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

L77 **KAPIOLANI REGIONAL PARK - SERVICE CENTER** **HI LUST** **U003221912**
Target **3447 LEAHI AVE** **HI UST** **N/A**
Property **HONOLULU, HI 96815** **HI Financial Assurance**

Site 5 of 7 in cluster L

Actual: **9 ft.**

LUST:
Name: KAPIOLANI REGIONAL PARK - SERVICE CENTER
Address: 3447 LEAHI AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-103322
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 08/22/2006
Release ID: 980040
Project Officer: Darren Park

Focus Map: **8**

UST:
Name: KAPIOLANI REGIONAL PARK - SERVICE CENTER
Address: 3447 LEAHI AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-103322
Owner: C&C OF HNL - DEPT OF PARKS AND RECREATION
Owner Address: 605 S KING ST
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.273323
Longitude: -157.815940
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 12/28/1997
Tank Capacity: 500

KAPIOLANI REGIONAL PARK - SERVICE CENTER (Continued) **U003221912**

Substance: Gasoline

Name: KAPIOLANI REGIONAL PARK - SERVICE CENTER
Address: 3447 LEAHI AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 12/28/1997
Tank Capacity: 1000
Substance: Gasoline

HI Financial Assurance:
Name: KAPIOLANI REGIONAL PARK - SERVICE CENTER
Address: 3447 LEAHI AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-103322
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: KAPIOLANI REGIONAL PARK - SERVICE CENTER
Address: 3447 LEAHI AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-103322
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

L78 **KAPIOLANI REGIONAL PARK - SERVICE CENTER** **RCRA-VSQG** **1004688793**
Target **3447 LEAHI AVENUE** **FINDS** **HID981639917**
Property **HONOLULU, HI 96815** **ECHO**

Site 6 of 7 in cluster L

Actual:
9 ft.

Focus Map:
8

RCRA Listings:
Date Form Received by Agency: 19930720
Handler Name: SERVICE CTR ANNEX
Handler Address: 3447 LEAHI AVE
Handler City,State,Zip: HONOLULU, HI 96815
EPA ID: HID981639917
Contact Name: ROY HIROHATA
Contact Address: 3447 LEAHI AVE
Contact City,State,Zip: HONOLULU, HI 96815
Contact Telephone: 808-732-5666
Contact Fax: Not reported
Contact Email: Not reported
Contact Title: Not reported
EPA Region: 09
Land Type: Not reported
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
Non-Notifier: Not reported

KAPIOLANI REGIONAL PARK - SERVICE CENTER (Continued) **1004688793**

Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	LEAHI AVE
Mailing City,State,Zip:	HONOLULU, HI 96815
Owner Name:	HONOLULU CTY & CO SVC CTR ANNEX
Owner Type:	Private
Operator Name:	NOT REQUIRED
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No

KAPIOLANI REGIONAL PARK - SERVICE CENTER (Continued) **1004688793**

Financial Assurance Required: Not reported
Handler Date of Last Change: 20000915
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: HONOLULU CTY & CO SVC CTR ANNEX
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19930720
Handler Name: SERVICE CTR ANNEX
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 811118
NAICS Description: OTHER AUTOMOTIVE MECHANICAL AND ELECTRICAL REPAIR AND MAINTENANCE

Facility Has Received Notices of Violations:

KAPIOLANI REGIONAL PARK - SERVICE CENTER (Continued) **1004688793**

Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110046163682

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER
Registry ID: 110005724485

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004688793
Registry ID:	110005724485
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005724485
Name:	SERVICE CTR ANNEX
Address:	3447 LEAHI AVE
City,State,Zip:	HONOLULU, HI 96815

L79 **KAPIOLANI REGIONAL PARK - SERVICE CENTER** **HI RGA LUST** **S116402379**
Target Property **3447 LEAHI AVE** **N/A**
HONOLULU, HI

Site 7 of 7 in cluster L

Actual: 9 ft.

Focus Map: 8

RGA LUST:

2012	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2011	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2010	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2009	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2008	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2007	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2006	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2005	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2004	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2003	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2002	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2001	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
2000	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE
1999	KAPIOLANI REGIONAL PARK - SERVICE CENTER	3447 LEAHI AVE

KAPIOLANI REGIONAL PARK - SERVICE CENTER (Continued) **S116402379**

1998 KAPIOLANI REGIONAL PARK - SERVICE CENTER 3447 LEAHI AVE

M80 **HAWAII SCHOOL FOR THE DEAF AND BLIND** **FTTS** **1009691857**
Target **3440 LEAHI AVENUE** **N/A**
Property **HONOLULU, HI 96815**

Site 1 of 3 in cluster M

Actual: **10 ft.**
Focus Map: 8

FTTS INSP:

Inspection Number:	20070705HI-08 1
Region:	09
Inspection Date:	07/05/07
Inspector:	KATHY VON GELDERN
Violation occurred:	Yes
Investigation Type:	AHERA, Enforcement, State Conducted
Investigation Reason:	Neutral Scheme, State
Legislation Code:	TSCA
Facility Function:	User

M81 **HAWAII SCHOOL FOR THE DEAF AND BLIND (HSDB) BUILDI** **HI SHWS** **S126282579**
Target **3440 LEAHI AVE** **N/A**
Property **HONOLULU, HI 96815**

Site 2 of 3 in cluster M

Actual: **10 ft.**
Focus Map: 8

SHWS:

Name:	HAWAII SCHOOL FOR THE DEAF AND BLIND (HSDB) BUILDING EXTERIOR SOILS
Address:	3440 LEAHI AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported

HAWAII SCHOOL FOR THE DEAF AND BLIND (HSDB) BUILDING EXTERIO (Continued) **S126282579**

Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2992
Location Description:	3440 Leahi Ave, Honolulu, HI 96815, USA
Is Public:	True
Update On:	2021-11-10 12:32:20
Latitude:	21.273307
Longitude:	-157.815063

M82 **HAWAII SCHOOL FOR THE DEAF AND BLIND** **FINDS** **1016338770**
Target **3440 LEAHI AVENUE** **N/A**
Property **HONOLULU, HI 96815**

Site 3 of 3 in cluster M

Actual: FINDS:
10 ft. Registry ID: 110025780705

Focus Map:
8 Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

N83 **KAPIOLANI PARK BANDSTAND RE** **FINDS** **1026233696**
Target **3840 PAKI AVE** **N/A**
Property **HONOLULU, HI 96815**

Site 1 of 2 in cluster N

Actual: FINDS:
8 ft. Registry ID: 110020719793

Focus Map:
8 Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United

KAPIOLANI PARK BANDSTAND RE (Continued) **1026233696**

States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

N84 **KAPIOLANI PARK BANDSTAND RE** **ECHO** **1022933099**
Target **3840 PAKI AVE** **N/A**
Property **HONOLULU, HI 96815**

Site 2 of 2 in cluster N

Actual: **8 ft.**
Focus Map: **8**

ECHO:

Envid:	1022933099
Registry ID:	110020719793
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110020719793
Name:	KAPIOLANI PARK BANDSTAND RE
Address:	3840 PAKI AVE
City,State,Zip:	HONOLULU, HI 96815

I85 **MANOA-PALOLO DRAINAGE CANAL AT MOILIILI, OAHU, HI** **PFAS WQP** **1027310724**
NW **N/A**
< 1/8 **, HI**
0.015 mi.
78 ft. **Site 3 of 3 in cluster I**

Actual: **10 ft.**
Focus Map: **8**

PFAS WQP:

Year:	2016
Name:	MANOA-PALOLO DRAINAGE CANAL AT MOILIILI, OAHU, HI
Address:	Not reported
City,State,Zip:	HI
Latitude:	21.28652778000000
Longitude:	-157.8185556000000
Organization:	USGS Hawaii Water Science Center
Environmental Media Name:	Water
Activity Identifier:	nwishi.01.01700033
Activity Type Code:	Sample-Routine
Analysis Start Date:	12/12/2016
Project Identifier:	Not reported
Monitoring Location Identifier:	USGS-16247100
Result Detection:	Not Detected
PFAS Chemical Name:	Tetraconazole
Result Measure Value (ppt):	-
Result Measure Value:	-
Result Unit of Measure:	Not reported
Detection/Quantitation Limit Type:	Not reported
Detection/Quantitation Measure Value:	Not reported
Detection/Quantitation Unit of Measure:	Not reported
Laboratory Accreditation Indicator:	Not reported
Fish Species:	Not reported
Activity Comment:	L-3350079 Added proposal CL17017. 12/8/2016 mec
Result Comment:	The holding time for the processing of this sample has been exceeded
Provider:	NWIS
EPA Region:	09
Project File URL:	-

MANOA-PALOLO DRAINAGE CANAL AT MOILIILI, OAHU, HI (Continued) **1027310724**

QAPP Approval Agency Name:	-
QAPP Approved:	-
Analytical Method:	Pesticides, wf, dir inj LC/MS/MS
HUC:	20060000
EJSCREEN Report:	https://ejscreen.epa.gov/mapper/mobile/EJSCREEN_mobile.aspx?geometry=%7B%22x%22:-157.8185556000000,%22y%22:21.28652778000000,%22spatialReference%22:%7B%22wkid%22:4326%7D%7D&unit=9035&areatype=&areaid=&basemap=streets&distance=1
Count:	1

---

86 **1609 ALA WAI DIESEL RELEASE** **HI SHWS** **S108008656**
SSE **1609 ALA WAI BLVD** **HI SPILLS** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.017 mi.
92 ft.

Actual:
3 ft.

Focus Map:
7

SHWS:

Name:	1609 ALA WAI DIESEL RELEASE
Address:	1609 ALA WAI BLVD
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	1609 Ala Wai Diesel Release
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Laura Young
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	1609 Ala Wai Diesel Release
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Diesel contaminated soil.
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	10/07/2005
Document Number:	2005-511-LY
Document Subject:	1609 Ala Wai Diesel Release No Further Action Letter
Project Manager:	Laura Young
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2427
Location Description:	1609 Ala Wai Blvd, 386, 372, 362, and 352 Hobron Ln
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.287659
Longitude:	-157.837732

1609 ALA WAI DIESEL RELEASE (Continued) **S108008656**

SPILLS:

Name:	1609 ALA WAI DIESEL RELEASE
Address:	1609 ALA WAI BLVD
Address 2:	386, 372, 362, AND 352 HOBRON LN
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20050523-1552
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	1609 Ala Wai Diesel Release
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2005-06-09 00:00:00
Result:	Refer to SDAR
File Under:	Ala Wai Watermark Development , LLC
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Sheen
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.287590999999999
Longitude:	-157.83786900000001
Name:	1609 ALA WAI DIESEL RELEASE
Address:	1609 ALA WAI BLVD
Address 2:	386, 372, 362, AND 352 HOBRON LN
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20050523-1552
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R

1609 ALA WAI DIESEL RELEASE (Continued) **S108008656**

ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	1609 Ala Wai Diesel Release
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2005-06-09 00:00:00
Result:	Refer to SDAR
File Under:	Ala Wai Watermark Development , LLC
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Sheen
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.287483000000002
Longitude:	-157.838472
Name:	1609 ALA WAI DIESEL RELEASE
Address:	1609 ALA WAI BLVD
Address 2:	386, 372, 362, AND 352 HOBRON LN
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20050523-1552
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	1609 Ala Wai Diesel Release
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2005-06-09 00:00:00
Result:	Refer to SDAR
File Under:	Ala Wai Watermark Development , LLC
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Sheen

1609 ALA WAI DIESEL RELEASE (Continued) **S108008656**

Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.287593000000001
Longitude:	-157.83787100000001
Name:	1609 ALA WAI DIESEL RELEASE
Address:	1609 ALA WAI BLVD
Address 2:	386, 372, 362, AND 352 HOBRON LN
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20050523-1552
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	1609 Ala Wai Diesel Release
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2005-06-09 00:00:00
Result:	Refer to SDAR
File Under:	Ala Wai Watermark Development , LLC
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Sheen
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported

1609 ALA WAI DIESEL RELEASE (Continued) **S108008656**

Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.287234000000002
Longitude:	-157.83829499999999

O87 **PILOT MARINE INC** **EDR Hist Auto** **1020162107**
WSW **1651 ALA NOANA BLVD** **N/A**
< 1/8 **HONOLULU, HI 96814**
0.019 mi.
99 ft. **Site 1 of 5 in cluster O**

Actual: EDR Hist Auto
2 ft.

Focus Map:
7

Year:	Name:	Type:
1969	TRANS-CONTINENTAL MARINA INC	Gasoline Service Stations
1970	TRANS-CONTINENTAL MARINA INC	Gasoline Service Stations
1973	PILOT MARINE INC	Boat Dealers
1974	PILOT MARINE INC	Boat Dealers
1975	PILOT MARINE INC	Boat Dealers
1976	ALOHA MARINE INC	Gasoline Service Stations
1977	ALOHA MARINE	Gasoline Service Stations
1978	ALOHA MARINE	Gasoline Service Stations
1979	ALOHA MARINE	Gasoline Service Stations
1980	ALOHA MARINE	Gasoline Service Stations
1982	M M D INC	Gasoline Service Stations
1983	M M D INC	Gasoline Service Stations
1985	M M D INC	Gasoline Service Stations
1985	ALOHA MARINE	Gasoline Service Stations
1986	M M D INC	Gasoline Service Stations
1986	ALOHA MARINE	Gasoline Service Stations
1987	M M D INC	Gasoline Service Stations
1987	ALOHA MARINE	Gasoline Service Stations
1987	ALA WAI MARINE LTD*	Boat Dealers
1988	ALOHA MARINE	Gasoline Service Stations
1988	M M D INC	Gasoline Service Stations
1989	ALOHA MARINE	Gasoline Service Stations, NEC
1989	M M D INC	Gasoline Service Stations, NEC
1990	ALOHA MARINE	Gasoline Service Stations, NEC
1991	M M D INC	Gasoline Service Stations, NEC
1991	ALOHA MARINE	Gasoline Service Stations, NEC
1992	M M D INC	Gasoline Service Stations, NEC
1992	ALOHA MARINE	Gasoline Service Stations, NEC
1993	ALOHA MARINE	Gasoline Service Stations, NEC
1993	M M D INC	Gasoline Service Stations, NEC
1994	M M D INC	Gasoline Service Stations, NEC
1994	ALOHA MARINE	Gasoline Service Stations, NEC
1995	M M D INC	Gasoline Service Stations, NEC

O88
WSW
< 1/8
0.019 mi.
99 ft.

STATE OF HAWAII DLNR DOBOR ALA WAI SMALL BOAT HARB
1651 ALA MOANA BLVD ALA WAI SMALL BOAT HARBOR
HONOLULU, HI 96815

Site 2 of 5 in cluster O

RCRA-VSQG **1001481551**
HIR000050146

Actual:
2 ft.

Focus Map:
7

RCRA Listings:

Date Form Received by Agency:	20210824
Handler Name:	STATE OF HAWAII DLNR DOBOR ALA WAI SMALL BOAT HARBOR
Handler Address:	1651 ALA MOANA BLVD ALA WAI SMALL BOAT HARBOR
Handler City,State,Zip:	HONOLULU, HI 96815
EPA ID:	HIR000050146
Contact Name:	Not reported
Contact Address:	SAND ISLAND ACCESS ROAD
Contact City,State,Zip:	HONOLULU, HI 96819
Contact Telephone:	808-973-9727
Contact Fax:	Not reported
Contact Email:	ALA.WAI.HARBOR@HAWAII.GOV
Contact Title:	Not reported
EPA Region:	09
Land Type:	State
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	SAND ISLAND ACCESS ROAD
Mailing City,State,Zip:	HONOLULU, HI 96819
Owner Name:	STATE OF HAWAII DLNR DOBOR
Owner Type:	State
Operator Name:	Not reported
Operator Type:	Not reported
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported

STATE OF HAWAII DLNR DOBOR ALA WAI SMALL BOAT HARBOR (Continued) **1001481551**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210824
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	STATE OF HAWAII DLNR DOBOR
Legal Status:	State
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	333 QUEEN ST STE 300
Owner/Operator City,State,Zip:	HONOLULU, HI 96813
Owner/Operator Telephone:	808-587-1973
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	STATE OF HAWAII DLNR DOBOR
Legal Status:	State
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	4 SAND ISLAND ACCESS ROAD
Owner/Operator City,State,Zip:	HONOLULU, HI 96819

STATE OF HAWAII DLNR DOBOR ALA WAI SMALL BOAT HARBOR (Continued) **1001481551**

Owner/Operator Telephone: 808-587-1966
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20210824
Handler Name: STATE OF HAWAII DLNR DOBOR ALA WAI SMALL BOAT HARBOR
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 19990315
Handler Name: STATE OF HAWAII DLNR DOBOR
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

O89 **ALA WAI MARINE LTD** **RCRA-VSQG** **1004464898**
WSW **1651 ALA MOANA BLVD** **ICIS** **HID981969983**
< 1/8 **HONOLULU, HI 96815** **CA HAZNET**
0.019 mi.
99 ft. **Site 3 of 5 in cluster O**

Actual:
2 ft.

Focus Map:
7

RCRA Listings:
Date Form Received by Agency: 19930722
Handler Name: ALA WAI MARINE LTD
Handler Address: 1651 ALA MOANA BLVD
Handler City,State,Zip: HONOLULU, HI 96815
EPA ID: HID981969983
Contact Name: STEVE LEWIS
Contact Address: 1651 ALA MOANA BLVD

ALA WAI MARINE LTD (Continued) **1004464898**

Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-946-4213
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		ALA MOANA BLVD
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	ARAPOFF PETER	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No

ALA WAI MARINE LTD (Continued) **1004464898**

Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: ARAPOFF PETER	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19930722
Handler Name: ALA WAI MARINE LTD	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes

ALA WAI MARINE LTD (Continued) **1004464898**

Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20031023
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: FOCUSED COMPLIANCE INSPECTION
Evaluation Responsible Person Identifier: AALLE
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported

ALA WAI MARINE LTD (Continued) **1004464898**

Request Agency: Not reported
Former Citation: Not reported

ICIS:
Enforcement Action ID: HI-N00000172
FRS ID: 110022917593
Action Name: ALA WAI MARINE SHIPYARD (Permit HI0020711) Letter Of Violation/Warning Letter
Facility Name: ALA WAI MARINE SHIPYARD
Facility Address: 1651 ALA MOANA BLVD
HONOLULU, HI 96814
Enforcement Action Type: Letter of Violation/ Warning Letter
Facility County: HONOLULU
Program System Acronym: NPDES
Enforcement Action Forum Desc: Administrative - Informal
EA Type Code: LOVWL
Facility SIC Code: 3732
Federal Facility ID: Not reported
Latitude in Decimal Degrees: +21.287111
Longitude in Decimal Degrees: -157.840944
Permit Type Desc: NPDES Individual Permit
Program System Acronym: HI0020711
Facility NAICS Code: Not reported
Tribal Land Code: Not reported

Enforcement Action ID: HI-N00000171
FRS ID: 110022917593
Action Name: ALA WAI MARINE SHIPYARD (Permit HI0020711) Letter Of Violation/Warning Letter
Facility Name: ALA WAI MARINE SHIPYARD
Facility Address: 1651 ALA MOANA BLVD
HONOLULU, HI 96814
Enforcement Action Type: Letter of Violation/ Warning Letter
Facility County: HONOLULU
Program System Acronym: NPDES
Enforcement Action Forum Desc: Administrative - Informal
EA Type Code: LOVWL
Facility SIC Code: 3732
Federal Facility ID: Not reported
Latitude in Decimal Degrees: +21.287111
Longitude in Decimal Degrees: -157.840944
Permit Type Desc: NPDES Individual Permit
Program System Acronym: HI0020711
Facility NAICS Code: Not reported
Tribal Land Code: Not reported

Enforcement Action ID: HI-N00000170
FRS ID: 110022917593
Action Name: ALA WAI MARINE SHIPYARD (Permit HI0020711) Letter Of Violation/Warning Letter
Facility Name: ALA WAI MARINE SHIPYARD
Facility Address: 1651 ALA MOANA BLVD
HONOLULU, HI 96814
Enforcement Action Type: Letter of Violation/ Warning Letter
Facility County: HONOLULU
Program System Acronym: NPDES

ALA WAI MARINE LTD (Continued) **1004464898**

Enforcement Action Forum Desc: Administrative - Informal
EA Type Code: LOVWL
Facility SIC Code: 3732
Federal Facility ID: Not reported
Latitude in Decimal Degrees: +21.287111
Longitude in Decimal Degrees: -157.840944
Permit Type Desc: NPDES Individual Permit
Program System Acronym: HI0020711
Facility NAICS Code: Not reported
Tribal Land Code: Not reported

Enforcement Action ID: HI-N00000169
FRS ID: 110022917593
Action Name: ALA WAI MARINE SHIPYARD (Permit HI0020711) Letter Of Violation/Warning Letter
Facility Name: ALA WAI MARINE SHIPYARD
Facility Address: 1651 ALA MOANA BLVD
HONOLULU, HI 96814
Enforcement Action Type: Letter of Violation/ Warning Letter
Facility County: HONOLULU
Program System Acronym: NPDES
Enforcement Action Forum Desc: Administrative - Informal
EA Type Code: LOVWL
Facility SIC Code: 3732
Federal Facility ID: Not reported
Latitude in Decimal Degrees: +21.287111
Longitude in Decimal Degrees: -157.840944
Permit Type Desc: NPDES Individual Permit
Program System Acronym: HI0020711
Facility NAICS Code: Not reported
Tribal Land Code: Not reported

Enforcement Action ID: HI-N00000168
FRS ID: 110022917593
Action Name: ALA WAI MARINE SHIPYARD (Permit HI0020711) Letter Of Violation/Warning Letter
Facility Name: ALA WAI MARINE SHIPYARD
Facility Address: 1651 ALA MOANA BLVD
HONOLULU, HI 96814
Enforcement Action Type: Letter of Violation/ Warning Letter
Facility County: HONOLULU
Program System Acronym: NPDES
Enforcement Action Forum Desc: Administrative - Informal
EA Type Code: LOVWL
Facility SIC Code: 3732
Federal Facility ID: Not reported
Latitude in Decimal Degrees: +21.287111
Longitude in Decimal Degrees: -157.840944
Permit Type Desc: NPDES Individual Permit
Program System Acronym: HI0020711
Facility NAICS Code: Not reported
Tribal Land Code: Not reported

Enforcement Action ID: HI-200009809
FRS ID: 110022917593
Action Name: Ala Wai Marine NAV
Facility Name: ALA WAI MARINE SHIPYARD

ALA WAI MARINE LTD (Continued) **1004464898**

Facility Address:	1651 ALA MOANA BLVD HONOLULU, HI 96814
Enforcement Action Type:	Letter of Violation/ Warning Letter
Facility County:	HONOLULU
Program System Acronym:	NPDES
Enforcement Action Forum Desc:	Administrative - Informal
EA Type Code:	LOVWL
Facility SIC Code:	3732
Federal Facility ID:	Not reported
Latitude in Decimal Degrees:	+21.287111
Longitude in Decimal Degrees:	-157.840944
Permit Type Desc:	NPDES Individual Permit
Program System Acronym:	HI0020711
Facility NAICS Code:	Not reported
Tribal Land Code:	Not reported

HAZNET:

Name:	ALA WAI MARINE LTD
Address:	1651 ALA MOANA BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 968150000
Contact:	STEVE LEWIS
Telephone:	8089464213
Mailing Name:	Not reported
Mailing Address:	1651 ALA MOANA BLVD
Year:	2002
Gepaid:	HID981969983
TSD EPA ID:	CAD028409019
CA Waste Code:	331 - Off-specification, aged or surplus organics
Disposal Method:	H01 - Transfer Station
Tons:	0.1188
Year:	2002
Gepaid:	HID981969983
TSD EPA ID:	CAD028409019
CA Waste Code:	221 - Waste oil and mixed oil
Disposal Method:	H01 - Transfer Station
Tons:	0.418
Year:	2001
Gepaid:	HID981969983
TSD EPA ID:	CAD028409019
CA Waste Code:	221 - Waste oil and mixed oil
Disposal Method:	T01 - Treatment, Tank
Tons:	0.779
Year:	2001
Gepaid:	HID981969983
TSD EPA ID:	CAD028409019
CA Waste Code:	221 - Waste oil and mixed oil
Disposal Method:	H01 - Transfer Station
Tons:	0.209
Year:	1998
Gepaid:	HID981969983

ALA WAI MARINE LTD (Continued) **1004464898**

TSD EPA ID:	CAD059494310
CA Waste Code:	741 - Liquids with halogenated organic compounds >= 1,000 Mg./L
Disposal Method:	T03 - Treatment, Incineration
Tons:	0.225

Additional Info:

Year:	2002
Gen EPA ID:	HID981969983
Shipment Date:	20020307
Creation Date:	12/26/2002 18:30:50
Receipt Date:	20020322
Manifest ID:	21069791
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.209
Waste Quantity:	55
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20020307
Creation Date:	12/26/2002 18:30:50
Receipt Date:	20020322
Manifest ID:	21069791
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	D001
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.209
Waste Quantity:	55
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

ALA WAI MARINE LTD (Continued) **1004464898**

Shipment Date:	20020212
Creation Date:	2/4/2003 14:36:58
Receipt Date:	20020225
Manifest ID:	21069781
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.0198
Waste Quantity:	6
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20020212
Creation Date:	2/4/2003 14:36:58
Receipt Date:	20020225
Manifest ID:	21069781
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.099
Waste Quantity:	30
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	2001
Gen EPA ID:	HID981969983

Shipment Date:	20010530
Creation Date:	10/1/2001 0:00:00
Receipt Date:	20010618
Manifest ID:	21069614
Trans EPA ID:	HIR000000562

ALA WAI MARINE LTD (Continued) **1004464898**

Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD028409019
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	T01 - Treatment, Tank
Quantity Tons:	0.209
Waste Quantity:	55
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20010530
Creation Date:	10/1/2001 0:00:00
Receipt Date:	20010709
Manifest ID:	21069613
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	AZD983473539
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	- Not reported
RCRA Code:	Not reported
Meth Code:	R01 - Recycler
Quantity Tons:	0.0749
Waste Quantity:	68
Quantity Unit:	K
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20010530
Creation Date:	10/1/2001 0:00:00
Receipt Date:	20010709
Manifest ID:	21069613
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	AZD983473539
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	- Not reported
RCRA Code:	D009

ALA WAI MARINE LTD (Continued) **1004464898**

Meth Code:	R01 - Recycler
Quantity Tons:	0.04
Waste Quantity:	80
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20010417
Creation Date:	7/30/2001 0:00:00
Receipt Date:	20010503
Manifest ID:	98392185
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	T01 - Treatment, Tank
Quantity Tons:	0.57
Waste Quantity:	150
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20010417
Creation Date:	7/30/2001 0:00:00
Receipt Date:	20010503
Manifest ID:	98392185
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.209
Waste Quantity:	55
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

ALA WAI MARINE LTD (Continued) **1004464898**

Additional Info:

Year:	1998
Gen EPA ID:	HID981969983
Shipment Date:	19980812
Creation Date:	12/7/1998 0:00:00
Receipt Date:	19980915
Manifest ID:	96825530
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000001099
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD059494310
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	741 - Liquids with halogenated organic compounds > 1000 mg/l
RCRA Code:	F002
Meth Code:	T03 - Treatment, Incineration
Quantity Tons:	0.225
Waste Quantity:	450
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

O90 **ALOHA MARINE** **HI LUST U001235075**
WSW **1651 ALA MOANA BLVD** **HI UST N/A**
< 1/8 **HONOLULU, HI 96815**
0.019 mi.
99 ft. **Site 4 of 5 in cluster O**

Actual:
2 ft.

Focus Map:
7

LUST:

Name:	ALOHA MARINE
Address:	1651 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100167
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/21/2012
Release ID:	110012
Project Officer:	To Heer

UST:

Name:	ALOHA MARINE
Address:	1651 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100167
Owner:	TEXACO REFINING & MARKETING INC.
Owner Address:	ENVIRONMENTAL SERVICES 800 SW FIRST AVE., SUITE 180
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.287100
Longitude:	-157.840500
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

ALOHA MARINE (Continued) **U001235075**

Tank ID:	R-1
Date Installed:	07/07/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	1000
Substance:	Used Oil
Name:	ALOHA MARINE
Address:	1651 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-2
Date Installed:	07/07/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Diesel
Name:	ALOHA MARINE
Address:	1651 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-3
Date Installed:	07/07/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Diesel
Name:	ALOHA MARINE
Address:	1651 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4
Date Installed:	07/07/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Gasoline
Name:	ALOHA MARINE
Address:	1651 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-5
Date Installed:	07/07/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Gasoline
Name:	ALOHA MARINE
Address:	1651 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-6
Date Installed:	07/07/1965

ALOHA MARINE (Continued) **U001235075**

Tank Status:	**Permanently Out of Use**
Date Closed:	06/01/1985
Tank Capacity:	4000
Substance:	Not Listed
Name:	ALOHA MARINE
Address:	1651 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-7
Date Installed:	07/07/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Not Listed

91
SW
< 1/8
0.020 mi.
106 ft.

2319 ALA WAI BLVD
2319 ALA WAI BLVD
HONOLULU, HI 96815

HI SHWS **S105263376**
N/A

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	2319 ALA WAI BLVD
Address:	2319 ALA WAI BLVD
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported

2319 ALA WAI BLVD (Continued) **S105263376**

Facility ID:	975
Location Description:	2319 Ala Wai Blvd, Honolulu, HI 96815
Is Public:	True
Update On:	2021-02-05 08:40:02
Latitude:	21.280519
Longitude:	-157.824725

H92 **THE WATERMARK WAIKIKI** **HI LUST** **S109467327**
SSE **1551 ALA WAI BLVD** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.021 mi.
110 ft. **Site 2 of 3 in cluster H**

Actual:
3 ft.

Focus Map:
7

LUST:

Name:	THE WATERMARK WAIKIKI
Address:	1551 ALA WAI BLVD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103868
Facility Status:	Confirmed Release
Facility Status Date:	11/04/2008
Release ID:	090003
Project Officer:	Miranda Fleisher

H93 **THE WATERMARK WAIKIKI** **HI UST** **U004364804**
SSE **1551 ALA WAI BLVD** **N/A**
< 1/8 **HONOLULU, HI**
0.021 mi.
110 ft. **Site 3 of 3 in cluster H**

Actual:
3 ft.

Focus Map:
7

UST:

Name:	THE WATERMARK WAIKIKI
Address:	1551 ALA WAI BLVD
City,State,Zip:	HONOLULU, HI
Facility ID:	9-103868
Owner:	Ala Wai Watermark Development, LLC
Owner Address:	2155 Kalakaua Ave, Suite 610
Owner City,St,Zip:	Honolulu, 57587 57587
Latitude:	21.287729
Longitude:	-157.838666
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	1
Date Installed:	Not reported
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	400
Substance:	Unknown

P94 **WAIKIKI YACHT CLUB** **RCRA-VSQG** **1025883901**
WNW **1599 ALA MOANA BLVD** **HIR000145920**
< 1/8 **HONOLULU, HI 96814**
0.025 mi.
130 ft. **Site 1 of 3 in cluster P**

Actual:
3 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:		20180524
Handler Name:	WAIKIKI YACHT CLUB	
Handler Address:		1599 ALA MOANA BLVD
Handler City,State,Zip:		HONOLULU, HI 96814
EPA ID:		HIR000145920
Contact Name:		RANDY AHLO
Contact Address:		ALA MOANA BLVD
Contact City,State,Zip:		HONOLULU, HI 96814
Contact Telephone:		808-955-4405
Contact Fax:		Not reported
Contact Email:		WYC@WAIKIKIYACHTCLUB.COM
Contact Title:		MANAGER
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		ALA MOANA BLVD
Mailing City,State,Zip:		HONOLULU, HI 96814
Owner Name:	Not reported	
Owner Type:		Not reported
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

WAIKIKI YACHT CLUB (Continued) **1025883901**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20191122
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Historic Generators:

Receive Date:	20180524
Handler Name: WAIKIKI YACHT CLUB	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

List of NAICS Codes and Descriptions:

NAICS Codes:	No NAICS Codes Found

Facility Has Received Notices of Violation:

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported

WAIKIKI YACHT CLUB (Continued) **1025883901**

Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	20180529
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	BROGI
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Q95 **ALA WAI SERVICE, INC.** **HI SHWS** **S106816080**
ENE **407 KAPAHULU AVE** **HI SPILLS** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.026 mi.
135 ft. **Site 1 of 6 in cluster Q**

Actual:
7 ft.

Focus Map:
8

SHWS:

Name:	ALA WAI SERVICE, INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815

ALA WAI SERVICE, INC. (Continued) **S106816080**

Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Ala Wai Service, Inc.
HID Number:	Not reported
Facility Registry Identifier:	110005727384
Lead Agency:	HEER Office
Program:	State
Project Manager:	Mark Sutterfield
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Ala Wai Service, Inc.
HID Number:	Not reported
Facility Registry Identifier:	110005727384
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	benzo[a]pyrene
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	10/14/2004
Document Number:	2004-428-MS
Document Subject:	NO further groundwater monitoring required
Project Manager:	Mark Sutterfield
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1414
Location Description:	407 Kapahulu Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.274200
Longitude:	-157.816000

SPILLS:

Name:	ALA WAI SERVICE, INC.
Address:	407 KAPAHULU AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20040105-1400
Facility Registry ID:	110005727384
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Baseline Excavation Release Notification
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2004-10-01 00:00:00
Result:	Refer to ISST

ALA WAI SERVICE, INC. (Continued) **S106816080**

File Under:	Chevron Products Company
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.271197000000001
Longitude:	-157.81720899999999
Name:	ALA WAI SERVICE, INC.
Address:	407 KAPAHULU AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20040105-1400
Facility Registry ID:	110005727384
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Baseline Excavation Release Notification
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2004-10-01 00:00:00
Result:	Refer to ISST
File Under:	Chevron Products Company
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

ALA WAI SERVICE, INC. (Continued) **S106816080**

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.274156000000001
Longitude:	-157.81614300000001

Name:	ALA WAI SERVICE, INC.
Address:	407 KAPAHULU AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20040105-1400
Facility Registry ID:	110005727384
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Baseline Excavation Release Notification
Activity Type:	Response
Activity Lead:	Ed Gomes
Assignment End Date:	2004-10-06 00:00:00
Result:	New SOSC
File Under:	Chevron Products Company
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported

ALA WAI SERVICE, INC. (Continued) **S106816080**

Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.274032999999999
Longitude:	-157.815957
Name:	ALA WAI SERVICE, INC.
Address:	407 KAPAHULU AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20040105-1400
Facility Registry ID:	110005727384
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Baseline Excavation Release Notification
Activity Type:	Response
Activity Lead:	Ed Gomes
Assignment End Date:	2004-10-06 00:00:00
Result:	New SOSC
File Under:	Chevron Products Company
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.271197000000001
Longitude:	-157.81720899999999
Name:	ALA WAI SERVICE, INC.
Address:	407 KAPAHULU AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815

ALA WAI SERVICE, INC. (Continued) **S106816080**

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20040105-1400
Facility Registry ID:	110005727384
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Baseline Excavation Release Notification
Activity Type:	Response
Activity Lead:	Ed Gomes
Assignment End Date:	2004-10-06 00:00:00
Result:	New SOSC
File Under:	Chevron Products Company
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.274156000000001
Longitude:	-157.81614300000001
Name:	ALA WAI SERVICE, INC.
Address:	407 KAPAHULU AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20040105-1400
Facility Registry ID:	110005727384
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Baseline Excavation Release Notification
Activity Type:	Response
Activity Lead:	Liz Galvez

ALA WAI SERVICE, INC. (Continued) **S106816080**

Assignment End Date:	2004-10-01 00:00:00
Result:	Refer to ISST
File Under:	Chevron Products Company
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.274032999999999
Longitude:	-157.815957

Q96 **ALA WAI SERVICE INC.** **HI LUST** **U004271741**
ENE **407 KAPAHULU AVE** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96815** **HI Financial Assurance**
0.026 mi.
135 ft. **Site 2 of 6 in cluster Q**

Actual:
7 ft.

Focus Map:
8

LUST:

Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101211
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	08/26/1999
Release ID:	880018
Project Officer:	Richard Takaba

Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101211
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	11/15/2004
Release ID:	040012
Project Officer:	Richard Takaba

UST:

ALA WAI SERVICE INC. (Continued) **U004271741**

Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101211
Owner:	Ala Wai Service Inc.
Owner Address:	PO Box 240607
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.274080
Longitude:	-157.815840
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	1
Date Installed:	07/18/1982
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	2
Date Installed:	07/18/1982
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	3
Date Installed:	07/18/1982
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-1
Date Installed:	10/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1982
Tank Capacity:	10000
Substance:	Gasoline
Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-2

ALA WAI SERVICE INC. (Continued) **U004271741**

Date Installed: 10/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1982
Tank Capacity: 10000
Substance: Gasoline

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-3
Date Installed: 10/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1982
Tank Capacity: 5000
Substance: Gasoline

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4A
Date Installed: 10/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1982
Tank Capacity: 1000
Substance: Used Oil

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4B
Date Installed: 07/18/1982
Tank Status: **Permanently Out of Use**
Date Closed: 11/18/1994
Tank Capacity: 1000
Substance: Used Oil

HI Financial Assurance:
Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/30/2014
FR Archive: True

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: R-4B
Tank Status: Permanently Out of Use
FRTYPE: Insurance

ALA WAI SERVICE INC. (Continued) **U004271741**

Expiration Date: 03/30/2014
FR Archive: True

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/30/2014
FR Archive: True

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: R-4A
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/30/2014
FR Archive: True

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/30/2014
FR Archive: True

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 03/30/2014
FR Archive: True

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 03/30/2014
FR Archive: True

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211

ALA WAI SERVICE INC. (Continued) **U004271741**

Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 03/30/2014
FR Archive: True

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 03/30/2023
FR Archive: False

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/30/2023
FR Archive: False

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: R-4A
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/30/2023
FR Archive: False

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 03/30/2023
FR Archive: False

Name: ALA WAI SERVICE INC.
Address: 407 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101211
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/30/2023
FR Archive: False

Name: ALA WAI SERVICE INC.

ALA WAI SERVICE INC. (Continued) **U004271741**

Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101211
Tank Id:	2
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	03/30/2023
FR Archive:	False

Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101211
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	03/30/2023
FR Archive:	False

Name:	ALA WAI SERVICE INC.
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101211
Tank Id:	R-4B
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	03/30/2023
FR Archive:	False

Q97 **ALA WAI SERVICE STATION** **EDR Hist Auto** **1020335706**
ENE **407 KAPAHULU** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.026 mi.
135 ft. **Site 3 of 6 in cluster Q**

Actual: EDR Hist Auto
7 ft.

Focus Map:
8

Year:	Name:	Type:
1969	ALA WAI SERVICE STATION	Gasoline Service Stations
1970	ALA WAI SERVICE STATION	Gasoline Service Stations
1971	ALA WAI SERVICE STATION	Gasoline Service Stations
1972	ALA WAI SERVICE STATION	Gasoline Service Stations
1973	ALA WAI SERVICE STATION	Gasoline Service Stations
1974	ALA WAI SERVICE STATION	Gasoline Service Stations
1975	ALA WAI SERVICE STATION	Gasoline Service Stations
1976	ALA WAI SERVICE STATION	Gasoline Service Stations
1977	ALA WAI SERVICE STATION	Gasoline Service Stations
1978	ALA WAI SERVICE STATION	Gasoline Service Stations
1979	ALA WAI SERVICE STATION	Gasoline Service Stations
1980	ALA WAI SERVICE INC	Gasoline Service Stations
1982	ALA WAI SERVICE INC	Gasoline Service Stations
1983	ALA WAI SERVICE INC	Gasoline Service Stations
1991	ALA WAI CHEVRON	Gasoline Service Stations
1992	ALA WAI CHEVRON	Gasoline Service Stations
1993	ALA WAI CHEVRON	Gasoline Service Stations
2000	ALA WAI SERVICE INC	Gasoline Service Stations
2001	ALA WAI SERVICE INC	Gasoline Service Stations
2002	ALA WAI SERVICE INC	Gasoline Service Stations

ALA WAI SERVICE STATION (Continued) **1020335706**

2003	ALA WAI SERVICE INC	Gasoline Service Stations
2004	ALA WAI SERVICE INC	Gasoline Service Stations

Q98 **ALA WAI BOAT HARBOR SLOT 61 & 62** **RCRA-VSQG** **1004688871**
ENE **407 KAPAHULU AVE** **FINDS** **HID984466672**
< 1/8 **HONOLULU, HI 96815** **ECHO**
0.026 mi.
135 ft. **Site 4 of 6 in cluster Q**

Actual:
7 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		19910529
Handler Name:	ALA WAI SERVICE INC	
Handler Address:		407 KAPAHULU AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HID984466672
Contact Name:		KAZUTOQ YONEMITSU
Contact Address:		407 KAPAHULU AVE
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-737-7986
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		KAPAHULU AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	CHEVRON USA	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No

ALA WAI BOAT HARBOR SLOT 61 & 62 (Continued) **1004688871**

Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: CHEVRON USA	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	1001 BISHOP ST
Owner/Operator City,State,Zip:	HONOLULU, HI 96813
Owner/Operator Telephone:	808-527-2700
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19910529
Handler Name: ALA WAI SERVICE INC	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No

ALA WAI BOAT HARBOR SLOT 61 & 62 (Continued) **1004688871**

Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005727384

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004688871
Registry ID:	110005727384
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005727384
Name:	ALA WAI BOAT HARBOR SLOT 61 & 62
Address:	407 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815

Q99 **ALA WAI GOLF COURSE** **HI SHWS** **U003346391**
ENE **404 KAPAHULU AVE** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96815** **HI Financial Assurance**
0.026 mi.
136 ft. **Site 5 of 6 in cluster Q**

Actual:
7 ft.

Focus Map:
8

SHWS:

Name:	ALA WAI GOLF COURSE MAINTENANCE YARD, LOCATION B
Address:	404 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported

ALA WAI GOLF COURSE (Continued) **U003346391**

Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1105
Location Description:	404 Kapahulu Ave, Honolulu, HI 96815
Is Public:	True
Update On:	2021-01-04 09:57:43
Latitude:	21.275220
Longitude:	-157.816211

UST:

Name:	ALA WAI GOLF COURSE
Address:	404 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103389
Owner:	C&C OF HNL - DEPT OF ENTERPRISE SERVICES
Owner Address:	404 Kapahulu Ave.
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.277890
Longitude:	-157.819530
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	1
Date Installed:	06/01/1989
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	1000
Substance:	Gasohol
Name:	ALA WAI GOLF COURSE
Address:	404 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815

ALA WAI GOLF COURSE (Continued) **U003346391**

Tank ID:	1
Date Installed:	06/01/1989
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	1000
Substance:	Gasohol

HI Financial Assurance:

Name:	ALA WAI GOLF COURSE
Address:	404 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-103389
Tank Id:	1
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	06/30/2015
FR Archive:	True

Name:	ALA WAI GOLF COURSE
Address:	404 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-103389
Tank Id:	1
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	10/10/2019
FR Archive:	False

Q100 **ALA WAI GOLF COURSE GRASSING & IRRIGATION IMPROVEM** **RCRA-VSQG** **1004688833**
ENE **404 KAPAHULU AVENUE** **FINDS** **HID982033474**
< 1/8 **HONOLULU, HI 96815** **ECHO**
0.026 mi.
136 ft. **Site 6 of 6 in cluster Q**

Actual:
7 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		19931210
Handler Name:	ALA WAIGOLF COURSE	
Handler Address:		404 KAPAHULU AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HID982033474
Contact Name:		JIMMY KAWASAKI
Contact Address:		404 KAPAHULU AVE
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-735-2370
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		KAPAHULU AVE

ALA WAI GOLF COURSE GRASSING & IRRIGATION IMPROVEMENTS (Continued) **1004688833**

Mailing City,State,Zip:	HONOLULU, HI 96815
Owner Name:	CITY & COUNTY HONOLULU
Owner Type:	Municipal
Operator Name:	NOT REQUIRED
Operator Type:	Municipal
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No

ALA WAI GOLF COURSE GRASSING & IRRIGATION IMPROVEMENTS (Continued) **1004688833**

Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: CITY & COUNTY HONOLULU
Legal Status: Municipal
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Municipal
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19931210
Handler Name: ALA WAIGOLF COURSE
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 71391
NAICS Description: GOLF COURSES AND COUNTRY CLUBS

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

ALA WAI GOLF COURSE GRASSING & IRRIGATION IMPROVEMENTS (Continued) **1004688833**

FINDS:
Registry ID: 110056349802

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004688833
Registry ID:	110056349802
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110056349802
Name:	ALA WAI GOLF COURSE GRASSING & IRRIGATION IMPROVEMENTS
Address:	404 KAPAHULU AVENUE
City,State,Zip:	HONOLULU, HI 96815

---

101 ESE < 1/8 0.027 mi. 140 ft.
Actual: 7 ft.
Focus Map: 8

ALA WAI GOLF COURSE **HI LUST U003154701**
484 KAPAHULU AVE **HI UST N/A**
HONOLULU, HI 96816

LUST:

Name:	ALA WAI GOLF COURSE
Address:	484 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-102885
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	11/05/2001
Release ID:	940034
Project Officer:	Mark Sutterfield

UST:

Name:	ALA WAI GOLF COURSE
Address:	484 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-102885
Owner:	C&C OF HNL - ALA WAI GOLF COURSE
Owner Address:	484 KAPAHULU AVENUE
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.275991
Longitude:	-157.815416
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**

ALA WAI GOLF COURSE (Continued) **U003154701**

Date Closed: 10/25/1993
Tank Capacity: 3000
Substance: Gasoline

Name: ALA WAI GOLF COURSE
Address: 484 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 10/25/1993
Tank Capacity: 1000
Substance: Diesel

Name: ALA WAI GOLF COURSE
Address: 484 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 11/16/1993
Tank Capacity: 250
Substance: Used Oil

---

102 **RRR RECYCLING - KAPAHULU AVE. KIOSK** **HI SWRCY** **S125958482**
ESE **548 KAPAHULU AVE.** **N/A**
< 1/8 **HONOLULU, HI**
0.027 mi.
142 ft.

Actual: **10 ft.**
Focus Map: **8**

SWRCY:
Permit Number: FY-0004-20
Name: RRR RECYCLING - KAPAHULU AVE. KIOSK
Address: 548 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI
Materials: dbc, select non-ferrous scrap, cardboard, newspaper, office paper.
Island: Oahu
TMK: 1-2-7-036:079
Closure Date: Not reported
Type: general
Status: Not reported

---

103 **HOKULANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS** **HI SHWS** **S126282700**
NNE **2940 KAMAKINI ST** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.032 mi.
169 ft.

Actual: **33 ft.**
Focus Map: **5**

SHWS:
Name: HOKULANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address: 2940 KAMAKINI ST
City,State,Zip: HONOLULU, HI 96816
Supplemental Location: Not reported
Island: Oahu

HOKULANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S126282700**

Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2898
Location Description:	2940 Kamakini St, Honolulu, HI 96816, USA
Is Public:	True
Update On:	2021-11-10 16:39:34
Latitude:	21.291344
Longitude:	-157.813217

104
East
< 1/8
0.036 mi.
192 ft.

DIAMOND SERVICE INC
629 KAPAHULU AVE
HONOLULU, HI 96815

EDR Hist Auto **1020155588**
N/A

Actual:
13 ft.

Focus Map:
8

EDR Hist Auto

Year:	Name:	Type:
1969	DIAMOND SERVICE INC	Gasoline Service Stations
1970	DIAMOND SERVICE INC	Gasoline Service Stations
1971	DIAMOND SERVICE INC	Gasoline Service Stations
1972	DIAMOND SERVICE INC	Gasoline Service Stations
1973	DIAMOND SERVICE INC	Gasoline Service Stations
1974	DIAMOND SERVICE INC	Gasoline Service Stations
1975	DIAMOND SERVICE INC	Gasoline Service Stations
1976	DIAMOND SERVICE INC	Gasoline Service Stations
1977	DIAMOND SERVICE INC	Gasoline Service Stations
1978	DIAMOND SERVICE INC	Gasoline Service Stations
1979	DIAMOND SERVICE INC	Gasoline Service Stations
1980	DIAMOND SERVICE INC	Gasoline Service Stations

DIAMOND SERVICE INC (Continued) **1020155588**

1982	DIAMOND SERVICE INC	Gasoline Service Stations
1983	DIAMOND SERVICE INC	Gasoline Service Stations

R105 **GEORGES UNION SERVICE** **EDR Hist Auto** **1020161804**
ESE **505 KAPAHULU AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.038 mi.
198 ft. **Site 1 of 5 in cluster R**

Actual: EDR Hist Auto
10 ft.

Focus Map:
8

Year:	Name:	Type:
1969	GEORGES UNION SERVICE	Gasoline Service Stations
1970	GEORGES UNION SERVICE	Gasoline Service Stations
1971	GEORGES UNION SERVICE	Gasoline Service Stations
1972	GEORGES UNION SERVICE	Gasoline Service Stations
1973	GEORGES UNION SERVICE	Gasoline Service Stations
1974	GEORGES UNION SERVICE	Gasoline Service Stations
1975	GEORGES UNION SERVICE	Gasoline Service Stations
1976	GEORGES UNION SERVICE	Gasoline Service Stations
1977	GEORGES UNION SERVICE	Gasoline Service Stations
1978	GEORGES UNION SERVICE	Gasoline Service Stations
1979	GEORGES UNION SERVICE	Gasoline Service Stations
1980	GEORGES UNION SERVICE	Gasoline Service Stations
1982	GEORGES UNION SERVICE	Gasoline Service Stations
1983	GEORGES UNION SERVICE	Gasoline Service Stations
1985	GEORGES UNION SERVICE	Gasoline Service Stations
1986	GEORGES UNION SERVICE	Gasoline Service Stations
1987	GEORGES UNION SERVICE	Gasoline Service Stations
1988	GEORGES UNION SERVICE	Gasoline Service Stations
1989	GEORGES UNION SERVICE	Gasoline Service Stations, NEC
1990	GEORGES UNION SERVICE	Gasoline Service Stations, NEC
1991	GEORGES UNION SERVICE	Gasoline Service Stations, NEC
1992	GEORGES UNION SERVICE	Gasoline Service Stations, NEC
1993	GEORGES UNION SERVICE	Gasoline Service Stations, NEC
1994	GEORGES UNION SERVICE	Gasoline Service Stations, NEC
1995	GEORGES UNION SERVICE	Gasoline Service Stations, NEC
1996	GEORGES UNION SERVICE	Gasoline Service Stations, NEC
1997	GEORGE S MORAKIWA INC	Gasoline Service Stations, NEC
1998	GEORGE S MORAKIWA INC	Gasoline Service Stations, NEC
1999	GEORGE S MORAKIWA INC	Gasoline Service Stations, NEC
2000	GEORGE S MORAKIWA INC	Gasoline Service Stations, NEC
2001	GEORGE S MORIKAWA INC	Gasoline Service Stations, NEC
2002	GEORGE S MORIKAWA INC	Gasoline Service Stations, NEC
2003	GEORGE S MORIKAWA INC	Gasoline Service Stations, NEC
2004	GEORGE S MORIKAWA INC	Gasoline Service Stations, NEC

R106 **UNOCAL 76 SS L 4573** **RCRA NonGen / NLR** **1000823247**
ESE **505 KAPAHULU AVE** **HID984468868**
< 1/8 **HONOLULU, HI 96815**
0.038 mi.
198 ft. **Site 2 of 5 in cluster R**

Actual: **10 ft.**

Focus Map: **8**

RCRA Listings:

Date Form Received by Agency:		19930827
Handler Name:	UNOCAL 76 SS L 4573	
Handler Address:		505 KAPAHULU AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HID984468868
Contact Name:		A FRITZ
Contact Address:		PO BOX 659
Contact City,State,Zip:		HONOLULU, HI 96809
Contact Telephone:		808-522-7657
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PO BOX 659
Mailing City,State,Zip:		HONOLULU, HI 96809
Owner Name:	UNOCAL 76	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

UNOCAL 76 SS L 4573 (Continued) **1000823247**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: UNOCAL 76	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	911 WILSHIRE BLVD STE 1010
Owner/Operator City,State,Zip:	LOS ANGELES, CA 90017
Owner/Operator Telephone:	213-977-7600
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19930827
Handler Name: UNOCAL 76 SS L 4573	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes

UNOCAL 76 SS L 4573 (Continued) **1000823247**

Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

R107 **GEORGE'S UNION SERVICE #4573** **HI SHWS** **U001235048**
ESE **505 KAPAHULU AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.038 mi.
198 ft. **Site 3 of 5 in cluster R**

Actual:
10 ft.

Focus Map:
8

SHWS:
Name: GEORGE'S UNION SERVICE #4573
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: George's Union Service #4573
HID Number: Not reported
Facility Registry Identifier: 110013790004
Lead Agency: HEER Office
Program: State
Project Manager: Cal Miyahara
Hazard Priority: Low
Potential Hazards And Controls: Hazard Present
Island: Oahu
SDAR Environmental Interest Name: George's Union Service #4573
HID Number: Not reported
Facility Registry Identifier: 110013790004
Lead Agency: HEER Office
Potential Hazard And Controls: Hazard Present
Priority: Low
Assessment: Response Necessary
Response: Response Complete
Nature of Contamination: Not reported
Nature of Residual Contamination: Residual TPH remains in area of the hydraulic hoist.
Use Restrictions: Controls Required to Manage Contamination
Engineering Control: Not reported
Description of Restrictions: Not reported
Institutional Control: Not reported
Within Designated Areawide Contamination: Not reported
Site Closure Type: No Further Action Letter - Restricted Use
Document Date: 06/20/2007
Document Number: 2007-394-CMM
Document Subject: Review of Hydraulic Hoist Closure Assessment, Jun 7, 2007
Project Manager: Cal Miyahara
Contact Information: (808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID: 2718

GEORGE'S UNION SERVICE #4573 (Continued) **U001235048**

Location Description:	505 Kapahulu Ave, Honolulu, HI 96815
Is Public:	True
Update On:	2021-01-29 10:07:41
Latitude:	21.276438
Longitude:	-157.814578

R108 **76 KAPAHULU 7-11 #116** **HI LUST** **U004251591**
ESE **505 KAPAHULU AVE** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96815** **HI Financial Assurance**
0.038 mi.
198 ft. **Site 4 of 5 in cluster R**

Actual:
10 ft.

Focus Map:
8

LUST:

Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100103
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/22/2002
Release ID:	930015
Project Officer:	Richard Takaba

UST:

Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100103
Owner:	Mid Pac Petroleum LLC
Owner Address:	1132 Bishop St., Suite 2500
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.276362
Longitude:	-157.814711
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Map

Tank ID:	5
Date Installed:	12/31/1988
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	12000
Substance:	Gasohol

Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815

Tank ID:	5
Date Installed:	12/31/1988
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	12000
Substance:	Gasohol

Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Tank ID: 5
Date Installed: 12/31/1988
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 5
Date Installed: 12/31/1988
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 5
Date Installed: 12/31/1988
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6
Date Installed: 12/31/1988
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6
Date Installed: 12/31/1988
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6
Date Installed: 12/31/1988

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	12000
Substance:	Gasohol
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	6
Date Installed:	12/31/1988
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	12000
Substance:	Gasohol
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	6
Date Installed:	12/31/1988
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	12000
Substance:	Gasohol
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-1-1
Date Installed:	03/26/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1987
Tank Capacity:	4000
Substance:	Gasoline
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-1-1
Date Installed:	03/26/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1987
Tank Capacity:	4000
Substance:	Gasoline
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-1-1
Date Installed:	03/26/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1987

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Tank Capacity: 4000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-1
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 4000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-1
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 4000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-2
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 5000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-2
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 5000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-2
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 5000
Substance: Gasoline

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-2
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 5000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-2
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 5000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-3
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 4000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-3
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 4000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-3
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 4000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-3
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 4000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-1-3
Date Installed: 03/26/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 4000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-2
Date Installed: 03/26/1981
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 8000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-2
Date Installed: 03/26/1981
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 8000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-2
Date Installed: 03/26/1981
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1987
Tank Capacity: 8000
Substance: Gasoline

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Tank ID:	R-4573-2
Date Installed:	03/26/1981
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1987
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-2
Date Installed:	03/26/1981
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1987
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-4
Date Installed:	03/26/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1987
Tank Capacity:	500
Substance:	Used Oil
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-4
Date Installed:	03/26/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1987
Tank Capacity:	500
Substance:	Used Oil
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-4
Date Installed:	03/26/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1987
Tank Capacity:	500
Substance:	Used Oil
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-4
Date Installed:	03/26/1960

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1987
Tank Capacity:	500
Substance:	Used Oil
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-4
Date Installed:	03/26/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1987
Tank Capacity:	500
Substance:	Used Oil
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-7
Date Installed:	12/31/1988
Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1997
Tank Capacity:	550
Substance:	Used Oil
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-7
Date Installed:	12/31/1988
Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1997
Tank Capacity:	550
Substance:	Used Oil
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-7
Date Installed:	12/31/1988
Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1997
Tank Capacity:	550
Substance:	Used Oil
Name:	76 KAPAHULU 7-11 #116
Address:	505 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4573-7
Date Installed:	12/31/1988
Tank Status:	**Permanently Out of Use**
Date Closed:	11/18/1997

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Tank Capacity: 550
Substance: Used Oil

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4573-7
Date Installed: 12/31/1988
Tank Status: Permanently Out of Use
Date Closed: 11/18/1997
Tank Capacity: 550
Substance: Used Oil

HI Financial Assurance:
Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-1-3
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-1-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-7
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: 5
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: 6
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-1-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2016
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-7
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2016
FR Archive: True

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-1-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2016
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2016
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: 5
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 03/31/2016
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-1-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2016
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-1-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2016
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: 6
Tank Status: Currently In Use
FRTYPE: Insurance

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Expiration Date: 03/31/2016
FR Archive: True

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-7
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: 6
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-1-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103

76 KAPAHULU 7-11 #116 (Continued) **U004251591**

Tank Id: R-4573-1-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: R-4573-1-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: 76 KAPAHULU 7-11 #116
Address: 505 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100103
Tank Id: 5
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

---

109 South < 1/8 0.038 mi. 198 ft.

UNIVERSITY OF HAWAII, WAIKIKI AQUARIUM
2777 KALAKAUA AVENUE
HONOLULU, HI 96815

RCRA-VSQG **1025502448** **HIR000145722**

Actual: 4 ft.

Focus Map: 8

RCRA Listings:

Date Form Received by Agency:	20190613
Handler Name:	UNIVERSITY OF HAWAII, WAIKIKI AQUARIUM
Handler Address:	2777 KALAKAUA AVENUE
Handler City,State,Zip:	HONOLULU, HI 96815
EPA ID:	HIR000145722
Contact Name:	CAROLYN OKI-IDOUCHI
Contact Address:	EAST-WEST ROAD
Contact City,State,Zip:	HONOLULU, HI 96822
Contact Telephone:	808-956-3201
Contact Fax:	808-956-3205
Contact Email:	COKI@HAWAII.EDU
Contact Title:	OCCUPATIONAL SAFETY SPECIALIST
EPA Region:	09
Land Type:	State
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	KALAKAUA AVENUE
Mailing City,State,Zip:	HONOLULU, HI 96815
Owner Name:	UNIVERSITY OF HAWAII
Owner Type:	State

UNIVERSITY OF HAWAII, WAIKIKI AQUARIUM (Continued) **1025502448**

Operator Name:	UNIVERSITY OF HAWAII, WAIKIKI AQUARIUM
Operator Type:	State
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required:	Not reported
Handler Date of Last Change:	20190613
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

UNIVERSITY OF HAWAII, WAIKIKI AQUARIUM (Continued) **1025502448**

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D006
Waste Description:	CADMIUM
Waste Code:	D009
Waste Description:	MERCURY
Waste Code:	D011
Waste Description:	SILVER
Waste Code:	D022
Waste Description:	CHLOROFORM
Waste Code:	D035
Waste Description:	METHYL ETHYL KETONE
Waste Code:	P042
Waste Description:	1,2-BENZENEDIOL, 4-[1-HYDROXY-2-(METHYLAMINO)ETHYL]-, (R)- (OR) EPINEPHRINE
Waste Code:	U188
Waste Description:	PHENOL

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	UNIVERSITY OF HAWAII
Legal Status:	State
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	2500 CAMPUS ROAD
Owner/Operator City,State,Zip:	HONOLULU, HI 96822
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name:	UNIVERSITY OF HAWAII, WAIKIKI AQUARIUM
Legal Status:	State
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	2777 KALAKAUA AVENUE
Owner/Operator City,State,Zip:	HONOLULU, HI 96815
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	20190613

UNIVERSITY OF HAWAII, WAIKIKI AQUARIUM (Continued) **1025502448**

Handler Name: UNIVERSITY OF HAWAII, WAIKIKI AQUARIUM
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 712130
NAICS Description: ZOOS AND BOTANICAL GARDENS

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

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110 North < 1/8 0.038 mi. 201 ft. **PUBLIC BATH WASTEWATER PUMP STATION** **HI UST** **U001236445**
2729 KALAKAUA AVE **HI Financial Assurance** **N/A**
HONOLULU, HI 96815

Actual: 3 ft.
Focus Map: 8

UST:
Name: PUBLIC BATH WASTEWATER PUMP STATION
Address: 2729 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-201985
Owner: C&C HNL - DEPT OF ENVIRONMENTAL SERVICES
Owner Address: 1000 ULU'OHIA STREET, SUITE 308
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.266130
Longitude: -157.821470
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: M-1
Date Installed: 05/29/1989
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: PUBLIC BATH WASTEWATER PUMP STATION
Address: 2729 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: M-1
Date Installed: 05/29/1989
Tank Status: **Currently in Use**

PUBLIC BATH WASTEWATER PUMP STATION (Continued) **U001236445**

Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: PUBLIC BATH WASTEWATER PUMP STATION
Address: 2729 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: M-1
Date Installed: 05/29/1989
Tank Status: Currently in Use
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

HI Financial Assurance:
Name: PUBLIC BATH WASTEWATER PUMP STATION
Address: 2729 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-201985
Tank Id: M-1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: 06/30/2014
FR Archive: True

Name: PUBLIC BATH WASTEWATER PUMP STATION
Address: 2729 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-201985
Tank Id: M-1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: 06/30/2021
FR Archive: False

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111 **WAIKIKI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS** **HI SHWS** **S106821016**
ESE **3710 LEAHI AVE** **HI SPILLS** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.039 mi.
204 ft.

Actual:
22 ft.

Focus Map:
8

SHWS:
Name: WAIKIKI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address: 3710 LEAHI AVE
City,State,Zip: HONOLULU, HI 96815
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Program: State
Project Manager: Not reported
Hazard Priority: Not reported
Potential Hazards And Controls: Not reported
Island: Oahu

WAIKIKI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S106821016**

SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	3036
Location Description:	3710 Leahi Ave, Honolulu, HI 96815, USA
Is Public:	True
Update On:	2021-11-10 17:01:55
Latitude:	21.268178
Longitude:	-157.814493

SPILLS:

Name:	WAIKIKI ELEMENTARY SCHOOL SEWAGE SPILL
Address:	3710 LEAHI AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Waikiki Elementary School
Case Number:	20041103-2130
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Referred
Less Or Greater Than:	Not reported
Units:	Waikiki Elementary School Sewage Spill
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2004-11-04 00:00:00
Result:	Refer to WWB
File Under:	City and County of Honolulu, Department of Environmental Services
Substances:	Sewage
Quanity:	300
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

WAIKIKI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S106821016**

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

R112 **KIM CHAU LAUNDERETTE** **HI UST** **U001235222**
ESE **517 KAPAHULU AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.039 mi.
207 ft. **Site 5 of 5 in cluster R**

Actual: **10 ft.**
Focus Map: **8**

UST:

Name:	KIM CHAU LAUNDERETTE
Address:	517 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100766
Owner:	BAU PHAN NGOC
Owner Address:	517 KAPAHULU AVE
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-1
Date Installed:	07/09/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	11/15/1992
Tank Capacity:	300
Substance:	Diesel

P113 **YACHT HARBOR TOWERS** **HI SHWS** **S106821166**
NNW **1600 ALA MOANA BLVD** **HI ENG CONTROLS** **N/A**
< 1/8 **HONOLULU, HI 96815** **HI INST CONTROL**
0.040 mi. **HI SPILLS**
210 ft. **Site 2 of 3 in cluster P**

Actual: **3 ft.**
Focus Map: **4**

SHWS:

Name:	YACHT HARBOR TOWERS GENERATOR
Address:	1600 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu

YACHT HARBOR TOWERS (Continued) **S106821166**

Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2651
Location Description:	1600 Ala Moana Blvd, 1650 Ala Moana Blvd
Is Public:	True
Update On:	2020-04-08 16:47:40
Latitude:	21.288336
Longitude:	-157.839888

ENG CONTROLS:

Supplemental Location Text:	Yacht Harbor Towers
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Yacht Harbor Towers
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SPILLS:

Name:	YACHT HARBOR TOWERS
Address:	1600 ALA MOANA BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815

YACHT HARBOR TOWERS (Continued) **S106821166**

Island:	Oahu
Supplemental Loc. Text:	Yacht Harbor Towers
Case Number:	19990301-1550
Facility Registry ID:	110013774629
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Referred
Less Or Greater Than:	Not reported
Units:	Yacht Harbor Tower Generator
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Yacht Harbor Towers
Substances:	Unknown
Quanity:	60
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.288177000000001
Longitude:	-157.84027900000001
Name:	YACHT HARBOR TOWERS
Address:	1600 ALA MOANA BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Yacht Harbor Towers
Case Number:	19990301-1550
Facility Registry ID:	110013774629
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Referred
Less Or Greater Than:	Not reported
Units:	Yacht Harbor Tower Generator
Activity Type:	Response
Activity Lead:	Mike Cripps

YACHT HARBOR TOWERS (Continued) **S106821166**

Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Yacht Harbor Towers
Substances:	Unknown
Quanity:	60
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.28877
Longitude:	-157.84010699999999
Name:	YACHT HARBOR TOWERS
Address:	1600 ALA MOANA BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Yacht Harbor Towers
Case Number:	19990301-1550
Facility Registry ID:	110013774629
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Referred
Less Or Greater Than:	Not reported
Units:	Yacht Harbor Tower Generator
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Yacht Harbor Towers
Substances:	Unknown
Quanity:	60
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported

YACHT HARBOR TOWERS (Continued) **S106821166**

Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.271197000000001
Longitude:	-157.81720899999999

P114 **AOAO YACHT HARBOR TOWERS** **RCRA-VSQG** **1004688961**
NNW **1600_1650 ALA MOANA BLVD** **HIR000037002**
< 1/8 **HONOLULU, HI 96815**
0.040 mi.
210 ft. **Site 3 of 3 in cluster P**

Actual:
3 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:	19980309
Handler Name:	AOAO YACHT HARBOR TOWERS
Handler Address:	1600_1650 ALA MOANA BLVD
Handler City,State,Zip:	HONOLULU, HI 96815
EPA ID:	HIR000037002
Contact Name:	SCOTT LUONGO
Contact Address:	1600 1650 ALA MOANA BLVD
Contact City,State,Zip:	HONOLULU, HI 96815
Contact Telephone:	808-942-5712
Contact Fax:	Not reported
Contact Email:	Not reported
Contact Title:	Not reported
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	1600 1650 ALA MOANA BLVD
Mailing City,State,Zip:	HONOLULU, HI 96815
Owner Name:	AOAO YACHT HARBOR TOWERS
Owner Type:	Private
Operator Name:	Not reported
Operator Type:	Not reported
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No

AOAO YACHT HARBOR TOWERS (Continued) **1004688961**

Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20021007
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE

AOAO YACHT HARBOR TOWERS (Continued) **1004688961**

Waste Code: F001
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F003
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: AOAO YACHT HARBOR TOWERS
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 1600 1650 ALA MOANA BLVD
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-947-1855
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19980309
Handler Name: AOAO YACHT HARBOR TOWERS
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

AOAO YACHT HARBOR TOWERS (Continued) **1004688961**

Evaluation Action Summary:
Evaluations: No Evaluations Found

115
SW
< 1/8
0.041 mi.
217 ft.

HAWAII AMALGAMATED VENTURES* **EDR Hist Auto** **1020469665**
311 OHUA ST **N/A**
HONOLULU, HI 96815

Actual:
3 ft.

EDR Hist Auto

Focus Map:
8

Year:	Name:	Type:
1982	HAWAII AMALGAMATED VENTURES*	Gasoline Service Stations

S116
NE
< 1/8
0.043 mi.
225 ft.

ELDON DRAPERY CLEANER **EDR Hist Cleaner** **1019980766**
716 KAPAHULU AVE **N/A**
HONOLULU, HI 96816
Site 1 of 5 in cluster S

Actual:
11 ft.

EDR Hist Cleaner

Focus Map:
8

Year:	Name:	Type:
1986	ELDON DRAPERY CLEANER	Drycleaning Plants, Except Rugs

E117
SE
< 1/8
0.045 mi.
240 ft.

MARYKNOLL HIGH SCHOOL **RCRA-VSQG** **1007370456**
1402 PUNAHOU ST **HIR000135830**
HONOLULU, HI 96822
Site 2 of 2 in cluster E

Actual:
49 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:	20040430
Handler Name:	MARYKNOLL HIGH SCHOOL
Handler Address:	1402 PUNAHOU ST
Handler City,State,Zip:	HONOLULU, HI 96822
EPA ID:	HIR000135830
Contact Name:	MICHAEL E BAKER
Contact Address:	1526 ALEXANDER ST
Contact City,State,Zip:	HONOLULU, HI 96822
Contact Telephone:	808-952-7300
Contact Fax:	Not reported
Contact Email:	Not reported
Contact Title:	Not reported
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported

MARYKNOLL HIGH SCHOOL (Continued) **1007370456**

Mailing Address:		1526 ALEXANDER ST
Mailing City,State,Zip:		HONOLULU, HI 96822
Owner Name:	MARYKNOLL SCHOOL	
Owner Type:		Private
Operator Name:	ROMAN CATHOLIC CHURCH OF HAWAII	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20040505
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No
Importer of Spent Lead Acid Batteries:		No

MARYKNOLL HIGH SCHOOL (Continued) **1007370456**

Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Hazardous Waste Summary:

Waste Code: D001
Waste Description: IGNITABLE WASTE

Waste Code: D002
Waste Description: CORROSIVE WASTE

Waste Code: D003
Waste Description: REACTIVE WASTE

Waste Code: F001
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F002
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F003
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F004
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: CRESOLS, CRESYLIC ACID, AND NITROBENZENE; AND THE STILL BOTTOMS FROM THE RECOVERY OF THESE SOLVENTS; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

MARYKNOLL HIGH SCHOOL (Continued) **1007370456**

Waste Code: F005
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: ROMAN CATHOLIC CHURCH OF HAWAII
Legal Status: Private
Date Became Current: 19270101
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: MARYKNOLL SCHOOL
Legal Status: Private
Date Became Current: 19270101
Date Ended Current: Not reported
Owner/Operator Address: 1526 ALEXANDER ST
Owner/Operator City,State,Zip: HONOLULU, HI 96822
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20040430
Handler Name: MARYKNOLL HIGH SCHOOL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 61111
NAICS Description: ELEMENTARY AND SECONDARY SCHOOLS

Facility Has Received Notices of Violations:
Violations: No Violations Found

MARYKNOLL HIGH SCHOOL (Continued) **1007370456**

Evaluation Action Summary:
Evaluations: No Evaluations Found

T118 **TONYS AUTO SERVICE LTD*** **EDR Hist Auto** **1020278256**
SE **449 KAPAHULU AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.048 mi.
252 ft. **Site 1 of 2 in cluster T**

Actual: EDR Hist Auto
7 ft.

Focus Map:
8

Year:	Name:	Type:
1969	TONYS AUTO SERVICE LTD*	General Automotive Repair Shops
1969	LAUS SERVICE & AUTO REPAIR	Gasoline Service Stations
1970	TONYS AUTO SERVICE LTD*	General Automotive Repair Shops
1970	LAUS SERVICE & AUTO REPAIR	Gasoline Service Stations
1971	TONYS AUTO SERVICE LTD*	General Automotive Repair Shops
1972	TONYS AUTO SERVICE PARTS LTD*	General Automotive Repair Shops
1973	TONYS AUTO SERVICE PARTS LTD*	General Automotive Repair Shops
1974	TONYS AUTO SERVICE PARTS LTD*	General Automotive Repair Shops
1975	TONYS AUTO SERVICE & PARTS *	General Automotive Repair Shops
1976	TONYS AUTO SERVICE & PARTS *	General Automotive Repair Shops
1977	TONYS AUTO SERVICE & PARTS *	General Automotive Repair Shops
1978	THOMPSON SERVICE & SUPPLY CO	Motor Vehicle Supplies And New Parts
1979	THOMPSON SERVICE & SUPPLY CO	Motor Vehicle Supplies And New Parts
1980	THOMPSON SERVICE & SUPPLY CO	General Automotive Repair Shops
1980	LARRYS AUTO AIR COND SV	Automotive Repair Shops, NEC
1982	THOMPSON SERVICE & SUPPLY CO	General Automotive Repair Shops
1982	HAWAII AUTO AIR INC	Automotive Repair Shops, NEC
1983	THOMPSON SERVICE & SUPPLY CO	General Automotive Repair Shops

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T119 **ROBINSON CORP** **EDR Hist Cleaner** **1020076034**
SE **449 KAPAHULU AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.048 mi.
252 ft. **Site 2 of 2 in cluster T**

Actual: EDR Hist Cleaner
7 ft.

Focus Map:
8

Year:	Name:	Type:
1992	ROBINSON CORP	Drycleaning Plants, Except Rugs, NEC
1993	ROBINSON CORP	Drycleaning Plants, Except Rugs, NEC
1994	ROBINSON CORP	Drycleaning Plants, Except Rugs, NEC
1995	ROBINSON CORP	Drycleaning Plants, Except Rugs, NEC
1996	ROBINSON CORP	Drycleaning Plants, Except Rugs, NEC
1997	ROBINSON CORP	Drycleaning Plants, Except Rugs, NEC
1998	ROBINSON CORP	Drycleaning Plants, Except Rugs, NEC
1999	ROBINSON CORP	Drycleaning Plants, Except Rugs, NEC

120
SW
< 1/8
0.048 mi.
253 ft.

ROYAL GARDENS HOTEL DIESEL
440 OLOHANA ST
HONOLULU, HI 96815

HI SHWS **S110061800**
HI SPILLS **N/A**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	ROYAL GARDENS HOTEL DIESEL
Address:	440 OLOHANA ST
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Dumpster alleyway right side of bldg from street.
Island:	Oahu
Environmental Interest:	Royal Gardens Hotel Diesel
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Roger Brewer
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Royal Gardens Hotel Diesel
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Diesel in soil at less than EALs.
Use Restrictions:	No Hazard Present for Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Action Letter
Document Date:	12/27/2007
Document Number:	2007-862-RB
Document Subject:	NFA for minor Soil removal under drums (not a formal case)
Project Manager:	Roger Brewer
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	597
Location Description:	440 Olohana St, Honolulu, HI 96815
Is Public:	True
Update On:	2020-08-11 15:22:03
Latitude:	21.284576
Longitude:	-157.830051

SPILLS:

Name:	ROYAL GARDENS HOTEL DIESEL
Address:	440 OLOHANA ST
Address 2:	WAIKIKI
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Dumpster alleyway right side of bldg from street.
Case Number:	20071029-0953
Facility Registry ID:	Not reported
HID Number:	Not reported

ROYAL GARDENS HOTEL DIESEL (Continued) **S110061800**

Lead and Program:	HEER EP&R
ER:	Off Scene
Less Or Greater Than:	Not reported
Units:	Royal Gardens Hotel Diesel
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	2008-01-07 00:00:00
Result:	SOSC NFA
File Under:	Royal Gardens Hotel
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Unknown
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.284495
Longitude:	-157.830163

U121 **ESQUIRE SHELL SERVICE** **EDR Hist Auto** **1020698898**
SSW **2960 WAIALAE AVE** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.049 mi.
261 ft. **Site 1 of 8 in cluster U**

Actual:
40 ft.

EDR Hist Auto

Focus Map:
5

Year:	Name:	Type:
1969	YAMANES SHELL SERVICE	Gasoline Service Stations
1970	YAMANES SHELL SERVICE	Gasoline Service Stations
1971	YAMANES SHELL SERVICE	Gasoline Service Stations
1972	YAMANES SHELL SERVICE	Gasoline Service Stations
1973	ESQUIRE SHELL SERVICE	Gasoline Service Stations
1974	ESQUIRE SHELL SERVICE	Gasoline Service Stations
1975	ESQUIRE SHELL SERVICE	Gasoline Service Stations
1976	ST LOUIS SHELL SERVICE	Gasoline Service Stations
1977	ST LOUIS SHELL SERVICE	Gasoline Service Stations
1978	ST LOUIS SHELL SERVICE	Gasoline Service Stations
1979	ST LOUIS SHELL SERVICE	Gasoline Service Stations
1980	BERGERS AUTOHAUS INC	General Automotive Repair Shops

ESQUIRE SHELL SERVICE (Continued) **1020698898**

1982	BERGERS AUTOHAUS INC	General Automotive Repair Shops
1983	BERGERS AUTOHAUS INC	General Automotive Repair Shops
1985	BERGERS AUTOHAUS INC	General Automotive Repair Shops
1987	BERGERS AUTOHAUS INC	General Automotive Repair Shops

U122 **MONSTER HI-5 & TIRES** **RCRA NonGen / NLR** **1016956269**
SSW **2960 WAIALAE AVE** **HIR000142380**
< 1/8 **HONOLULU, HI 96816**
0.049 mi.
261 ft. **Site 2 of 8 in cluster U**

Actual:
40 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20160408
Handler Name:	MONSTER HI-5 & TIRES	
Handler Address:		2960 WAIALAE AVE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HIR000142380
Contact Name:		JAEWOO LEE
Contact Address:		4459 LAAKEA ST
Contact City,State,Zip:		HONOLULU, HI 96818
Contact Telephone:		808-753-8366
Contact Fax:		Not reported
Contact Email:		JLEEKUO@GMAIL.COM
Contact Title:		PRESIDENT
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		4459 LAAKEA ST
Mailing City,State,Zip:		HONOLULU, HI 96818
Owner Name:	LLC CHAN PARTNERSHIP	
Owner Type:		Private
Operator Name:	MONSTER HI-5 & TIRES	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		Yes
Universal Waste Destination Facility:		Yes
Federal Universal Waste:		Yes
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N

MONSTER HI-5 & TIRES (Continued) **1016956269**

Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20160413
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: ISLAND RECYCLING, INC.	
Legal Status:	Private
Date Became Current:	20080601
Date Ended Current:	Not reported
Owner/Operator Address:	91-140 KAOMI LOOP
Owner/Operator City,State,Zip:	KAPOLEI, HI 96707
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name: MONSTER HI-5 & TIRES	
Legal Status:	Private
Date Became Current:	20160501
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported

MONSTER HI-5 & TIRES (Continued) **1016956269**

Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: LLC CHAN PARTNERSHIP
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 3012 WAIALAE AVE
Owner/Operator City,State,Zip: HONOLULU, HI 96816
Owner/Operator Telephone: 808-737-5369
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: ISLAND CONTAINER REDEMPTION, LLC
Legal Status: Private
Date Became Current: 20080601
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20140523
Handler Name: ISLAND REDEMPTION & RECYCLING CENTER
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: Yes
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20160408
Handler Name: MONSTER HI-5 & TIRES
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: Yes
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

MONSTER HI-5 & TIRES (Continued) **1016956269**

List of NAICS Codes and Descriptions:
NAICS Code: 56292
NAICS Description: MATERIALS RECOVERY FACILITIES

NAICS Code: 562920
NAICS Description: MATERIALS RECOVERY FACILITIES

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20140827
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: SAMN
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported

MONSTER HI-5 & TIRES (Continued) **1016956269**

Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

U123 **MONSTER HI-5 & TIRES, INC.** **HI SWRCY** **S125958523**
SSW **2960 WAIALAE AVENUE** **N/A**
< 1/8 **HONOLULU, HI**
0.049 mi.
261 ft. **Site 3 of 8 in cluster U**

Actual:
40 ft.

Focus Map:
5

SWRCY:

Permit Number:	RY-0052-18
Name:	MONSTER HI-5 & TIRES, INC.
Address:	2960 WAIALAE AVENUE
City,State,Zip:	HONOLULU, HI
Materials:	dbc, select non-ferrous scrap, LAB, whole catallytic converters
Island:	Oahu
TMK:	1-2-8-028:038
Closure Date:	Not reported
Type:	general
Status:	Not reported

U124 **SEVEN HAWAIIANS CORP** **HI UST** **U001235771**
SSW **2960 WAIALAE AVE** **N/A**
< 1/8 **HONOLULU, HI 96826**
0.049 mi.
261 ft. **Site 4 of 8 in cluster U**

Actual:
40 ft.

Focus Map:
5

UST:

Name:	SEVEN HAWAIIANS CORP
Address:	2960 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-102216
Owner:	SEVEN HAWAIIANS CORP.
Owner Address:	1750 KALAKAUA AVE. SUITE 206
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	01
Date Installed:	05/15/1964
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	550
Substance:	Used Oil

U125 **MONSTER HI-5 & TIRES** **RCRA NonGen / NLR** **1000340159**
SSW **2960 WAIALAE AVE** **FINDS** **HID981663230**
< 1/8 **HONOLULU, HI 96816** **ECHO**
0.049 mi.
261 ft. **Site 5 of 8 in cluster U**

Actual:
40 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		19931210
Handler Name:	EUROPEAN AUTO TECH LTD	
Handler Address:		2960 WAIALAE AVE
Handler City,State,Zip:		HONOLULU, HI 96826
EPA ID:		HID981663230
Contact Name:		ENVIRONMENTAL MANAGER
Contact Address:		2960 WAIALAE AVE
Contact City,State,Zip:		HONOLULU, HI 96826
Contact Telephone:		808-988-6523
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		WAIALAE AVE
Mailing City,State,Zip:		HONOLULU, HI 96826
Owner Name:	SECRIST LARRY	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

MONSTER HI-5 & TIRES (Continued) **1000340159**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: SECRIST LARRY	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

MONSTER HI-5 & TIRES (Continued) **1000340159**

Historic Generators:
Receive Date: 19931210
Handler Name: EUROPEAN AUTO TECH LTD
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110064326965

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER
Registry ID: 110005725242

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
Registry ID: 110060233910

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

MONSTER HI-5 & TIRES (Continued) **1000340159**

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000340159
Registry ID:	110060233910
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110060233910
Name:	MONSTER HI-5 & TIRES
Address:	2960 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816

Envid:	1000340159
Registry ID:	110005725242
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005725242
Name:	EUROPEAN AUTO TECH LTD
Address:	2960 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96826

V126 **IES RETAIL S. KING ST.** **RCRA-VSQG** **1004688816**
SE **2969 S KING ST** **FINDS** **HID981967250**
< 1/8 **HONOLULU, HI 96826** **ECHO**
0.050 mi.
262 ft. **Site 1 of 3 in cluster V**

Actual:
23 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20161028
Handler Name:	IES RETAIL S. KING ST.	
Handler Address:		2969 S KING ST
Handler City,State,Zip:		HONOLULU, HI 96826
EPA ID:		HID981967250
Contact Name:		MARC DEXTER
Contact Address:		91-480 MALAKOLE ST.
Contact City,State,Zip:		KAPOLEI, HI 96707
Contact Telephone:		808-682-5711
Contact Fax:		808-682-2214
Contact Email:		MARC.DEXTER@ISLANDENERGYSERVICES.COM
Contact Title:		EHS MANAGER
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		91-480 MALAKOLE ST.
Mailing City,State,Zip:		KAPOLEI, HI 96707
Owner Name:	IES RETAIL, LLC	
Owner Type:		Private
Operator Name:	IES RETAIL, LLC	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No

IES RETAIL S. KING ST. (Continued) **1004688816**

Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20161028
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D018

IES RETAIL S. KING ST. (Continued) **1004688816**

Waste Description: BENZENE

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	CHEVRON USA
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	IES RETAIL, LLC
Legal Status:	Private
Date Became Current:	20161101
Date Ended Current:	Not reported
Owner/Operator Address:	30 ROCKEFELLER PLAZA
Owner/Operator City,State,Zip:	NEW YORK, NY 10112
Owner/Operator Telephone:	212-605-6000
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	NOT REQUIRED
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	CHEVRON USA INC.
Legal Status:	Private
Date Became Current:	19661001
Date Ended Current:	Not reported
Owner/Operator Address:	PO BOX 6004
Owner/Operator City,State,Zip:	SAN RAMON, CA 94583
Owner/Operator Telephone:	877-386-6044
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	CHEVRON USA INC.
Legal Status:	Private
Date Became Current:	19661001
Date Ended Current:	Not reported
Owner/Operator Address:	PO BOX 6004

IES RETAIL S. KING ST. (Continued) **1004688816**

Owner/Operator City,State,Zip: SAN RAMON, CA 94583
Owner/Operator Telephone: 877-386-6044
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: IES RETAIL, LLC
Legal Status: Private
Date Became Current: 20161101
Date Ended Current: Not reported
Owner/Operator Address: 30 ROCKEFELLER PLAZA
Owner/Operator City,State,Zip: NEW YORK, NY 10112
Owner/Operator Telephone: 212-605-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19930722
Handler Name: MELS SUNRISE CHEVRON
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20110509
Handler Name: CHEVRON 91919
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20161028
Handler Name: IES RETAIL S. KING ST.
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

IES RETAIL S. KING ST. (Continued) **1004688816**

Receive Date: 19900301
Handler Name: MEL'S SUNRISE CHEVRON
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 324191
NAICS Description: PETROLEUM LUBRICATING OIL AND GREASE MANUFACTURING

NAICS Code: 4471
NAICS Description: GASOLINE STATIONS

NAICS Code: 44711
NAICS Description: GASOLINE STATIONS WITH CONVENIENCE STORES

NAICS Code: 811111
NAICS Description: GENERAL AUTOMOTIVE REPAIR

NAICS Code: 811118
NAICS Description: OTHER AUTOMOTIVE MECHANICAL AND ELECTRICAL REPAIR AND MAINTENANCE

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005725625

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1004688816
Registry ID: 110005725625

IES RETAIL S. KING ST. (Continued) **1004688816**

DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005725625
Name: IES RETAIL S. KING ST.
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

V127 **KAPIOLANI TEXACO 91919** **HI UST** **1000376013**
SE **2969 S KING ST** **HI Financial Assurance** **N/A**
< 1/8 **HONOLULU, HI 96826**
0.050 mi.
262 ft. **Site 2 of 3 in cluster V**

Actual:
23 ft.

Focus Map:
5

UST:
Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-101247
Owner: CHEVRON PRODUCTS COMPANY
Owner Address: 91-480 MALAKOLE ST.
Owner City,St,Zip: Honolulu, 96826 96826
Latitude: 21.288790
Longitude: -157.815580
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1

KAPIOLANI TEXACO 91919 (Continued) **1000376013**

Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 07/18/1985
Tank Status: **Currently in Use**

KAPIOLANI TEXACO 91919 (Continued) **1000376013**

Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 07/18/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 4
Date Installed: 07/18/1981
Tank Status: **Temporarily out of Use**
Date Closed: Not reported
Tank Capacity: 6000
Substance: Diesel

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 4
Date Installed: 07/18/1981
Tank Status: **Temporarily out of Use**
Date Closed: Not reported
Tank Capacity: 6000

KAPIOLANI TEXACO 91919 (Continued) **1000376013**

Substance: Diesel

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 4
Date Installed: 07/18/1981
Tank Status: **Temporarily out of Use**
Date Closed: Not reported
Tank Capacity: 6000
Substance: Diesel

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 4
Date Installed: 07/18/1981
Tank Status: **Temporarily out of Use**
Date Closed: Not reported
Tank Capacity: 6000
Substance: Diesel

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 5
Date Installed: 07/18/1981
Tank Status: **Temporarily out of Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Used Oil

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 5
Date Installed: 07/18/1981
Tank Status: **Temporarily out of Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Used Oil

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 5
Date Installed: 07/18/1981
Tank Status: **Temporarily out of Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Used Oil

KAPIOLANI TEXACO 91919 (Continued) **1000376013**

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 5
Date Installed: 07/18/1981
Tank Status: Temporarily out of Use
Date Closed: Not reported
Tank Capacity: 1000
Substance: Used Oil

HI Financial Assurance:
Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Guarantee
Expiration Date: 04/23/2013
FR Archive: True

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 5
Tank Status: Temporarily out of Use
FRTYPE: Guarantee
Expiration Date: 04/23/2013
FR Archive: True

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 4
Tank Status: Temporarily out of Use
FRTYPE: Guarantee
Expiration Date: 04/23/2013
FR Archive: True

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Guarantee
Expiration Date: 04/23/2013
FR Archive: True

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 1

KAPIOLANI TEXACO 91919 (Continued) **1000376013**

Tank Status: Currently in Use
FRTYPE: Guarantee
Expiration Date: 04/23/2013
FR Archive: True

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 4
Tank Status: Temporarily out of Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 5
Tank Status: Temporarily out of Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

Name: KAPIOLANI TEXACO 91919
Address: 2969 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101247
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

V128 **SUNRISE SERVICE STATION** **EDR Hist Auto** **1020161803**
SE **2969 S KING STREET** **N/A**
< 1/8 **HONOLULU, HI 96814**
0.050 mi.
262 ft. **Site 3 of 3 in cluster V**

Actual: EDR Hist Auto
23 ft.

Focus Map:
5

Year:	Name:	Type:
1969	SUNRISE SERVICE STATION	Gasoline Service Stations
1970	SUNRISE SERVICE STATION	Gasoline Service Stations
1971	SUNRISE SERVICE STATION	Gasoline Service Stations
1972	SUNRISE SERVICE STATION	Gasoline Service Stations
1973	SUNRISE SERVICE STATION	Gasoline Service Stations
1974	SUNRISE SERVICE STATION	Gasoline Service Stations
1975	SUNRISE SERVICE STATION	Gasoline Service Stations
1976	SUNRISE SERVICE STATION	Gasoline Service Stations
1977	SUNRISE SERVICE STATION	Gasoline Service Stations
1983	J H T INC	Gasoline Service Stations
1985	J H T INC	Gasoline Service Stations
1986	J H T INC	Gasoline Service Stations
1987	J H T INC	Gasoline Service Stations
1988	J H T INC	Gasoline Service Stations
1989	J H T INC	Gasoline Service Stations
1990	J H T INC	Gasoline Service Stations
1991	J H T INC	Gasoline Service Stations
1992	J H T INC	Gasoline Service Stations
1993	J H T INC	Gasoline Service Stations
1994	J H T INC	Gasoline Service Stations
1995	J H T INC	Gasoline Service Stations
1996	J H T INC	Gasoline Service Stations
1997	J H T INC	Gasoline Service Stations
1998	J H T INC	Gasoline Service Stations
1999	J H T INC	Gasoline Service Stations
2000	J H T INC	Gasoline Service Stations
2001	J H T INC	Gasoline Service Stations
2002	J H T INC	Gasoline Service Stations
2003	J H T INC	Gasoline Service Stations
2004	OSEDO HOWARD INC	Gasoline Service Stations
2004	J H T INC	Gasoline Service Stations
2005	J H T INC	Gasoline Service Stations, NEC
2005	OSEDO HOWARD INC	Gasoline Service Stations
2006	J H T INC	Gasoline Service Stations, NEC
2006	OSEDO HOWARD INC	Gasoline Service Stations
2007	J H T INC	Gasoline Service Stations, NEC
2007	OSEDO HOWARD INC	Gasoline Service Stations
2008	J H T INC	Gasoline Service Stations, NEC
2008	OSEDO HOWARD INC	Gasoline Service Stations
2009	J H T INC	Gasoline Service Stations, NEC
2010	J H T INC	Gasoline Service Stations, NEC
2011	J H T INC	Gasoline Service Stations, NEC
2012	J H T INC	Gasoline Service Stations, NEC
2013	J H T INC	Gasoline Service Stations, NEC
2014	J H T INC	Gasoline Service Stations, NEC

O129 **ALA WAI HARBOR BOAT REPAIR YARD** **HI SHWS** **S111704669**
WSW **ALA MOANA BLVD** **N/A**
< 1/8 **HONOLULU, HI**
0.050 mi.
264 ft. **Site 5 of 5 in cluster O**

Actual:
3 ft.

Focus Map:
7

SHWS:

Name:	ALA WAI HARBOR BOAT REPAIR YARD
Address:	ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Ala Wai Yacht Harbor
Island:	Oahu
Environmental Interest:	Ala Wai Harbor Boat Repair Yard
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Cal Miyahara
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Ala Wai Harbor Boat Repair Yard
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Not reported
Nature of Contamination:	Found: TPH-G,d, and o, PAH, and lead found in the gw above Tier 1 unrestricted use.
Nature of Residual Contamination:	TPH-G,d, and o, PAH, and lead below Tier I Residential EALs.
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	03/21/2012
Document Number:	2012-195-CMM
Document Subject:	Site Investigation (SI) Report, Ala Wai Harbor Boat Repair Facility
Project Manager:	Cal Miyahara
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2706
Location Description:	Ala Moana Blvd, Ala Wai Harbor
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.287206
Longitude:	-157.840700

130
SSE
< 1/8
0.050 mi.
265 ft.

LING BROTHERS, LTD.
1819-E LIPEEPEE ST
HONOLULU, HI 96815

HI LUST **S108009335**
N/A

Actual:
3 ft.

Focus Map:
7

LUST:

Name:	LING BROTHERS, LTD.
Address:	1819-E LIPEEPEE ST
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100819
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/16/2007
Release ID:	060020
Project Officer:	Richard Takaba

131
SW
< 1/8
0.050 mi.
266 ft.

WAIKIKI SAND VILLA II
250 KAIULANI AVE
HONOLULU, HI 96815

HI SHWS **S106821022**
N/A

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	WAIKIKI SAND VILLA II
Address:	250 KAIULANI AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Waikiki Sand Villa II
HID Number:	Not reported
Facility Registry Identifier:	110013775986
Lead Agency:	HEER Office
Program:	State
Project Manager:	Unassigned
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Waikiki Sand Villa II
HID Number:	Not reported
Facility Registry Identifier:	110013775986
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Found: Petroleum in groundwater.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Unassigned
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2264
Location Description:	250 Kaiulani Ave

WAIKIKI SAND VILLA II (Continued) **S106821022**

Is Public:	True
Update On:	2021-11-17 07:51:10
Latitude:	21.278522
Longitude:	-157.823114

132
West
< 1/8
0.054 mi.
283 ft.

ROGERS CHEVRON **EDR Hist Auto** **1021259836**
1403 MAKIKI ST APT 407 **N/A**
HONOLULU, HI 96814

Actual:
36 ft.

EDR Hist Auto

Focus Map:
5

Year:	Name:	Type:
2007	ROGERS CHEVRON	Gasoline Service Stations, NEC
2008	ROGERS CHEVRON	Gasoline Service Stations, NEC

S133
NE
< 1/8
0.055 mi.
291 ft.

TESORO HAWAII CORPORATION **EDR Hist Auto** **1020392807**
707 KAPAHULU AVE **N/A**
HONOLULU, HI 96816
Site 2 of 5 in cluster S

Actual:
13 ft.

EDR Hist Auto

Focus Map:
8

Year:	Name:	Type:
1969	WALTS TEXACO SERVICE	Gasoline Service Stations
1970	WALTS TEXACO SERVICE	Gasoline Service Stations
1971	WALTS TEXACO SERVICE	Gasoline Service Stations
1972	WALTS TEXACO SERVICE	Gasoline Service Stations
1973	WALTS TEXACO SERVICE	Gasoline Service Stations
1974	WALTS TEXACO SERVICE	Gasoline Service Stations
1975	WALTS TEXACO SERVICE	Gasoline Service Stations
1976	WALTS TEXACO SERVICE	Gasoline Service Stations
1977	WALTS TEXACO SERVICE	Gasoline Service Stations
1978	WALTS TEXACO SERVICE	Gasoline Service Stations
1979	WALTS TEXACO SERVICE	Gasoline Service Stations
1980	WALTS TEXACO SERVICE	Gasoline Service Stations
1982	WALTS TEXACO SERVICE	Gasoline Service Stations
1982	OKA GEORGE INC	Gasoline Service Stations
1983	WALTS TEXACO SERVICE	Gasoline Service Stations
1991	PACIFIC RESOURCES INC	Gasoline Service Stations
1992	PACIFIC RESOURCES INC	Gasoline Service Stations
1993	B H P PETRO AMERICAS HAWA INC	Gasoline Service Stations
1994	B H P PETRO AMERICAS HAWA INC	Gasoline Service Stations
1995	BHP GAS EXPRESS	Gasoline Service Stations
1995	BHP HAWAII INC	Gasoline Service Stations
1996	BHP GAS EXPRESS	Gasoline Service Stations
1996	BHP HAWAII INC	Gasoline Service Stations
1997	BHP GAS EXPRESS	Gasoline Service Stations
1998	BHP GAS EXPRESS	Gasoline Service Stations
1999	TESORO HAWAII CORPORATION	Gasoline Service Stations
1999	TESORO HAWAII CORPORATION	Gasoline Service Stations
2000	TESORO HAWAII CORPORATION	Gasoline Service Stations
2001	TESORO HAWAII CORPORATION	Gasoline Service Stations
2002	TESORO HAWAII CORPORATION	Gasoline Service Stations

TESORO HAWAII CORPORATION (Continued) **1020392807**

2003	TESORO HAWAII CORPORATION	Gasoline Service Stations
2004	TESORO HAWAII CORPORATION	Gasoline Service Stations
2005	TESORO HAWAII CORPORATION	Gasoline Service Stations
2006	TESORO HAWAII CORPORATION	Gasoline Service Stations
2007	TESORO HAWAII CORPORATION	Gasoline Service Stations
2008	TESORO HAWAII CORPORATION	Gasoline Service Stations
2009	TESORO HAWAII CORPORATION	Gasoline Service Stations
2010	TESORO HAWAII CORPORATION	Gasoline Service Stations
2011	TESORO HAWAII CORPORATION	Gasoline Service Stations
2012	TESORO HAWAII CORPORATION	Gasoline Service Stations
2013	HAWAII INDEPENDENT ENERGY LLC	Gasoline Service Stations
2014	HAWAII INDEPENDENT ENERGY LLC	Gasoline Service Stations

S134 **HELE KAPAHULU #61013** **HI LUST** **U003402810**
NE **707 KAPAHULU AVE** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96816** **HI Financial Assurance**
0.055 mi.
291 ft. **Site 3 of 5 in cluster S**

Actual:
13 ft.

Focus Map:
8

LUST:

Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100914
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/04/2010
Release ID:	070033
Project Officer:	Shunsheng Fu

UST:

Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100914
Owner:	HIE Retail, LLC
Owner Address:	800 Gessner Road, Suite 875
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.280051
Longitude:	-157.813655
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	1
Date Installed:	01/05/2009
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	12000
Substance:	Gasohol
Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	1
Date Installed:	01/05/2009
Tank Status:	**Currently In Use**
Date Closed:	Not reported

HELE KAPAHULU #61013 (Continued) **U003402810**

Tank Capacity: 12000
Substance: Gasohol

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 1
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 1
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 2
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 2
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 2
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

HELE KAPAHULU #61013 (Continued) **U003402810**

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 2
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 12000
Substance: Gasohol

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 3
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Diesel

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 3
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Diesel

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 3
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Diesel

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 3
Date Installed: 01/05/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Diesel

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE

HELE KAPAHULU #61013 (Continued) **U003402810**

City,State,Zip: HONOLULU, HI 96816

Tank ID: r-1
Date Installed: 05/06/1982
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-1
Date Installed: 05/06/1982
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-1
Date Installed: 05/06/1982
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-1
Date Installed: 05/06/1982
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-2
Date Installed: 05/01/1986
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

HELE KAPAHULU #61013 (Continued) **U003402810**

Tank ID: r-2
Date Installed: 05/01/1986
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-2
Date Installed: 05/01/1986
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-2
Date Installed: 05/01/1986
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 05/01/1986
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 05/01/1986
Tank Status: **Permanently out of Use**
Date Closed: 11/18/2008
Tank Capacity: 12000
Substance: Gasoline

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 05/01/1986

HELE KAPAHULU #61013 (Continued) **U003402810**

Tank Status:	**Permanently out of Use**
Date Closed:	11/18/2008
Tank Capacity:	12000
Substance:	Gasoline
Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	r-92
Date Installed:	05/01/1986
Tank Status:	**Permanently out of Use**
Date Closed:	11/18/2008
Tank Capacity:	12000
Substance:	Gasoline

HI Financial Assurance:

Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100914
Tank Id:	r-92
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True
Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100914
Tank Id:	3
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True
Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100914
Tank Id:	2
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True
Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100914
Tank Id:	1
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

HELE KAPAHULU #61013 (Continued) **U003402810**

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-1
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-1
Tank Status: Permanently out of Use
FRTYPE: Self Insured
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Self Insured
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Self Insured
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Self Insured

HELE KAPAHULU #61013 (Continued) **U003402810**

Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Self Insured
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Self Insured
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 03/28/2014
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-1
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 03/28/2014
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 03/28/2014
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914

HELE KAPAHULU #61013 (Continued) **U003402810**

Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 03/28/2014
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 03/28/2014
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 03/28/2014
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2015
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2015
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2015
FR Archive: True

Name: HELE KAPAHULU #61013

HELE KAPAHULU #61013 (Continued) **U003402810**

Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-1
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2015
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2015
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2015
FR Archive: True

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2022
FR Archive: False

Name: HELE KAPAHULU #61013
Address: 707 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100914
Tank Id: r-1
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2022

HELE KAPAHULU #61013 (Continued) **U003402810**

FR Archive:	False
Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100914
Tank Id:	1
Tank Status:	Currently In Use
FRTYPE:	Insurance
Expiration Date:	09/30/2022
FR Archive:	False
Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100914
Tank Id:	2
Tank Status:	Currently In Use
FRTYPE:	Insurance
Expiration Date:	09/30/2022
FR Archive:	False
Name:	HELE KAPAHULU #61013
Address:	707 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100914
Tank Id:	r-2
Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	09/30/2022
FR Archive:	False

S135 **PACIFIC RESOURCES INC** **EDR Hist Auto** **1021682106**
NE **707 KAPAHULA AVE** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.056 mi.
294 ft. **Site 4 of 5 in cluster S**

Actual: EDR Hist Auto
13 ft.

Focus Map: Year: Name: Type:
8 1988 PACIFIC RESOURCES INC Gasoline Service Stations
1989 PACIFIC RESOURCES INC Gasoline Service Stations
1990 PACIFIC RESOURCES INC Gasoline Service Stations

S136 **PACIFIC RESOURCES INC** **EDR Hist Auto** **1021924470**
NE **707 KAPAHULE** **N/A**
< 1/8 **HONOLULU, HI 96817**
0.056 mi.
294 ft. **Site 5 of 5 in cluster S**

Actual: EDR Hist Auto
13 ft.

Focus Map: Year: Name: Type:
8 1986 PACIFIC RESOURCES INC Gasoline Service Stations
1987 PACIFIC RESOURCES INC Gasoline Service Stations

137
WSW
< 1/8
0.059 mi.
309 ft.

MAKIKI FIRE STATION #3
1202 WILDER AVE
HONOLULU, HI 96822

HI LUST **U004223395**
HI UST **N/A**
HI Financial Assurance

Actual:
57 ft.

Focus Map:
4

LUST:

Name:	MAKIKI FIRE STATION #3
Address:	1202 WILDER AVE
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100081
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	05/11/1995
Release ID:	910029
Project Officer:	Roger Brewer

UST:

Name:	MAKIKI FIRE STATION #3
Address:	1202 WILDER AVE
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100081
Owner:	C&C OF HNL - HONOLULU FIRE DEPARATMENT
Owner Address:	636 South Street
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	21.306700
Longitude:	-157.839130
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	1
Date Installed:	04/30/1991
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	1000
Substance:	Diesel

Name:	MAKIKI FIRE STATION #3
Address:	1202 WILDER AVE
City,State,Zip:	HONOLULU, HI 96822

Tank ID:	1
Date Installed:	04/30/1991
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	1000
Substance:	Diesel

Name:	MAKIKI FIRE STATION #3
Address:	1202 WILDER AVE
City,State,Zip:	HONOLULU, HI 96822

Tank ID:	1
Date Installed:	04/30/1991
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	1000
Substance:	Diesel

Name:	MAKIKI FIRE STATION #3

MAKIKI FIRE STATION #3 (Continued) **U004223395**

Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822

Tank ID: 1
Date Installed: 04/30/1991
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822

Tank ID: 1
Date Installed: 04/30/1991
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-1
Date Installed: 01/30/1955
Tank Status: **Permanently Out of Use**
Date Closed: 05/18/1991
Tank Capacity: 500
Substance: Diesel

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-1
Date Installed: 01/30/1955
Tank Status: **Permanently Out of Use**
Date Closed: 05/18/1991
Tank Capacity: 500
Substance: Diesel

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-1
Date Installed: 01/30/1955
Tank Status: **Permanently Out of Use**
Date Closed: 05/18/1991
Tank Capacity: 500
Substance: Diesel

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822

MAKIKI FIRE STATION #3 (Continued) **U004223395**

Tank ID: R-1
Date Installed: 01/30/1955
Tank Status: **Permanently Out of Use**
Date Closed: 05/18/1991
Tank Capacity: 500
Substance: Diesel

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-1
Date Installed: 01/30/1955
Tank Status: **Permanently Out of Use**
Date Closed: 05/18/1991
Tank Capacity: 500
Substance: Diesel

HI Financial Assurance:
Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100081
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: 06/30/2015
FR Archive: True

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100081
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: 06/30/2015
FR Archive: True

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100081
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: 06/30/2019
FR Archive: False

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100081
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: 06/30/2019

MAKIKI FIRE STATION #3 (Continued) **U004223395**

FR Archive: False

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100081
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 08/18/2021
FR Archive: False

Name: MAKIKI FIRE STATION #3
Address: 1202 WILDER AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100081
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 08/18/2021
FR Archive: False

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138 **GEORGES SHELL SERVICE** **EDR Hist Auto** **1020615274**
NNE **1944 KAPIOLANI BLVD** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.063 mi.
335 ft.

Actual: EDR Hist Auto
3 ft.

Focus Map:
5

Year:	Name:	Type:
1969	GEORGES SHELL SERVICE	Gasoline Service Stations
1970	GEORGES SHELL SERVICE	Gasoline Service Stations
1971	GEORGES SHELL SERVICE	Gasoline Service Stations
1972	GEORGES SHELL SERVICE	Gasoline Service Stations
1973	GEORGES SHELL SERVICE	Gasoline Service Stations
1974	GEORGES SHELL SERVICE	Gasoline Service Stations
1975	OKA GEORGE INC	Gasoline Service Stations
1976	OKA GEORGE INC	Gasoline Service Stations
1977	OKA GEORGE INC	Gasoline Service Stations
1978	OKA GEORGE INC	Gasoline Service Stations
1979	OKA GEORGE INC	Gasoline Service Stations
1980	OKA GEORGE INC	Gasoline Service Stations
1982	OKA GEORGE INC	Gasoline Service Stations
1983	OKA GEORGE INC	Gasoline Service Stations

W139 **THE PALMS, INC.** **RCRA NonGen / NLR** **1018274551**
SW **431 NAHUA STREET** **FINDS** **HIP000143727**
< 1/8 **HONOLULU, HI 96815** **ECHO**
0.066 mi.
347 ft. **Site 1 of 2 in cluster W**

Actual: RCRA Listings:
3 ft.
Date Form Received by Agency: 20160802
Focus Map: Handler Name: THE PALMS, INC.
8 Handler Address: 431 NAHUA STREET

THE PALMS, INC. (Continued) **1018274551**

Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIP000143727
Contact Name:		MELODY PAI
Contact Address:		NAHUA STREET
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-304-6229
Contact Fax:		Not reported
Contact Email:		AOAOPALMS@AOL.COM
Contact Title:		RESIDENT MANAGER
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		NAHUA STREET
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	THE PALMS, INC.	
Owner Type:		Private
Operator Name:	THE PALMS, INC.	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No

THE PALMS, INC. (Continued) **1018274551**

TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20160802
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: THE PALMS, INC.	
Legal Status:	Private
Date Became Current:	19640101
Date Ended Current:	Not reported
Owner/Operator Address:	431 NAHUA STREET
Owner/Operator City,State,Zip:	HONOLULU, HI 96815
Owner/Operator Telephone:	808-923-5978
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name: THE PALMS, INC.	
Legal Status:	Private
Date Became Current:	19640101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: THE PALMS, INC.	
Legal Status:	Private
Date Became Current:	19640101
Date Ended Current:	Not reported
Owner/Operator Address:	431 NAHUA STREET
Owner/Operator City,State,Zip:	HONOLULU, HI 96815
Owner/Operator Telephone:	808-923-5978

THE PALMS, INC. (Continued) **1018274551**

Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: THE PALMS, INC.
Legal Status: Private
Date Became Current: 19640101
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20160802
Handler Name: THE PALMS, INC.
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20160502
Handler Name: THE PALMS, INC.
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 531311
NAICS Description: RESIDENTIAL PROPERTY MANAGERS

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

THE PALMS, INC. (Continued) **1018274551**

FINDS:
Registry ID: 110067675359

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1018274551
Registry ID:	110067675359
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110067675359
Name:	THE PALMS, INC.
Address:	431 NAHUA STREET
City,State,Zip:	HONOLULU, HI 96815

X140 **BERGER AUTOHAUS, INC** **HI SHWS** **S121405851**
SE **3030 WAIALAE AVE** **HI ENG CONTROLS** **N/A**
< 1/8 **HONOLULU, HI 96816** **HI INST CONTROL**
0.066 mi.
347 ft. **Site 1 of 7 in cluster X**

Actual:
43 ft.

Focus Map:
5

SHWS:

Name:	BERGER AUTOHAUS, INC
Address:	3030 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Berger AutoHaus, Inc
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Iris van der Zander
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Berger AutoHaus, Inc
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: TPH-O and Lead.
Nature of Residual Contamination:	TPH-o and Lead.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported

BERGER AUTOHAUS, INC (Continued) **S121405851**

Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	05/16/2018
Document Number:	2018-140-IV
Document Subject:	No Further Action (NFA) with Institutional Controls (ICs) at 3028/3030 Waialae Ave
Project Manager:	Iris van der Zander
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	923
Location Description:	3030 Waialae Ave, 3028 Waialae Ave
Is Public:	True
Update On:	2020-04-07 15:57:21
Latitude:	21.289298
Longitude:	-157.811629

Name:	BERGER AUTOHAUS, INC
Address:	3030 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Berger AutoHaus, Inc
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Iris van der Zander
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Berger AutoHaus, Inc
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: TPH-O and Lead.
Nature of Residual Contamination:	TPH-o and Lead.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	05/16/2018
Document Number:	2018-140-IV
Document Subject:	No Further Action (NFA) with Institutional Controls (ICs) at 3028/3030 Waialae Ave
Project Manager:	Iris van der Zander
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	923
Location Description:	3030 Waialae Ave, 3028 Waialae Ave
Is Public:	True
Update On:	2020-04-07 15:57:21
Latitude:	21.289298

BERGER AUTOHAUS, INC (Continued) **S121405851**

Longitude: -157.811629

ENG CONTROLS:
Supplemental Location Text: Not reported
Zip Suffix: Not reported
Island: Oahu
Potential Hazards And Controls: Hazard Managed With Controls
Engineering Control: Engineering Control Required

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

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X141 **BERGERS AUTOHAUS INC** **HI LUST** **1000234132**
SE **3030 WAIALAE AVE** **HI UST** **HID982017170**
< 1/8 **HONOLULU, HI 96816** **HI SPILLS**
0.066 mi. **RCRA NonGen / NLR**
347 ft. **Site 2 of 7 in cluster X** **ECHO**

Actual:
43 ft.

Focus Map:
5

LUST:
Name: BERGER'S AUTOHAUS, INC.
Address: 3030 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101454
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 12/22/1997
Release ID: 960064
Project Officer: Steven Okoji

UST:
Name: BERGER'S AUTOHAUS, INC.
Address: 3030 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101454
Owner: BERGER'S AUTOHAUS, INC.
Owner Address: 3030 WAIALAE AVENUE
Owner City,St,Zip: Honolulu, 96816 96816
Latitude: 21.289242
Longitude: -157.811696
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 05/08/1983
Tank Status: **Permanently Out of Use**
Date Closed: 05/13/1995
Tank Capacity: 500
Substance: Used Oil

SPILLS:
Name: BERGER AUTOHAUS, INC
Address: 3030 WAIALAE AVE
Address 2: Not reported

BERGERS AUTOHAUS INC (Continued) **1000234132**

City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19930315-2
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	Berger AutoHaus, Inc
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Gas
Quanity:	0
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.289394000000001
Longitude:	-157.81162599999999

RCRA Listings:

Date Form Received by Agency:		19870728
Handler Name:	BERGERS AUTOHAUS INC	
Handler Address:		3030 WAIALAE AVE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HID982017170
Contact Name:		ENVIRONMENTAL MANAGER
Contact Address:		3030 WAIALAE AVE
Contact City,State,Zip:		HONOLULU, HI 96816
Contact Telephone:		808-735-2488
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09

BERGERS AUTOHAUS INC (Continued) **1000234132**

Land Type:		Other
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		3030 WAIALAE AVE
Mailing City,State,Zip:		HONOLULU, HI 96816
Owner Name:	BERGER WILLIAM J	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No

BERGERS AUTOHAUS INC (Continued) **1000234132**

Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20020729
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: BERGER WILLIAM J
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19870728
Handler Name: BERGERS AUTOHAUS INC
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 44111
NAICS Description: NEW CAR DEALERS

BERGERS AUTOHAUS INC (Continued) **1000234132**

NAICS Code: 811111
NAICS Description: GENERAL AUTOMOTIVE REPAIR

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 19951212
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

BERGERS AUTOHAUS INC (Continued) **1000234132**

ECHO:

Envid:	1000234132
Registry ID:	110005726081
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005726081
Name:	BERGERS AUTOHAUS SALES INC
Address:	3030 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816

X142 **BERGERS AUTOHAUS SALES INC** **RCRA-VSQG** **1000234133**
SE **3030 WAIALAE AVE** **FINDS** **HID982018475**
< 1/8 **HONOLULU, HI 96816**
0.066 mi.
347 ft. **Site 3 of 7 in cluster X**

Actual:
43 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		19870729
Handler Name:	BERGERS AUTOHAUS SALES INC	
Handler Address:		3030 WAIALAE AVE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HID982018475
Contact Name:		ENVIRONMENTAL MANAGER
Contact Address:		3030 WAIALAE AVE
Contact City,State,Zip:		HONOLULU, HI 96816
Contact Telephone:		808-735-2488
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		WAIALAE AVE
Mailing City,State,Zip:		HONOLULU, HI 96816
Owner Name:	BERGER WILLIAM J	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported

BERGERS AUTOHAUS SALES INC (Continued) **1000234133**

Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: BERGER WILLIAM J	

BERGERS AUTOHAUS SALES INC (Continued) **1000234133**

Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19870729
Handler Name:	BERGERS AUTOHAUS SALES INC
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	44111
NAICS Description:	NEW CAR DEALERS

Facility Has Received Notices of Violation:

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported

BERGERS AUTOHAUS SALES INC (Continued) **1000234133**

SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19951212
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported

BERGERS AUTOHAUS SALES INC (Continued) **1000234133**

Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20081126
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	JUNG
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110005726081

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

Y143 **WAIKIKI TEXACO SERVICE** **EDR Hist Auto** **1020354594**
SW **1922 KALAKAUA AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.071 mi.
377 ft. **Site 1 of 3 in cluster Y**

Actual:
3 ft.

EDR Hist Auto

Focus Map:
8

Year:	Name:	Type:
1969	WAIKIKI TEXACO SERVICE	Gasoline Service Stations
1970	WAIKIKI TEXACO SERVICE	Gasoline Service Stations
1971	WAIKIKI TEXACO SERVICE	Gasoline Service Stations
1972	WAIKIKI TEXACO SERVICE	Gasoline Service Stations
1973	WAIKIKI TEXACO SERVICE	Gasoline Service Stations
1974	WAIKIKI TEXACO SERVICE	Gasoline Service Stations
1975	WAIKIKI TEXACO SERVICE	Gasoline Service Stations
1976	WAIKIKI TEXACO SERVICE	Gasoline Service Stations
1977	WAIKIKI TEXACO SERVICE	Gasoline Service Stations

Z144 **IES RETAIL MANOA** **RCRA-VSQG** **1009398553**
North **2927 E MANOA RD UNIT B** **HIR000137604**
< 1/8 **HONOLULU, HI 96822**
0.072 mi.
378 ft. **Site 1 of 5 in cluster Z**

Actual:
152 ft.

Focus Map:
6

RCRA Listings:

Date Form Received by Agency:		20161028
Handler Name:	IES RETAIL MANOA	
Handler Address:		2927 E MANOA RD UNIT B
Handler City,State,Zip:		HONOLULU, HI 96822
EPA ID:		HIR000137604
Contact Name:		MARC DEXTER
Contact Address:		91-480 MALAKOLE ST.
Contact City,State,Zip:		KAPOLEI, HI 96707
Contact Telephone:		808-682-5711
Contact Fax:		808-682-2214
Contact Email:		MARC.DEXTER@ISLANDENERGYSERVICES.COM
Contact Title:		EHS MANAGER
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		91-480 MALAKOLE ST.
Mailing City,State,Zip:		KAPOLEI, HI 96707
Owner Name:	IES RETAIL, LLC	
Owner Type:		Private
Operator Name:	IES RETAIL, LLC	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

IES RETAIL MANOA (Continued) **1009398553**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20161028
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D008
Waste Description:	LEAD
Waste Code:	D018
Waste Description:	BENZENE

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: CHEVRON USA INC	
Legal Status:	Private
Date Became Current:	19780601
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported

IES RETAIL MANOA (Continued) **1009398553**

Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: CHEVRON USA INC
Legal Status: Private
Date Became Current: 19780601
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: CHEVRON USA INC
Legal Status: Private
Date Became Current: 19780601
Date Ended Current: Not reported
Owner/Operator Address: PO BOX 6004
Owner/Operator City,State,Zip: SAN RAMON, CA 94583-2324
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: IES RETAIL, LLC
Legal Status: Private
Date Became Current: 20161101
Date Ended Current: Not reported
Owner/Operator Address: 30 ROCKEFELLER PLAZA
Owner/Operator City,State,Zip: NEW YORK, NY 10112
Owner/Operator Telephone: 212-605-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: IES RETAIL, LLC
Legal Status: Private
Date Became Current: 20161101
Date Ended Current: Not reported
Owner/Operator Address: 30 ROCKEFELLER PLAZA
Owner/Operator City,State,Zip: NEW YORK, NY 10112
Owner/Operator Telephone: 212-605-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: CHEVRON USA INC
Legal Status: Private
Date Became Current: 19780601
Date Ended Current: Not reported
Owner/Operator Address: PO BOX 6004
Owner/Operator City,State,Zip: SAN RAMON, CA 94583-2324

IES RETAIL MANOA (Continued) **1009398553**

Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20070312
Handler Name: CHEVRON SS NO 95683
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20060322
Handler Name: CHEVRON SS NO 95683
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20161028
Handler Name: IES RETAIL MANOA
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 44711
NAICS Description: GASOLINE STATIONS WITH CONVENIENCE STORES

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

Z145 **MANOA SERVICE 95683** **HI LUST** **U003221661**
North **2927 E MANOA RD** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96822** **HI SPILLS**
0.072 mi. **HI Financial Assurance**
378 ft. **Site 2 of 5 in cluster Z**

Actual:
152 ft.

Focus Map:
6

LUST:

Name:	MANOA SERVICE 95683
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-101246
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	08/09/2005
Release ID:	040016
Project Officer:	Haven Westerman

UST:

Name:	MANOA SERVICE 95683
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-101246
Owner:	CHEVRON PRODUCTS COMPANY
Owner Address:	Attn Permit Desk PO Box 6004
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	21.309750
Longitude:	-157.809710
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	1
Date Installed:	01/01/1984
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol

Name:	MANOA SERVICE 95683
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822

Tank ID:	1
Date Installed:	01/01/1984
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol

Name:	MANOA SERVICE 95683
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822

Tank ID:	1
Date Installed:	01/01/1984
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol

Name:	MANOA SERVICE 95683

MANOA SERVICE 95683 (Continued) **U003221661**

Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: 2
Date Installed: 01/01/1984
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: 2
Date Installed: 01/01/1984
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: 2
Date Installed: 01/01/1984
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: 3
Date Installed: 01/01/1984
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: 3
Date Installed: 01/01/1984
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

MANOA SERVICE 95683 (Continued) **U003221661**

Tank ID:	3
Date Installed:	01/01/1984
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	MANOA SERVICE 95683
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-4
Date Installed:	01/01/1984
Tank Status:	**Permanently Out of Use**
Date Closed:	03/21/1997
Tank Capacity:	1000
Substance:	Used Oil
Name:	MANOA SERVICE 95683
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-4
Date Installed:	01/01/1984
Tank Status:	**Permanently Out of Use**
Date Closed:	03/21/1997
Tank Capacity:	1000
Substance:	Used Oil
Name:	MANOA SERVICE 95683
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-4
Date Installed:	01/01/1984
Tank Status:	**Permanently Out of Use**
Date Closed:	03/21/1997
Tank Capacity:	1000
Substance:	Used Oil

SPILLS:

Name:	MANOA CHEVRON SERVICE STATION LEAKING HYDRAULIC HOIST
Address:	Not reported
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20161122-1507
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	Not reported
ER:	No
Less Or Greater Than:	Not reported
Units:	Not reported
Activity Type:	Not reported
Activity Lead:	Not reported
Assignment End Date:	Not reported

MANOA SERVICE 95683 (Continued) **U003221661**

Result:	NFA
File Under:	Not reported
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	11/22/16 8:07 PM EST
Release Date:	Not reported
Release Duration:	Not reported
Media:	Soil
Waterbody:	Not reported
Summary:	Removal of a hydraulic hoist on 10/25/2016. Samples taken 7.5 feet bgs and did not see evidence of petroleum contaminated soil. Analytical results indicate PAH and TPH-O below DOH EALs. Please note that the Incident Case No. assigned to the case is 20161122-1507LG and not 20161122-1057LG. Report: Hoist Removal Soil Sampling Technical Memo, Manoa Chevron Service Station, 2927 East Manoa Road, Honolulu, Hawaii, Island Energy Services Facility No. 95683, December 1, 2016, prepared by Arcadis, U.S. Inc. to Marc Dexter. The Hawaii Department of Health (HDOH), Hazard Evaluation and Emergency Response (HEER) Office has reviewed the subject document. It is unclear if the confirmation sample taken and analyzed followed the HDOH HEER s Technical Guidance Manual using multi-incremental sampling. DOH concurs with the report which documents the response actions taken as a result of the hoist removal. Please be aware that if future information indicate that contaminant exposure at the site becomes a threat to public health, the environment or natural resources, the HDOH may require additional investigation and/or cleanup work be performed.
Is Noteworthy for Reports:	No
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Liz Galvez
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Off-scene
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Mar 31, 2017
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

HI Financial Assurance:

Name:	MANOA SERVICE 95683
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-101246
Tank Id:	2
Tank Status:	Currently in Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

MANOA SERVICE 95683 (Continued) **U003221661**

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Guarantee
Expiration Date: 04/27/2012
FR Archive: True

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Guarantee
Expiration Date: 04/27/2012
FR Archive: True

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Guarantee

MANOA SERVICE 95683 (Continued) **U003221661**

Expiration Date: 04/27/2012
FR Archive: True

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 04/27/2012
FR Archive: True

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

Name: MANOA SERVICE 95683
Address: 2927 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101246
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 11/01/2021
FR Archive: False

Z146 **MANOA SERVICE STATION** **EDR Hist Auto** **1020155603**
North **2927 E MANOA RD** **N/A**
< 1/8 **HONOLULU, HI 96819**
0.072 mi.
378 ft. **Site 3 of 5 in cluster Z**

Actual: EDR Hist Auto
152 ft.

Focus Map:
6

Year:	Name:	Type:
1969	MANOA SERVICE STATION	Gasoline Service Stations
1970	MANOA SERVICE STATION	Gasoline Service Stations
1971	MANOA SERVICE STATION	Gasoline Service Stations
1972	MANOA SERVICE STATION	Gasoline Service Stations
1973	MANOA SERVICE STATION	Gasoline Service Stations
1974	MANOA SERVICE STATION	Gasoline Service Stations
1975	MANOA SERVICE INC	Gasoline Service Stations
1976	MANOA SERVICE INC	Gasoline Service Stations
1977	MANOA SERVICE INC	Gasoline Service Stations
1978	MANOA SERVICE INC	Gasoline Service Stations
1979	MANOA SERVICE INC	Gasoline Service Stations
1980	MANOA SERVICE INC	Gasoline Service Stations
1982	MANOA SERVICE INC	Gasoline Service Stations
1983	MANOA SERVICE INC	Gasoline Service Stations
1985	MANOA SERVICE INC	Gasoline Service Stations
1986	MANOA SERVICE INC	Gasoline Service Stations
1987	MANOA SERVICE INC	Gasoline Service Stations
1988	MANOA SERVICE INC	Gasoline Service Stations
1989	MANOA SERVICE INC	Gasoline Service Stations
1990	MANOA SERVICE INC	Gasoline Service Stations
1991	MANOA SERVICE INC	Gasoline Service Stations
1992	MANOA SERVICE INC	Gasoline Service Stations
1993	MANOA SERVICE INC	Gasoline Service Stations
1994	MANOA SERVICE INC	Gasoline Service Stations
1995	MANOA SERVICE INC	Gasoline Service Stations
1996	MANOA SERVICE INC	Gasoline Service Stations
1997	MANOA SERVICE INC	Gasoline Service Stations
1998	MANOA SERVICE INC	Gasoline Service Stations
1999	MANOA SERVICE INC	Gasoline Service Stations
2000	MANOA SERVICE INC	Gasoline Service Stations
2001	MANOA SERVICE INC	Gasoline Service Stations
2002	MANOA SERVICE INC	Gasoline Service Stations
2003	MANOA SERVICE INC	Gasoline Service Stations
2004	MANOA SERVICE INC	Gasoline Service Stations
2005	MANOA SERVICE INC	Gasoline Service Stations
2006	MANOA SERVICE INC	Gasoline Service Stations
2007	MANOA SERVICE INC	Gasoline Service Stations
2008	MANOA SERVICE INC	Gasoline Service Stations
2009	MANOA SERVICE INC	Gasoline Service Stations
2010	MANOA SERVICE INC	Gasoline Service Stations
2011	MANOA SERVICE INC	Gasoline Service Stations
2012	MANOA SERVICE INC	Gasoline Service Stations
2013	MANOA SERVICE INC	Gasoline Service Stations
2014	MANOA SERVICE INC	Gasoline Service Stations

Z147 **IES RETAIL MANOA** **RCRA NonGen / NLR** **1000327564**
North **2927 E MANOA RD** **FINDS** **HID981970478**
< 1/8 **HONOLULU, HI 96822** **ECHO**
0.072 mi.
378 ft. **Site 4 of 5 in cluster Z**

Actual:
152 ft.

Focus Map:
6

RCRA Listings:

Date Form Received by Agency:		19870519
Handler Name:	MANOA SERVICE INC	
Handler Address:		2927 E MANOA RD
Handler City,State,Zip:		HONOLULU, HI 96822
EPA ID:		HID981970478
Contact Name:		ELOISE MARUGAME
Contact Address:		2927 E MANOA RD
Contact City,State,Zip:		HONOLULU, HI 96822
Contact Telephone:		808-988-3622
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Other
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		2927 E MANOA RD
Mailing City,State,Zip:		HONOLULU, HI 96822
Owner Name:	MANOA SERVICE	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

IES RETAIL MANOA (Continued) **1000327564**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: MANOA SERVICE	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

IES RETAIL MANOA (Continued) **1000327564**

Historic Generators:
- Receive Date: 19870519
- Handler Name: MANOA SERVICE INC
- Federal Waste Generator Description: Not a generator, verified
- State District Owner: Not reported
- Large Quantity Handler of Universal Waste: No
- Recognized Trader Importer: No
- Recognized Trader Exporter: No
- Spent Lead Acid Battery Importer: No
- Spent Lead Acid Battery Exporter: No
- Current Record: Yes
- Non Storage Recycler Activity: Not reported
- Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
- NAICS Code: 4471
- NAICS Description: GASOLINE STATIONS

- NAICS Code: 811111
- NAICS Description: GENERAL AUTOMOTIVE REPAIR

Facility Has Received Notices of Violation:
- Found Violation: No
- Agency Which Determined Violation: Not reported
- Violation Short Description: Not reported
- Date Violation was Determined: Not reported
- Actual Return to Compliance Date: Not reported
- Return to Compliance Qualifier: Not reported
- Violation Responsible Agency: Not reported
- Scheduled Compliance Date: Not reported
- Enforcement Identifier: Not reported
- Date of Enforcement Action: Not reported
- Enforcement Responsible Agency: Not reported
- Enforcement Docket Number: Not reported
- Enforcement Attorney: Not reported
- Corrective Action Component: Not reported
- Appeal Initiated Date: Not reported
- Appeal Resolution Date: Not reported
- Disposition Status Date: Not reported
- Disposition Status: Not reported
- Disposition Status Description: Not reported
- Consent/Final Order Sequence Number: Not reported
- Consent/Final Order Respondent Name: Not reported
- Consent/Final Order Lead Agency: Not reported
- Enforcement Type: Not reported
- Enforcement Responsible Person: Not reported
- Enforcement Responsible Sub-Organization: Not reported
- SEP Sequence Number: Not reported
- SEP Expenditure Amount: Not reported
- SEP Scheduled Completion Date: Not reported
- SEP Actual Date: Not reported
- SEP Defaulted Date: Not reported
- SEP Type: Not reported
- SEP Type Description: Not reported
- Proposed Amount: Not reported
- Final Monetary Amount: Not reported

IES RETAIL MANOA (Continued) **1000327564**

Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19951212
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110024542217

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000327564
Registry ID:	110024542217
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110024542217
Name:	IES RETAIL MANOA
Address:	2927 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822

148
SW
< 1/8
0.074 mi.
392 ft.

MANOA CENTRAL OFFICE **HI UST** **U003221606**
2803 LOWREY AVE **HI Financial Assurance** **N/A**
HONOLULU, HI 96822

Actual:
165 ft.

Focus Map:
6

UST:

Name:	MANOA CENTRAL OFFICE
Address:	2803 LOWREY AVE
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100517
Owner:	Hawaiian Telcom
Owner Address:	1177 Bishop Street, Suite 30
Owner City,St,Zip:	Honolulu, 96822 96822

MANOA CENTRAL OFFICE (Continued) **U003221606**

Latitude: 21.312000
Longitude: -157.809520
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: M-1
Date Installed: 05/07/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 550
Substance: Diesel

HI Financial Assurance:
Name: MANOA CENTRAL OFFICE
Address: 2803 LOWREY AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100517
Tank Id: M-1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: MANOA CENTRAL OFFICE
Address: 2803 LOWREY AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100517
Tank Id: M-1
Tank Status: Currently in Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: MANOA CENTRAL OFFICE
Address: 2803 LOWREY AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100517
Tank Id: M-1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 05/02/2015
FR Archive: True

Name: MANOA CENTRAL OFFICE
Address: 2803 LOWREY AVE
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100517
Tank Id: M-1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 05/02/2021
FR Archive: False

Y149 **CLABIR INVESTMENT C3** **EDR Hist Cleaner** **1019955764**
SW **224 MC CULLY ST** **N/A**
< 1/8 **HONOLULU, HI 96814**
0.075 mi.
394 ft. **Site 2 of 3 in cluster Y**

Actual: EDR Hist Cleaner
3 ft.

Focus Map:
8

Year:	Name:	Type:
1969	CLABIR INVESTMENT C3	Drycleaning Plants, Except Rugs
1970	CLABIR INVESTMENT C3	Drycleaning Plants, Except Rugs
1971	CLABIR INVESTMENT CO	Drycleaning Plants, Except Rugs
1972	PHILLIPS AL THE CLEANERS INC	Drycleaning Plants, Except Rugs
1973	PHILLIPS AL THE CLEANERS INC	Drycleaning Plants, Except Rugs
1974	PHILLIPS AL THE CLEANERS INC	Drycleaning Plants, Except Rugs
1975	PHILLIPS AL THE CLEANERS INC	Drycleaning Plants, Except Rugs
1976	PHILLIPS AL THE CLEANERS INC	Drycleaning Plants, Except Rugs
1977	PHILLIPS AL THE CLEANERS INC	Drycleaning Plants, Except Rugs
1978	PHILLIPS AL THE CLEANERS INC	Drycleaning Plants, Except Rugs

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150 **KEE - THEMA INC** **HI UST** **U003998219**
SSW **3060 KAPIOLANI BLVD** **N/A**
< 1/8 **HONOLULU, HI 96814**
0.076 mi.
399 ft.

Actual: UST:
30 ft.

Focus Map:
5

Name:	KEE - THEMA INC
Address:	3060 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-103795
Owner:	Kee-Thelma Inc
Owner Address:	909 Hauoli Street
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	r-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	04/25/2005
Tank Capacity:	6500
Substance:	Gasoline

---

151 **HECO TRANSFOMER 27266 SELF IMPLEMENTING PCB CLEANU** **HI SHWS** **S110061486**
SW **249 LILIUOKALANI AVE** **HI SPILLS** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.076 mi.
402 ft.

Actual: SHWS:
3 ft.

Focus Map:
8

Name:	HECO TRANSFOMER 27266 SELF IMPLEMENTING PCB CLEANUP
Address:	249 LILIUOKALANI AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu

HECO TRANSFOMER 27266 SELF IMPLEMENTING PCB CLEANUP (Continued) **S110061486**

Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	TSCA
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	TSCA
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	469
Location Description:	249 Liliuokalani Ave
Is Public:	True
Update On:	2020-01-17 19:12:57
Latitude:	21.276196
Longitude:	-157.820965

SPILLS:

Name:	HECO TRANSFOMER 27266
Address:	249 LILIUOKALANI AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Mona-Marie Apartments
Case Number:	20080603-1413
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	Not reported
Units:	HECO Pad-Mount Transformer No. 27266
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Hawaiian Electric Co., Inc. (HECO)
Substances:	Transformer Oil

HECO TRANSFOMER 27266 SELF IMPLEMENTING PCB CLEANUP (Continued) **S110061486**

Quanity:	4
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.276201
Longitude:	-157.82115200000001
Name:	HECO TRANSFOMER 27266
Address:	249 LILIUOKALANI AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Mona-Marie Apartments
Case Number:	20080603-1413
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	Not reported
Units:	HECO Pad-Mount Transformer No. 27266
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Hawaiian Electric Co., Inc. (HECO)
Substances:	Transformer Oil
Quanity:	4
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported

HECO TRANSFOMER 27266 SELF IMPLEMENTING PCB CLEANUP (Continued) **S110061486**

Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.276201
Longitude:	-157.82115400000001

U152 **SERAI'S UNION SERVICE L-4922** **HI LUST** **U001235019**
South **3011 WAIALAE AVE** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.076 mi.
403 ft. **Site 6 of 8 in cluster U**

Actual:
40 ft.

Focus Map:
5

LUST:

Name:	SERAI'S UNION SERVICE L-4922
Address:	3011 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100044
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/29/2001
Release ID:	920187
Project Officer:	Shunsheng Fu

Name:	SERAI'S UNION SERVICE L-4922
Address:	3011 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100044
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	05/02/2001
Release ID:	950025
Project Officer:	Shunsheng Fu

UST:

Name:	SERAI'S UNION SERVICE L-4922
Address:	3011 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100044
Owner:	UNOCAL CORPORATION
Owner Address:	3915 Mission Avenue #7416
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.288869
Longitude:	-157.812376
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

Tank ID:	R-1
Date Installed:	03/26/1962
Tank Status:	**Permanently Out of Use**

SERAI'S UNION SERVICE L-4922 (Continued) **U001235019**

Date Closed: 05/27/1992
Tank Capacity: 6000
Substance: Gasoline

Name: SERAI'S UNION SERVICE L-4922
Address: 3011 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-2
Date Installed: 03/26/1962
Tank Status: **Permanently Out of Use**
Date Closed: 05/27/1992
Tank Capacity: 6000
Substance: Gasoline

Name: SERAI'S UNION SERVICE L-4922
Address: 3011 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 03/26/1962
Tank Status: **Permanently Out of Use**
Date Closed: 03/30/1990
Tank Capacity: 4000
Substance: Gasoline

Name: SERAI'S UNION SERVICE L-4922
Address: 3011 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 03/26/1962
Tank Status: **Permanently Out of Use**
Date Closed: 03/30/1990
Tank Capacity: 280
Substance: Used Oil

Name: SERAI'S UNION SERVICE L-4922
Address: 3011 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-5
Date Installed: 03/30/1990
Tank Status: **Permanently Out of Use**
Date Closed: 05/27/1992
Tank Capacity: 550
Substance: Used Oil

U153 **SERAIS UNION SERVICE** **EDR Hist Auto** **1021623225**
South **3011 WAIALAE AVE** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.076 mi.
403 ft. **Site 7 of 8 in cluster U**

Actual: EDR Hist Auto
40 ft.

Focus Map:
5

Year:	Name:	Type:
1971	SERAIS UNION SERVICE	Gasoline Service Stations
1972	SERAIS UNION SERVICE	Gasoline Service Stations
1973	SERAIS UNION SERVICE	Gasoline Service Stations
1974	SERAIS UNION SERVICE	Gasoline Service Stations
1976	SERAIS UNION SERVICE	Gasoline Service Stations
1977	SERAIS UNION SERVICE	Gasoline Service Stations
1978	SERAIS UNION SERVICE	Gasoline Service Stations
1979	SERAIS UNION SERVICE	Gasoline Service Stations
1980	SERAIS UNION SERVICE	Gasoline Service Stations
1982	SERAIS UNION SERVICE	Gasoline Service Stations
1983	SERAIS UNION SERVICE	Gasoline Service Stations
1985	SERAIS UNION SERVICE	Gasoline Service Stations
1986	SERAIS UNION SERVICE	Gasoline Service Stations
1987	SERAIS UNION SERVICE	Gasoline Service Stations
1988	SERAIS SERVICE & REPAIRS INC	Gasoline Service Stations
1989	SERAIS SERVICE & REPAIRS INC	Gasoline Service Stations, NEC
1990	SERAIS SERVICE & REPAIRS INC	Gasoline Service Stations, NEC
1991	SERAIS SERVICE & REPAIRS INC	Gasoline Service Stations, NEC

U154 **UNOCAL 76 SS L 4922** **RCRA NonGen / NLR** **1000823242**
South **3011 WAIALAE AVE** **HID984468819**
< 1/8 **HONOLULU, HI 96816**
0.076 mi.
403 ft. **Site 8 of 8 in cluster U**

Actual: RCRA Listings:
40 ft.

Focus Map:
5

Date Form Received by Agency:		19930827
Handler Name:	UNOCAL 76 SS L 4922	
Handler Address:		3011 WAIALAE AVE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HID984468819
Contact Name:		A FRITZ
Contact Address:		PO BOX 659
Contact City,State,Zip:		HONOLULU, HI 96809
Contact Telephone:		808-522-7657
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PO BOX 659
Mailing City,State,Zip:		HONOLULU, HI 96809
Owner Name:	UNOCAL 76	
Owner Type:		Private

UNOCAL 76 SS L 4922 (Continued) **1000823242**

Operator Name:	Not reported
Operator Type:	Not reported
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required:	Not reported
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

UNOCAL 76 SS L 4922 (Continued) **1000823242**

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: UNOCAL 76	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	911 WILSHIRE BLVD STE 1010
Owner/Operator City,State,Zip:	LOS ANGELES, CA 90017
Owner/Operator Telephone:	213-977-7600
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19930827
Handler Name: UNOCAL 76 SS L 4922	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Codes:	No NAICS Codes Found

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

AA155 **NOELANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS** **HI SHWS** **S126283040**
WSW **2655 WOODLAWN DR** **N/A**
< 1/8 **HONOLULU, HI 96822**
0.078 mi.
412 ft. **Site 1 of 2 in cluster AA**

Actual:
141 ft.

Focus Map:
5

SHWS:

Name:	NOELANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	2655 WOODLAWN DR
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported

NOELANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S126283040**

Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	3024
Location Description:	2655 Woodlawn Dr, Honolulu, HI 96822, USA
Is Public:	True
Update On:	2021-11-10 16:56:06
Latitude:	21.306257
Longitude:	-157.811994

156
NNW
< 1/8
0.078 mi.
413 ft.

FUDS BASE YARD NO. 6 (WAIKIKI) **HI SHWS** **S121405913**
KAMOKU STREET **N/A**
WAIKIKI, HI

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	FUDS BASE YARD NO. 6 (WAIKIKI)
Address:	KAMOKU STREET
City,State,Zip:	WAIKIKI, HI
Supplemental Location:	H09HI003500
Island:	Oahu
Environmental Interest:	FUDS Base Yard No. 6 (Waikiki)
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	FUDS Base Yard No. 6 (Waikiki)
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low

FUDS BASE YARD NO. 6 (WAIKIKI) (Continued) **S121405913**

Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1871
Location Description:	Kamoku Street
Is Public:	True
Update On:	2020-08-05 15:42:32
Latitude:	21.284644
Longitude:	-157.822755

X157 **FREDERICK FONG M.D.** **HI LUST U004149682**
ESE **3034 AND 3036 WAIALAE AVE** **HI UST N/A**
< 1/8 **HONOLULU, HI 96813**
0.079 mi.
416 ft. **Site 4 of 7 in cluster X**

Actual:
42 ft.

Focus Map:
5

LUST:

Name:	FREDERICK FONG M.D.
Address:	3034 AND 3036 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96813
Facility ID:	9-103834
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/20/2012
Release ID:	120002
Project Officer:	Richard Takaba

UST:

Name:	FREDERICK FONG M.D.
Address:	3034 AND 3036 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96813
Facility ID:	9-103834
Owner:	F and F Land Corporation
Owner Address:	The Queen's Physican Office Building 1380 Lusitana Street, Suite 514
Owner City,St,Zip:	Honolulu, 96813 96813
Latitude:	21.289194
Longitude:	-157.811404
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Map
Tank ID:	r-1
Date Installed:	Not reported
Tank Status:	**Permanently out of Use**
Date Closed:	06/18/2007
Tank Capacity:	2000
Substance:	Unknown

FREDERICK FONG M.D. (Continued) **U004149682**

Name: FREDERICK FONG M.D.
Address: 3034 AND 3036 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96813

Tank ID: r-2
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 06/18/2007
Tank Capacity: 2000
Substance: Unknown

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158 **ARCADIA RETIREMENT** **HI LUST** **U003402852**
SE **1434 PUNAHOU ST** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96822**
0.080 mi.
420 ft.

Actual:
54 ft.

Focus Map:
5

LUST:
Name: ARCADIA RETIREMENT
Address: 1434 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-103458
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 02/12/1999
Release ID: 990006
Project Officer: Jeffrey Ung

UST:
Name: ARCADIA RETIREMENT
Address: 1434 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-103458
Owner: Acradia Retirement Residence
Owner Address: 1434 Punahou Stq
Owner City,St,Zip: Honolulu, 96822 96822
Latitude: 21.301592
Longitude: -157.833737
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-M-1
Date Installed: 01/01/1981
Tank Status: **Permanently Out of Use**
Date Closed: 07/07/1998
Tank Capacity: 300
Substance: Diesel

Name: ARCADIA RETIREMENT
Address: 1434 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-M-1
Date Installed: 01/01/1981
Tank Status: **Permanently Out of Use**
Date Closed: 07/07/1998
Tank Capacity: 300
Substance: Diesel

AB159 **ALOHA MOTORS** **HI LUST** **U001235755**
NNW **KAPIOLANI BLVD X KALAKAUA AVE** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.080 mi.
421 ft. **Site 1 of 9 in cluster AB**

Actual:
3 ft.

Focus Map:
5

LUST:

Name:	ALOHA MOTORS
Address:	KAPIOLANI BLVD X KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102160
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	04/12/1993
Release ID:	890025
Project Officer:	Raymond Seid

UST:

Name:	ALOHA MOTORS
Address:	KAPIOLANI BLVD X KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102160
Owner:	STATE DBEDT - CONVENTION CENTER AUTHORITY
Owner Address:	1833 KALAKAUA AVE, SUITE 800
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.290235
Longitude:	-157.835938
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported

Tank ID:	1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	Not reported
Substance:	Not Listed

Name:	ALOHA MOTORS
Address:	KAPIOLANI BLVD X KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815

Tank ID:	R-2
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	08/21/1995
Tank Capacity:	550
Substance:	Not Listed

Name:	ALOHA MOTORS
Address:	KAPIOLANI BLVD X KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815

Tank ID:	R-3
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	08/24/1995
Tank Capacity:	260
Substance:	Not Listed

Name:	ALOHA MOTORS

ALOHA MOTORS (Continued) **U001235755**

Address:	KAPIOLANI BLVD X KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	10/18/1995
Tank Capacity:	550
Substance:	Not Listed
Name:	ALOHA MOTORS
Address:	KAPIOLANI BLVD X KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-5
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	10/29/1996
Tank Capacity:	250
Substance:	Not Listed

AA160 **UNIVERSITY OF HAWAII INSTITUTE FOR ASTRONOMY MANOA** **RCRA-VSQG** **1025883886**
WSW **2680 WOODLAWN DRIVE** **HIR000145755**
< 1/8 **HONOLULU, HI 96822**
0.080 mi.
422 ft. **Site 2 of 2 in cluster AA**

Actual:
141 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:	20190614
Handler Name:	UNIVERSITY OF HAWAII INSTITUTE FOR ASTRONOMY MANOA
Handler Address:	2680 WOODLAWN DRIVE
Handler City,State,Zip:	HONOLULU, HI 96822
EPA ID:	HIR000145755
Contact Name:	CAROLYN OKI-IDOUCHI
Contact Address:	EAST-WEST ROAD
Contact City,State,Zip:	HONOLULU, HI 96822
Contact Telephone:	808-956-3201
Contact Fax:	808-956-3205
Contact Email:	COKI@HAWAII.EDU
Contact Title:	OCCUPATIONAL SAFETY SPECIALIST
EPA Region:	09
Land Type:	State
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	WOODLAWN DRIVE
Mailing City,State,Zip:	HONOLULU, HI 96822
Owner Name:	UNIVERSITY OF HAWAII AT MANOA
Owner Type:	State
Operator Name:	UNIVERSITY OF HAWAII INSTITUTE FOR ASTRONOMY (MANOA)
Operator Type:	State
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No

UNIVERSITY OF HAWAII INSTITUTE FOR ASTRONOMY MANOA (Continued) **1025883886**

Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20190626
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE

UNIVERSITY OF HAWAII INSTITUTE FOR ASTRONOMY MANOA (Continued) **1025883886**

Waste Code: D002
Waste Description: CORROSIVE WASTE

Waste Code: D009
Waste Description: MERCURY

Waste Code: F003
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: UNIVERSITY OF HAWAII AT MANOA
Legal Status: State
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 2500 CAMPUS ROAD
Owner/Operator City,State,Zip: HONOLULU, HI 96822
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: UNIVERSITY OF HAWAII INSTITUTE FOR ASTRONOMY (MANOA)
Legal Status: State
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 2680 WOODLAWN DRIVE
Owner/Operator City,State,Zip: HONOLULU, HI 96822
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20190614
Handler Name: UNIVERSITY OF HAWAII INSTITUTE FOR ASTRONOMY MANOA
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

UNIVERSITY OF HAWAII INSTITUTE FOR ASTRONOMY MANOA (Continued) **1025883886**

List of NAICS Codes and Descriptions:
NAICS Code: 541715
NAICS Description: RESEARCH AND DEVELOPMENT IN THE PHYSICAL, ENGINEERING, AND LIFE SCIENCES (EXCEPT NANOTECHNOLOGY AND BIOTECHNOLOGY

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

AC161 **COSMOS JEWELRY LTD.** **RCRA NonGen / NLR** **1015742085**
SSE **438 HOBRON LN #202** **HIR000141317**
< 1/8 **HONOLULU, HI 96815**
0.080 mi.
425 ft. **Site 1 of 3 in cluster AC**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		20120828
Handler Name:	COSMOS JEWELRY LTD.	
Handler Address:		438 HOBRON LN #202
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIR000141317
Contact Name:		DENNY WONG
Contact Address:		438 HOBRON LN #202
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-947-0188
Contact Fax:		808-947-2588
Contact Email:		DENNY@DENNYWONG.COM
Contact Title:		PRESIDENT
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		438 HOBRON LN #202
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	DENNY WONG	
Owner Type:		Private
Operator Name:	DENNY WONG	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No

COSMOS JEWELRY LTD. (Continued) **1015742085**

Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20120828
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: DENNY WONG	
Legal Status:	Private
Date Became Current:	19800101
Date Ended Current:	Not reported
Owner/Operator Address:	438 HOBRON LN #202
Owner/Operator City,State,Zip:	HONOLULU, HI 96815
Owner/Operator Telephone:	808-947-0188
Owner/Operator Telephone Ext:	Not reported

COSMOS JEWELRY LTD. (Continued) **1015742085**

Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: DENNY WONG
Legal Status: Private
Date Became Current: 19800101
Date Ended Current: Not reported
Owner/Operator Address: 438 HOBRON LN #202
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-947-0188
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20120828
Handler Name: COSMOS JEWELRY LTD.
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 42394
NAICS Description: JEWELRY, WATCH, PRECIOUS STONE, AND PRECIOUS METAL MERCHANT WHOLESALERS

Facility Has Received Notices of Violation:
Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20120728
Actual Return to Compliance Date: 20131002
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20130204
Enforcement Responsible Agency: State
Enforcement Docket Number: 12-HW-EA-04
Enforcement Attorney: WHARG
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: 20130204
Disposition Status: AS
Disposition Status Description: ACTION SATISFIED (CASE CLOSED)
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported

COSMOS JEWELRY LTD. (Continued) **1015742085**

Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 25000
Paid Amount: 25000
Final Count: 1
Final Amount: 25000

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Permits - General Information
Date Violation was Determined: 20120728
Actual Return to Compliance Date: 20131002
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20120803
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State

COSMOS JEWELRY LTD. (Continued) **1015742085**

Violation Short Description:	Permits - General Information
Date Violation was Determined:	20120728
Actual Return to Compliance Date:	20131002
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20121008
Enforcement Responsible Agency:	State
Enforcement Docket Number:	12-HW-EA-04
Enforcement Attorney:	WHARG
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	INITIAL 3008(A) COMPLIANCE
Enforcement Responsible Person:	TBRAN
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	30000
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Permits - General Information
Date Violation was Determined:	20120728
Actual Return to Compliance Date:	20131002
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20130204
Enforcement Responsible Agency:	State
Enforcement Docket Number:	12-HW-EA-04
Enforcement Attorney:	WHARG
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	20130204
Disposition Status:	AS
Disposition Status Description:	ACTION SATISFIED (CASE CLOSED)
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported

COSMOS JEWELRY LTD. (Continued) **1015742085**

Consent/Final Order Lead Agency: Not reported
Enforcement Type: FINAL 3008(A) COMPLIANCE ORDER
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: 25000
Paid Amount: 25000
Final Count: 1
Final Amount: 25000

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20120728
Actual Return to Compliance Date: 20131002
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20121008
Enforcement Responsible Agency: State
Enforcement Docket Number: 12-HW-EA-04
Enforcement Attorney: WHARG
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: INITIAL 3008(A) COMPLIANCE
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: 30000
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State

COSMOS JEWELRY LTD. (Continued) **1015742085**

Violation Short Description: Generators - General
Date Violation was Determined: 20120728
Actual Return to Compliance Date: 20131002
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20120803
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20120629
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: TBRAN
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20131002
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 20120629
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: TBRAN
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20131002

COSMOS JEWELRY LTD. (Continued) **1015742085**

Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20120629
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20131002
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20120629
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20131002
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20120629
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20131002
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20120629
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20131002
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

AC162 **WIHC, LLC DBA ALOHA TOXICOLOGY** **RCRA-VSQG** **1018155832**
SSE **438 HOBRON LANE SUITE 302** **FINDS** **HIR000143263**
< 1/8 **HONOLULU, HI 96815** **ECHO**
0.080 mi.
425 ft. **Site 2 of 3 in cluster AC**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:	20210122
Handler Name:	WIHC, LLC DBA ALOHA TOXICOLOGY
Handler Address:	438 HOBRON LANE SUITE 302
Handler City,State,Zip:	HONOLULU, HI 96815
EPA ID:	HIR000143263
Contact Name:	CODY MAKI
Contact Address:	438 HOBRON LANE SUITE 302
Contact City,State,Zip:	HONOLULU, HI 96815
Contact Telephone:	808-949-5146
Contact Fax:	Not reported
Contact Email:	CMAKI@ALOHATOX.COM
Contact Title:	Not reported
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	438 HOBRON LANE SUITE 302
Mailing City,State,Zip:	HONOLULU, HI 96815
Owner Name:	EATON SQUARE SHOPPING CENTER
Owner Type:	Private
Operator Name:	WIHC, LLC DBA ALOHA TOXICOLOGY
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported

WIHC, LLC DBA ALOHA TOXICOLOGY (Continued) **1018155832**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210122
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code: D001
Waste Description: IGNITABLE WASTE

Waste Code: F003
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	EATON SQUARE SHOPPING CENTER
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	438 HOBRON LANE
Owner/Operator City,State,Zip:	HONOLULU, HI 96815

WIHC, LLC DBA ALOHA TOXICOLOGY (Continued) **1018155832**

Owner/Operator Telephone: 808-941-1411
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: WIHC, LLC DBA ALOHA TOXICOLOGY
Legal Status: Private
Date Became Current: 20110101
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: WIHC, LLC DBA ALOHA TOXICOLOGY
Legal Status: Private
Date Became Current: 20110101
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: EATON SQUARE SHOPPING CENTER
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 438 HOBRON LANE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-941-1411
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20210122
Handler Name: WIHC, LLC DBA ALOHA TOXICOLOGY
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20150902
Handler Name: WIHC, LLC DBA ALOHA TOXICOLOGY

WIHC, LLC DBA ALOHA TOXICOLOGY (Continued) **1018155832**

Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	54138
NAICS Description:	TESTING LABORATORIES AND SERVICES

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

FINDS:

Registry ID:	110066845196

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1018155832
Registry ID:	110066845196
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110066845196
Name:	WIHC, LLC DBA ALOHA TOXICOLOGY
Address:	438 HOBRON LANE SUITE 302
City,State,Zip:	HONOLULU, HI 96815

163
SW
< 1/8
0.081 mi.
428 ft.

ALA MOANA CRASH BOAT BASE
HONOLULU, HI

FUDS **1024901891**
N/A

Actual:
3 ft.

Focus Map:
7

FUDS:

EPA Region:	09
Installation ID:	HI99799F376100
Congressional District Number:	1
Name:	ALA MOANA CRASH BOAT BASE
FUDS Number:	H09HI0013
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	5622
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=55753
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	NO REAL ESTATE RECORDS AVAILABLE. FACTS CONFIRMED W/ PERSONS INVOLVED WITH OPERATIONS DURING WWII YEARS. ESTABLISHED FOR AIR/SEA RESCUE. ARMY HAD LEASE AGREEMENT FOR HOUSING HOUSING THE CRACH BOA T SITE WITH THE TERRITORY OF HAWAII. THE PIER WAS DEMOLISHED BY THE APRIL 1, 1946 TIDAL WAVE.
Project Required:	No
Feature Description:	Not reported
Latitude:	21.28666667
Longitude:	-157.84083333

AD164
NW
< 1/8
0.081 mi.
430 ft.

SAFEWAY STORE #204
2855 EAST MANOA ROAD
HONOLULU, HI 96822
Site 1 of 2 in cluster AD

RCRA-VSQG **1017770186**
HIR000142786

Actual:
162 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20210721
Handler Name:	SAFEWAY STORE #204	
Handler Address:		2855 EAST MANOA ROAD
Handler City,State,Zip:		HONOLULU, HI 96822
EPA ID:		HIR000142786
Contact Name:		KEITH B POWERS
Contact Address:		STONERIDGE MALL ROAD
Contact City,State,Zip:		PLEASANTON, CA 94588
Contact Telephone:		510-246-0358
Contact Fax:		623-869-1548
Contact Email:		KEITH.POWERS@SAFEWAY.COM
Contact Title:		ENVIRONMENTAL COMPLIANCE MANAGER
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported

SAFEWAY STORE #204 (Continued) **1017770186**

Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		STONERIDGE MALL ROAD
Mailing City,State,Zip:		PLEASANTON, CA 94588
Owner Name:	MANOA MARKETPLACE LLC	
Owner Type:		Private
Operator Name:	SAFEWAY	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20210721

SAFEWAY STORE #204 (Continued) **1017770186**

Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	H

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D007
Waste Description:	CHROMIUM
Waste Code:	D010
Waste Description:	SELENIUM
Waste Code:	D011
Waste Description:	SILVER
Waste Code:	P075
Waste Description:	NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name:	SAFEWAY
Legal Status:	Private
Date Became Current:	19640817
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	MANOA MARKETPLACE LLC
Legal Status:	Private
Date Became Current:	20120112
Date Ended Current:	Not reported
Owner/Operator Address:	CO LEVY AFFILIATED HOLDINGS
Owner/Operator City,State,Zip:	SANTA MONICA, CA 90401
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	MANOA MARKETPLACE LLC

SAFEWAY STORE #204 (Continued) **1017770186**

Legal Status: Private
Date Became Current: 20120112
Date Ended Current: Not reported
Owner/Operator Address: CO LEVY AFFILIATED HOLDINGS
Owner/Operator City,State,Zip: SANTA MONICA, CA 90401
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: SAFEWAY
Legal Status: Private
Date Became Current: 19640817
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20140908
Handler Name: SAFEWAY STORE #204
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20210721
Handler Name: SAFEWAY STORE #204
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 445110
NAICS Description: SUPERMARKETS AND OTHER GROCERY RETAILERS (EXCEPT CONVENIENCE RETAILERS)

Facility Has Received Notices of Violations:
Violations: No Violations Found

SAFEWAY STORE #204 (Continued) **1017770186**

Evaluation Action Summary:
Evaluations: No Evaluations Found

165
NNW
< 1/8
0.082 mi.
431 ft.

I L W U LOCAL 142
451 ATKINSON DR
HONOLULU, HI 96814

RCRA NonGen / NLR **1012178202**
HIP000122101

Actual:
3 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:		20090818
Handler Name:	I L W U LOCAL 142	
Handler Address:		451 ATKINSON DR
Handler City,State,Zip:		HONOLULU, HI 96814-4796
EPA ID:		HIP000122101
Contact Name:		JAMES BAUCKHAM
Contact Address:		451 ATKINSON DR
Contact City,State,Zip:		HONOLULU, HI 96814-4796
Contact Telephone:		808-947-7233
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		451 ATKINSON DR
Mailing City,State,Zip:		HONOLULU, HI 96814-4796
Owner Name:	I L W U MEMORIAL ASSOCIATION	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N

I L W U LOCAL 142 (Continued) **1012178202**

Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20090818
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D009
Waste Description:	MERCURY

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	I L W U MEMORIAL ASSOCIATION
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	451 ATKINSON DR
Owner/Operator City,State,Zip:	HONOLULU, HI 96814-4796
Owner/Operator Telephone:	808-949-4161
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner

I L W U LOCAL 142 (Continued) **1012178202**

Owner/Operator Name: I L W U MEMORIAL ASSOCIATION
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 451 ATKINSON DR
Owner/Operator City,State,Zip: HONOLULU, HI 96814-4796
Owner/Operator Telephone: 808-949-4161
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20020614
Handler Name: I L W U LOCAL 142
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20090818
Handler Name: I L W U LOCAL 142
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

X166 **DANA LABELS COMPANY** **HI UST** **U001235619**
SE **3035 WAIALAE AVE** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.088 mi.
464 ft. **Site 5 of 7 in cluster X**

Actual: UST:
45 ft.
Name: DANA LABELS COMPANY
Focus Map: Address: 3035 WAIALAE AVE
5 City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101905
Owner: DANA LABELS
Owner Address: 3035 WAIALAE AVE
Owner City,St,Zip: Honolulu, 96816 96816
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-001
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 12/13/1989
Tank Capacity: 500
Substance: Diesel

X167 **CONSUMER TIRE WAREHOUSE** **RCRA NonGen / NLR** **1000390331**
ESE **3040 WAIALAE AVE** **FINDS** **HID981657125**
< 1/8 **HONOLULU, HI 96816** **ECHO**
0.088 mi.
466 ft. **Site 6 of 7 in cluster X**

Actual: RCRA Listings:
43 ft.
Date Form Received by Agency: 19930728
Focus Map: Handler Name: CONSUMER TIRE WAREHOUSE
5 Handler Address: 3040 WAIALAE AVE
Handler City,State,Zip: HONOLULU, HI 96816
EPA ID: HID981657125
Contact Name: BERNARD CHAN
Contact Address: 3040 WAIALAE AVE
Contact City,State,Zip: HONOLULU, HI 96816
Contact Telephone: 808-621-4886
Contact Fax: Not reported
Contact Email: Not reported
Contact Title: Not reported
EPA Region: 09
Land Type: Other
Federal Waste Generator Description: Not a generator, verified
Non-Notifier: Not reported
Biennial Report Cycle: Not reported
Accessibility: Not reported
Active Site Indicator: Not reported
State District Owner: Not reported
State District: Not reported
Mailing Address: 401 N CANE ST
Mailing City,State,Zip: WAHIAWA, HI 96786
Owner Name: INTERSTATE TIRE WAREHOUSE
Owner Type: Private
Operator Name: NOT REQUIRED
Operator Type: Private

CONSUMER TIRE WAREHOUSE (Continued) **1000390331**

Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

CONSUMER TIRE WAREHOUSE (Continued) **1000390331**

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	INTERSTATE TIRE WAREHOUSE
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	NOT REQUIRED
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19930728
Handler Name:	CONSUMER TIRE WAREHOUSE
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	441
NAICS Description:	MOTOR VEHICLE AND PARTS DEALERS

NAICS Code:	811111
NAICS Description:	GENERAL AUTOMOTIVE REPAIR

NAICS Code:	811118
NAICS Description:	OTHER AUTOMOTIVE MECHANICAL AND ELECTRICAL REPAIR AND MAINTENANCE

NAICS Code:	811198
NAICS Description:	ALL OTHER AUTOMOTIVE REPAIR AND MAINTENANCE

Facility Has Received Notices of Violation:

Found Violation:	No
Agency Which Determined Violation:	Not reported

CONSUMER TIRE WAREHOUSE (Continued) **1000390331**

Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 19960412
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

FINDS:
Registry ID: 110005725046

Click Here for FRS Facility Detail Report:

CONSUMER TIRE WAREHOUSE (Continued) **1000390331**

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000390331
Registry ID:	110005725046
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005725046
Name:	CONSUMER TIRE WAREHOUSE
Address:	3040 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816

X168 **MIWA ROBERT M** **EDR Hist Auto** **1021521584**
ESE **3040 WAIALAE AVE** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.088 mi.
466 ft. **Site 7 of 7 in cluster X**

Actual: EDR Hist Auto
43 ft.

Focus Map:
5

Year:	Name:	Type:
1969	MIWA ROBERT M	Gasoline Service Stations
1970	MIWA ROBERT M	Gasoline Service Stations
1971	MIWA ROBERT M	Gasoline Service Stations
1972	MIWA ROBERT M	Gasoline Service Stations

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169 **LILANGS GUITAR SHELLCRAFT HAWA** **EDR Hist Auto** **1020302196**
SW **412 LEWERS ST** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.088 mi.
466 ft.

Actual: EDR Hist Auto
3 ft.

Focus Map:
8

Year:	Name:	Type:
1990	LILANGS GUITAR SHELLCRAFT HAWA	Gifts And Novelties
1991	LILANGS GUITAR SHELLCRAFT HAWA	Gifts And Novelties
1992	LILANGS GUITAR SHELLCRAFT HAWA	Gifts And Novelties

AC170 **ROBINSON CORP** **EDR Hist Cleaner** **1019947094**
SSE **444 HOBRON LN STE 5A** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.089 mi.
468 ft. **Site 3 of 3 in cluster AC**

Actual: EDR Hist Cleaner
3 ft.

Focus Map:
8

Year:	Name:	Type:
1994	CAESARS CLEANERS	Drycleaning Plants, Except Rugs
1995	CAESARS CLEANERS	Drycleaning Plants, Except Rugs
1996	CAESARS CLEANERS	Drycleaning Plants, Except Rugs
1997	CAESARS CLEANERS	Drycleaning Plants, Except Rugs
1998	CAESARS CLEANERS	Drycleaning Plants, Except Rugs
1999	ROBINSON CORP	Drycleaning Plants, Except Rugs
2000	ROBINSON CORP	Drycleaning Plants, Except Rugs
2001	ROBINSON CORP	Drycleaning Plants, Except Rugs
2002	ROBINSON CORP	Drycleaning Plants, Except Rugs
2003	ROBINSON CORP	Drycleaning Plants, Except Rugs
2004	ROBINSON CORP	Drycleaning Plants, Except Rugs

AE171 **JIMMY'S CHEVRON SERVICE** **HI UST** **U004364776**
SW **1958 KALAKAUA AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.089 mi.
470 ft. **Site 1 of 3 in cluster AE**

Actual: UST:
3 ft.

Focus Map:
8

Name:	JIMMY'S CHEVRON SERVICE
Address:	1958 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101106
Owner:	CHEVRON PRODUCTS COMPANY
Owner Address:	91-480 MALAKOLE ST.
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.285780
Longitude:	-157.832771
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-001
Date Installed:	07/19/1955
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Other
Name:	JIMMY'S CHEVRON SERVICE
Address:	1958 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-002
Date Installed:	07/19/1955
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Other
Name:	JIMMY'S CHEVRON SERVICE
Address:	1958 KALAKAUA AVE

JIMMY'S CHEVRON SERVICE (Continued) **U004364776**

City,State,Zip: HONOLULU, HI 96815

Tank ID: R-003
Date Installed: 07/19/1955
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 3000
Substance: Other

Name: JIMMY'S CHEVRON SERVICE
Address: 1958 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-004
Date Installed: 07/19/1955
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Other

AE172 **JIMMY'S CHEVRON SERVICE** **HI LUST** **1000303791**
SW **1958 KALAKAUA AVE** **RCRA NonGen / NLR** **HID981661085**
< 1/8 **HONOLULU, HI 96815** **FINDS**
0.089 mi. **ECHO**
470 ft. **Site 2 of 3 in cluster AE**

Actual:
3 ft.

Focus Map:
8

LUST:
Name: JIMMY'S CHEVRON SERVICE
Address: 1958 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-101106
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 09/11/1997
Release ID: 970126
Project Officer: Eric Sadoyama

RCRA Listings:
Date Form Received by Agency: 19861006
Handler Name: JIMMY'S CHEVRON SERVICE INC
Handler Address: 1958 KALAKAUA AVE
Handler City,State,Zip: HONOLULU, HI 96815
EPA ID: HID981661085
Contact Name: ENVIRONMENTAL MANAGER
Contact Address: 1958 KALAKAUA AVE
Contact City,State,Zip: HONOLULU, HI 96815
Contact Telephone: 808-946-3905
Contact Fax: Not reported
Contact Email: Not reported
Contact Title: Not reported
EPA Region: 09
Land Type: Not reported
Federal Waste Generator Description: Not a generator, verified
Non-Notifier: Not reported
Biennial Report Cycle: Not reported
Accessibility: Not reported
Active Site Indicator: Not reported
State District Owner: Not reported

JIMMY'S CHEVRON SERVICE (Continued) **1000303791**

State District:		Not reported
Mailing Address:		KALAKAUA AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	CHEVRON INC USA	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20000915
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No

JIMMY'S CHEVRON SERVICE (Continued) **1000303791**

Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: CHEVRON INC USA	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19861006
Handler Name: JIMMY'S CHEVRON SERVICE INC	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Codes:	No NAICS Codes Found

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

JIMMY'S CHEVRON SERVICE (Continued) **1000303791**

FINDS:
Registry ID: 110005725215

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000303791
Registry ID:	110005725215
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005725215
Name:	JIMMY'S CHEVRON SERVICE
Address:	1958 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815

AE173 **KALAKAUA CHEVRON SERVICE** **EDR Hist Auto** **1021193949**
SW **1958 KALAKAUA AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.089 mi.
470 ft. **Site 3 of 3 in cluster AE**

Actual: EDR Hist Auto
3 ft.

Focus Map:
8

Year:	Name:	Type:
1969	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1970	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1971	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1972	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1973	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1974	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1976	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1977	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1978	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations
1979	KALAKAUA CHEVRON SERVICE	Gasoline Service Stations

---

174 **PUNCHBOWL CAMP** **FUDS** **1024902095**
WNW **N/A**
< 1/8 **HONOLULU, HI**
0.090 mi.
475 ft.

Actual: FUDS:
80 ft.

Focus Map:
4

EPA Region:	09
Installation ID:	HI99799F402200
Congressional District Number:	1
Name:	PUNCHBOWL CAMP
FUDS Number:	H09HI0292

PUNCHBOWL CAMP (Continued) **1024902095**

City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	4737
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62457
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	SITE WAS A TEMPORARY HOUSING FOR THE ARMY ENGINEERS BATTALION. THE SITE CONTAINED AN ADMINISTRATIVE OFFICE SPACE FOR CAMP, TWO MESS HALLS, A MOTOR SHOP, MOTOR POOL, VEHICALE WASH RACK, LATRINES, B ARRACKS, TENTS, A SUPPLY ROOM, AND POST EXCHANGE.
Project Required:	No
Feature Description:	Not reported
Latitude:	21.30833333
Longitude:	-157.84

AF175 **CAMPBELL CLOTHES CLEANERS** **EDR Hist Cleaner** **1019947843**
ESE **3306 CAMPBELL AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.092 mi.
484 ft. **Site 1 of 2 in cluster AF**

Actual: EDR Hist Cleaner
16 ft.

Focus Map:
8

Year:	Name:	Type:
1969	CAMPBELL CLOTHES CLEANERS	Drycleaning Plants, Except Rugs
1970	CAMPBELL CLOTHES CLEANERS	Drycleaning Plants, Except Rugs
1971	CAMPBELL CLOTHES CLEANERS	Drycleaning Plants, Except Rugs

---

W176 **HONOLULU PRINCE** **HI UST** **U003154821**
SW **415 NAHUA ST** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.092 mi.
487 ft. **Site 2 of 2 in cluster W**

Actual: UST:
3 ft.

Focus Map:
8

Name:	HONOLULU PRINCE
Address:	415 NAHUA ST
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103092
Owner:	KOEI USA ENTERPRISE, INC.
Owner Address:	415 NAHUA ST
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-1
Date Installed:	08/01/1961

HONOLULU PRINCE (Continued) **U003154821**

Tank Status:	**Permanently Out of Use**
Date Closed:	06/27/1995
Tank Capacity:	550
Substance:	Diesel

Z177 **MASAS GAS SHACK** **EDR Hist Auto** **1021710223**
NNW **2914 E MANOA RD** **N/A**
< 1/8 **HONOLULU, HI 96822**
0.093 mi.
489 ft. **Site 5 of 5 in cluster Z**

Actual: EDR Hist Auto
163 ft.

Focus Map:
5

Year:	Name:	Type:
1972	MASAS GAS SHACK	Gasoline Service Stations
1973	MASAS GAS SHACK	Gasoline Service Stations
1974	MASAS GAS SHACK	Gasoline Service Stations
1975	MASAS GAS SHACK	Gasoline Service Stations
1976	MASAS GAS SHACK	Gasoline Service Stations
1977	MASAS GAS SHACK	Gasoline Service Stations
1978	MASAS GAS SHACK	Gasoline Service Stations
1979	MASAS GAS SHACK	Gasoline Service Stations
1980	MASAS GAS SHACK	Gasoline Service Stations
1982	MASAS GAS SHACK	Gasoline Service Stations

AB178 **DOLLAR RENT-A-CAR** **HI UST** **U001235437**
North **1801 KALAKAUA AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.094 mi.
494 ft. **Site 2 of 9 in cluster AB**

Actual: UST:
3 ft.

Focus Map:
5

Name:	DOLLAR RENT-A-CAR
Address:	1801 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101267
Owner:	PACIFIC INTERNATIONAL SERVICES
Owner Address:	1600 KAPIOLANI BLVD. #825
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-1
Date Installed:	06/30/1962
Tank Status:	**Permanently Out of Use**
Date Closed:	06/15/1979
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	DOLLAR RENT-A-CAR
Address:	1801 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-2

DOLLAR RENT-A-CAR (Continued) **U001235437**

Date Installed:	06/30/1962
Tank Status:	**Permanently Out of Use**
Date Closed:	06/15/1979
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	DOLLAR RENT-A-CAR
Address:	1801 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-3
Date Installed:	06/30/1962
Tank Status:	**Permanently Out of Use**
Date Closed:	06/15/1979
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	DOLLAR RENT-A-CAR
Address:	1801 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-4
Date Installed:	06/30/1962
Tank Status:	**Permanently Out of Use**
Date Closed:	06/15/1979
Tank Capacity:	Not reported
Substance:	Used Oil
Name:	DOLLAR RENT-A-CAR
Address:	1801 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-6
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasoline
Name:	DOLLAR RENT-A-CAR
Address:	1801 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-7
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasoline

AB179 **HAWAII CONVENTION CENTER** **RCRA-VSQG** **1000277482**
North **1801 KALAKAUA AVENUE** **HID981633647**
< 1/8 **HONOLULU, HI 96815**
0.094 mi.
494 ft. **Site 3 of 9 in cluster AB**

Actual:
3 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20221013
Handler Name:	HAWAII CONVENTION CENTER	
Handler Address:		1801 KALAKAUA AVENUE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HID981633647
Contact Name:		MARI TAIT
Contact Address:		KALAKAUA AVENUE
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-943-3595
Contact Fax:		Not reported
Contact Email:		MTAIT@HCCASM.COM
Contact Title:		DIRECTOR OF OPERATIONS
EPA Region:		09
Land Type:		State
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		KALAKAUA AVENUE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	STATE OF HAWAII	
Owner Type:		State
Operator Name:	SMG	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

HAWAII CONVENTION CENTER (Continued) **1000277482**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required:	Not reported
Handler Date of Last Change:	20221024
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Biennial: List of Years
Year: 2009

Click Here for Biennial Reporting System Data:

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D003
Waste Description:	REACTIVE WASTE
Waste Code:	D035
Waste Description:	METHYL ETHYL KETONE
Waste Code:	F001
Waste Description:	THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED

HAWAII CONVENTION CENTER (Continued) **1000277482**

IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F002
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F003
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F005
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: STATE OF HAWAII
Legal Status: State
Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVENUE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-943-3000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: SMG
Legal Status: Private
Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVENUE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-943-3000
Owner/Operator Telephone Ext: Not reported

HAWAII CONVENTION CENTER (Continued) **1000277482**

Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: SMG/HAWAII CONVENTION CENTER
Legal Status: Private
Date Became Current: 19980101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: STATE OF HAWAII
Legal Status: State
Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVENUE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-943-3000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: STATE OF HAWAII
Legal Status: State
Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: SMG
Legal Status: Private
Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVENUE

HAWAII CONVENTION CENTER (Continued) **1000277482**

Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-943-3000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: SMG
Legal Status: Private
Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVENUE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-943-3000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: PACIFIC INTERNATIONAL
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: STATE OF HAWAII
Legal Status: State
Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVENUE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-943-3000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: STATE OF HAWAII
Legal Status: State
Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVENUE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-943-3000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: SMG
Legal Status: Private

HAWAII CONVENTION CENTER (Continued) **1000277482**

Date Became Current: 19970101
Date Ended Current: Not reported
Owner/Operator Address: 1801 KALAKAUA AVENUE
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-943-3000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:

Receive Date: 20100325
Handler Name: HAWAII CONVENTION CENTER
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20180613
Handler Name: HAWAII CONVENTION CENTER
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20181024
Handler Name: HAWAII CONVENTION CENTER
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20221013
Handler Name: HAWAII CONVENTION CENTER
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No

HAWAII CONVENTION CENTER (Continued) **1000277482**

Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 19870121
Handler Name: DOLLAR RENT A CAR
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20091015
Handler Name: HAWAII CONVENTION CENTER
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 531311
NAICS Description: RESIDENTIAL PROPERTY MANAGERS

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

AB180 **HAWAII CONVENTION CENTER** **RCRA NonGen / NLR** **1012178122**
North **1801 KALAKAUA AVE** **FINDS** **HIP000040451**
< 1/8 **HONOLULU, HI 96815** **ECHO**
0.094 mi.
494 ft. **Site 4 of 9 in cluster AB**

Actual:
3 ft.

Focus Map:
5

RCRA Listings:
Date Form Received by Agency: 20090624
Handler Name: FUJI PHOTO FILM U S A INC
Handler Address: 1801 KALAKAUA AVE
Handler City,State,Zip: HONOLULU, HI 96815
EPA ID: HIP000040451
Contact Name: ANDREA MANNO
Contact Address: 555 TAXTER RD

HAWAII CONVENTION CENTER (Continued) **1012178122**

Contact City,State,Zip:		ELMSFORD, NY 10523
Contact Telephone:		914-789-8793
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		555 TAXTER RD
Mailing City,State,Zip:		ELMSFORD, NY 10523
Owner Name:	FUJI PHOTO FILM U S A INC	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No

HAWAII CONVENTION CENTER (Continued) **1012178122**

Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20090624
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: FUJI PHOTO FILM U S A INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	555 TAXTER RD
Owner/Operator City,State,Zip:	ELMSFORD, NY 10523
Owner/Operator Telephone:	914-789-8100
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: FUJI PHOTO FILM U S A INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	555 TAXTER RD
Owner/Operator City,State,Zip:	ELMSFORD, NY 10523
Owner/Operator Telephone:	914-789-8100
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19980605
Handler Name: FUJI PHOTO FILM U S A INC	
Federal Waste Generator Description:	Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No

HAWAII CONVENTION CENTER (Continued) **1012178122**

Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20090624
Handler Name: FUJI PHOTO FILM U S A INC
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005724172

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER
HAZARDOUS WASTE BIENNIAL REPORTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1012178122
Registry ID: 110005724172
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005724172
Name: HAWAII CONVENTION CENTER
Address: 1801 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

AB181 **JIMS ALOHA CHEVRON** **EDR Hist Auto** **1020499774**
North **1801 KALAKAUA AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.094 mi.
494 ft. **Site 5 of 9 in cluster AB**

Actual: EDR Hist Auto
3 ft.

Focus Map:
5

Year:	Name:	Type:
1969	JIMS ALOHA CHEVRON	Gasoline Service Stations
1970	JIMS ALOHA CHEVRON	Gasoline Service Stations
1971	JIMS ALOHA CHEVRON	Gasoline Service Stations
1972	JIMS ALOHA CHEVRON	Gasoline Service Stations
1973	JIMS ALOHA CHEVRON	Gasoline Service Stations
1974	DONS ALOHA CHEVRON	Gasoline Service Stations
1974	JIMS ALOHA CHEVRON	Gasoline Service Stations
1975	DONS ALOHA CHEVRON	Gasoline Service Stations
1975	JIMS ALOHA CHEVRON	Gasoline Service Stations
1976	DONS ALOHA CHEVRON	Gasoline Service Stations
1977	DONS ALOHA CHEVRON	Gasoline Service Stations
1978	DONS ALOHA CHEVRON	Gasoline Service Stations

AB182 **HAWAII CONVENTION CENTER** **HI SHWS** **1006820847**
North **1801 KALAKAUA AVE** **N/A**
< 1/8 **HONOLULU, HI 96814**
0.094 mi.
494 ft. **Site 6 of 9 in cluster AB**

Actual: SHWS:
3 ft.

Focus Map:
5

Name:	HAWAII CONVENTION CENTER
Address:	1801 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Kalakaua Ave & Kapiolani Blvd
Island:	Oahu
Environmental Interest:	Hawaii Convention Center
HID Number:	Not reported
Facility Registry Identifier:	110013788641
Lead Agency:	SHWB
Program:	State
Project Manager:	Not reported
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Hawaii Convention Center
HID Number:	Not reported
Facility Registry Identifier:	110013788641
Lead Agency:	SHWB
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action - Type Undetermined
Document Date:	09/03/1997

HAWAII CONVENTION CENTER (Continued) **1006820847**

Document Number:	Not reported
Document Subject:	Letter Report Removal and Disposal of Transite Pipes, Hawaii Convention Center, Honolulu HI
Project Manager:	Not reported
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1993
Location Description:	1801 Kalakaua Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.289729
Longitude:	-157.836096

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183 **PRINCE WAIKIKI** **HI UST** **U004159311**
South **100 HOLOMOANA ST** **HI Financial Assurance** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.094 mi.
497 ft.

Actual:
3 ft.

Focus Map:
7

UST:

Name:	PRINCE WAIKIKI
Address:	100 HOLOMOANA ST
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103903
Owner:	Hawii Prince Hotel
Owner Address:	100 Holomoana St
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.286200
Longitude:	-157.840027
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	1
Date Installed:	04/01/1990
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Diesel
Name:	PRINCE WAIKIKI
Address:	100 HOLOMOANA ST
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	1
Date Installed:	04/01/1990
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Diesel

HI Financial Assurance:

Name:	PRINCE WAIKIKI
Address:	100 HOLOMOANA ST
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-103903
Tank Id:	1
Tank Status:	Currently In Use
FRTYPE:	Insurance

PRINCE WAIKIKI (Continued) **U004159311**

Expiration Date: 09/16/2019
FR Archive: True

Name: PRINCE WAIKIKI
Address: 100 HOLOMOANA ST
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-103903
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 01/01/2022
FR Archive: False

AG184 **SHRINERS HOSPITALS FOR CRIPPLED CHILDREN** **HI LUST** **U001235903**
SE **1310 PUNAHOU ST** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96826** **HI Financial Assurance**
0.095 mi.
499 ft. **Site 1 of 3 in cluster AG**

Actual:
41 ft.

Focus Map:
5

LUST:
Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-102410
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 09/11/1998
Release ID: 910069
Project Officer: David Hodges

UST:
Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-102410
Owner: KAUAI VETERANS' MEMORIAL Hospital
Owner Address: 4643 Waimea Canyon Dr.
Owner City,St,Zip: Honolulu, 96826 96826
Latitude: 21.300770
Longitude: -157.834900
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: R-1
Date Installed: 02/28/1967
Tank Status: **Permanently Out of Use**
Date Closed: 06/28/1991
Tank Capacity: 8500
Substance: Other

Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-2
Date Installed: 02/28/1967
Tank Status: **Permanently Out of Use**
Date Closed: 06/28/1991

SHRINERS HOSPITALS FOR CRIPPLED CHILDREN (Continued) **U001235903**

Tank Capacity: 550
Substance: Diesel

Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-3
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 08/10/2009
Tank Capacity: 550
Substance: Diesel

HI Financial Assurance:
Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-102410
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-102410
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-102410
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-102410
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: 05/12/2010
FR Archive: False

Name: SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address: 1310 PUNAHOU ST

SHRINERS HOSPITALS FOR CRIPPLED CHILDREN (Continued) **U001235903**

City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-102410
Tank Id:	r-3
Tank Status:	Permanently out of Use
FRTYPE:	Self Insured
Expiration Date:	05/12/2010
FR Archive:	False

Name:	SHRINERS HOSPITALS FOR CRIPPLED CHILDREN
Address:	1310 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-102410
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Self Insured
Expiration Date:	05/12/2010
FR Archive:	False

AH185 **ALOHA CAMPBELL** **HI LUST** **U001235402**
ESE **3327 CAMPBELL AVE** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96815** **HI SPILLS**
0.095 mi. **HI Financial Assurance**
504 ft. **Site 1 of 4 in cluster AH**

Actual:
14 ft.

Focus Map:
8

LUST:

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101185
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	08/10/2005
Release ID:	980077
Project Officer:	Chad Pritchard

UST:

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101185
Owner:	ALOHA PETROLEUM, LTD.
Owner Address:	1001 Bishop Street, ASB Tower, Suite 1300
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.276980
Longitude:	-157.813610
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	1
Date Installed:	08/01/1997
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815

ALOHA CAMPBELL (Continued) **U001235402**

Tank ID: 1
Date Installed: 08/01/1997
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 1
Date Installed: 08/01/1997
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2A
Date Installed: 08/01/1997
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 6000
Substance: Gasohol

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2A
Date Installed: 08/01/1997
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 6000
Substance: Gasohol

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2A
Date Installed: 08/01/1997
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 6000
Substance: Gasohol

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2B
Date Installed: 08/01/1997

ALOHA CAMPBELL (Continued) **U001235402**

Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Diesel
Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	2B
Date Installed:	08/01/1997
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Diesel
Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	2B
Date Installed:	08/01/1997
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Diesel
Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-1
Date Installed:	04/04/1981
Tank Status:	**Permanently Out of Use**
Date Closed:	07/17/1997
Tank Capacity:	10000
Substance:	Gasoline
Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-1
Date Installed:	04/04/1981
Tank Status:	**Permanently Out of Use**
Date Closed:	07/17/1997
Tank Capacity:	10000
Substance:	Gasoline
Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-1
Date Installed:	04/04/1981
Tank Status:	**Permanently Out of Use**
Date Closed:	07/17/1997

ALOHA CAMPBELL (Continued) **U001235402**

Tank Capacity: 10000
Substance: Gasoline

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-2
Date Installed: 04/04/1981
Tank Status: **Permanently Out of Use**
Date Closed: 07/17/1997
Tank Capacity: 10000
Substance: Gasoline

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-2
Date Installed: 04/04/1981
Tank Status: **Permanently Out of Use**
Date Closed: 07/17/1997
Tank Capacity: 10000
Substance: Gasoline

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-2
Date Installed: 04/04/1981
Tank Status: **Permanently Out of Use**
Date Closed: 07/17/1997
Tank Capacity: 10000
Substance: Gasoline

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-3
Date Installed: 04/04/1981
Tank Status: **Permanently Out of Use**
Date Closed: 07/17/1997
Tank Capacity: 10000
Substance: Gasoline

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-3
Date Installed: 04/04/1981
Tank Status: **Permanently Out of Use**
Date Closed: 07/17/1997
Tank Capacity: 10000
Substance: Gasoline

ALOHA CAMPBELL (Continued) **U001235402**

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-3
Date Installed:	04/04/1981
Tank Status:	**Permanently Out of Use**
Date Closed:	07/17/1997
Tank Capacity:	10000
Substance:	Gasoline

SPILLS:

Name:	HECO PAD-MOUNTED TRANSFORMER #56961 RELEASE
Address:	3327 CAMPBELL AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20130128-1133
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	>
Units:	HECO Pad-Mounted Transformer #56961 Release
Activity Type:	Response
Activity Lead:	Curtis Martin
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Not reported
Substances:	Transformer Oil
Quanity:	0
Units:	Unknown
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

ALOHA CAMPBELL (Continued) **U001235402**

HI Financial Assurance:

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101185
Tank Id:	1
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101185
Tank Id:	R-3
Tank Status:	Permanently Out of Use
FRTYPE:	Risk Retention Group
Expiration Date:	Not reported
FR Archive:	True

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101185
Tank Id:	2B
Tank Status:	Currently In Use
FRTYPE:	Risk Retention Group
Expiration Date:	Not reported
FR Archive:	True

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101185
Tank Id:	2B
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101185
Tank Id:	2A
Tank Status:	Currently In Use
FRTYPE:	Risk Retention Group
Expiration Date:	Not reported
FR Archive:	True

Name:	ALOHA CAMPBELL
Address:	3327 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101185
Tank Id:	2A
Tank Status:	Currently In Use

ALOHA CAMPBELL (Continued) **U001235402**

FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

ALOHA CAMPBELL (Continued) **U001235402**

Alt Facility ID: 9-101185
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 04/03/2013
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 04/03/2013
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/03/2013
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 04/03/2013
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: 2B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/03/2013
FR Archive: True

ALOHA CAMPBELL (Continued) **U001235402**

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: 2A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/03/2013
FR Archive: True

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: 2A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: 2B
Tank Status: Currently In Use
FRTYPE: Insurance

ALOHA CAMPBELL (Continued) **U001235402**

Expiration Date: 09/15/2020
FR Archive: False

Name: ALOHA CAMPBELL
Address: 3327 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101185
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

AI186 **ALOHA MANOA** **HI LUST** **U003221555**
South **3001 E MANOA RD** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96822** **HI Financial Assurance**
0.096 mi.
507 ft. **Site 1 of 3 in cluster AI**

Actual:
162 ft.

Focus Map:
6

LUST:

Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-100049
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 07/03/2003
Release ID: 020005
Project Officer: Anay Shende

Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-100049
Facility Status: LUST Cleanup Initiated
Facility Status Date: 10/09/2019
Release ID: 190005
Project Officer: Anay Shende

Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-100049
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 03/07/2007
Release ID: 050021
Project Officer: Anay Shende

Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-100049
Facility Status: Site Cleanup Completed with EHE/EHMP
Facility Status Date: 06/24/2014
Release ID: 100008
Project Officer: Anay Shende

UST:

ALOHA MANOA (Continued) **U003221555**

Name:	ALOHA MANOA
Address:	3001 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100049
Owner:	ALOHA PETROLEUM, LTD.
Owner Address:	1132 Bishop Street, Suite 1700
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	21.310760
Longitude:	-157.808320
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	1
Date Installed:	10/31/1987
Tank Status:	**Temporarily out of Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	ALOHA MANOA
Address:	3001 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	1
Date Installed:	10/31/1987
Tank Status:	**Temporarily out of Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	ALOHA MANOA
Address:	3001 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	2
Date Installed:	10/31/1987
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	ALOHA MANOA
Address:	3001 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	2
Date Installed:	10/31/1987
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	ALOHA MANOA
Address:	3001 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	3

ALOHA MANOA (Continued) **U003221555**

Date Installed: 10/31/1987
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: 3
Date Installed: 10/31/1987
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

HI Financial Assurance:
Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100049
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/01/2015
FR Archive: True

Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100049
Tank Id: 1
Tank Status: Temporarily out of Use
FRTYPE: Insurance
Expiration Date: 04/01/2015
FR Archive: True

Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100049
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/01/2015
FR Archive: True

Name: ALOHA MANOA
Address: 3001 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100049
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

ALOHA MANOA (Continued) **U003221555**

Name:	ALOHA MANOA
Address:	3001 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100049
Tank Id:	3
Tank Status:	Currently In Use
FRTYPE:	Insurance
Expiration Date:	09/15/2021
FR Archive:	False

Name:	ALOHA MANOA
Address:	3001 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100049
Tank Id:	1
Tank Status:	Temporarily out of Use
FRTYPE:	Insurance
Expiration Date:	09/15/2021
FR Archive:	False

AI187 **MANOA VILLAGE MART** **EDR Hist Auto** **1021229508**
South **3001 E MANOA RD** **N/A**
< 1/8 **HONOLULU, HI 96822**
0.096 mi.
507 ft. **Site 2 of 3 in cluster AI**

Actual: EDR Hist Auto
162 ft.

Focus Map:
6

Year:	Name:	Type:
2005	MANOA VILLAGE MART	Gasoline Service Stations
2006	MANOA VILLAGE MART	Gasoline Service Stations
2007	MANOA VILLAGE MART	Gasoline Service Stations
2008	MANOA VILLAGE MART	Gasoline Service Stations

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188 **FUDS WAREHOUSE NO. 3 & 4 (HONOLULU)** **HI SHWS** **S126282518**
NE **N/A**
< 1/8 **HONOLULU, HI**
0.097 mi.
511 ft.

Actual: SHWS:
3 ft.

Focus Map:
5

Name:	FUDS WAREHOUSE NO. 3 & 4 (HONOLULU)
Address:	Not reported
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported

FUDS WAREHOUSE NO. 3 & 4 (HONOLULU) (Continued) **S126282518**

HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1980
Location Description:	Not reported
Is Public:	True
Update On:	2020-02-27 15:02:32
Latitude:	21.289367
Longitude:	-157.831225

AF189 **ISLAND TRIATHLON & BIKE INC** **RCRA NonGen / NLR** **1000151957**
ESE **3312 CAMPBELL AVE** **FINDS** **HID981614472**
< 1/8 **HONOLULU, HI 96815** **ECHO**
0.098 mi.
516 ft. **Site 2 of 2 in cluster AF**

Actual:
16 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:	19861120
Handler Name:	ISLAND TRIATHLON & BIKE INC
Handler Address:	3312 CAMPBELL AVE
Handler City,State,Zip:	HONOLULU, HI 96815
EPA ID:	HID981614472
Contact Name:	ENVIRONMENTAL MANAGER
Contact Address:	3312 CAMPBELL AVE
Contact City,State,Zip:	HONOLULU, HI 96815
Contact Telephone:	808-732-7227
Contact Fax:	Not reported
Contact Email:	Not reported
Contact Title:	Not reported
EPA Region:	09
Land Type:	Other
Federal Waste Generator Description:	Not a generator, verified
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Not reported
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	569 KAPAHULU
Mailing City,State,Zip:	HONOLULU, HI 96815
Owner Name:	ISLAND TRIATHLON & BIKE INC

ISLAND TRIATHLON & BIKE INC (Continued) **1000151957**

Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20020729
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No
Importer of Spent Lead Acid Batteries:		No
Exporter of Spent Lead Acid Batteries:		No
Recycler Activity Without Storage:		No
Manifest Broker:		No

ISLAND TRIATHLON & BIKE INC (Continued) **1000151957**

Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: ISLAND TRIATHLON & BIKE INC
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19861120
Handler Name: ISLAND TRIATHLON & BIKE INC
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 45111
NAICS Description: SPORTING GOODS STORES

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported

ISLAND TRIATHLON & BIKE INC (Continued) **1000151957**

Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19951212
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:

Registry ID: 110005723896

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

ISLAND TRIATHLON & BIKE INC (Continued) **1000151957**

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000151957
Registry ID:	110005723896
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005723896
Name:	ISLAND TRIATHLON & BIKE INC
Address:	3312 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815

AJ190 **FURUMOTO FAMILY PARTNERS** **RCRA NonGen / NLR** **1012178109**
South **1135 KAPAHULU** **HIP000033795**
< 1/8 **HONOLULU, HI 96816**
0.098 mi.
516 ft. **Site 1 of 2 in cluster AJ**

Actual:
39 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20090624
Handler Name:	FURUMOTO FAMILY PARTNERS	
Handler Address:		1135 KAPAHULU
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HIP000033795
Contact Name:		HOWARD FURUMOTO
Contact Address:		4433 AUKAI AVE
Contact City,State,Zip:		HONOLULU, HI 96816
Contact Telephone:		808-734-5601
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		4433 AUKAI AVE
Mailing City,State,Zip:		HONOLULU, HI 96816
Owner Name:	FURUMOTO FAMILY PARTNERS	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No

FURUMOTO FAMILY PARTNERS (Continued) **1012178109**

Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20090624
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: FURUMOTO FAMILY PARTNERS	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	4433 AUKAI AVE
Owner/Operator City,State,Zip:	HONOLULU, HI 96816
Owner/Operator Telephone:	808-734-5601
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

FURUMOTO FAMILY PARTNERS (Continued) **1012178109**

Owner/Operator Indicator: Owner
Owner/Operator Name: FURUMOTO FAMILY PARTNERS
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 4433 AUKAI AVE
Owner/Operator City,State,Zip: HONOLULU, HI 96816
Owner/Operator Telephone: 808-734-5601
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19971117
Handler Name: FURUMOTO FAMILY PARTNERS
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20090624
Handler Name: FURUMOTO FAMILY PARTNERS
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

AJ191 **VETERANS OF FOREIGN WARS** **RCRA NonGen / NLR** **1001213473**
South **1135 KAPAHULU** **FINDS** **HIR000033803**
< 1/8 **HONOLULU, HI 96816** **ECHO**
0.098 mi.
516 ft. **Site 2 of 2 in cluster AJ**

Actual:
39 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20210420
Handler Name:	VETERANS OF FOREIGN WARS	
Handler Address:		1135 KAPAHULU
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HIR000033803
Contact Name:		Not reported
Contact Address:		Not reported
Contact City,State,Zip:		Not reported
Contact Telephone:		Not reported
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Other
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		Not reported
Mailing City,State,Zip:		Not reported
Owner Name:	Not reported	
Owner Type:		Not reported
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

VETERANS OF FOREIGN WARS (Continued) **1001213473**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210420
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D000
Waste Description:	Not Defined
Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D009
Waste Description:	MERCURY

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	VETRANS OF FOREIGN WARS
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	1188 BISHOP ST NO 1212
Owner/Operator City,State,Zip:	HONOLULU, HI 96813
Owner/Operator Telephone:	808-586-8470
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

VETERANS OF FOREIGN WARS (Continued) **1001213473**

Historic Generators:
Receive Date: 20210420
Handler Name: VETERANS OF FOREIGN WARS
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 19971117
Handler Name: VETERANS OF FOREIGN WARS
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005729890

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1001213473

VETERANS OF FOREIGN WARS (Continued) **1001213473**

Registry ID: 110005729890
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005729890
Name: VETERANS OF FOREIGN WARS
Address: 1135 KAPAHULU
City,State,Zip: HONOLULU, HI 96816

192
SW
< 1/8
0.099 mi.
521 ft.

RICHARDS 66 SERVICE INC **EDR Hist Auto** **1021812468**
1901 KALAKAUA AVE **N/A**
HONOLULU, HI 96815

Actual:
6 ft.

EDR Hist Auto

Focus Map:
8

Year:	Name:	Type:
1969	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1970	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1971	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1972	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1973	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1974	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1976	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1977	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1978	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1979	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1980	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1982	RICHARDS 66 SERVICE INC	Gasoline Service Stations
1983	RICHARDS 66 SERVICE INC	Gasoline Service Stations

AK193
East
< 1/8
0.100 mi.
530 ft.

STAN'S UNION SERVICE L-6352 **HI LUST** **U003221554**
3045 MONSARRAT AVE **HI UST** **N/A**
HONOLULU, HI 96815
Site 1 of 3 in cluster AK

Actual:
27 ft.

Focus Map:
8

LUST:
Name: STAN'S UNION SERVICE L-6352
Address: 3045 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100048
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 10/09/2001
Release ID: 920185
Project Officer: Shunsheng Fu

UST:
Name: STAN'S UNION SERVICE L-6352
Address: 3045 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100048
Owner: UNOCAL CORPORATION
Owner Address: 3915 Mission Avenue #7416
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.268873
Longitude: -157.813611
Horizontal Reference Datum Name: NAD83

STAN'S UNION SERVICE L-6352 (Continued) **U003221554**

Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 03/26/1972
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasoline

Name: STAN'S UNION SERVICE L-6352
Address: 3045 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-2
Date Installed: 03/26/1972
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasoline

Name: STAN'S UNION SERVICE L-6352
Address: 3045 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-3
Date Installed: 03/26/1972
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 550
Substance: Used Oil

AK194 **STANS UNION SERVICE** **EDR Hist Auto** **1020474768**
East **3045 MONSARRAT AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.100 mi.
530 ft. **Site 2 of 3 in cluster AK**

Actual: EDR Hist Auto
27 ft.

Focus Map: **8**

Year:	Name:	Type:
1975	MORIKAWA STANLEY F	Gasoline Service Stations
1976	MORIKAWA STANLEY F	Gasoline Service Stations
1977	STANS UNION SERVICE	Gasoline Service Stations
1978	STANS UNION SERVICE	Gasoline Service Stations
1979	STANS UNION SERVICE	Gasoline Service Stations
1980	STANS UNION SERVICE	Gasoline Service Stations
1982	STANS UNION SERVICE	Gasoline Service Stations
1983	STANS UNION SERVICE	Gasoline Service Stations
1985	STANS UNION SERVICE	Gasoline Service Stations
1986	STANS UNION SERVICE	Gasoline Service Stations
1987	STANS UNION SERVICE	Gasoline Service Stations
1988	STANS UNION SERVICE	Gasoline Service Stations
1989	STANS UNION SERVICE	Gasoline Service Stations
1990	STANS UNION SERVICE	Gasoline Service Stations
1991	STANS UNION SERVICE	Gasoline Service Stations

AK195 **UNOCAL 76 SS L 6352** **RCRA-VSQG** **1004688904**
East **3045 MONSARRAT AVE** **HID984468827**
< 1/8 **HONOLULU, HI 96815**
0.100 mi.
530 ft. **Site 3 of 3 in cluster AK**

Actual: **27 ft.**

Focus Map: **8**

RCRA Listings:

Date Form Received by Agency:		19930827
Handler Name:	UNOCAL 76 SS L 6352	
Handler Address:		3045 MONSARRAT AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HID984468827
Contact Name:		A FRITZ
Contact Address:		PO BOX 659
Contact City,State,Zip:		HONOLULU, HI 96809
Contact Telephone:		808-522-7657
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PO BOX 659
Mailing City,State,Zip:		HONOLULU, HI 96809
Owner Name:	UNOCAL 76	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

UNOCAL 76 SS L 6352 (Continued) **1004688904**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: UNOCAL 76	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	911 WILSHIRE BLVD STE 1010
Owner/Operator City,State,Zip:	LOS ANGELES, CA 90017
Owner/Operator Telephone:	213-977-7600
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19930827
Handler Name: UNOCAL 76 SS L 6352	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes

UNOCAL 76 SS L 6352 (Continued) **1004688904**

Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

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196 **ALA WAI AIRPORT** **FUDS** **1024901892**
NE **N/A**
< 1/8 **HONOLULU, HI**
0.101 mi.
531 ft.

Actual:
3 ft.

Focus Map:
8

FUDS:
EPA Region: 09
Installation ID: HI99799F376200
Congressional District Number: 1
Name: ALA WAI AIRPORT
FUDS Number: H09HI0014
City: HONOLULU
State: HI
County: HONOLULU
Object ID: 5930
USACE Division: pod
USACE District: poh
Status: Properties without projects
Current Owner: Not reported
EMS Map Link: https://fudsportal.usace.army.mil/ems/inventory/map?id=62320
Eligibility: Eligible
Has Projects: No
NPL Status: Not on the NPL
Property History: Not reported

Project Required: No
Feature Description: Not reported
Latitude: 21.27833333
Longitude: -157.81833333

AB197 **B & S AUTOMOTIVE TECHNICIANS** **RCRA NonGen / NLR** **1000130413**
North **1789 KAPIOLANI** **FINDS** **HID981573959**
< 1/8 **HONOLULU, HI 96814** **ECHO**
0.102 mi.
539 ft. **Site 7 of 9 in cluster AB**

Actual:
3 ft.

Focus Map:
5

RCRA Listings:
Date Form Received by Agency: 19931210
Handler Name: B & S AUTOMOTIVE TECHNICIANS
Handler Address: 1789 KAPIOLANI
Handler City,State,Zip: HONOLULU, HI 96814

B & S AUTOMOTIVE TECHNICIANS (Continued) **1000130413**

EPA ID:		HID981573959
Contact Name:		ENVIRONMENTAL MANAGER
Contact Address:		1789 KAPIOLANI
Contact City,State,Zip:		HONOLULU, HI 96814
Contact Telephone:		808-946-0677
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		KAPIOLANI
Mailing City,State,Zip:		HONOLULU, HI 96814
Owner Name:	UEHARA BLAKE	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No

B & S AUTOMOTIVE TECHNICIANS (Continued) **1000130413**

TSDFs Only Subject to CA under Discretionary Auth Universe: No
Corrective Action Priority Ranking: No NCAPS ranking
Environmental Control Indicator: No
Institutional Control Indicator: No
Human Exposure Controls Indicator: N/A
Groundwater Controls Indicator: N/A
Operating TSDF Universe: Not reported
Full Enforcement Universe: Not reported
Significant Non-Complier Universe: No
Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20000915
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: UEHARA BLAKE
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19931210
Handler Name: B & S AUTOMOTIVE TECHNICIANS
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No

B & S AUTOMOTIVE TECHNICIANS (Continued) **1000130413**

Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005723770

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000130413
Registry ID: 110005723770
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005723770
Name: B & S AUTOMOTIVE TECHNICIANS
Address: 1789 KAPIOLANI
City,State,Zip: HONOLULU, HI 96814

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198 **PUMP IT UP** **EDR Hist Auto** **1020586608**
ESE **3093 PUALEI CIR** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.103 mi.
546 ft.

Actual: **42 ft.**

EDR Hist Auto

Focus Map: **8**

Year:	Name:	Type:
2010	PUMP IT UP	Gasoline Service Stations, NEC
2011	PUMP IT UP	Gasoline Service Stations, NEC
2012	PUMP IT UP	Gasoline Service Stations, NEC
2013	PUMP IT UP	Gasoline Service Stations, NEC
2014	PUMP IT UP	Gasoline Service Stations, NEC

AB199 **ALOHA MOTORS** **HI SHWS** **1006820308**
NNW **1777 KAPIOLANI BLVD** **N/A**
< 1/8 **HONOLULU, HI 96813**
0.104 mi.
551 ft. **Site 8 of 9 in cluster AB**

Actual: **3 ft.**
Focus Map: **5**

SHWS:

Name:	ALOHA MOTORS
Address:	1777 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2103
Location Description:	1777 Kapiolani Blvd
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.289663
Longitude:	-157.836545

AB200 **FIRST DEVELOPMENT INC** **SEMS-ARCHIVE** **1003879446**
NNW **1777 KAPIOLANI BLVD** **RCRA-VSQG** **HID984466060**
< 1/8 **HONOLULU, HI 96814** **FINDS**
0.104 mi. **ECHO**
551 ft. **Site 9 of 9 in cluster AB**

Actual: **3 ft.**
Focus Map: **5**

SEMS Archive:

Site ID:	0903612
EPA ID:	HID984466060
Name:	ALOHA MOTORS
Address:	1777 KAPIOLANI BLVD

FIRST DEVELOPMENT INC (Continued) **1003879446**

Address 2: Not reported
City,State,Zip: HONOLULU, HI 96813
Cong District: 01
FIPS Code: 15003
FF: N
NPL: Not on the NPL
Non NPL Status: NFRAP-Site does not qualify for the NPL based on existing information

SEMS Archive Detail:

Region: 09
Site ID: 0903612
EPA ID: HID984466060
Site Name: ALOHA MOTORS
NPL: N
FF: N
OU: 00
Action Code: VS
Action Name: ARCH SITE
SEQ: 1
Start Date: Not reported
Finish Date: 1992-03-23 05:00:00
Qual: Not reported
Current Action Lead: EPA Perf In-Hse

Region: 09
Site ID: 0903612
EPA ID: HID984466060
Site Name: ALOHA MOTORS
NPL: N
FF: N
OU: 00
Action Code: DS
Action Name: DISCVRY
SEQ: 1
Start Date: 1990-09-24 04:00:00
Finish Date: 1990-09-24 04:00:00
Qual: Not reported
Current Action Lead: EPA Perf

Region: 09
Site ID: 0903612
EPA ID: HID984466060
Site Name: ALOHA MOTORS
NPL: N
FF: N
OU: 00
Action Code: SI
Action Name: SI
SEQ: 1
Start Date: Not reported
Finish Date: 1992-03-23 05:00:00
Qual: N
Current Action Lead: EPA Perf

Region: 09
Site ID: 0903612
EPA ID: HID984466060
Site Name: ALOHA MOTORS

FIRST DEVELOPMENT INC (Continued) **1003879446**

NPL:	N
FF:	N
OU:	00
Action Code:	PA
Action Name:	PA
SEQ:	1
Start Date:	Not reported
Finish Date:	1991-04-22 04:00:00
Qual:	H
Current Action Lead:	EPA Perf

RCRA Listings:

Date Form Received by Agency:		19920813
Handler Name:	FIRST DEVELOPMENT INC	
Handler Address:		1777 KAPIOLANI BLVD
Handler City,State,Zip:		HONOLULU, HI 96814
EPA ID:		HID984466060
Contact Name:		HITOSHI UCHINO
Contact Address:		745 FORT ST HAWAII TWR
Contact City,State,Zip:		HONOLULU, HI 96813
Contact Telephone:		808-545-1953
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		FORT ST HAWAII TWR
Mailing City,State,Zip:		HONOLULU, HI 96813
Owner Name:	FIRST DEVELOPMENT INC	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---

FIRST DEVELOPMENT INC (Continued) **1003879446**

Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: FIRST DEVELOPMENT INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	745 FORT ST HAWAII TWR 1501
Owner/Operator City,State,Zip:	HONOLULU, HI 96813
Owner/Operator Telephone:	808-545-1953
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19920813
Handler Name: FIRST DEVELOPMENT INC	

FIRST DEVELOPMENT INC (Continued) **1003879446**

Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005727204

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER
Registry ID: 110064283948

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1003879446
Registry ID:	110005727204
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005727204
Name:	FIRST DEVELOPMENT INC
Address:	1777 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814

201
SSE
< 1/8
0.104 mi.
551 ft.

O & J SERVICE INC
1720 ALA MOANA BLVD
HONOLULU, HI 96815

EDR Hist Auto **1021303783**
N/A

Actual:
3 ft.

Focus Map:
7

EDR Hist Auto

Year:	Name:	Type:
1990	O & J SERVICE INC	Gasoline Service Stations
1991	O & J SERVICE INC	Gasoline Service Stations
1992	O & J SERVICE INC	Gasoline Service Stations
1993	O & J SERVICE INC	Gasoline Service Stations
1994	O & J SERVICE INC	Gasoline Service Stations

202
NE
< 1/8
0.106 mi.
558 ft.

ALA WAI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
503 KAMOKU ST
HONOLULU, HI 96826

HI SHWS **S126282213**
N/A

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	ALA WAI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	503 KAMOKU ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2880
Location Description:	503 Kamoku St, Honolulu, HI 96826, USA
Is Public:	True

ALA WAI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S126282213**

Update On:	2021-11-10 12:10:10
Latitude:	21.284899
Longitude:	-157.826958

AL203 **UNOCAL 76 SS L 5583** **RCRA NonGen / NLR** **1000823237**
North **1818 KAPIOLANI BLVD** **FINDS** **HID984468769**
< 1/8 **HONOLULU, HI 96826** **ECHO**
0.106 mi.
561 ft. **Site 1 of 3 in cluster AL**

Actual:
3 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		19930827
Handler Name:	UNOCAL 76 SS L 5583	
Handler Address:		1818 KAPIOLANI BLVD
Handler City,State,Zip:		HONOLULU, HI 96826
EPA ID:		HID984468769
Contact Name:		A FRITZ
Contact Address:		PO BOX 659
Contact City,State,Zip:		HONOLULU, HI 96809
Contact Telephone:		808-522-7657
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PO BOX 659
Mailing City,State,Zip:		HONOLULU, HI 96809
Owner Name:	UNOCAL 76	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported

UNOCAL 76 SS L 5583 (Continued) **1000823237**

Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: UNOCAL 76	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	911 WILSHIRE BLVD STE 1010
Owner/Operator City,State,Zip:	LOS ANGELES, CA 90017
Owner/Operator Telephone:	213-977-7600
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19930827
Handler Name: UNOCAL 76 SS L 5583	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No

UNOCAL 76 SS L 5583 (Continued) **1000823237**

Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005728169

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000823237
Registry ID:	110005728169
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005728169
Name:	UNOCAL 76 SS L 5583
Address:	1818 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96826

AD204 **C&CH MANOA FIRE STATION** **HI LUST** **U003221565**
WNW **2850 E MANOA RD** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96822**
0.106 mi.
562 ft. **Site 2 of 2 in cluster AD**

Actual:
163 ft.

Focus Map:
5

LUST:

Name:	C&CH MANOA FIRE STATION
Address:	2850 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100086
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/14/2001
Release ID:	930123
Project Officer:	Shumin Liu

C&CH MANOA FIRE STATION (Continued) **U003221565**

UST:

Name:	C&CH MANOA FIRE STATION
Address:	2850 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100086
Owner:	C&C OF HNL - HONOLULU FIRE DEPARATMENT
Owner Address:	636 South Street
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	21.309594
Longitude:	-157.810961
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	09/02/1980
Tank Status:	**Permanently Out of Use**
Date Closed:	10/27/1993
Tank Capacity:	550
Substance:	Diesel

AI205 **ENIVEL INC** **EDR Hist Cleaner** **1019982441**
SSW **2966 E MANOA RD** **N/A**
< 1/8 **HONOLULU, HI 96822**
0.108 mi.
569 ft. **Site 3 of 3 in cluster AI**

Actual: EDR Hist Cleaner
159 ft.

Focus Map:
6

Year:	Name:	Type:
1992	ENIVEL INC	Drycleaning Plants, Except Rugs
1993	ENIVEL INC	Drycleaning Plants, Except Rugs
1994	ENIVEL INC	Drycleaning Plants, Except Rugs
1995	ENIVEL INC	Drycleaning Plants, Except Rugs
1996	ENIVEL INC	Drycleaning Plants, Except Rugs
1997	ENIVEL INC	Drycleaning Plants, Except Rugs

Y206 **THE PAVILLION** **HI SHWS** **S106820617**
SW **1925 KALAKAUA AVE** **HI SPILLS** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.108 mi.
571 ft. **Site 3 of 3 in cluster Y**

Actual: SHWS:
5 ft.

Focus Map:
8

Name:	THE PAVILLION
Address:	1925 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	The Pavillion
HID Number:	Not reported
Facility Registry Identifier:	110013773693
Lead Agency:	SHWB
Program:	State
Project Manager:	Steve Mow
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined

THE PAVILLION (Continued) **S106820617**

Island:	Oahu
SDAR Environmental Interest Name:	The Pavillion
HID Number:	Not reported
Facility Registry Identifier:	110013773693
Lead Agency:	SHWB
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action - Type Undetermined
Document Date:	03/02/1998
Document Number:	Not reported
Document Subject:	Results of Soil Sampling and Analysis for AOAO the Pavillion
Project Manager:	Steve Mow
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1694
Location Description:	1925 Kalakaua Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.286386
Longitude:	-157.833694

SPILLS:

Name:	THE PAVILLION
Address:	1925 KALAKAUA AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19980120-1455
Facility Registry ID:	110013773693
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	The Pavilion at Waikiki Contaminated Soil
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	Referred
File Under:	The Pavilion
Substances:	Gasoline
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

THE PAVILLION (Continued) **S106820617**

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.271197000000001
Longitude:	-157.81720899999999

Name:	THE PAVILLION
Address:	1925 KALAKAUA AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19980120-1455
Facility Registry ID:	110013773693
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	The Pavilion at Waikiki Contaminated Soil
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	Referred
File Under:	The Pavilion
Substances:	Gasoline
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported

THE PAVILLION (Continued) **S106820617**

Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.286362
Longitude:	-157.83352400000001
Name:	THE PAVILLION
Address:	1925 KALAKAUA AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19980120-1455
Facility Registry ID:	110013773693
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	The Pavilion at Waikiki Contaminated Soil
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	Referred
File Under:	The Pavilion
Substances:	Gasoline
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.286363999999999
Longitude:	-157.833687

AG207 **KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER** **HI SHWS** **U001235208**
ESE **1319 PUNAHOU ST** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96826** **HI AIRS**
0.109 mi. **HI Financial Assurance**
574 ft. **Site 2 of 3 in cluster AG**

Actual:
45 ft.

Focus Map:
5

SHWS:

Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Address:	1319 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2173
Location Description:	1319 Punahou St
Is Public:	True
Update On:	2019-10-24 11:32:09
Latitude:	21.299491
Longitude:	-157.832896

UST:

Name:	KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER
Address:	1319 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100740
Owner:	KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER
Owner Address:	1319 PUNAHOU ST
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.299429
Longitude:	-157.832592

KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER (Continued) **U001235208**

Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Map

Tank ID: R-001
Date Installed: 03/22/1971
Tank Status: **Permanently Out of Use**
Date Closed: 04/16/1996
Tank Capacity: 1000
Substance: Diesel

Name: KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER
Address: 1319 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-1
Date Installed: 10/01/1995
Tank Status: **Permanently out of Use**
Date Closed: 07/23/2014
Tank Capacity: 15000
Substance: Diesel

AIRS:
Name: HAWAII PACIFIC HEALTH DBA KAPIOLANI MEDICAL CENTER FOR WOMAN AND C
Address: 1319 PUNAHOU STREET
City,State,Zip: HONOLULU, HI
Facility Identifier: 0588-01-N
Island: Oahu
Mailing Address: 1319 Punahou Street
Locale: Not reported
Mailing City: Honolulu
Contact Name: Francisco "Kiko" Riego De Dios
Mailing State: Hawaii
Mailing Zip: 96826
Contact Phone: Facilities Management Director
Business Phone: Not reported
Issue Date: 03/14/2013
Expiration Date: 01/23/2018
Description: 125 HP Boiler and 50 HP Exempt Boiler1.Boiler No.1 - 50 HP Cleaver-Brooks boiler #1 (model no. CB 200-50, serial no. L102531, 2.09 MMBtu/hr, fired primarily on synthetic natural gas (SNG) and fuel oil no.2 as a back-up). This boiler is exempt pursuant to Director s discretion as specified in Attachment II, Special Conditions No. B.1.d.2.Boiler No.2 - 125 HP Cleaver-Brooks boiler (model no. CB 200-125-150ST, serial no. L88692, 5.23 MMBtu/hr, fired primarily on SNG and fuel oil no. 2 as back-up).

HI Financial Assurance:
Name: KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER
Address: 1319 PUNAHOU ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100740
Tank Id: R-001
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER (Continued) **U001235208**

Name:	KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER
Address:	1319 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100740
Tank Id:	r-1
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False

Name:	KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER
Address:	1319 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100740
Tank Id:	r-1
Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	08/01/2014
FR Archive:	False

Name:	KAPIOLANI WOMEN'S & CHILDREN'S MEDICAL CENTER
Address:	1319 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100740
Tank Id:	R-001
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	08/01/2014
FR Archive:	False

AG208 **KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN** **RCRA-VSQG** **1004688971**
ESE **1319 PUNAHOU STREET** **FINDS** **HIR000041509**
< 1/8 **HONOLULU, HI 96826** **ECHO**
0.109 mi.
574 ft. **Site 3 of 3 in cluster AG**

Actual:
45 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:	20220215
Handler Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Handler Address:	1319 PUNAHOU STREET
Handler City,State,Zip:	HONOLULU, HI 96826
EPA ID:	HIR000041509
Contact Name:	ROBERT S CRAWFORD
Contact Address:	PUNAHOU STREET
Contact City,State,Zip:	HONOLULU, HI 96826
Contact Telephone:	808-983-8963
Contact Fax:	Not reported
Contact Email:	ROBERT.CRAWFORD@KAPIOLANI.ORG
Contact Title:	ENVIRONMENTAL SERVICES DIRECTOR
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Mailing Address:		PUNAHOU STREET
Mailing City,State,Zip:		HONOLULU, HI 96826
Owner Name:	HAWAII PACIFIC HEALTH	
Owner Type:		Private
Operator Name:	HAWAII PACIFIC HEALTH	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20220215
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No
Importer of Spent Lead Acid Batteries:		No

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: H

Biennial: List of Years
Year: 2019

Click Here for Biennial Reporting System Data:
Year: 2017

Click Here for Biennial Reporting System Data:
Year: 2015

Click Here for Biennial Reporting System Data:
Year: 2013

Click Here for Biennial Reporting System Data:

Hazardous Waste Summary:
Waste Code: D000
Waste Description: Not Defined

Waste Code: D001
Waste Description: IGNITABLE WASTE

Waste Code: D002
Waste Description: CORROSIVE WASTE

Waste Code: D004
Waste Description: ARSENIC

Waste Code: D005
Waste Description: BARIUM

Waste Code: D007
Waste Description: CHROMIUM

Waste Code: D009
Waste Description: MERCURY

Waste Code: D010
Waste Description: SELENIUM

Waste Code: D011
Waste Description: SILVER

Waste Code: D013
Waste Description: LINDANE (1,2,3,4,5,6-HEXA-CHLOROCYCLOHEXANE, GAMMA ISOMER)

Waste Code: D022
Waste Description: CHLOROFORM

Waste Code: D024
Waste Description: M-CRESOL

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Waste Code: F001
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F003
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: P001
Waste Description: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

Waste Code: P012
Waste Description: ARSENIC OXIDE AS2O3 (OR) ARSENIC TRIOXIDE

Waste Code: P042
Waste Description: 1,2-BENZENEDIOL, 4-[1-HYDROXY-2-(METHYLAMINO)ETHYL]-, (R)- (OR) EPINEPHRINE

Waste Code: P075
Waste Description: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

Waste Code: P081
Waste Description: 1,2,3-PROPANETRIOL, TRINITRATE (R) (OR) NITROGLYCERINE (R)

Waste Code: P105
Waste Description: SODIUM AZIDE

Waste Code: P188
Waste Description: BENZOIC ACID, 2-HYDROXY-, COMPD. WITH (3AS-CIS)-1,2,3,3A,8,8A-HEXAHYDRO-1,3A,8-TRIMETHYLPYRROLO[2,3-B]INDOL-5-YL METHYLCARBAMATE ESTER (1:1) (OR) PHYSOSTIGMINE SALICYLATE

Waste Code: P204
Waste Description: PHYSOSTIGMINE (OR) PYRROLO[2,3-B]INDOL-5-OL, 1,2,3,3A,8,8A-HEXAHYDRO-1,3A,8-TRIMETHYL-METHYLCARBAMATE (ESTER), (3AS-CIS)-

Waste Code: U010
Waste Description: AZIRINO [2',3':3,4]PYRROLO[1,2-A]INDOLE-4,7-DIONE, 6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1A,2,8,8A,8B-HEXAHYDRO-8A-MET

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

HOXY-5-METHYL-, [1AS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]- (OR) MITOMYCIN C

Waste Code: U034
Waste Description: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

Waste Code: U058
Waste Description: 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS(2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE (OR) CYCLOPHOSPHAMIDE

Waste Code: U059
Waste Description: 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHA-L-LYXO-HEXOPYRANOSYL)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)- (OR) DAUNOMYCIN

Waste Code: U129
Waste Description: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

Waste Code: U150
Waste Description: L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) MELPHALAN

Waste Code: U188
Waste Description: PHENOL

Waste Code: U205
Waste Description: SELENIUM SULFIDE (OR) SELENIUM SULFIDE SES2 (R,T)

Waste Code: U248
Waste Description: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYL-BUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: KAPIOLANI MEDICAL CENTER
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU ST
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-535-7503
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: HAWAIIAN PACIFIC HEALTH
Legal Status: Private
Date Became Current: 20130103
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU ST
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6716
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: HAWAIIAN PACIFIC HEALTH
Legal Status: Private
Date Became Current: 20130103

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Date Ended Current:	Not reported
Owner/Operator Address:	1319 PUNAHOU ST
Owner/Operator City,State,Zip:	HONOLULU, HI 96826
Owner/Operator Telephone:	808-983-6716
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	HAWAII PACIFIC HEALTH
Legal Status:	Private
Date Became Current:	19780101
Date Ended Current:	Not reported
Owner/Operator Address:	1319 PUNAHOU STREET
Owner/Operator City,State,Zip:	HONOLULU, HI 96826
Owner/Operator Telephone:	808-983-6000
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	HAWAII PACIFIC HEALTH
Legal Status:	Private
Date Became Current:	19780101
Date Ended Current:	Not reported
Owner/Operator Address:	1319 PUNAHOU STREET
Owner/Operator City,State,Zip:	HONOLULU, HI 96826
Owner/Operator Telephone:	808-983-8000
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	HAWAII PACIFIC HEALTH
Legal Status:	Private
Date Became Current:	19780101
Date Ended Current:	Not reported
Owner/Operator Address:	1319 PUNAHOU STREET
Owner/Operator City,State,Zip:	HONOLULU, HI 96826
Owner/Operator Telephone:	808-983-6000
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	HAWAII PACIFIC HEALTH
Legal Status:	Private
Date Became Current:	19780101
Date Ended Current:	Not reported
Owner/Operator Address:	1319 PUNAHOU STREET
Owner/Operator City,State,Zip:	HONOLULU, HI 96826
Owner/Operator Telephone:	808-983-6000
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Owner/Operator Name: HAWAII PACIFIC HEALTH
Legal Status: Private
Date Became Current: 19780101
Date Ended Current: Not reported
Owner/Operator Address: 1319 PUNAHOU STREET
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-983-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:

Receive Date: 20140408
Handler Name: KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20160304
Handler Name: KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20180302
Handler Name: KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20200213
Handler Name: KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20220207
Handler Name: KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 19980706
Handler Name: KAPOLANI MEDICAL CENTER
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20130103
Handler Name: KAPOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20210714
Handler Name: KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Electronic Manifest Broker: No

Receive Date: 20220215
Handler Name: KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 621491
NAICS Description: HMO MEDICAL CENTERS

NAICS Code: 621493
NAICS Description: FREESTANDING AMBULATORY SURGICAL AND EMERGENCY CENTERS

Facility Has Received Notices of Violation:
Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20180321
Actual Return to Compliance Date: 20180423
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20180402
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: SAMN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Generators - Pre-transport
Date Violation was Determined:	20140212
Actual Return to Compliance Date:	20140225
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20140212
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	SAMN
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Universal Waste - Small Quantity Handlers
Date Violation was Determined:	20140212
Actual Return to Compliance Date:	20140225
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20140212
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	SAMN
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Generators - Pre-transport
Date Violation was Determined:	20180321
Actual Return to Compliance Date:	20180423
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20180402
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	SAMN
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Universal Waste - Small Quantity Handlers
Date Violation was Determined: 20140212
Actual Return to Compliance Date: 20140225
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20140212
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: SAMN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Universal Waste - Small Quantity Handlers
Date Violation was Determined: 20180321
Actual Return to Compliance Date: 20180423
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20180402
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	SAMN
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	TSD IS-Container Use and Management
Date Violation was Determined:	20140212
Actual Return to Compliance Date:	20140225
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20140212
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	SAMN
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	20180207
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	SAMN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20180423
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140109
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	SAMN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20140225
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140109
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	SAMN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20140225
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20180207
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	SAMN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20180423
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

Evaluation Date:	20140109
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	SAMN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20140225
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20180207
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	SAMN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20180423
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20140109
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	SAMN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20140225
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110005730067

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting

KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN (Continued) **1004688971**

requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
HAZARDOUS WASTE BIENNIAL REPORTER
STATE MASTER

Registry ID: 110064234840

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004688971
Registry ID:	110005730067
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005730067
Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN AND CHILDREN
Address:	1319 PUNAHOU STREET
City,State,Zip:	HONOLULU, HI 96826

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209 NE < 1/8 0.109 mi. 578 ft. **UH MANOA LOWER CAMPUS TENNIS COURTS** **HI SHWS** **S126283190**
2693 DOLE ST **N/A**
HONOLULU, HI 96822

Actual: 69 ft.
Focus Map: 5

SHWS:

Name:	UH MANOA LOWER CAMPUS TENNIS COURTS
Address:	2693 DOLE ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported

UH MANOA LOWER CAMPUS TENNIS COURTS (Continued) **S126283190**

Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1004
Location Description:	2693 Dole Street
Is Public:	True
Update On:	2021-03-13 17:09:57
Latitude:	21.295395
Longitude:	-157.816173

AH210 **CAMPBELL AVENUE SERVICE STN** **EDR Hist Auto** **1020354560**
ESE **3335 CAMPBELL AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.110 mi.
582 ft. **Site 2 of 4 in cluster AH**

Actual: EDR Hist Auto
16 ft.

Focus Map:
8

Year:	Name:	Type:
1969	CAMPBELL AVENUE SERVICE STN	Gasoline Service Stations
1970	CAMPBELL AVENUE SERVICE STN	Gasoline Service Stations
1971	CAMPBELL AVENUE SERVICE STN	Gasoline Service Stations
1972	CAMPBELL AVENUE SERVICE STN	Gasoline Service Stations
1973	CAMPBELL AVENUE SERVICE STN	Gasoline Service Stations
1974	CAMPBELL AVENUE SERVICE STN	Gasoline Service Stations
1975	CAMPBELL AVENUE SERVICE STN	Gasoline Service Stations
1976	CAMPBELL AVENUE SERVICE STN	Gasoline Service Stations
1977	CAMPBELL AVENUE CHEVRON	Gasoline Service Stations
1978	CAMPBELL AVENUE CHEVRON	Gasoline Service Stations
1988	R & R TEXACO INC	General Automotive Repair Shops

AH211 **MAL MAT AUTO LEASING INC** **RCRA NonGen / NLR** **1000123797**
ESE **3335 CAMPBELL AVE** **FINDS** **HID981656390**
< 1/8 **HONOLULU, HI 96815** **ECHO**
0.110 mi.
582 ft. **Site 3 of 4 in cluster AH**

Actual: RCRA Listings:
16 ft.

Focus Map:
8

Date Form Received by Agency:	19931210
Handler Name:	MAL MAT AUTO LEASING INC
Handler Address:	3335 CAMPBELL AVE
Handler City,State,Zip:	HONOLULU, HI 96815
EPA ID:	HID981656390
Contact Name:	ENVIRONMENTAL MANAGER
Contact Address:	3335 CAMPBELL AVE
Contact City,State,Zip:	HONOLULU, HI 96815
Contact Telephone:	808-735-7052
Contact Fax:	Not reported

MAL MAT AUTO LEASING INC (Continued) **1000123797**

Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		CAMPBELL AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	R&A MALONEY	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A

MAL MAT AUTO LEASING INC (Continued) **1000123797**

Operating TSDF Universe: Not reported
Full Enforcement Universe: Not reported
Significant Non-Complier Universe: No
Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20000915
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: R&A MALONEY
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19931210
Handler Name: MAL MAT AUTO LEASING INC
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

MAL MAT AUTO LEASING INC (Continued) **1000123797**

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005724957

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000123797
Registry ID: 110005724957
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005724957
Name: MAL MAT AUTO LEASING INC
Address: 3335 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

AH212 **JH SAKAMOTO & ASSOCIATES** **HI UST** **U001237393**
ESE **3335 CAMPBELL AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.110 mi.
582 ft. **Site 4 of 4 in cluster AH**

Actual:
16 ft.

Focus Map:
8

UST:
Name: JH SAKAMOTO & ASSOCIATES
Address: 3335 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-102553
Owner: JH SAKAMOTO & ASSOCIATES
Owner Address: PACIFIC PARK PLAZA / 711 KAPIOLANI BLVD, SUITE 1270
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**

JH SAKAMOTO & ASSOCIATES (Continued) **U001237393**

Date Closed: 02/05/1992
Tank Capacity: 1000
Substance: Not Listed

Name: JH SAKAMOTO & ASSOCIATES
Address: 3335 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 02/05/1992
Tank Capacity: 1200
Substance: Not Listed

Name: JH SAKAMOTO & ASSOCIATES
Address: 3335 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-3
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 02/05/1992
Tank Capacity: 4000
Substance: Not Listed

AL213 **FUNAI'S UNION SERVICE L-5583** **HI LUST** **U001235021**
North **1810 KAPIOLANI BLVD** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96813** **HI Financial Assurance**
0.110 mi.
583 ft. **Site 2 of 3 in cluster AL**

Actual:
3 ft.

Focus Map:
5

LUST:
Name: FUNAI'S UNION SERVICE L-5583
Address: 1810 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI 96813
Facility ID: 9-100047
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 02/08/2002
Release ID: 910048
Project Officer: Shunsheng Fu

UST:
Name: FUNAI'S UNION SERVICE L-5583
Address: 1810 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI 96813
Facility ID: 9-100047
Owner: UNOCAL CORPORATION
Owner Address: 3915 Mission Avenue #7416
Owner City,St,Zip: Honolulu, 96813 96813
Latitude: 21.290739
Longitude: -157.835372
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 03/26/1966

FUNAI'S UNION SERVICE L-5583 (Continued) **U001235021**

Tank Status:	**Permanently Out of Use**
Date Closed:	06/10/1991
Tank Capacity:	8000
Substance:	Gasoline
Name:	FUNAI'S UNION SERVICE L-5583
Address:	1810 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Tank ID:	R-2
Date Installed:	03/26/1966
Tank Status:	**Permanently Out of Use**
Date Closed:	06/10/1991
Tank Capacity:	6000
Substance:	Gasoline
Name:	FUNAI'S UNION SERVICE L-5583
Address:	1810 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Tank ID:	R-3
Date Installed:	03/26/1966
Tank Status:	**Permanently Out of Use**
Date Closed:	06/10/1991
Tank Capacity:	250
Substance:	Used Oil

HI Financial Assurance:

Name:	FUNAI'S UNION SERVICE L-5583
Address:	1810 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Alt Facility ID:	9-100047
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Risk Retention Group
Expiration Date:	Not reported
FR Archive:	False
Name:	FUNAI'S UNION SERVICE L-5583
Address:	1810 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Alt Facility ID:	9-100047
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Not Listed
Expiration Date:	Not reported
FR Archive:	False
Name:	FUNAI'S UNION SERVICE L-5583
Address:	1810 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Alt Facility ID:	9-100047
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Risk Retention Group
Expiration Date:	Not reported
FR Archive:	False

FUNAI'S UNION SERVICE L-5583 (Continued) **U001235021**

Name:	FUNAI'S UNION SERVICE L-5583
Address:	1810 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Alt Facility ID:	9-100047
Tank Id:	R-3
Tank Status:	Permanently Out of Use
FRTYPE:	Not Listed
Expiration Date:	Not reported
FR Archive:	False

Name:	FUNAI'S UNION SERVICE L-5583
Address:	1810 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Alt Facility ID:	9-100047
Tank Id:	R-3
Tank Status:	Permanently Out of Use
FRTYPE:	Risk Retention Group
Expiration Date:	Not reported
FR Archive:	False

Name:	FUNAI'S UNION SERVICE L-5583
Address:	1810 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Alt Facility ID:	9-100047
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Not Listed
Expiration Date:	Not reported
FR Archive:	False

AL214 **FUNAIS UNION SERVICE** **EDR Hist Auto** **1020444092**
North **1810 KAPIOLANI BLVD** **N/A**
< 1/8 **HONOLULU, HI 96814**
0.110 mi.
583 ft. **Site 3 of 3 in cluster AL**

Actual: EDR Hist Auto
3 ft.

Focus Map:
5

Year:	Name:	Type:
1969	DAY & NIGHT 76 SERVICE	Gasoline Service Stations
1970	DAY & NIGHT 76 SERVICE	Gasoline Service Stations
1971	DAY & NIGHT 76 SERVICE	Gasoline Service Stations
1974	FUNAIS UNION SERVICE	Gasoline Service Stations
1975	FUNAIS UNION SERVICE	Gasoline Service Stations
1976	FUNAIS UNION SERVICE	Gasoline Service Stations
1977	FUNAIS UNION SERVICE	Gasoline Service Stations
1978	FUNAIS UNION SERVICE	Gasoline Service Stations
1979	FUNAIS UNION SERVICE	Gasoline Service Stations
1980	FUNAIS SERVICE INC	Gasoline Service Stations
1982	FUNAIS SERVICE INC	Gasoline Service Stations
1983	FUNAIS SERVICE INC	Gasoline Service Stations
1985	FUNAIS SERVICE INC	Gasoline Service Stations
1986	FUNAIS SERVICE INC	Gasoline Service Stations
1987	FUNAIS SERVICE INC	Gasoline Service Stations
1988	FUNAIS SERVICE INC	Gasoline Service Stations
1989	FUNAIS SERVICE INC	Gasoline Service Stations
1990	FUNAIS SERVICE INC	Gasoline Service Stations

AM215 **ROCK STAR TATTOOS** **RCRA NonGen / NLR** **1015742063**
SW **2270 B KUHIO AVE** **HIP000140901**
< 1/8 **HONOLULU, HI 96816**
0.110 mi.
583 ft. **Site 1 of 3 in cluster AM**

Actual: **3 ft.**

Focus Map: **8**

RCRA Listings:

Date Form Received by Agency:		20120723
Handler Name:	ROCK STAR TATTOOS	
Handler Address:		2270 B KUHIO AVE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HIP000140901
Contact Name:		TERRY CORPUS
Contact Address:		919 ALA MOANA BLVD, RM 206
Contact City,State,Zip:		HONOLULU, HI 96814
Contact Telephone:		808-586-4699
Contact Fax:		808-586-7537
Contact Email:		TERRY.CORPUS@DOH.HAWAII.GOV
Contact Title:		STATE ON-SCENE COORDINATOR
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		919 ALA MOANA BLVD, RM 206
Mailing City,State,Zip:		HONOLULU, HI 96814
Owner Name:	HONOLULU LIMITED	
Owner Type:		Private
Operator Name:	CONOR PIERCE	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

ROCK STAR TATTOOS (Continued) **1015742063**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20120723
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D009
Waste Description:	MERCURY

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: HONOLULU LIMITED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	3660 WAIALAE AVE. 400
Owner/Operator City,State,Zip:	HONOLULU, HI 96816
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: HONOLULU LIMITED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	3660 WAIALAE AVE. 400
Owner/Operator City,State,Zip:	HONOLULU, HI 96816

ROCK STAR TATTOOS (Continued) **1015742063**

Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name: CONOR PIERCE	
Legal Status:	Private
Date Became Current:	20020101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name: CONOR PIERCE	
Legal Status:	Private
Date Became Current:	20020101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	20120423
Handler Name: ROCK STAR TATTOOS	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported
Receive Date:	20120723
Handler Name: ROCK STAR TATTOOS	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

ROCK STAR TATTOOS (Continued) **1015742063**

List of NAICS Codes and Descriptions:
NAICS Code: 812199
NAICS Description: OTHER PERSONAL CARE SERVICES

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

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216 NE < 1/8 0.110 mi. 583 ft. **ALA WAI COVE CONDOMINIUM APARTMENTS** **HI SHWS 1006820430**
509 UNIVERSITY AVE **HI SPILLS N/A**
HONOLULU, HI 96815

Actual: 3 ft.
Focus Map: 8

SHWS:

Name:	ALA WAI COVE CONDOMINIUM APARTMENTS
Address:	509 UNIVERSITY AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Ala Wai Cove Condominium Apartments
HID Number:	Not reported
Facility Registry Identifier:	110013783888
Lead Agency:	HEER Office
Program:	State
Project Manager:	John Peard
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Ala Wai Cove Condominium Apartments
HID Number:	Not reported
Facility Registry Identifier:	110013783888
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Found: Petroleum in soil.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Closed - Documentation Inadequate to Evaluate Risk
Document Date:	07/14/1992
Document Number:	Not reported
Document Subject:	Site Assessment for the Removal of an UST at the Ala Wai Cove Condominium Apartments, Honolulu HI, Prepared for M. Nakai Repair Service Ltd, Project 00459
Project Manager:	John Peard
Contact Information:	(808) 933-9921 Environmental Health Bldg, 1582 Kamehameha Ave, Hilo, HI 96720

ALA WAI COVE CONDOMINIUM APARTMENTS (Continued) **1006820430**

Facility ID:	2277
Location Description:	509 University Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.285859
Longitude:	-157.827018

SPILLS:

Name:	ALA WAI COVE CONDOMINIUM APARTMENTS
Address:	509 UNIVERSITY AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19920714
Facility Registry ID:	110013783888
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Ala Wai Cove Condominium Apartments
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Ala Wai Cove Condominium Apartments
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.285903000000001
Longitude:	-157.826919
Name:	ALA WAI COVE CONDOMINIUM APARTMENTS
Address:	509 UNIVERSITY AVE
Address 2:	Not reported

ALA WAI COVE CONDOMINIUM APARTMENTS (Continued) **1006820430**

City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19920714
Facility Registry ID:	110013783888
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Ala Wai Cove Condominium Apartments
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Ala Wai Cove Condominium Apartments
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.271197000000001
Longitude:	-157.81720899999999
Name:	ALA WAI COVE CONDOMINIUM APARTMENTS
Address:	509 UNIVERSITY AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19920714
Facility Registry ID:	110013783888
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Ala Wai Cove Condominium Apartments
Activity Type:	Response

ALA WAI COVE CONDOMINIUM APARTMENTS (Continued) **1006820430**

Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Ala Wai Cove Condominium Apartments
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.286078
Longitude:	-157.827248

AN217 **WINAM SHELL SERVICE** **RCRA NonGen / NLR** **1000149469**
NE **755 KAPAHULU AVE** **FINDS** **HID981977853**
< 1/8 **HONOLULU, HI 96816** **ECHO**
0.112 mi.
591 ft. **Site 1 of 3 in cluster AN**

Actual:
15 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		19870416
Handler Name:	WINAM SHELL SERVICE	
Handler Address:		755 KAPAHULU AVE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HID981977853
Contact Name:		SONDRA BIENVENUE
Contact Address:		755 KAPAHULU AVE
Contact City,State,Zip:		HONOLULU, HI 96816
Contact Telephone:		713-241-2258
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported

WINAM SHELL SERVICE (Continued) **1000149469**

State District Owner:		Not reported
State District:		Not reported
Mailing Address:		755 KAPAHULU AVE
Mailing City,State,Zip:		HONOLULU, HI 96816
Owner Name:	KAHALA SHELL AAUTO CAR	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20020729
Recognized Trader-Importer:		No

WINAM SHELL SERVICE (Continued) **1000149469**

Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: KAHALA SHELL AAUTO CAR	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19870416
Handler Name: WINAM SHELL SERVICE	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	4471
NAICS Description:	GASOLINE STATIONS

Facility Has Received Notices of Violation:

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported

WINAM SHELL SERVICE (Continued) **1000149469**

Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 19951212
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

FINDS:
Registry ID: 110005725796

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource

WINAM SHELL SERVICE (Continued) **1000149469**

Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000149469
Registry ID:	110005725796
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005725796
Name:	WINAM SHELL SERVICE
Address:	755 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816

AN218 **GOOSE'S EDGE INC 139555** **HI LUST** **U004159309**
NE **755 KAPAHULU AVE.** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96816** **HI AIRS**
0.112 mi. **HI Financial Assurance**
591 ft. **Site 2 of 3 in cluster AN**

Actual:
15 ft.

Focus Map:
8

LUST:

Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101020
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	04/10/2002
Release ID:	010045
Project Officer:	Josh Nagashima

Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101020
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	07/08/2010
Release ID:	080034
Project Officer:	Josh Nagashima

Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101020
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	06/19/2002
Release ID:	950043
Project Officer:	Josh Nagashima

UST:

Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101020
Owner:	EQUILON ENTERPRISES, LLC DBA SHELL OIL PRODUCTS US

GOOSE'S EDGE INC 139555 (Continued) **U004159309**

Owner Address:	2555 13TH AVE, SW
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.281310
Longitude:	-157.813890
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	R-1
Date Installed:	04/19/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1995
Tank Capacity:	6000
Substance:	Gasoline
Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-1
Date Installed:	04/19/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1995
Tank Capacity:	6000
Substance:	Gasoline
Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-2
Date Installed:	04/19/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1995
Tank Capacity:	6000
Substance:	Gasoline
Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-2
Date Installed:	04/19/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1995
Tank Capacity:	6000
Substance:	Gasoline
Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-3
Date Installed:	04/19/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1995
Tank Capacity:	6000
Substance:	Gasoline

GOOSE'S EDGE INC 139555 (Continued) **U004159309**

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 04/19/1971
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1995
Tank Capacity: 6000
Substance: Gasoline

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/19/1971
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1995
Tank Capacity: 6000
Substance: Gasoline

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/19/1971
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1995
Tank Capacity: 6000
Substance: Gasoline

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-5
Date Installed: 04/19/1971
Tank Status: **Permanently Out of Use**
Date Closed: 04/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-5
Date Installed: 04/19/1971
Tank Status: **Permanently Out of Use**
Date Closed: 04/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.

GOOSE'S EDGE INC 139555 (Continued) **U004159309**

City,State,Zip: HONOLULU, HI 96816

Tank ID: R-8
Date Installed: 02/01/1998
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2001
Tank Capacity: 600
Substance: Used Oil

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-8
Date Installed: 02/01/1998
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2001
Tank Capacity: 600
Substance: Used Oil

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-87
Date Installed: 03/25/1995
Tank Status: **Permanently out of Use**
Date Closed: 09/21/2010
Tank Capacity: 12000
Substance: Gasoline

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-87
Date Installed: 03/25/1995
Tank Status: **Permanently out of Use**
Date Closed: 09/21/2010
Tank Capacity: 12000
Substance: Gasoline

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 03/25/1995
Tank Status: **Permanently out of Use**
Date Closed: 09/21/2010
Tank Capacity: 12000
Substance: Gasoline

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

GOOSE'S EDGE INC 139555 (Continued) **U004159309**

Tank ID: r-92
Date Installed: 03/25/1995
Tank Status: **Permanently out of Use**
Date Closed: 09/21/2010
Tank Capacity: 12000
Substance: Gasoline

AIRS:
Name: LINDSEY'S KAPAHULU SHELL SERVICE
Address: 755 KAPAHULU AVENUE
City,State,Zip: HONOLULU, HI
Facility Identifier: 0294-01-NT
Island: Oahu
Mailing Address: Not reported
Locale: Not reported
Mailing City: Not reported
Contact Name: Not reported
Mailing State: Not reported
Mailing Zip: Not reported
Contact Phone: Not reported
Business Phone: Not reported
Issue Date: 09/13/1995
Expiration Date: 08/01/2000
Description: Soil Vapor Extraction System (SVE system), VR System Model V-3, consisting of: One (1) Internal Combustion Engine, Model LSG-875 (1 50 HP and 460 cubic inches each), combined with Car Sound 3 way - 2 way catalytic converter and computerized oxygen air-to-fuel sensing and control unit.

HI Financial Assurance:
Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-8
Tank Status: Permanently Out of Use

GOOSE'S EDGE INC 139555 (Continued) **U004159309**

FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-5
Tank Status: Permanently Out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816

GOOSE'S EDGE INC 139555 (Continued) **U004159309**

Alt Facility ID: 9-101020
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2011
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2011
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-5
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2011
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-8
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2011
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2011
FR Archive: False

Name: GOOSE'S EDGE INC 139555
Address: 755 KAPAHULU AVE.
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101020
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2011
FR Archive: False

GOOSE'S EDGE INC 139555 (Continued) **U004159309**

Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-101020
Tank Id:	r-87
Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	01/01/2011
FR Archive:	False

Name:	GOOSE'S EDGE INC 139555
Address:	755 KAPAHULU AVE.
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-101020
Tank Id:	R-3
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	01/01/2011
FR Archive:	False

AN219 **WINAM AUTO SERVICE INC** **EDR Hist Auto** **1020272402**
NE **755 KAPAHULU AVE** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.112 mi.
591 ft. **Site 3 of 3 in cluster AN**

Actual: EDR Hist Auto
15 ft.

Focus Map:
8

Year:	Name:	Type:
1969	WINAM AUTO SERVICE INC	Gasoline Service Stations
1970	WINAM AUTO SERVICE INC	Gasoline Service Stations
1971	WINAM AUTO SERVICE INC	Gasoline Service Stations
1972	WINAM AUTO SERVICE INC	Gasoline Service Stations
1973	WINAM AUTO SERVICE INC	Gasoline Service Stations
1974	WINAM AUTO SERVICE INC	Gasoline Service Stations
1975	WINAM AUTO SERVICE	Gasoline Service Stations
1976	WINAM AUTO SERVICE	Gasoline Service Stations
1977	WINAM AUTO SERVICE	Gasoline Service Stations
1978	WINAM AUTO SERVICE INC	Gasoline Service Stations
1979	WINAM AUTO SERVICE INC	Gasoline Service Stations
1980	WINAM AUTO SERVICE INC	Gasoline Service Stations
1982	WINAM AUTO SERVICE INC	Gasoline Service Stations
1983	WINAM AUTO SERVICE INC	Gasoline Service Stations
1985	WINAM AUTO SERVICE INC	Gasoline Service Stations
1986	WINAM AUTO SERVICE INC	Gasoline Service Stations
1987	KAHALA SHELL AUTO CARE INC	Gasoline Service Stations
1988	KAHALA SHELL AUTO CARE INC	Gasoline Service Stations
1989	KAHALA SHELL AUTO CARE INC	Gasoline Service Stations
1990	KAHALA SHELL AUTO CARE INC	Gasoline Service Stations
1991	STANDARD AUTO SERVICE INC	Gasoline Service Stations
1992	STANDARD AUTO SERVICE INC	Gasoline Service Stations
1992	LINDSEYS AUTO REPAIR INC	Gasoline Service Stations
1993	LINDSEYS AUTO REPAIR INC	Gasoline Service Stations
1993	STANDARD AUTO SERVICE INC	Gasoline Service Stations
1994	STANDARD AUTO SERVICE INC	Gasoline Service Stations
1994	LINDSEYS AUTO REPAIR INC	Gasoline Service Stations
1995	LINDSEYS AUTO REPAIR INC	Gasoline Service Stations
1995	STANDARD AUTO SERVICE INC	Gasoline Service Stations

WINAM AUTO SERVICE INC (Continued) **1020272402**

1996	STANDARD AUTO SERVICE INC	Gasoline Service Stations
1996	LINDSEYS AUTO REPAIR INC	Gasoline Service Stations
1997	LINDSEYS AUTO REPAIR INC	Gasoline Service Stations
1998	LINDSEYS AUTO REPAIR INC	Gasoline Service Stations
1999	LINDSEYS AUTO REPAIR INC	Gasoline Service Stations

AO220 **MIDAS** **RCRA-VSQG** **1000156633**
SE **3051 WAIALAE** **FINDS** **HID981654858**
< 1/8 **HONOLULU, HI 96816** **ECHO**
0.115 mi.
608 ft. **Site 1 of 7 in cluster AO**

Actual: **50 ft.**

Focus Map: **5**

RCRA Listings:

Date Form Received by Agency:		19860915
Handler Name:	MIDAS	
Handler Address:		3051 WAIALAE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HID981654858
Contact Name:		ENVIRONMENTAL MANAGER
Contact Address:		3051 WAIALAE
Contact City,State,Zip:		HONOLULU, HI 96816
Contact Telephone:		808-845-7851
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Other
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		1415 DILLINGHAM BLVD
Mailing City,State,Zip:		HONOLULU, HI 96817
Owner Name:	PEREIRA OF HAWAII INC	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported

MIDAS (Continued) **1000156633**

Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: PEREIRA OF HAWAII INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported

MIDAS (Continued) **1000156633**

Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19860915
Handler Name: MIDAS
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 811112
NAICS Description: AUTOMOTIVE EXHAUST SYSTEM REPAIR

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported

MIDAS (Continued) **1000156633**

SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20040324
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: LHASH
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported

MIDAS (Continued) **1000156633**

Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	19951212
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110005724822

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000156633
Registry ID:	110005724822
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005724822
Name:	MIDAS MUFFLER KAIMUKI
Address:	3051 WAIALAE
City,State,Zip:	HONOLULU, HI 96816

AO221 **MIDAS MUFFLER KAIMUKI** **HI UST** **U003346390**
SE **3051 WAIALAE AVE** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.115 mi.
608 ft. **Site 2 of 7 in cluster AO**

Actual:
50 ft.

Focus Map:
5

UST:

Name:	MIDAS MUFFLER KAIMUKI
Address:	3051 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-103386
Owner:	MIDAS MUFFLER
Owner Address:	98-1234 KAAHUMANU ST
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	Not reported
Longitude:	Not reported

MIDAS MUFFLER KAIMUKI (Continued) **U003346390**

Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 11/30/1999
Tank Capacity: 550
Substance: Used Oil

AO222 **ROGERS CHEVRON** **EDR Hist Auto** **1020354580**
ESE **3048 WAIALAE AVE** **N/A**
< 1/8 **HONOLULU, HI 96816**
0.119 mi.
629 ft. **Site 3 of 7 in cluster AO**

Actual: EDR Hist Auto
48 ft.

Focus Map:
5

Year:	Name:	Type:
1969	ST LOUIS CHEVRON SERVICE	Gasoline Service Stations
1970	ST LOUIS CHEVRON SERVICE	Gasoline Service Stations
1971	ST LOUIS CHEVRON SERVICE	Gasoline Service Stations
1972	ST LOUIS CHEVRON SERVICE	Gasoline Service Stations
1973	MELS CHEVRON SERVICE	Gasoline Service Stations
1974	MELS CHEVRON SERVICE	Gasoline Service Stations
1975	MELS CHEVRON SERVICE	Gasoline Service Stations
1976	MELS CHEVRON SERVICE	Gasoline Service Stations
1977	MELS CHEVRON SERVICE	Gasoline Service Stations
1978	MELS CHEVRON SERVICE	Gasoline Service Stations
1979	MELS CHEVRON SERVICE	Gasoline Service Stations
1980	MELS CHEVRON SERVICE	Gasoline Service Stations
1986	ROGERS CHEVRON	Gasoline Service Stations
1987	ROGERS CHEVRON	Gasoline Service Stations
1988	ROGERS CHEVRON	Gasoline Service Stations
1989	ROGERS CHEVRON	Gasoline Service Stations, NEC
1990	ROGERS CHEVRON	Gasoline Service Stations, NEC
1991	ROGERS CHEVRON	Gasoline Service Stations, NEC
1992	ROGERS CHEVRON	Gasoline Service Stations, NEC
1993	ROGERS CHEVRON	Gasoline Service Stations, NEC
1994	ROGERS CHEVRON	Gasoline Service Stations, NEC
1995	ROGERS CHEVRON	Gasoline Service Stations, NEC
1996	ROGERS CHEVRON	Gasoline Service Stations, NEC
1997	ROGERS CHEVRON	Gasoline Service Stations, NEC
1998	ROGERS CHEVRON	Gasoline Service Stations, NEC
1999	ROGERS CHEVRON	Gasoline Service Stations, NEC
2000	ROGERS CHEVRON	Gasoline Service Stations, NEC
2001	ROGERS CHEVRON	Gasoline Service Stations, NEC
2002	ROGERS CHEVRON	Gasoline Service Stations, NEC
2003	ROGERS CHEVRON	Gasoline Service Stations, NEC
2004	ROGERS CHEVRON	Gasoline Service Stations, NEC
2005	ROGERS CHEVRON	Gasoline Service Stations, NEC
2006	ROGERS CHEVRON	Gasoline Service Stations, NEC

AO223 **ROGER'S CHEVRON** **HI SHWS** **U001235440**
ESE **3048 WAIALAE AVE** **HI LUST** **N/A**
< 1/8 **HONOLULU, HI 96816** **HI UST**
0.119 mi. **HI Financial Assurance**
629 ft. **Site 4 of 7 in cluster AO**

Actual:
48 ft.

Focus Map:
5

SHWS:

Name:	ROGER'S CHEVRON
Address:	3048 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Roger's Chevron
HID Number:	Not reported
Facility Registry Identifier:	110013778652
Lead Agency:	HEER Office
Program:	State
Project Manager:	Cal Miyahara
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Roger's Chevron
HID Number:	Not reported
Facility Registry Identifier:	110013778652
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	TPH remain in the soil at levels below HDOH EALs..
Use Restrictions:	No Hazard Present for Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	10/31/2007
Document Number:	2007-763-CMM
Document Subject:	Roger's Chevron Service Station, Baseline Assessment Report, Chevron Facility No 9-3778, 3048 Waialae Ave, Honolulu HI
Project Manager:	Cal Miyahara
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	962
Location Description:	3048 Waialae Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.289061
Longitude:	-157.810895

LUST:

Name:	ROGER'S CHEVRON
Address:	3048 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101273
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	11/30/2007
Release ID:	070027
Project Officer:	Shaobin Li

ROGER'S CHEVRON (Continued) **U001235440**

UST:

Name:	ROGER'S CHEVRON
Address:	3048 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101273
Owner:	CHEVRON PRODUCTS COMPANY
Owner Address:	91-480 MALAKOLE ST.
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.289119
Longitude:	-157.811046
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	r-4
Date Installed:	04/18/1982
Tank Status:	**Permanently out of Use**
Date Closed:	07/01/2007
Tank Capacity:	1000
Substance:	Used Oil
Name:	ROGER'S CHEVRON
Address:	3048 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	r-4
Date Installed:	04/18/1982
Tank Status:	**Permanently out of Use**
Date Closed:	07/01/2007
Tank Capacity:	1000
Substance:	Used Oil
Name:	ROGER'S CHEVRON
Address:	3048 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	r-87
Date Installed:	04/18/1982
Tank Status:	**Permanently out of Use**
Date Closed:	07/01/2007
Tank Capacity:	10000
Substance:	Gasoline
Name:	ROGER'S CHEVRON
Address:	3048 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	r-87
Date Installed:	04/18/1982
Tank Status:	**Permanently out of Use**
Date Closed:	07/01/2007
Tank Capacity:	10000
Substance:	Gasoline
Name:	ROGER'S CHEVRON
Address:	3048 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816

ROGER'S CHEVRON (Continued) **U001235440**

Tank ID: r-89
Date Installed: 04/18/1982
Tank Status: **Permanently out of Use**
Date Closed: 07/01/2007
Tank Capacity: 10000
Substance: Gasoline

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-89
Date Installed: 04/18/1982
Tank Status: **Permanently out of Use**
Date Closed: 07/01/2007
Tank Capacity: 10000
Substance: Gasoline

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 04/18/1982
Tank Status: **Permanently out of Use**
Date Closed: 07/01/2007
Tank Capacity: 10000
Substance: Gasoline

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 04/18/1982
Tank Status: **Permanently out of Use**
Date Closed: 07/01/2007
Tank Capacity: 10000
Substance: Gasoline

HI Financial Assurance:
Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101273
Tank Id: r-4
Tank Status: Permanently out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101273
Tank Id: r-92
Tank Status: Permanently out of Use

ROGER'S CHEVRON (Continued) **U001235440**

FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101273
Tank Id: r-89
Tank Status: Permanently out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101273
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Not reported
Expiration Date: Not reported
FR Archive: False

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101273
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 05/05/2007
FR Archive: False

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101273
Tank Id: r-89
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 05/05/2007
FR Archive: False

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101273
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 05/05/2007
FR Archive: False

Name: ROGER'S CHEVRON
Address: 3048 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

ROGER'S CHEVRON (Continued) **U001235440**

Alt Facility ID:	9-101273
Tank Id:	r-4
Tank Status:	Permanently out of Use
FRTYPE:	Guarantee
Expiration Date:	05/05/2007
FR Archive:	False

AO224 **CHEVRON 93778** **RCRA-VSQG** **1008880408**
ESE **3048 WAIALAE AVE** **HIR000136853**
< 1/8 **HONOLULU, HI 96816**
0.119 mi.
629 ft. **Site 5 of 7 in cluster AO**

Actual:
48 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20190404
Handler Name:	CHEVRON 93778	
Handler Address:		3048 WAIALAE AVE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HIR000136853
Contact Name:		Not reported
Contact Address:		PO BOX 6004
Contact City,State,Zip:		SAN RAMON, CA 94583
Contact Telephone:		925-842-5931
Contact Fax:		Not reported
Contact Email:		NAWTDESK@CHEVRON.COM
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PO BOX 6004
Mailing City,State,Zip:		SAN RAMON, CA 94583
Owner Name:	CHEVRON USA INC	
Owner Type:		Private
Operator Name:	CHEVRON USA INC	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---

CHEVRON 93778 (Continued) **1008880408**

Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20190405
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D018
Waste Description:	BENZENE

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: CHEVRON USA INC	
Legal Status:	Private
Date Became Current:	19800501
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

CHEVRON 93778 (Continued) **1008880408**

Owner/Operator Indicator: Owner
Owner/Operator Name: CHEVRON USA INC
Legal Status: Private
Date Became Current: 19800501
Date Ended Current: Not reported
Owner/Operator Address: PO BOX 6004
Owner/Operator City,State,Zip: SAN RAMON, CA 94583
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: CHEVRON USA INC
Legal Status: Private
Date Became Current: 19800501
Date Ended Current: Not reported
Owner/Operator Address: PO BOX 6004
Owner/Operator City,State,Zip: SAN RAMON, CA 94583
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: CHEVRON USA INC
Legal Status: Private
Date Became Current: 19800501
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20190404
Handler Name: CHEVRON 93778
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20050916
Handler Name: CHEVRON 93778
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No

CHEVRON 93778 (Continued) **1008880408**

Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 44719
NAICS Description: OTHER GASOLINE STATIONS

NAICS Code: 811111
NAICS Description: GENERAL AUTOMOTIVE REPAIR

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

AP225 **AOAO ALA MOANA HOTEL CONDOMINIUM** **HI UST** **U004331144**
North **410 ATKINSON DR** **HI Financial Assurance** **N/A**
< 1/8 **HONOLULU, HI 96814**
0.120 mi.
632 ft. **Site 1 of 2 in cluster AP**

Actual:
3 ft.

Focus Map:
4

UST:
Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-101159
Owner: Ala Moana Property Development, LLC
Owner Address: 410 ATKINSON DR
Owner City,St,Zip: Honolulu, 96814 96814
Latitude: 21.290290
Longitude: -157.838680
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Map

Tank ID: M-2
Date Installed: 03/01/1999
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814

Tank ID: M-2
Date Installed: 03/01/1999
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

AOAO ALA MOANA HOTEL CONDOMINIUM (Continued) **U004331144**

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814

Tank ID: M-2
Date Installed: 03/01/1999
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Diesel

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-M-1
Date Installed: 08/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 02/22/1999
Tank Capacity: 1000
Substance: Diesel

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-M-1
Date Installed: 08/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 02/22/1999
Tank Capacity: 1000
Substance: Diesel

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-M-1
Date Installed: 08/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 02/22/1999
Tank Capacity: 1000
Substance: Diesel

HI Financial Assurance:
Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101159
Tank Id: M-2
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR

AOAO ALA MOANA HOTEL CONDOMINIUM (Continued) **U004331144**

City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101159
Tank Id: R-M-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101159
Tank Id: M-2
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 06/18/2019
FR Archive: True

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101159
Tank Id: R-M-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 06/18/2019
FR Archive: True

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101159
Tank Id: M-2
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 06/18/2021
FR Archive: False

Name: AOAO ALA MOANA HOTEL CONDOMINIUM
Address: 410 ATKINSON DR
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101159
Tank Id: R-M-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 06/18/2021
FR Archive: False

AP226 **ALA MOANA HOTEL** **RCRA-VSQG** **1001116172**
North **410 ATKINSON DRIVE** **FINDS** **HIR000000992**
< 1/8 **HONOLULU, HI 96814** **ECHO**
0.120 mi.
632 ft. **Site 2 of 2 in cluster AP**

Actual:
3 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:		20221013
Handler Name:	ALA MOANA HOTEL	
Handler Address:		410 ATKINSON DR
Handler City,State,Zip:		HONOLULU, HI 96814-4722
EPA ID:		HIR000000992
Contact Name:		DERRICK LEE
Contact Address:		ATKINSON DR
Contact City,State,Zip:		HONOLULU, HI 96814-4722
Contact Telephone:		808-944-4350
Contact Fax:		808-944-6882
Contact Email:		DERRICK.LEE@ALAMOANAHOTEL.COM
Contact Title:		DIRECTOR ENGINEERING
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		ATKINSON DR
Mailing City,State,Zip:		HONOLULU, HI 96814-4722
Owner Name:	ALA MOANA HOTEL BY MANTRA	
Owner Type:		Private
Operator Name:	ALA MOANA HOTEL BY MANTRA	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

ALA MOANA HOTEL (Continued) **1001116172**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20221024
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: AZABU USA CORP	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	410 ATKINSON DR
Owner/Operator City,State,Zip:	HONOLULU, HI 96814-4722
Owner/Operator Telephone:	808-955-4811
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name: ALA MOANA HOTEL BY MANTRA	
Legal Status:	Private
Date Became Current:	20210422

ALA MOANA HOTEL (Continued) **1001116172**

Date Ended Current: Not reported
Owner/Operator Address: 410 ATKINSON DR
Owner/Operator City,State,Zip: HONOLULU, HI 96814-4722
Owner/Operator Telephone: 808-944-4351
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: TERI.TANAKA@ALAMOANAHOTEL.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: ALA MOANA HOTEL BY MANTRA
Legal Status: Private
Date Became Current: 20210422
Date Ended Current: Not reported
Owner/Operator Address: 410 ATKINSON DR
Owner/Operator City,State,Zip: HONOLULU, HI 96814-4722
Owner/Operator Telephone: 808-944-4351
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: TERI.TANAKA@ALAMOANAHOTEL.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: ALA MOANA HOTEL BY MANTRA
Legal Status: Private
Date Became Current: 20210422
Date Ended Current: Not reported
Owner/Operator Address: 410 ATKINSON DR
Owner/Operator City,State,Zip: HONOLULU, HI 96814-4722
Owner/Operator Telephone: 808-944-4351
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: TERI.TANAKA@ALAMOANAHOTEL.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: AZABU USA CORP
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 410 ATKINSON DR
Owner/Operator City,State,Zip: HONOLULU, HI 96814-4722
Owner/Operator Telephone: 808-955-4811
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: ALA MOANA HOTEL BY MANTRA
Legal Status: Private
Date Became Current: 20210422
Date Ended Current: Not reported
Owner/Operator Address: 410 ATKINSON DR
Owner/Operator City,State,Zip: HONOLULU, HI 96814-4722
Owner/Operator Telephone: 808-944-4351
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: TERI.TANAKA@ALAMOANAHOTEL.COM

ALA MOANA HOTEL (Continued) **1001116172**

Historic Generators:

Receive Date:	20180123
Handler Name: ALAMOANA HOTEL	
Federal Waste Generator Description:	Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

Receive Date:	20221013
Handler Name: ALA MOANA HOTEL	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

Receive Date:	19960819
Handler Name: ALAMOANA HOTEL	
Federal Waste Generator Description:	Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20210422
Handler Name: ALA MOANA HOTEL	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

List of NAICS Codes and Descriptions:

NAICS Code:	72111
NAICS Description:	HOTELS (EXCEPT CASINO HOTELS) AND MOTELS

ALA MOANA HOTEL (Continued) **1001116172**

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005729694

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1001116172
Registry ID: 110005729694
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005729694
Name: ALA MOANA HOTEL
Address: 410 ATKINSON DRIVE
City,State,Zip: HONOLULU, HI 96814

AQ227 **BUDGET RENT-A-CAR SYSTEMS, INC.** **HI UST** **U001235453**
SW **2330 KUHIO AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.120 mi.
635 ft. **Site 1 of 3 in cluster AQ**

Actual:
3 ft.

Focus Map:
8

UST:
Name: BUDGET RENT-A-CAR SYSTEMS, INC.
Address: 2330 KUHIO AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-101361
Owner: BUDGET RENT-A-CAR SYSTEMS, INC.
Owner Address: Not reported
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: r-1

BUDGET RENT-A-CAR SYSTEMS, INC. (Continued) **U001235453**

Date Installed:	01/01/1983
Tank Status:	**Permanently Out of Use**
Date Closed:	06/24/1993
Tank Capacity:	6000
Substance:	Gasoline
Name:	BUDGET RENT-A-CAR SYSTEMS, INC.
Address:	2330 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	r-2
Date Installed:	01/01/1983
Tank Status:	**Permanently Out of Use**
Date Closed:	06/24/1993
Tank Capacity:	6000
Substance:	Gasoline

AR228 **CHEVRON U.S.A., INC.** **HI SHWS** **U001235436**
SW **2002 KALAKAUA AVE** **HI LUST** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.121 mi.
639 ft. **Site 1 of 4 in cluster AR**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	CHEVRON 2002 KALAKAUA
Address:	2002 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Chevron 2002 Kalakaua
HID Number:	Not reported
Facility Registry Identifier:	110013779045
Lead Agency:	EPA Region IX
Program:	State
Project Manager:	Amy Playdon
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Chevron 2002 Kalakaua
HID Number:	Not reported
Facility Registry Identifier:	110013779045
Lead Agency:	EPA Region IX
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Found: TPH as diesel and gasoline, BTEX, PAHs, HVOCs, PCBs, metals
Nature of Residual Contamination:	Most TPH levels below HDOH EALs
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Historic NFA - Incomplete Documentation
Document Date:	10/01/1997
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Amy Playdon

CHEVRON U.S.A., INC. (Continued) **U001235436**

Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2594
Location Description:	2002 Kalakaua Ave
Is Public:	True
Update On:	2020-04-01 14:20:12
Latitude:	21.284747
Longitude:	-157.832137

LUST:

Name:	CHEVRON U.S.A., INC.
Address:	2002 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101266
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	06/10/1997
Release ID:	920073
Project Officer:	Steven Okoji

AR229 **DAIO USA CORP** **RCRA NonGen / NLR** **1000742334**
SW **2002 KALAKAUA AVE** **FINDS** **HID984468306**
< 1/8 **HONOLULU, HI 96815** **ECHO**
0.121 mi.
639 ft. **Site 2 of 4 in cluster AR**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		19970225
Handler Name:	DAIO USA CORP	
Handler Address:		2002 KALAKAUA AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HID984468306
Contact Name:		Not reported
Contact Address:		Not reported
Contact City,State,Zip:		Not reported
Contact Telephone:		Not reported
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		2002 KALAKAUA AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	Not reported	
Owner Type:		Not reported
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No

DAIO USA CORP (Continued) **1000742334**

Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020905
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: DAIO USA CORP	
Legal Status:	Private
Date Became Current:	Not reported

DAIO USA CORP (Continued) **1000742334**

Date Ended Current:	Not reported
Owner/Operator Address:	1750 KALAKAUA AVE STE 705
Owner/Operator City,State,Zip:	HONOLULU, HI 96826
Owner/Operator Telephone:	808-949-1010
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19970225
Handler Name: DAIO USA CORP	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	19920427
Handler Name: DAIO USA CORP	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Codes:	No NAICS Codes Found

Facility Has Received Notices of Violation:

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported

DAIO USA CORP (Continued) **1000742334**

Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19970113
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:

Registry ID: 110007502452

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000742334
Registry ID:	110007502452
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110007502452
Name:	DAIO USA CORP

DAIO USA CORP (Continued) **1000742334**

Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

AR230 **CHEVRON U.S.A., INC.** **HI UST** **U004364787**
SW **2002 KALAKAUA AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.121 mi.
639 ft. **Site 3 of 4 in cluster AR**

Actual:
3 ft.

Focus Map:
8

UST:
Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI
Facility ID: 9-101266
Owner: DAIO USA CORP
Owner Address: CENTURY CENTER, SUITE 705 / 1750 KALAKAUA AVE
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.284703
Longitude: -157.832164
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: R-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**

CHEVRON U.S.A., INC. (Continued) **U004364787**

Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: R-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-3
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: R-3
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: R-3
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 5000

CHEVRON U.S.A., INC. (Continued) **U004364787**

Substance: Gasoline

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Used Oil

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: R-4
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Used Oil

Name: CHEVRON U.S.A., INC.
Address: 2002 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: R-4
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 1000
Substance: Used Oil

AR231 **TRADEWIND CHEVRON SERVICE** **EDR Hist Auto** **1021666592**
SW **2002 KALAKAUA AVE** **N/A**
< 1/8 **HONOLULU, HI 96815**
0.121 mi.
639 ft. **Site 4 of 4 in cluster AR**

Actual: EDR Hist Auto
3 ft.

Focus Map:
8

Year:	Name:	Type:
1969	TRADEWIND CHEVRON SERVICE	Gasoline Service Stations
1970	TRADEWIND CHEVRON SERVICE	Gasoline Service Stations
1971	TRADEWIND CHEVRON SERVICE	Gasoline Service Stations
1971	WAIKIKI SERVICE CENTER	Gasoline Service Stations
1972	WAIKIKI SERVICE CENTER	Gasoline Service Stations
1972	TRADEWIND CHEVRON SERVICE	Gasoline Service Stations
1973	TRADEWIND CHEVRON SERVICE	Gasoline Service Stations
1973	TRADEWIND CHEVRON	Gasoline Service Stations
1974	TRADEWIND CHEVRON SERVICE	Gasoline Service Stations
1974	TRADEWIND CHEVRON	Gasoline Service Stations
1975	TRADEWIND CHEVRON SERVICE	Gasoline Service Stations

232
SE
< 1/8
0.122 mi.
643 ft.

PACIFIC LAUNDROMAT & SERVICE
2919 KAPIOLANI BLVD
HONOLULU, HI 96826

EDR Hist Cleaner **1020057095**
N/A

Actual:
21 ft.

EDR Hist Cleaner

Focus Map:
8

Year:	Name:	Type:
1992	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
1993	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
1994	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
1995	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
1996	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
1997	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
1998	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
1999	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
2000	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
2001	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
2002	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
2003	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs
2004	PACIFIC LAUNDROMAT & SERVICE	Drycleaning Plants, Except Rugs

---

233
SW
< 1/8
0.122 mi.
645 ft.

ROYAL KUHIO CONDOMINIUMS
2240 KUHIO AVE
HONOLULU, HI 96815

HI LUST **U003711723**
HI UST **N/A**

Actual:
3 ft.

Focus Map:
8

LUST:

Name:	ROYAL KUHIO CONDOMINIUMS
Address:	2240 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103574
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	04/02/2001
Release ID:	000065
Project Officer:	Shaobin Li

UST:

Name:	ROYAL KUHIO CONDOMINIUMS
Address:	2240 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103574
Owner:	ROYAL KUHIO CONDOMINIUM ASSOCIATION OF APT OWNERS
Owner Address:	2240 KUHIO AVE
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.280721
Longitude:	-157.827293
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-M-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	02/21/2000
Tank Capacity:	550
Substance:	Diesel

AS234 **TENGAN PHILLIPS 66** **EDR Hist Auto** **1020329904**
NNE **2955 E MANOA RD** **N/A**
< 1/8 **HONOLULU, HI 96822**
0.123 mi.
647 ft. **Site 1 of 2 in cluster AS**

Actual: EDR Hist Auto
159 ft.

Focus Map:
6

Year:	Name:	Type:
1969	TENGAN PHILLIPS 66	Gasoline Service Stations
1970	TENGAN PHILLIPS 66	Gasoline Service Stations
1971	TENGAN PHILLIPS 66	Gasoline Service Stations
1972	TENGAN PHILLIPS 66	Gasoline Service Stations
1973	TENGAN PHILLIPS 66	Gasoline Service Stations
1974	TENGAN PHILLIPS 66	Gasoline Service Stations
1975	TENGAN PHILLIPS 66	Gasoline Service Stations
1977	ASHIS 66 SERVICE STATION	Gasoline Service Stations
1978	ASHIS 66 SERVICE STATION	Gasoline Service Stations
1979	ASHIS 66 SERVICE STATION	Gasoline Service Stations
1980	ASHIS 66 SERVICE STATION	Gasoline Service Stations
1982	ASHIS 66 SERVICE STATION	Gasoline Service Stations

AS235 **MANOA MART/MANOA LIQUOR** **HI LUST** **U003154502**
NNE **2955 E MANOA RD** **HI UST** **N/A**
< 1/8 **HONOLULU, HI 96822** **HI Financial Assurance**
0.123 mi.
647 ft. **Site 2 of 2 in cluster AS**

Actual: LUST:
159 ft.

Focus Map:
6

Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-101188
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/07/2008
Release ID:	070032
Project Officer:	Shaobin Li

Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-101188
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/09/2001
Release ID:	960072
Project Officer:	Shaobin Li

UST:

Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-101188
Owner:	Waipono, Inc
Owner Address:	1164 Bishop st
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	21.310468
Longitude:	-157.808771
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

MANOA MART/MANOA LIQUOR (Continued) **U003154502**

Tank ID:	R-1
Date Installed:	04/04/1976
Tank Status:	**Permanently Out of Use**
Date Closed:	06/26/1996
Tank Capacity:	5000
Substance:	Gasoline
Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-2
Date Installed:	04/04/1961
Tank Status:	**Permanently Out of Use**
Date Closed:	06/26/1996
Tank Capacity:	5000
Substance:	Gasoline
Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-3
Date Installed:	04/04/1981
Tank Status:	**Permanently Out of Use**
Date Closed:	06/26/1996
Tank Capacity:	7500
Substance:	Gasoline
Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-4
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	06/26/1996
Tank Capacity:	550
Substance:	Diesel
Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	r-87
Date Installed:	06/29/1996
Tank Status:	**Permanently out of Use**
Date Closed:	09/17/2007
Tank Capacity:	10000
Substance:	Gasoline
Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	r-92
Date Installed:	06/29/1996

MANOA MART/MANOA LIQUOR (Continued) **U003154502**

Tank Status:	**Permanently out of Use**
Date Closed:	09/17/2007
Tank Capacity:	10000
Substance:	Gasoline

HI Financial Assurance:

Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-101188
Tank Id:	R-4
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	Not reported
FR Archive:	False

Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-101188
Tank Id:	r-92
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False

Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-101188
Tank Id:	r-87
Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	Not reported
FR Archive:	False

Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-101188
Tank Id:	r-87
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False

Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-101188
Tank Id:	R-4
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False

Name: MANOA MART/MANOA LIQUOR

MANOA MART/MANOA LIQUOR (Continued) **U003154502**

Address: 2955 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101188
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MANOA MART/MANOA LIQUOR
Address: 2955 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101188
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MANOA MART/MANOA LIQUOR
Address: 2955 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101188
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MANOA MART/MANOA LIQUOR
Address: 2955 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101188
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MANOA MART/MANOA LIQUOR
Address: 2955 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101188
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MANOA MART/MANOA LIQUOR
Address: 2955 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101188
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported

MANOA MART/MANOA LIQUOR (Continued) **U003154502**

FR Archive:	False
Name:	MANOA MART/MANOA LIQUOR
Address:	2955 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-101188
Tank Id:	R-3
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False

AM236 **S.W.A.T. GUN CLUB** **RCRA NonGen / NLR** **1024879272**
SW **2266 KUHIO AVE** **HIP000145359**
< 1/8 **HONOLULU, HI 96815**
0.125 mi.
659 ft. **Site 2 of 3 in cluster AM**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:	20190325
Handler Name:	S.W.A.T. GUN CLUB
Handler Address:	2266 KUHIO AVE
Handler City,State,Zip:	HONOLULU, HI 96815
EPA ID:	HIP000145359
Contact Name:	LLOYD SUEDA
Contact Address:	MAKAHIKI WAY #A
Contact City,State,Zip:	HONOLULU, HI 96826
Contact Telephone:	808-949-6644
Contact Fax:	Not reported
Contact Email:	LLOYD@SUEDASAI.COM
Contact Title:	Not reported
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Not a generator, verified
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Not reported
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	WAIALAE AVE SUITE 400
Mailing City,State,Zip:	HONOLULU, HI 96816
Owner Name:	HONOLULU, LLC DBA HON REALTY, LLC
Owner Type:	Private
Operator Name:	HONOLULU, LLC DBA HON REALTY, LLC
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No

S.W.A.T. GUN CLUB (Continued) **1024879272**

Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20190325
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D008
Waste Description:	LEAD

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	HONOLULU, LLC DBA HON REALTY, LLC
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	3660 WAIALAE AVE SUITE 400

S.W.A.T. GUN CLUB (Continued) **1024879272**

Owner/Operator City,State,Zip: HONOLULU, HI 96816
Owner/Operator Telephone: 808-949-6644
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: LLOYD@SUEDASAI.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: HONOLULU, LLC DBA HON REALTY, LLC
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 3660 WAIALAE AVE SUITE 400
Owner/Operator City,State,Zip: HONOLULU, HI 96816
Owner/Operator Telephone: 808-949-6644
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: LLOYD@SUEDASAI.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: HONOLULU, LLC DBA HON REALTY, LLC
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 3660 WAIALAE AVE SUITE 400
Owner/Operator City,State,Zip: HONOLULU, HI 96816
Owner/Operator Telephone: 808-949-6644
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: LLOYD@SUEDASAI.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: HONOLULU, LLC DBA HON REALTY, LLC
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 3660 WAIALAE AVE SUITE 400
Owner/Operator City,State,Zip: HONOLULU, HI 96816
Owner/Operator Telephone: 808-949-6644
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: LLOYD@SUEDASAI.COM

Historic Generators:
Receive Date: 20190325
Handler Name: S.W.A.T. GUN CLUB
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20181114

S.W.A.T. GUN CLUB (Continued) **1024879272**

Handler Name: S.W.A.T. GUN CLUB
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 713990
NAICS Description: ALL OTHER AMUSEMENT AND RECREATION INDUSTRIES

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

AT237 **MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L** **HI LUST** **U003221550**
West **2809 E MANOA RD** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96822** **HI Financial Assurance**
0.126 mi.
665 ft. **Site 1 of 2 in cluster AT**

Actual:
158 ft.

Focus Map:
5

LUST:
Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-100039
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 03/24/2014
Release ID: 140015
Project Officer: Shunsheng Fu

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-100039
Facility Status: Site Cleanup Completed with EHE
Facility Status Date: 07/24/2012
Release ID: 110007
Project Officer: Shunsheng Fu

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-100039
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 03/12/2009
Release ID: 040057
Project Officer: Shunsheng Fu

MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.) (Continued) **U003221550**

UST:

Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100039
Owner:	Mid Pac Petroleum LLC
Owner Address:	677 Ala Moana Blvd Suite 625
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	21.308777
Longitude:	-157.812078
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-3923-1
Date Installed:	03/26/1956
Tank Status:	**Permanently Out of Use**
Date Closed:	08/01/1997
Tank Capacity:	7500
Substance:	Gasoline
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-3923-1
Date Installed:	03/26/1956
Tank Status:	**Permanently Out of Use**
Date Closed:	08/01/1997
Tank Capacity:	7500
Substance:	Gasoline
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-3923-2
Date Installed:	03/26/1956
Tank Status:	**Permanently Out of Use**
Date Closed:	08/01/1987
Tank Capacity:	5000
Substance:	Gasoline
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-3923-2
Date Installed:	03/26/1956
Tank Status:	**Permanently Out of Use**
Date Closed:	08/01/1987
Tank Capacity:	5000
Substance:	Gasoline
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822

MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.) (Continued) **U003221550**

Tank ID: R-3923-4
Date Installed: 03/26/1956
Tank Status: **Permanently Out of Use**
Date Closed: 08/01/1987
Tank Capacity: 550
Substance: Used Oil

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-3923-4
Date Installed: 03/26/1956
Tank Status: **Permanently Out of Use**
Date Closed: 08/01/1987
Tank Capacity: 550
Substance: Used Oil

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: r-4
Date Installed: 08/21/1987
Tank Status: **Permanently out of Use**
Date Closed: 12/16/2010
Tank Capacity: 550
Substance: Used Oil

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: r-4
Date Installed: 08/21/1987
Tank Status: **Permanently out of Use**
Date Closed: 12/16/2010
Tank Capacity: 550
Substance: Used Oil

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: r-87
Date Installed: 08/21/1987
Tank Status: **Permanently out of Use**
Date Closed: 12/04/2013
Tank Capacity: 12000
Substance: Gasoline

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: r-87
Date Installed: 08/21/1987

MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.) (Continued) **U003221550**

Tank Status:	**Permanently out of Use**
Date Closed:	12/04/2013
Tank Capacity:	12000
Substance:	Gasoline
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	r-92
Date Installed:	08/21/1987
Tank Status:	**Permanently out of Use**
Date Closed:	12/04/2013
Tank Capacity:	12000
Substance:	Gasoline
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	r-92
Date Installed:	08/21/1987
Tank Status:	**Permanently out of Use**
Date Closed:	12/04/2013
Tank Capacity:	12000
Substance:	Gasoline

HI Financial Assurance:

Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100039
Tank Id:	r-4
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100039
Tank Id:	r-92
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100039
Tank Id:	r-87
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False

MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.) (Continued) **U003221550**

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100039
Tank Id: R-3923-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100039
Tank Id: R-3923-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100039
Tank Id: R-3923-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100039
Tank Id: R-3923-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2012
FR Archive: False

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100039
Tank Id: r-4
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2012
FR Archive: False

Name: MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address: 2809 E MANOA RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-100039
Tank Id: R-3923-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance

MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.) (Continued) **U003221550**

Expiration Date:	03/31/2012
FR Archive:	False
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100039
Tank Id:	r-92
Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	03/31/2012
FR Archive:	False
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100039
Tank Id:	R-3923-4
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	03/31/2012
FR Archive:	False
Name:	MID PAC PETROLEIM 253923 (PREV: TANABE'S SERVICE L-3923.)
Address:	2809 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100039
Tank Id:	r-87
Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	03/31/2012
FR Archive:	False

AT238 **UNOCAL S S NO 3923** **RCRA NonGen / NLR** **1001024240**
West **2809 E MANOA RD** **HIR000000414**
1/8-1/4 **HONOLULU, HI 96822**
0.126 mi.
665 ft. **Site 2 of 2 in cluster AT**

Actual:
158 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20210426
Handler Name:	UNOCAL S S NO 3923	
Handler Address:		2809 E MANOA RD
Handler City,State,Zip:		HONOLULU, HI 96822
EPA ID:		HIR000000414
Contact Name:		Not reported
Contact Address:		Not reported
Contact City,State,Zip:		Not reported
Contact Telephone:		Not reported
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported

UNOCAL S S NO 3923 (Continued) **1001024240**

Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		Not reported
Mailing City,State,Zip:		Not reported
Owner Name:	Not reported	
Owner Type:		Not reported
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20210426

UNOCAL S S NO 3923 (Continued) **1001024240**

Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	UNION OIL CO OF CALIFORNIA
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	841 BISHOP ST STE 2204
Owner/Operator City,State,Zip:	HONOLULU, HI 96813
Owner/Operator Telephone:	808-522-7600
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	20210426
Handler Name: UNOCAL S S NO 3923	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

Receive Date:	19950914
Handler Name: UNOCAL S S NO 3923	
Federal Waste Generator Description:	Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Codes:	No NAICS Codes Found

Facility Has Received Notices of Violations:

Violations:	No Violations Found

UNOCAL S S NO 3923 (Continued) **1001024240**

Evaluation Action Summary:
Evaluations: No Evaluations Found

AU239 **WAIKIKI KUHIO COLLECTION** **HI SHWS** **S123640239**
SW **2370 KUHIO AVE** **N/A**
1/8-1/4 **WAIKIKI, HI 96815**
0.126 mi.
666 ft. **Site 1 of 4 in cluster AU**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	WAIKIKI KUHIO COLLECTION
Address:	2370 KUHIO AVE
City,State,Zip:	WAIKIKI, HI 96815
Supplemental Location:	20171103-0838TC; HECO Transformer 39456
Island:	Oahu
Environmental Interest:	Waikiki Kuhio Collection
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Iris van der Zander
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Waikiki Kuhio Collection
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Found: TPH-o
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Iris van der Zander
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1222
Location Description:	2370 Kuhio Ave, 2380 Kuhio Avenue
Is Public:	True
Update On:	2021-09-21 17:40:55
Latitude:	21.278393
Longitude:	-157.824360

240
NW
1/8-1/4
0.127 mi.
669 ft.

KAPIOLANI VILLAGE APARTMENTS
737 KAIPUU ST
HONOLULU, HI 96826

HI SHWS **S126282812**
N/A

Actual:
10 ft.

Focus Map:
8

SHWS:

Name:	KAPIOLANI VILLAGE APARTMENTS
Address:	737 KAIPUU ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2809
Location Description:	737 Kaipuu St
Is Public:	True
Update On:	2021-11-05 16:57:12
Latitude:	21.286851
Longitude:	-157.821546

241
NE
1/8-1/4
0.128 mi.
677 ft.

WAREHOUSE NOS. 3 & 4
HONOLULU, HI

FUDS **1024902143**
N/A

Actual:
3 ft.

Focus Map:
5

FUDS:

EPA Region:	09
Installation ID:	HI99799F409400
Congressional District Number:	1
Name:	WAREHOUSE NOS. 3 & 4

WAREHOUSE NOS. 3 & 4 (Continued) **1024902143**

FUDS Number:	H09HI0376
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	4710
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62507
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	A TOTAL OF 1.15 ACRES ON THE TWO SITES.
Project Required:	No
Feature Description:	Not reported
Latitude:	21.28916667
Longitude:	-157.83027778

AV242 **RICHARD'S CHEVRON** **HI UST** **U003221650**
SSW **1509 S BERETANIA ST** **N/A**
1/8-1/4 **HONOLULU, HI 96826**
0.129 mi.
681 ft. **Site 1 of 2 in cluster AV**

Actual:
27 ft.

Focus Map:
5

UST:

Name:	RICHARD'S CHEVRON
Address:	1509 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-101122
Owner:	CHEVRON PRODUCTS COMPANY
Owner Address:	91-480 MALAKOLE ST.
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-1
Date Installed:	12/30/1980
Tank Status:	**Permanently Out of Use**
Date Closed:	11/01/1987
Tank Capacity:	10000
Substance:	Gasoline
Name:	RICHARD'S CHEVRON
Address:	1509 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-2
Date Installed:	12/30/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	11/01/1987
Tank Capacity:	10000
Substance:	Gasoline
Name:	RICHARD'S CHEVRON

RICHARD'S CHEVRON (Continued) **U003221650**

Address:	1509 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-3
Date Installed:	12/30/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	11/01/1987
Tank Capacity:	10000
Substance:	Gasoline
Name:	RICHARD'S CHEVRON
Address:	1509 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-4
Date Installed:	12/30/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	11/01/1979
Tank Capacity:	1000
Substance:	Used Oil

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243 WSW 1/8-1/4 0.131 mi. 690 ft. **JEFFERSON ELEMENTARY SCHOOL BUILDING EXTERIOR SOIL** **HI SHWS** **S126282729**
324 KAPAHULU AVE **N/A**
HONOLULU, HI 96815

Actual: 3 ft.

Focus Map: 8

SHWS:

Name:	JEFFERSON ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	324 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported

JEFFERSON ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S126282729**

Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2901
Location Description:	324 Kapahulu Ave, Honolulu, HI 96815, USA
Is Public:	True
Update On:	2021-11-10 16:41:55
Latitude:	21.273088
Longitude:	-157.818643

AW244 **RITZ CARLTON WAIKIKI RESIDENCE & RESORT** **HI SHWS** **S118422853**
SW **2139 KUHIO AVE** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.131 mi.
693 ft. **Site 1 of 2 in cluster AW**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	RITZ CARLTON WAIKIKI RESIDENCE & RESORT
Address:	2139 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Ritz Carlton Waikiki Residence & Resort
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Roger Brewer
Hazard Priority:	Medium
Potential Hazards And Controls:	Hazard Present
Island:	Oahu
SDAR Environmental Interest Name:	Ritz Carlton Waikiki Residence & Resort
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Present
Priority:	Medium
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Roger Brewer
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	596
Location Description:	2139 Kuhio Ave
Is Public:	True
Update On:	2019-05-30 20:35:41

RITZ CARLTON WAIKIKI RESIDENCE & RESORT (Continued) **S118422853**

Latitude: 21.281661
Longitude: -157.829457

AU245 **ABC STORE 21** **HI LUST** **U001235205**
SW **2394 KUHIO AVE** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96813**
0.134 mi.
705 ft. **Site 2 of 4 in cluster AU**

Actual:
3 ft.

Focus Map:
8

LUST:
Name: ABC STORE 21
Address: 2394 KUHIO AVE
City,State,Zip: HONOLULU, HI 96813
Facility ID: 9-100728
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 08/07/2008
Release ID: 040029
Project Officer: Josh Nagashima

UST:
Name: ABC STORE 21
Address: 2394 KUHIO AVE
City,State,Zip: HONOLULU, HI 96813
Facility ID: 9-100728
Owner: MNS, LTD.
Owner Address: 766 POHUKAINA ST
Owner City,St,Zip: Honolulu, 96813 96813
Latitude: 21.277806
Longitude: -157.824247
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Map

Tank ID: r-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 02/05/2004
Tank Capacity: 2000
Substance: Gasoline

Name: ABC STORE 21
Address: 2394 KUHIO AVE
City,State,Zip: HONOLULU, HI 96813

Tank ID: r-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 02/05/2004
Tank Capacity: 5500
Substance: Gasoline

Name: ABC STORE 21
Address: 2394 KUHIO AVE
City,State,Zip: HONOLULU, HI 96813

Tank ID: r-3
Date Installed: Not reported
Tank Status: **Permanently out of Use**

ABC STORE 21 (Continued) **U001235205**

Date Closed:	02/05/2004
Tank Capacity:	550
Substance:	Used Oil

AU246 **ABC STORES NO 21** **RCRA NonGen / NLR** **1025883809**
SW **2394 KUHIO AVE** **HIP000135855**
1/8-1/4 **HONOLULU, HI 96815**
0.134 mi.
705 ft. **Site 3 of 4 in cluster AU**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		20040514
Handler Name:	ABC STORES NO 21	
Handler Address:		2394 KUHIO AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIP000135855
Contact Name:		VERNON PAI
Contact Address:		766 POHUKAINA ST
Contact City,State,Zip:		HONOLULU, HI 96813
Contact Telephone:		808-591-2550 x324
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		766 POHUKAINA ST
Mailing City,State,Zip:		HONOLULU, HI 96813
Owner Name:	QUEEN EMMA FOUNDATION	
Owner Type:		Private
Operator Name:	MNS LTD	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported

ABC STORES NO 21 (Continued) **1025883809**

Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20090824
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D008
Waste Description:	LEAD

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: MNS LTD	
Legal Status:	Private
Date Became Current:	19740921
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: QUEEN EMMA FOUNDATION	

ABC STORES NO 21 (Continued) **1025883809**

Legal Status:	Private
Date Became Current:	19740509
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	20040514
Handler Name: ABC STORES NO 21	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	45322
NAICS Description:	GIFT, NOVELTY, AND SOUVENIR STORES

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

AW247 **BEACH WALK WASTEWATER PUMP STATION** **HI UST** **U003154539**
SW **377 KAIOLU ST** **HI Financial Assurance** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.135 mi.
713 ft. **Site 2 of 2 in cluster AW**

Actual:
3 ft.

Focus Map:
8

UST:

Name:	BEACH WALK WASTEWATER PUMP STATION
Address:	377 KAIOLU ST
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101975
Owner:	C&C HNL - DEPT OF ENVIRONMENTAL SERVICES
Owner Address:	1000 ULU'OHIA STREET, SUITE 308
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	M-1
Date Installed:	01/08/1988

BEACH WALK WASTEWATER PUMP STATION (Continued) **U003154539**

Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	6000
Substance:	Diesel
Name:	BEACH WALK WASTEWATER PUMP STATION
Address:	377 KAIOLU ST
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	M-1
Date Installed:	01/08/1988
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	6000
Substance:	Diesel
Name:	BEACH WALK WASTEWATER PUMP STATION
Address:	377 KAIOLU ST
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	M-1
Date Installed:	01/08/1988
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	6000
Substance:	Diesel

HI Financial Assurance:

Name:	BEACH WALK WASTEWATER PUMP STATION
Address:	377 KAIOLU ST
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101975
Tank Id:	M-1
Tank Status:	Currently in Use
FRTYPE:	Other
Expiration Date:	06/30/2012
FR Archive:	True
Name:	BEACH WALK WASTEWATER PUMP STATION
Address:	377 KAIOLU ST
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101975
Tank Id:	M-1
Tank Status:	Currently in Use
FRTYPE:	Other
Expiration Date:	06/30/2019
FR Archive:	False

AX248 **WAIKIKI CENTRAL OFFICE** **HI LUST** **U001235201**
SW **214 KAPUNI ST.** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96815** **HI Financial Assurance**
0.138 mi.
728 ft. **Site 1 of 3 in cluster AX**

Actual:
3 ft.

Focus Map:
8

LUST:

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100535
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	09/24/1998
Release ID:	970023
Project Officer:	Richard Takaba

UST:

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100535
Owner:	Hawaiian Telcom
Owner Address:	1177 Bishop Street, Suite 30
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.276426
Longitude:	-157.822841
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	M-1
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	600
Substance:	Diesel

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815

Tank ID:	R-1
Date Installed:	03/01/1970
Tank Status:	**Permanently Out of Use**
Date Closed:	11/12/1996
Tank Capacity:	560
Substance:	Diesel

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815

Tank ID:	R-2
Date Installed:	05/07/1984
Tank Status:	**Permanently Out of Use**
Date Closed:	11/12/1996
Tank Capacity:	550
Substance:	Diesel

WAIKIKI CENTRAL OFFICE (Continued) **U001235201**

HI Financial Assurance:

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100535
Tank Id:	M-1
Tank Status:	Currently In Use
FRTYPE:	Insurance
Expiration Date:	05/02/2015
FR Archive:	True

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100535
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	05/02/2015
FR Archive:	True

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100535
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	05/02/2015
FR Archive:	True

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100535
Tank Id:	M-1
Tank Status:	Currently In Use
FRTYPE:	Insurance
Expiration Date:	05/02/2021
FR Archive:	False

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100535
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	05/02/2021
FR Archive:	False

Name:	WAIKIKI CENTRAL OFFICE
Address:	214 KAPUNI ST.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100535
Tank Id:	R-2
Tank Status:	Permanently Out of Use

WAIKIKI CENTRAL OFFICE (Continued) **U001235201**

FRTYPE:	Insurance
Expiration Date:	05/02/2021
FR Archive:	False

AY249 **PFLUEGER ACURA** **RCRA-VSQG** **1000424581**
WSW **1450 S BERETANIA ST** **HI UST** **HID981630700**
1/8-1/4 **HONOLULU, HI 96814** **FINDS**
0.139 mi. **ECHO**
735 ft. **Site 1 of 6 in cluster AY**

Actual: **29 ft.**

Focus Map: 4

RCRA Listings:

Date Form Received by Agency:		19890803
Handler Name:	PFLUEGER ACURA	
Handler Address:		1450 S BERETANIA ST
Handler City,State,Zip:		HONOLULU, HI 96814
EPA ID:		HID981630700
Contact Name:		PAUL FURTADO
Contact Address:		1450 S BERETANIA ST
Contact City,State,Zip:		HONOLULU, HI 96814
Contact Telephone:		808-942-4555
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Other
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		1450 S BERETANIA ST
Mailing City,State,Zip:		HONOLULU, HI 96814
Owner Name:	P F LUEGER	
Owner Type:		County
Operator Name:	NOT REQUIRED	
Operator Type:		County
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported

PFLUEGER ACURA (Continued) **1000424581**

Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: P F LUEGER	
Legal Status:	County
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	County
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999

PFLUEGER ACURA (Continued) **1000424581**

Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19890803
Handler Name: PFLUEGER ACURA
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 44111
NAICS Description: NEW CAR DEALERS

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported

PFLUEGER ACURA (Continued) **1000424581**

Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19960402
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

UST:

Name:	PFLUEGER ACURA
Address:	1450 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100192
Owner:	PFLUEGER HAWAII INC.
Owner Address:	DBA: PFLUEGER ACURA / 1450 S BERETANIA ST
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported

Tank ID:	R-1
Date Installed:	12/26/1969
Tank Status:	**Permanently Out of Use**
Date Closed:	10/02/1991
Tank Capacity:	6000
Substance:	Gasoline

Name:	PFLUEGER ACURA
Address:	1450 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814

Tank ID:	R-2
Date Installed:	12/26/1969
Tank Status:	**Permanently Out of Use**
Date Closed:	10/02/1991
Tank Capacity:	1000
Substance:	Other

Name:	PFLUEGER ACURA
Address:	1450 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814

PFLUEGER ACURA (Continued) **1000424581**

Tank ID: R-3
Date Installed: 12/26/1969
Tank Status: **Permanently Out of Use**
Date Closed: 10/02/1991
Tank Capacity: 1000
Substance: Used Oil

FINDS:
Registry ID: 110005724118

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000424581
Registry ID: 110005724118
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005724118
Name: PFLUEGER ACURA
Address: 1450 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

AQ250 **MIRAMAR HOTEL INTERNATIONAL MARKET PLACE REDEVELOP** **HI SHWS** **S115488716**
SW **2345 KUHIO AVE** **HI ENG CONTROLS** **N/A**
1/8-1/4 **HONOLULU, HI 96815** **HI INST CONTROL**
0.145 mi.
767 ft. **Site 2 of 3 in cluster AQ**

Actual:
3 ft.

Focus Map:
8

SHWS:
Name: MIRAMAR HOTEL INTERNATIONAL MARKET PLACE REDEVELOPMENT
Address: 2345 KUHIO AVE
City,State,Zip: HONOLULU, HI 96815
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Miramar Hotel International Market Place Redevelopment
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Program: Fast Track
Project Manager: Steve Mow
Hazard Priority: NFA
Potential Hazards And Controls: Hazard Managed With Controls
Island: Oahu
SDAR Environmental Interest Name: Miramar Hotel International Market Place Redevelopment
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Potential Hazard And Controls: Hazard Managed With Controls

MIRAMAR HOTEL INTERNATIONAL MARKET PLACE REDEVELOPMENT (Continued) **S115488716**

Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Pb, PAHs.
Nature of Residual Contamination:	Lead under a slab.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	01/05/2017
Document Number:	2017-005-SPM
Document Subject:	No Further Action Determination for International Market Place, 2330 Kalakaua Ave
Project Manager:	Steve Mow
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1632
Location Description:	2345 Kuhio Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.278398
Longitude:	-157.825476

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

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AQ251 **MIRAMAR HOTEL HAWAII, INC.** **HI LUST** **U001235536**
SW **2345 KUHIO AVE** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.145 mi.
767 ft. **Site 3 of 3 in cluster AQ**

Actual:
3 ft.

Focus Map:
8

LUST:

Name:	MIRAMAR HOTEL HAWAII, INC.
Address:	2345 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101531
Facility Status:	Site Cleanup Completed with EHE
Facility Status Date:	01/11/2017
Release ID:	150002
Project Officer:	To VRP

UST:

Name:	MIRAMAR HOTEL HAWAII, INC.

MIRAMAR HOTEL HAWAII, INC. (Continued) **U001235536**

Address:	2345 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101531
Owner:	MIRAMAR HOTEL HAWAII, INC.
Owner Address:	2345 KUHIO AVENUE
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-1
Date Installed:	05/21/1976
Tank Status:	**Permanently Out of Use**
Date Closed:	10/27/1992
Tank Capacity:	2000
Substance:	Gasoline
Name:	MIRAMAR HOTEL HAWAII, INC.
Address:	2345 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-2 aka MIR5
Date Installed:	05/22/1983
Tank Status:	**Permanently Out of Use**
Date Closed:	10/27/1992
Tank Capacity:	5000
Substance:	Diesel
Name:	MIRAMAR HOTEL HAWAII, INC.
Address:	2345 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	r-3 aka MIR8
Date Installed:	Not reported
Tank Status:	**Permanently out of Use**
Date Closed:	09/22/2014
Tank Capacity:	700
Substance:	Mixture

AX252 **REMEDIATION SPECIALISTS** **RCRA NonGen / NLR** **1000455799**
SW **2440 KUHIO AVE STE 1903** **FINDS** **HID982494916**
1/8-1/4 **HONOLULU, HI 96815** **ECHO**
0.146 mi.
772 ft. **Site 2 of 3 in cluster AX**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:	19931108
Handler Name:	REMEDIATION SPECIALISTS
Handler Address:	2440 KUHIO AVE STE 1903
Handler City,State,Zip:	HONOLULU, HI 96815
EPA ID:	HID982494916
Contact Name:	ENVIRONMENTAL MANAGER
Contact Address:	2440 KUHIO AVE STE 1903
Contact City,State,Zip:	HONOLULU, HI 96815
Contact Telephone:	808-922-6670
Contact Fax:	Not reported
Contact Email:	Not reported

REMEDIATION SPECIALISTS (Continued) **1000455799**

Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		KUHIO AVE STE 1903
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	JOHN LIND	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported

REMEDIATION SPECIALISTS (Continued) **1000455799**

Full Enforcement Universe: Not reported
Significant Non-Complier Universe: No
Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20000915
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: JOHN LIND
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 2440 KUHIO AVE STE 1903
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19931108
Handler Name: REMEDIATION SPECIALISTS
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

REMEDIATION SPECIALISTS (Continued) **1000455799**

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005727035

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000455799
Registry ID:	110005727035
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005727035
Name:	REMEDIATION SPECIALISTS
Address:	2440 KUHIO AVE STE 1903
City,State,Zip:	HONOLULU, HI 96815

AM253 **WAIKIKI TRADE CTR** **RCRA-VSQG** **1001213474**
SW **2255 KUHIO AVE** **FINDS** **HIR000034447**
1/8-1/4 **HONOLULU, HI 96815** **ECHO**
0.147 mi.
775 ft. **Site 3 of 3 in cluster AM**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		20170822
Handler Name:	NORDSTROM RACK	
Handler Address:		2255 KUHIO AVE SUITE 200
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIR000034447
Contact Name:		KOUA YANG
Contact Address:		KUHIO AVE SUITE 200
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-275-2555 x1889
Contact Fax:		808-275-2556
Contact Email:		KOUA.YANG@NORDSTROM.COM
Contact Title:		BUILDING SERVICES AREA MANAGER
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported

WAIKIKI TRADE CTR (Continued) **1001213474**

Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	KUHIO AVE SUITE 200
Mailing City,State,Zip:	HONOLULU, HI 96815
Owner Name:	HYATT CENTRIC WAIKIKI BEACH
Owner Type:	Private
Operator Name:	NORDSTROM, INC.
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No

WAIKIKI TRADE CTR (Continued) **1001213474**

Financial Assurance Required:	Not reported
Handler Date of Last Change:	20170823
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D000
Waste Description:	Not Defined
Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D008
Waste Description:	LEAD

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	WANG INTL INVESTMENT KABUSHIKI KAISHA
Legal Status:	Private
Date Became Current:	19890101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	HYATT CENTRIC WAIKIKI BEACH
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	349 SEASIDE AVE
Owner/Operator City,State,Zip:	HONOLULU, HI 96815
Owner/Operator Telephone:	808-237-1234
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name:	NORDSTROM, INC.
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	1700 SEVENTH AVE
Owner/Operator City,State,Zip:	SEATTLE, WA 98101

WAIKIKI TRADE CTR (Continued) **1001213474**

Owner/Operator Telephone: 206-303-0111
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: SUN SEIBU INC
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 1937 REPUBLICAN ST
Owner/Operator City,State,Zip: HONOLULU, HI 96819
Owner/Operator Telephone: 808-848-8849
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: LNW MGMT INC
Legal Status: Private
Date Became Current: 20040901
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19971208
Handler Name: DIAMOND HEAD GUN CLUB
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20050203
Handler Name: WAIKIKI TRADE CTR
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20170822

WAIKIKI TRADE CTR (Continued) **1001213474**

Handler Name: NORDSTROM RACK
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 452210
NAICS Description: DEPARTMENT STORES

NAICS Code: 53139
NAICS Description: OTHER ACTIVITIES RELATED TO REAL ESTATE

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005729916

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1001213474
Registry ID: 110005729916
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005729916
Name: WAIKIKI TRADE CTR
Address: 2255 KUHIO AVE
City,State,Zip: HONOLULU, HI 96815

254
ESE
1/8-1/4
0.147 mi.
777 ft.

GREEN THUMB INCORPORATED
3363 CAMPBELL AVE
HONOLULU, HI 96815

HI UST **U001235456**
HI Financial Assurance **N/A**

Actual:
18 ft.

Focus Map:
8

UST:

Name:	GREEN THUMB INCORPORATED
Address:	3363 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101368
Owner:	GREEN THUMB INC
Owner Address:	3363 CAMPBELL AVE
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported

Tank ID:	R-1
Date Installed:	03/17/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	12/17/1998
Tank Capacity:	500
Substance:	Gasoline

Name:	GREEN THUMB INCORPORATED
Address:	3363 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815

Tank ID:	R-2
Date Installed:	03/17/1978
Tank Status:	**Permanently Out of Use**
Date Closed:	12/17/1998
Tank Capacity:	2000
Substance:	Gasoline

HI Financial Assurance:

Name:	GREEN THUMB INCORPORATED
Address:	3363 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101368
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Surety Bond
Expiration Date:	Not reported
FR Archive:	False

Name:	GREEN THUMB INCORPORATED
Address:	3363 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101368
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	Not reported
FR Archive:	False

Name:	GREEN THUMB INCORPORATED

GREEN THUMB INCORPORATED (Continued) **U001235456**

Address:	3363 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101368
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Surety Bond
Expiration Date:	Not reported
FR Archive:	False

Name:	GREEN THUMB INCORPORATED
Address:	3363 CAMPBELL AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-101368
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	Not reported
FR Archive:	False

AZ255 **IOLANI SCHOOL** **RCRA-VSQG** **1004464854**
North **563 KAMOKU ST** **HID077669950**
1/8-1/4 **HONOLULU, HI 96826**
0.148 mi.
779 ft. **Site 1 of 4 in cluster AZ**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		19950727
Handler Name:	IOLANI SCHOOL	
Handler Address:		563 KAMOKU ST
Handler City,State,Zip:		HONOLULU, HI 96826
EPA ID:		HID077669950
Contact Name:		BERTHA TOMIYASU
Contact Address:		563 KAMOKU ST
Contact City,State,Zip:		HONOLULU, HI 96826
Contact Telephone:		808-949-5355
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		563 KAMOKU ST
Mailing City,State,Zip:		HONOLULU, HI 96826
Owner Name:	IOLANI SCHOOL 501C3 COOP	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No

IOLANI SCHOOL (Continued) **1004464854**

Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	IOLANI SCHOOL 501C3 COOP
Legal Status:	Private
Date Became Current:	Not reported

IOLANI SCHOOL (Continued) **1004464854**

Date Ended Current: Not reported
Owner/Operator Address: 563 KAMOKU ST
Owner/Operator City,State,Zip: HONOLULU, HI 96826
Owner/Operator Telephone: 808-949-5355
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19950727
Handler Name: IOLANI SCHOOL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violation:
Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20010112
Actual Return to Compliance Date: 20010302
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: 20010216
Enforcement Identifier: 001
Date of Enforcement Action: 20010112
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: KBELL
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported

IOLANI SCHOOL (Continued) **1004464854**

SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	20001212
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9STA
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20010302
Scheduled Compliance Date:	20010216
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

AZ256 **IOLANI SCHOOL** **HI UST** **1000978834**
North **563 KAMOKU ST** **N/A**
1/8-1/4 **HONOLULU, HI 96826**
0.148 mi.
779 ft. **Site 2 of 4 in cluster AZ**

Actual:
3 ft.

Focus Map:
8

UST:

Name:	IOLANI SCHOOL
Address:	563 KAMOKU ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100774
Owner:	IOLANI SCHOOL
Owner Address:	563 KAMOKU ST
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.283628
Longitude:	-157.823070
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	R-1
Date Installed:	03/17/1961
Tank Status:	**Permanently Out of Use**
Date Closed:	12/28/1988
Tank Capacity:	1000
Substance:	Gasoline
Name:	IOLANI SCHOOL
Address:	563 KAMOKU ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-4
Date Installed:	12/31/1988
Tank Status:	**Permanently Out of Use**
Date Closed:	08/20/1998

IOLANI SCHOOL (Continued) **1000978834**

Tank Capacity: 1000
Substance: Gasoline

AZ257 **IOLANI SCHOOL CAMPUS EXPANSION** **HI SHWS** **S121406119**
North **563 KAMOKU ST** **N/A**
1/8-1/4 **HONOLULU, HI 96826**
0.148 mi.
779 ft. **Site 3 of 4 in cluster AZ**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	IOLANI SCHOOL CAMPUS EXPANSION
Address:	563 KAMOKU ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Iolani School Campus Expansion
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	High
Potential Hazards And Controls:	Hazard Present
Island:	Oahu
SDAR Environmental Interest Name:	Iolani School Campus Expansion
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Present
Priority:	High
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Found: Organochlorine termiticides
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1199
Location Description:	563 Kamoku St
Is Public:	True
Update On:	2019-06-13 09:39:01
Latitude:	21.284867
Longitude:	-157.822428

AZ258 **IOLANI SCHOOL PETROLEUM** **HI SHWS** **S106817948**
North **563 KAMOKU ST** **HI SPILLS** **N/A**
1/8-1/4 **HONOLULU, HI 96826**
0.148 mi.
779 ft. **Site 4 of 4 in cluster AZ**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	IOLANI SCHOOL PETROLEUM
Address:	563 KAMOKU ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	81
Location Description:	563 Kamoku St
Is Public:	True
Update On:	2021-10-04 15:05:27
Latitude:	21.285546
Longitude:	-157.825575

Name:	IOLANI SCHOOL PETROLEUM
Address:	563 KAMOKU ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State

IOLANI SCHOOL PETROLEUM (Continued) **S106817948**

Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	81
Location Description:	563 Kamoku St
Is Public:	True
Update On:	2021-10-04 15:05:27
Latitude:	21.285666
Longitude:	-157.825329

Name:	IOLANI SCHOOL PETROLEUM
Address:	563 KAMOKU ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported

IOLANI SCHOOL PETROLEUM (Continued) **S106817948**

Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	81
Location Description:	563 Kamoku St
Is Public:	True
Update On:	2021-10-04 15:05:27
Latitude:	21.284899
Longitude:	-157.823679

SPILLS:

Name:	IOLANI SCHOOL PETROLEUM ODOR
Address:	563 KAMOKU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96826
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20000814-1440
Facility Registry ID:	110005723208
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	Iolani School Petroleum odor
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Iolani School
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported

IOLANI SCHOOL PETROLEUM (Continued) **S106817948**

Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.291408000000001
Longitude:	-157.82630499999999
Name:	IOLANI SCHOOL PETROLEUM ODOR
Address:	563 KAMOKU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96826
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20000814-1440
Facility Registry ID:	110005723208
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	Iolani School Petroleum odor
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Iolani School
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.286301000000002
Longitude:	-157.82484600000001

259
SSW
1/8-1/4
0.148 mi.
780 ft.

BWS KAIMUKI PUMP STATION
2951 HARDING AVE
HONOLULU, HI 96816

HI SHWS **1006820791**
HI SPILLS **N/A**

Actual:
29 ft.

Focus Map:
8

SHWS:

Name:	BWS KAIMUKI PUMP STATION
Address:	2951 HARDING AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	732
Location Description:	2951 Harding Ave, Honolulu, HI 96816
Is Public:	True
Update On:	2021-01-11 14:47:47
Latitude:	21.287592
Longitude:	-157.813554

SPILLS:

Name:	KAIMUKI PUMPING STATION
Address:	2951 HARDING AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19940729-20
Facility Registry ID:	110013788026
HID Number:	Not reported

BWS KAIMUKI PUMP STATION (Continued) **1006820791**

Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Kaimuki Pump Station
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	City and County of Honolulu, Board of Water Supply
Substances:	SEE INCIDENT DESCRIPTION
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.295943000000001
Longitude:	-157.789548
Name:	KAIMUKI PUMPING STATION
Address:	2951 HARDING AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19940729-20
Facility Registry ID:	110013788026
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Kaimuki Pump Station
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	City and County of Honolulu, Board of Water Supply
Substances:	SEE INCIDENT DESCRIPTION
Quanity:	Not reported

BWS KAIMUKI PUMP STATION (Continued) **1006820791**

Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.287987000000001
Longitude:	-157.813636

AO260 **ALOHA PETROLEUM: ST. LOUIS SHELL** **RCRA-VSQG** **1009398546**
SE **3075 WAIALAE AVE** **FINDS** **HIR000137539**
1/8-1/4 **HONOLULU, HI 96816**
0.151 mi.
798 ft. **Site 6 of 7 in cluster AO**

Actual:
62 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:	20180706
Handler Name:	ALOHA PETROLEUM: ST. LOUIS SHELL
Handler Address:	3075 WAIALAE AVE
Handler City,State,Zip:	HONOLULU, HI 96816
EPA ID:	HIR000137539
Contact Name:	GREGORY MCCARTNEY
Contact Address:	1132 BISHOP ST, SUITE 1700
Contact City,State,Zip:	HONOLULU, HI 96813
Contact Telephone:	808-522-9704
Contact Fax:	808-522-9707
Contact Email:	GMCCARTNEY@ALOHAGAS.COM
Contact Title:	EHS MANAGER
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	3075 WAIALAE AVE
Mailing City,State,Zip:	HONOLULU, HI 96816
Owner Name:	ALOHA PETROLEUM LTD
Owner Type:	Private

ALOHA PETROLEUM: ST. LOUIS SHELL (Continued) **1009398546**

Operator Name:	ALOHA PETROLEUM LTD
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required:	Not reported
Handler Date of Last Change:	20180706
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

ALOHA PETROLEUM: ST. LOUIS SHELL (Continued) **1009398546**

Hazardous Waste Summary:
Waste Code: D001
Waste Description: IGNITABLE WASTE

Waste Code: D018
Waste Description: BENZENE

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: EQUILON ENTERPRISES DBA SHELL OIL PRODCT
Legal Status: Private
Date Became Current: 19980801
Date Ended Current: Not reported
Owner/Operator Address: PO BOX 2099
Owner/Operator City,State,Zip: HOUSTON, TX 77252
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: ALOHA PETROLEUM LTD
Legal Status: Private
Date Became Current: 19990301
Date Ended Current: Not reported
Owner/Operator Address: 1132 BISHOP ST, SUITE 1700
Owner/Operator City,State,Zip: HONOLULU, HI 96813
Owner/Operator Telephone: 808-522-9700
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: ALOHA PETROLEUM LTD
Legal Status: Private
Date Became Current: 19990301
Date Ended Current: Not reported
Owner/Operator Address: 1132 BISHOP ST, SUITE 1700
Owner/Operator City,State,Zip: HONOLULU, HI 96813
Owner/Operator Telephone: 808-522-9700
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: ALOHA PETROLEUM LTD
Legal Status: Private
Date Became Current: 19990301
Date Ended Current: Not reported
Owner/Operator Address: 1132 BISHOP ST, SUITE 1700
Owner/Operator City,State,Zip: HONOLULU, HI 96813
Owner/Operator Telephone: 808-522-9700
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

ALOHA PETROLEUM: ST. LOUIS SHELL (Continued) **1009398546**

Owner/Operator Indicator: Operator
Owner/Operator Name: SHELL OIL PRODUCTS US
Legal Status: Private
Date Became Current: 19980801
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: ALOHA PETROLEUM LTD
Legal Status: Private
Date Became Current: 19990301
Date Ended Current: Not reported
Owner/Operator Address: 1132 BISHOP ST, SUITE 1700
Owner/Operator City,State,Zip: HONOLULU, HI 96813
Owner/Operator Telephone: 808-522-9700
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: ALOHA PETROLEUM LTD
Legal Status: Private
Date Became Current: 19990301
Date Ended Current: Not reported
Owner/Operator Address: 1132 BISHOP ST, SUITE 1700
Owner/Operator City,State,Zip: HONOLULU, HI 96813
Owner/Operator Telephone: 808-522-9700
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: ALOHA PETROLEUM LTD
Legal Status: Private
Date Became Current: 19990301
Date Ended Current: Not reported
Owner/Operator Address: 1132 BISHOP ST, SUITE 1700
Owner/Operator City,State,Zip: HONOLULU, HI 96813
Owner/Operator Telephone: 808-522-9700
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20180612
Handler Name: ST. LOUIS SHELL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No

ALOHA PETROLEUM: ST. LOUIS SHELL (Continued) **1009398546**

Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20060227
Handler Name: SHELL OIL PRODUCTS SAP 139543
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20120301
Handler Name: ST. LOUIS SHELL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20180706
Handler Name: ALOHA PETROLEUM: ST. LOUIS SHELL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 44711
NAICS Description: GASOLINE STATIONS WITH CONVENIENCE STORES

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

ALOHA PETROLEUM: ST. LOUIS SHELL (Continued) **1009398546**

FINDS:
Registry ID: 110046160792

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

AO261 **2ND AVENUE SHELL** **HI LUST** **U001235154**
SE **3075 WAIALAE AVE** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96816** **HI Financial Assurance**
0.151 mi.
798 ft. **Site 7 of 7 in cluster AO**

Actual:
62 ft.

Focus Map:
5

LUST:
Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-100314
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 06/23/2017
Release ID: 160013
Project Officer: Shunsheng Fu

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-100314
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 01/29/1997
Release ID: 960013
Project Officer: Shunsheng Fu

UST:
Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-100314
Owner: EQUILON ENTERPRISES, LLC DBA SHELL OIL PRODUCTS US
Owner Address: 2555 13TH AVE, SW
Owner City,St,Zip: Honolulu, 96816 96816
Latitude: 21.288580
Longitude: -157.810700
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1A
Date Installed: 09/16/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Gasohol

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE

2ND AVENUE SHELL (Continued) **U001235154**

City,State,Zip: HONOLULU, HI 96816

Tank ID: 1A
Date Installed: 09/16/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Gasohol

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 1A
Date Installed: 09/16/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Gasohol

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 1A
Date Installed: 09/16/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Gasohol

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 1B
Date Installed: 09/16/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5800
Substance: Gasohol

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 1B
Date Installed: 09/16/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5800
Substance: Gasohol

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

2ND AVENUE SHELL (Continued) **U001235154**

Tank ID: 1B
Date Installed: 09/16/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5800
Substance: Gasohol

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 1B
Date Installed: 09/16/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5800
Substance: Gasohol

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 08/18/1976
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 6000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 08/18/1976
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 6000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 08/18/1976
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 6000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 08/18/1976

2ND AVENUE SHELL (Continued) **U001235154**

Tank Status:	**Permanently Out of Use**
Date Closed:	02/07/1994
Tank Capacity:	6000
Substance:	Gasoline
Name:	2ND AVENUE SHELL
Address:	3075 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-2
Date Installed:	04/19/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	02/07/1994
Tank Capacity:	8000
Substance:	Gasoline
Name:	2ND AVENUE SHELL
Address:	3075 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-2
Date Installed:	04/19/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	02/07/1994
Tank Capacity:	8000
Substance:	Gasoline
Name:	2ND AVENUE SHELL
Address:	3075 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-2
Date Installed:	04/19/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	02/07/1994
Tank Capacity:	8000
Substance:	Gasoline
Name:	2ND AVENUE SHELL
Address:	3075 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-2
Date Installed:	04/19/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	02/07/1994
Tank Capacity:	8000
Substance:	Gasoline
Name:	2ND AVENUE SHELL
Address:	3075 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-3
Date Installed:	04/19/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	02/07/1994

2ND AVENUE SHELL (Continued) **U001235154**

Tank Capacity: 8000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 04/19/1979
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 8000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 04/19/1979
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 8000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 04/19/1979
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 8000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/19/1979
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 550
Substance: Used Oil

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/19/1979
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 550
Substance: Used Oil

2ND AVENUE SHELL (Continued) **U001235154**

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/19/1979
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 550
Substance: Used Oil

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/19/1979
Tank Status: **Permanently Out of Use**
Date Closed: 02/07/1994
Tank Capacity: 550
Substance: Used Oil

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-3
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 550
Substance: Used Oil

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-3
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 550
Substance: Used Oil

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-3
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 550
Substance: Used Oil

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE

2ND AVENUE SHELL (Continued) **U001235154**

City,State,Zip: HONOLULU, HI 96816

Tank ID: r-3
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 550
Substance: Used Oil

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-87
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 12000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-87
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 12000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-87
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 12000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-87
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 12000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

2ND AVENUE SHELL (Continued) **U001235154**

Tank ID: r-92
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 12000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 12000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 12000
Substance: Gasoline

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 03/16/1994
Tank Status: **Permanently out of Use**
Date Closed: 08/08/2016
Tank Capacity: 12000
Substance: Gasoline

HI Financial Assurance:
Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: 1A
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-2
Tank Status: Permanently Out of Use

2ND AVENUE SHELL (Continued) **U001235154**

FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: 1B
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

2ND AVENUE SHELL (Continued) **U001235154**

Alt Facility ID: 9-100314
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2020
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2020
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2020
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2020
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: 1B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 01/01/2020
FR Archive: True

2ND AVENUE SHELL (Continued) **U001235154**

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2020
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: 1A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 01/01/2020
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 01/01/2020
FR Archive: True

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: 1A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance

2ND AVENUE SHELL (Continued) **U001235154**

Expiration Date: 09/15/2020
FR Archive: False

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: 1B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: 2ND AVENUE SHELL
Address: 3075 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100314
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

262
NE
1/8-1/4
0.152 mi.
804 ft.

FUDS ALA WAI FIELD
WAIKIKI, HI

HI SHWS **S121405904**
N/A

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	FUDS ALA WAI FIELD
Address:	Not reported
City,State,Zip:	WAIKIKI, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1862
Location Description:	Not reported
Is Public:	True
Update On:	2021-08-10 12:59:17
Latitude:	21.279825
Longitude:	-157.818732

BA263
SW
1/8-1/4
0.153 mi.
806 ft.

WAIKIKI GATEWAY PARK EXPLOSION
2044 KALAKAUA AVE
HONOLULU, HI 96815
Site 1 of 2 in cluster BA

HI SHWS **S106821017**
HI SPILLS **N/A**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	WAIKIKI GATEWAY PARK EXPLOSION
Address:	2044 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported

WAIKIKI GATEWAY PARK EXPLOSION (Continued) **S106821017**

Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2140
Location Description:	2044 Kalakaua Ave
Is Public:	True
Update On:	2020-03-13 12:53:34
Latitude:	21.283897
Longitude:	-157.831594

SPILLS:

Name:	WAIKIKI GATEWAY PARK
Address:	2044 KALAKAUA AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19941208-2
Facility Registry ID:	110013776002
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Gateway Park Explosion
Activity Type:	Response
Activity Lead:	Bill Perry
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	City and County of Honolulu, Department of Parks and Recreation, Parks

WAIKIKI GATEWAY PARK EXPLOSION (Continued) **S106821017**

	& Playgrounds
Substances:	gas (unknown) explosion
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.283961000000001
Longitude:	-157.83187899999999

BB264 **SJD RADIATOR SERVICE** **RCRA-VSQG** **1004688809**
West **1218 MAKIKI ST** **FINDS** **HID981664634**
1/8-1/4 **HONOLULU, HI 96814** **ECHO**
0.154 mi.
811 ft. **Site 1 of 3 in cluster BB**

Actual:
28 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:		19930808
Handler Name:	SJD RADIATOR SERVICE	
Handler Address:		1218 MAKIKI ST
Handler City,State,Zip:		HONOLULU, HI 96814
EPA ID:		HID981664634
Contact Name:		HERBERT HIRATA
Contact Address:		1218 MAKIKI ST
Contact City,State,Zip:		HONOLULU, HI 96814
Contact Telephone:		808-955-4902
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		MAKIKI ST

SJD RADIATOR SERVICE (Continued) **1004688809**

Mailing City,State,Zip:		HONOLULU, HI 96814
Owner Name:	HIRATA HERB & COLIN	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20000915
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No
Importer of Spent Lead Acid Batteries:		No
Exporter of Spent Lead Acid Batteries:		No

SJD RADIATOR SERVICE (Continued) **1004688809**

Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: HIRATA HERB & COLIN
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19930808
Handler Name: SJD RADIATOR SERVICE
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

SJD RADIATOR SERVICE (Continued) **1004688809**

FINDS:
Registry ID: 110005725260

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004688809
Registry ID:	110005725260
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005725260
Name:	SJD RADIATOR SERVICE
Address:	1218 MAKIKI ST
City,State,Zip:	HONOLULU, HI 96814

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265 SW 1/8-1/4 0.155 mi. 820 ft. **PRINCE KUHIO HOTEL REPORT** **HI SHWS 1006819048**
2500 KUHIO AVE **HI AIRS N/A**
HONOLULU, HI 96815

Actual: 3 ft.
Focus Map: 8

SHWS:

Name:	PRINCE KUHIO HOTEL REPORT
Address:	2500 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported

PRINCE KUHIO HOTEL REPORT (Continued) **1006819048**

Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1045
Location Description:	2500 Kuhio Ave
Is Public:	True
Update On:	2020-04-13 20:01:12
Latitude:	21.275450
Longitude:	-157.822002

AIRS:

Name:	OCEAN VIEW HOTEL CORPORATION
Address:	2500 KUHIO AVENUE
City,State,Zip:	HONOLULU, HI
Facility Identifier:	0013-01-N
Island:	Oahu
Mailing Address:	2500 Kuhio Avenue
Locale:	Not reported
Mailing City:	Honolulu
Contact Name:	Anthony Espiritu
Mailing State:	Hawaii
Mailing Zip:	96815
Contact Phone:	Chief Engineer
Business Phone:	Not reported
Issue Date:	06/22/2016
Expiration Date:	06/21/2021
Description:	Two (2) 70 HP BoilersSeventy (70) HP (2.93 MMBtu/hr input) boiler, manufactured by Superior, model no. 4-5-353, serial no. 10223, fired primarily on synthetic natural gas (SNG) and fuel oil no. 2 fired as back-up, built in 1987.Second boiler is exempt.A 70 HP [2.93 MMBtu/hr input] Boiler, manufactured in 1987 by Superior, model no. 4-5-353, serial no. 10222, is fired only on SNG and therefore considered exempt pursuant to HAR, 11-60.1-62(d)(6). As explained by Mr. Espritu, Chief Engineer for this facility, the fuel tank system piping to this boiler was permanently disconnected due to lack of use for an extended time.

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266 SW 1/8-1/4 0.158 mi. 836 ft.

WAIKIKI MARINA HOTEL
1956 ALA MOANA BLVD
HONOLULU, HI 96815

RCRA NonGen / NLR **1000270469**
FINDS **HID982511883**
ECHO

Actual: 4 ft.

Focus Map: 8

RCRA Listings:

Date Form Received by Agency:		19930810
Handler Name:	WAIKIKI MARINA HOTEL	
Handler Address:		1956 ALA MOANA BLVD
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HID982511883
Contact Name:		DREW CAMENSON
Contact Address:		1956 ALA MOANA BLVD

WAIKIKI MARINA HOTEL (Continued) **1000270469**

Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-941-7275
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Not reported
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		ALA MOANA BLVD
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	WAIKIKI MARINA HOTEL	
Owner Type:		County
Operator Name:	NOT REQUIRED	
Operator Type:		County
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No

WAIKIKI MARINA HOTEL (Continued) **1000270469**

Institutional Control Indicator: No
Human Exposure Controls Indicator: N/A
Groundwater Controls Indicator: N/A
Operating TSDF Universe: Not reported
Full Enforcement Universe: Not reported
Significant Non-Complier Universe: No
Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20000915
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: WAIKIKI MARINA HOTEL
Legal Status: County
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: County
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19930810
Handler Name: WAIKIKI MARINA HOTEL
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes

WAIKIKI MARINA HOTEL (Continued) **1000270469**

Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005727151

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000270469
Registry ID: 110005727151
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005727151
Name: WAIKIKI MARINA HOTEL
Address: 1956 ALA MOANA BLVD
City,State,Zip: HONOLULU, HI 96815

AY267 **SHELL SERVICE STATION SAP 139544** **RCRA NonGen / NLR** **1004689077**
WSW **1436 S BERETANIA** **FINDS** **HIR000109934**
1/8-1/4 **HONOLULU, HI 96814** **ECHO**
0.159 mi.
837 ft. **Site 2 of 6 in cluster AY**

Actual:
27 ft.

Focus Map:
4

RCRA Listings:
Date Form Received by Agency: 20181206
Handler Name: SHELL SERVICE STATION SAP 139544
Handler Address: 1436 S BERETANIA
Handler City,State,Zip: HONOLULU, HI 96814
EPA ID: HIR000109934
Contact Name: SCOTT BURKEY
Contact Address: S. WILMINGTON AVE
Contact City,State,Zip: CARSON, CA 90810

SHELL SERVICE STATION SAP 139544 (Continued) **1004689077**

Contact Telephone:	214-483-5460
Contact Fax:	Not reported
Contact Email:	WASTECOMPLIANCE@GHD.COM
Contact Title:	SR SGW RISK MGMT AND ADVOCACY SPECIALIST
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Not a generator, verified
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Not reported
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	S. WILMINGTON AVE
Mailing City,State,Zip:	CARSON, CA 90810
Owner Name:	EQUILON ENTERPRISES LLC DBA SHELL OIL PRODUCTS US
Owner Type:	Private
Operator Name:	EQUILON ENTERPRISES LLC DBA SHELL OIL PRODUCTS US
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No

SHELL SERVICE STATION SAP 139544 (Continued) **1004689077**

Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20181211
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D018
Waste Description:	BENZENE

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	EQUILON ENTERPRISE L L C
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	P O BOX 2648
Owner/Operator City,State,Zip:	HOUSTON, TX 77252-2648
Owner/Operator Telephone:	713-241-5036
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	EQUILON ENTERPRISES LLC DBA SHELL OIL PRODUCTS US
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	20945 S. WILMINGTON AVE
Owner/Operator City,State,Zip:	CARSON, CA 90810
Owner/Operator Telephone:	214-483-5460
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	WASTECOMPLIANCE@GHD.COM
Owner/Operator Indicator:	Operator
Owner/Operator Name:	EQUILON ENTERPRISES LLC DBA SHELL OIL PRODUCTS US
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported

SHELL SERVICE STATION SAP 139544 (Continued) **1004689077**

Owner/Operator Address: 20945 S. WILMINGTON AVE
Owner/Operator City,State,Zip: CARSON, CA 90810
Owner/Operator Telephone: 214-483-5460
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: WASTECOMPLIANCE@GHD.COM

Historic Generators:
Receive Date: 20181206
Handler Name: SHELL SERVICE STATION SAP 139544
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20011207
Handler Name: SHELL SERVICE STATION
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 447190
NAICS Description: OTHER GASOLINE STATIONS

NAICS Code: 562910
NAICS Description: REMEDIATION SERVICES

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110012241715

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource

SHELL SERVICE STATION SAP 139544 (Continued) **1004689077**

Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004689077
Registry ID:	110012241715
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110012241715
Name:	SHELL SERVICE STATION SAP 139544
Address:	1436 S BERETANIA
City,State,Zip:	HONOLULU, HI 96814

AY268 **MAKIKI SHELL** **HI LUST** **U003188504**
WSW **1436 S BERETANIA ST** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96814** **HI SWRCY**
0.159 mi. **HI Financial Assurance**
837 ft. **Site 3 of 6 in cluster AY**

Actual:
27 ft.

Focus Map:
4

LUST:

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100833
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/22/2008
Release ID:	980196
Project Officer:	Shunsheng Fu

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100833
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/19/1999
Release ID:	930023
Project Officer:	Shunsheng Fu

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100833
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	06/22/2005
Release ID:	040039
Project Officer:	Shunsheng Fu

UST:

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100833
Owner:	EQUILON ENTERPRISES, LLC DBA SHELL OIL PRODUCTS US

MAKIKI SHELL (Continued) **U003188504**

Owner Address:	2555 13TH AVE, SW
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.300110
Longitude:	-157.838525
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	R-1
Date Installed:	04/18/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	07/06/1998
Tank Capacity:	5000
Substance:	Gasoline
Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-2
Date Installed:	04/18/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	07/06/1998
Tank Capacity:	4000
Substance:	Gasoline
Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-3
Date Installed:	04/18/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	07/06/1998
Tank Capacity:	3000
Substance:	Gasoline
Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-4
Date Installed:	04/19/1967
Tank Status:	**Permanently Out of Use**
Date Closed:	07/06/1998
Tank Capacity:	4000
Substance:	Gasoline
Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-5
Date Installed:	04/19/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	07/06/1998
Tank Capacity:	6000
Substance:	Gasoline

MAKIKI SHELL (Continued) **U003188504**

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-6
Date Installed: 03/01/1994
Tank Status: **Permanently Out of Use**
Date Closed: 04/12/2004
Tank Capacity: 550
Substance: Used Oil

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-6
Date Installed: 04/18/1960
Tank Status: **Permanently Out of Use**
Date Closed: 01/24/1994
Tank Capacity: 550
Substance: Used Oil

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: r-82
Date Installed: 09/01/1998
Tank Status: **Permanently Out of Use**
Date Closed: 10/31/2005
Tank Capacity: 12000
Substance: Gasoline

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: r-92
Date Installed: 09/01/1998
Tank Status: **Permanently Out of Use**
Date Closed: 10/31/2005
Tank Capacity: 12000
Substance: Gasoline

SWRCY:
Permit Number: RY-0035-15
Name: RRR RECYCLING - BERETANIA ST. KIOSK
Address: 1436 S. BERETANIA ST.
City,State,Zip: HONOLULU, HI
Materials: dbc
Island: Oahu
TMK: 1-2-4-010:003
Closure Date: Not reported
Type: general
Status: Not reported

MAKIKI SHELL (Continued) **U003188504**

HI Financial Assurance:

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100833
Tank Id:	R-5
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	Not reported
FR Archive:	False

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100833
Tank Id:	r-92
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	Not reported
FR Archive:	False

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100833
Tank Id:	r-82
Tank Status:	Permanently Out of Use
FRTYPE:	Risk Retention Group
Expiration Date:	Not reported
FR Archive:	False

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100833
Tank Id:	r-82
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100833
Tank Id:	r-82
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	Not reported
FR Archive:	False

Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100833
Tank Id:	R-6
Tank Status:	Permanently Out of Use

MAKIKI SHELL (Continued) **U003188504**

FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-6
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-6
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: r-92
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-5
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: r-92
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

MAKIKI SHELL (Continued) **U003188504**

Alt Facility ID: 9-100833
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-5
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

MAKIKI SHELL (Continued) **U003188504**

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MAKIKI SHELL
Address: 1436 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100833
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Other

MAKIKI SHELL (Continued) **U003188504**

Expiration Date:	Not reported
FR Archive:	False
Name:	MAKIKI SHELL
Address:	1436 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100833
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Risk Retention Group
Expiration Date:	Not reported
FR Archive:	False

AY269 **MAKIKI SHELL** **RCRA NonGen / NLR** **1004689013**
WSW **1436 S BERETANIA** **HIR000082081**
1/8-1/4 **HONOLULU, HI 96814**
0.159 mi.
837 ft. **Site 4 of 6 in cluster AY**

Actual:
27 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:	20181206
Handler Name:	MAKIKI SHELL
Handler Address:	1436 S BERETANIA
Handler City,State,Zip:	HONOLULU, HI 96814-1329
EPA ID:	HIR000082081
Contact Name:	SCOTT BURKEY
Contact Address:	S. WILMINGTON AVE
Contact City,State,Zip:	CARSON, CA 90810
Contact Telephone:	214-483-5460
Contact Fax:	Not reported
Contact Email:	WASTECOMPLIANCE@GHD.COM
Contact Title:	SR SGW RISK MGMT AND ADVOCACY SPECIALIST
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Not a generator, verified
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Not reported
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	S. WILMINGTON AVE
Mailing City,State,Zip:	CARSON, CA 90810
Owner Name:	EQUILON ENTERPRISES LLC DBA SHELL OIL PRODUCTS US
Owner Type:	Private
Operator Name:	EQUILON ENTERPRISES LLC DBA SHELL OIL PRODUCTS US
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No

MAKIKI SHELL (Continued) **1004689013**

Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20181211
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	F001
Waste Description:	THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

MAKIKI SHELL (Continued) **1004689013**

Waste Code: F002
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: EQUILON ENTERPRISES LLC DBA SHELL OIL PRODUCTS US
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 20945 S. WILMINGTON AVE
Owner/Operator City,State,Zip: CARSON, CA 90810
Owner/Operator Telephone: 214-483-5460
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: WASTECOMPLIANCE@GHD.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: EQUILON ENTERPRISES LLC DBA SHELL OIL PRODUCTS US
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 20945 S. WILMINGTON AVE
Owner/Operator City,State,Zip: CARSON, CA 90810
Owner/Operator Telephone: 214-483-5460
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: WASTECOMPLIANCE@GHD.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: WARREN HIGA
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 1986 PUOWAINA DR
Owner/Operator City,State,Zip: HONOLULU, HI 96813
Owner/Operator Telephone: 808-537-6615
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20181206
Handler Name: MAKIKI SHELL
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No

MAKIKI SHELL (Continued) **1004689013**

Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20000908
Handler Name: MAKIKI SHELL
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 447190
NAICS Description: OTHER GASOLINE STATIONS

NAICS Code: 562910
NAICS Description: REMEDIATION SERVICES

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

AY270 **HONOLULU POLICE DEPT** **RCRA-SQG** **1015757417**
SW **801 S. BERETANIA ST.** **PADS** **HID982495871**
1/8-1/4 **HONOLULU, HI 96815**
0.160 mi.
843 ft. **Site 5 of 6 in cluster AY**

Actual:
26 ft.

Focus Map:
4

RCRA Listings:
Date Form Received by Agency: 20210830
Handler Name: HONOLULU POLICE DEPT
Handler Address: 801 S. BERETANIA ST.
Handler City,State,Zip: HONOLULU, HI 96815
EPA ID: HID982495871
Contact Name: ALAN KAINUMA
Contact Address: S. BERETANIA ST.
Contact City,State,Zip: HONOLULU, HI 96815
Contact Telephone: 808-723-3005
Contact Fax: Not reported
Contact Email: AKAINUMA@HONOLULU.GOV
Contact Title: QD EXAMINER V
EPA Region: 09
Land Type: County
Federal Waste Generator Description: Small Quantity Generator
Non-Notifier: Not reported

HONOLULU POLICE DEPT (Continued) **1015757417**

Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	S. BERETANIA ST.
Mailing City,State,Zip:	HONOLULU, HI 96815
Owner Name:	CITY AND COUNTY OF HONOLULU
Owner Type:	County
Operator Name:	HONOLULU POLICE DEPARTMENT
Operator Type:	County
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No

HONOLULU POLICE DEPT (Continued) **1015757417**

Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20210831
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No
Importer of Spent Lead Acid Batteries:		No
Exporter of Spent Lead Acid Batteries:		No
Recycler Activity Without Storage:		No
Manifest Broker:		No
Sub-Part P Indicator:		No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D009
Waste Description:	MERCURY
Waste Code:	D011
Waste Description:	SILVER
Waste Code:	D022
Waste Description:	CHLOROFORM
Waste Code:	F002
Waste Description:	THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.
Waste Code:	F003
Waste Description:	THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name:	NOT REQUIRED
Legal Status:	Municipal
Date Became Current:	Not reported
Date Ended Current:	Not reported

HONOLULU POLICE DEPT (Continued) **1015757417**

Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: HONOLULU POLICE DEPARTMENT
Legal Status: County
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 801 S. BERETANIA ST.
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: HONOLULU CITY OF
Legal Status: Municipal
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: CITY AND COUNTY OF HONOLULU
Legal Status: County
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 650 S. KING ST
Owner/Operator City,State,Zip: HONOLULU, HI 96813
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19900814
Handler Name: HONOLULU POLICE DEPT
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

HONOLULU POLICE DEPT (Continued) **1015757417**

Receive Date:	20210830
Handler Name:	HONOLULU POLICE DEPT
Federal Waste Generator Description:	Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

List of NAICS Codes and Descriptions:

NAICS Code:	92212
NAICS Description:	POLICE PROTECTION

Facility Has Received Notices of Violation:

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Used Oil - Generators
Date Violation was Determined:	20050502
Actual Return to Compliance Date:	20051021
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20050525
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	20051021
Disposition Status:	AS
Disposition Status Description:	ACTION SATISFIED (CASE CLOSED)
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	BROGI
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

HONOLULU POLICE DEPT (Continued) **1015757417**

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Used Oil - Generators
Date Violation was Determined:	20050502
Actual Return to Compliance Date:	20051021
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	002
Date of Enforcement Action:	20050525
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	BROGI
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Generators - General
Date Violation was Determined:	20050502
Actual Return to Compliance Date:	20051021
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20050525
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	20051021
Disposition Status:	AS
Disposition Status Description:	ACTION SATISFIED (CASE CLOSED)

HONOLULU POLICE DEPT (Continued) **1015757417**

Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: BROGI
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Used Oil - Generators
Date Violation was Determined: 20050502
Actual Return to Compliance Date: 20051021
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20050525
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: 20051021
Disposition Status: AS
Disposition Status Description: ACTION SATISFIED (CASE CLOSED)
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: BROGI
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

HONOLULU POLICE DEPT (Continued) **1015757417**

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Used Oil - Generators
Date Violation was Determined:	20050502
Actual Return to Compliance Date:	20051021
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	003
Date of Enforcement Action:	20050525
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	BROGI
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Universal Waste - Small Quantity Handlers
Date Violation was Determined:	20140522
Actual Return to Compliance Date:	20140707
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20141120
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported

HONOLULU POLICE DEPT (Continued) **1015757417**

Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: SAMN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20041103
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: BROGI
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20051021
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 20041103
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: BROGI
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20051021
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 20041103
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: BROGI
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20051021
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported

HONOLULU POLICE DEPT (Continued) **1015757417**

Former Citation:	Not reported
Evaluation Date:	20041103
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	BROGI
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20051021
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20041103
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	BROGI
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20051021
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20140522
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	SAMN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20140707
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

PADS:

Name:	PAWEE ANNEX, HONOLULU POL DEPT
Address:	1455 BERETANIA STREET
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
EDR ID:	1015757417
EPAID:	HID982495871
Region:	9
Generator:	Y
Storer:	N
Disposer:	N
Transporter:	N
Smelter:	N
Research Facility:	N
Mailing Address:	650 S. KING ST., DEPT OF HSG & COMD

HONOLULU POLICE DEPT (Continued) **1015757417**

Mailing Address 2:	Not reported
Mailing City:	HONOLULU
Mailing State:	HI
Mailing Zip:	96813
Mailing Country:	US
Owner Name:	CITY & COUNTY OF HONOLULU
Certification Date:	04/11/1994
Contact Name:	SILVESTRE L ULEP
Contact Title:	Not reported
Contact Telephone:	808-527-5301
Contact Text:	Not reported
Contact Email:	Not reported

AY271 **HONOLULU STATION - PAWAA ANNEX** **HI LUST** **U001235050**
SW **1455 S BERETANIA ST** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96814** **HI Financial Assurance**
0.160 mi.
843 ft. **Site 6 of 6 in cluster AY**

Actual:
26 ft.

Focus Map:
4

LUST:

Name:	HONOLULU STATION - PAWAA ANNEX
Address:	1455 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100114
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	09/05/2000
Release ID:	930074
Project Officer:	Richard Takaba

UST:

Name:	HONOLULU STATION - PAWAA ANNEX
Address:	1455 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100114
Owner:	C&C OF HNL - DEPT OF COMMUNITY SERVICES
Owner Address:	715 S. KING ST, SUITE 311
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.298620
Longitude:	-157.838281
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	R-1
Date Installed:	06/01/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	04/22/1998
Tank Capacity:	5000
Substance:	Gasoline

Name:	HONOLULU STATION - PAWAA ANNEX
Address:	1455 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814

Tank ID:	R-2
Date Installed:	06/01/1981
Tank Status:	**Permanently Out of Use**
Date Closed:	04/22/1998

HONOLULU STATION - PAWAA ANNEX (Continued) **U001235050**

Tank Capacity: 5000
Substance: Gasoline

Name: HONOLULU STATION - PAWAA ANNEX
Address: 1455 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-3
Date Installed: 07/15/1965
Tank Status: **Permanently Out of Use**
Date Closed: 04/22/1998
Tank Capacity: 5000
Substance: Gasoline

Name: HONOLULU STATION - PAWAA ANNEX
Address: 1455 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: 07/15/1965
Tank Status: **Permanently Out of Use**
Date Closed: 04/22/1998
Tank Capacity: 1000
Substance: Used Oil

HI Financial Assurance:
Name: HONOLULU STATION - PAWAA ANNEX
Address: 1455 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100114
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: HONOLULU STATION - PAWAA ANNEX
Address: 1455 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100114
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: HONOLULU STATION - PAWAA ANNEX
Address: 1455 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100114
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: HONOLULU STATION - PAWAA ANNEX

HONOLULU STATION - PAWAA ANNEX (Continued) **U001235050**

Address:	1455 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100114
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Self Insured
Expiration Date:	Not reported
FR Archive:	False

---

272 **MANOA ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS** **HI SHWS** **S126282933**
NNW **3155 MANOA RD** **N/A**
1/8-1/4 **HONOLULU, HI 96822**
0.160 mi.
844 ft.

Actual:
223 ft.

Focus Map:
3

SHWS:

Name:	MANOA ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	3155 MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2929
Location Description:	3155 Manoa Rd, Honolulu, HI 96822, USA
Is Public:	True
Update On:	2021-11-10 16:53:24
Latitude:	21.316621
Longitude:	-157.808700

BC273 **JCRA INVESTMENTS** **HI UST** **U004364801**
North **1685 KAPIOLANI PROPERTY** **N/A**
1/8-1/4 **HONOLULU, HI**
0.160 mi.
845 ft. **Site 1 of 2 in cluster BC**

Actual: UST:
3 ft.
Name: JCRA INVESTMENTS
Focus Map: Address: 1685 KAPIOLANI PROPERTY
4 City,State,Zip: HONOLULU, HI
Facility ID: 9-103857
Owner: State of Hawaii Department Of Health
Owner Address: 919 Ala Moana Boulevard
Owner City,St,Zip: Honolulu, 57586 57586
Latitude: 21.290848
Longitude: -157.837798
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Map

Tank ID: r-1
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 03/10/2008
Tank Capacity: 900
Substance: Gasoline

Name: JCRA INVESTMENTS
Address: 1685 KAPIOLANI PROPERTY
City,State,Zip: HONOLULU, HI

Tank ID: r-1
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 03/10/2008
Tank Capacity: 900
Substance: Gasoline

Name: JCRA INVESTMENTS
Address: 1685 KAPIOLANI PROPERTY
City,State,Zip: HONOLULU, HI

Tank ID: r-1
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 03/10/2008
Tank Capacity: 900
Substance: Gasoline

BC274 **JCRA INVESTMENTS** **HI LUST** **S109096053**
North **1685 KAPIOLANI PROPERTY** **N/A**
1/8-1/4 **HONOLULU, HI 96814**
0.160 mi.
845 ft. **Site 2 of 2 in cluster BC**

Actual: LUST:
3 ft.
Name: JCRA INVESTMENTS
Focus Map: Address: 1685 KAPIOLANI PROPERTY
4 City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-103857
Facility Status: Site Cleanup Completed (NFA)

JCRA INVESTMENTS (Continued) **S109096053**

Facility Status Date: 06/20/2008
Release ID: 080037
Project Officer: Darren Park

275
NE
1/8-1/4
0.161 mi.
849 ft.

KUHIO CLEANERS
810 KAPAHULU AVE
HONOLULU, HI 96816

HI UST **U003154459**
N/A

Actual:
17 ft.

Focus Map:
8

UST:

Name:	KUHIO CLEANERS
Address:	810 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100265
Owner:	MORENO ENTERPRISES, INC.
Owner Address:	810 KAPAHULU AVE
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-2
Date Installed:	05/05/1976
Tank Status:	**Permanently Out of Use**
Date Closed:	05/02/1991
Tank Capacity:	1000
Substance:	Other

276
SW
1/8-1/4
0.161 mi.
851 ft.

AIM WAIKIKI
2025 KALAKAUA AVE.
HONOLULU, HI 96815

HI LUST **U001235162**
HI UST **N/A**
HI SPILLS
HI Financial Assurance

Actual:
3 ft.

Focus Map:
8

LUST:

Name:	AIM WAIKIKI
Address:	2025 KALAKAUA AVE.
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100328
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	07/07/2000
Release ID:	980144
Project Officer:	Miranda Fleisher
Name:	AIM WAIKIKI
Address:	2025 KALAKAUA AVE.
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100328
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	05/05/2008
Release ID:	050016
Project Officer:	Miranda Fleisher
Name:	AIM WAIKIKI

AIM WAIKIKI (Continued) **U001235162**

Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100328
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 07/07/2000
Release ID: 940190
Project Officer: Miranda Fleisher

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100328
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 03/21/2022
Release ID: 210002
Project Officer: Miranda Fleisher

UST:
Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100328
Owner: ALOHA PETROLEUM, LTD.
Owner Address: 1132 Bishop Street, Suite 1700
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.283909
Longitude: -157.832151
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1A-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 1A-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 1A-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000

AIM WAIKIKI (Continued) **U001235162**

Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 1A-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2B-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2B-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2B-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2B-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 2B-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

AIM WAIKIKI (Continued) **U001235162**

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 3-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Diesel

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 3-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Diesel

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 3-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Diesel

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 3-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Diesel

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 4-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.

AIM WAIKIKI (Continued) **U001235162**

City,State,Zip: HONOLULU, HI 96815

Tank ID: 4-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 4-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 4-CS
Date Installed: 11/01/2020
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-1
Date Installed: 02/06/1985
Tank Status: **Permanently Out of Use**
Date Closed: 08/10/1994
Tank Capacity: 550
Substance: Used Oil

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-1
Date Installed: 02/06/1985
Tank Status: **Permanently Out of Use**
Date Closed: 08/10/1994
Tank Capacity: 550
Substance: Used Oil

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815

AIM WAIKIKI (Continued) **U001235162**

Tank ID:	R-1
Date Installed:	02/06/1985
Tank Status:	**Permanently Out of Use**
Date Closed:	08/10/1994
Tank Capacity:	550
Substance:	Used Oil
Name:	AIM WAIKIKI
Address:	2025 KALAKAUA AVE.
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	R-1
Date Installed:	02/06/1985
Tank Status:	**Permanently Out of Use**
Date Closed:	08/10/1994
Tank Capacity:	550
Substance:	Used Oil

SPILLS:

Name:	ALOHA GAS WAIKIKI STYRENE DISCOVERY
Address:	2025 KALAKAUA AVENUE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20201214-1345 REFERRED
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	Not reported
ER:	No
Less Or Greater Than:	Not reported
Units:	Not reported
Activity Type:	Not reported
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	Referred
File Under:	Not reported
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	12/14/20 6:45 PM EST
Release Date:	Not reported
Release Duration:	Not reported
Media:	Soil
Waterbody:	Not reported
Summary:	During a pipeline replacement project, Styrene contamination was discovered above DOH s action levels. In a multi-increment sample of the lines that run from the UST to the dispensers, Styrene concentration was 9.4 ppm. No stains. No odors. Field screening equipment found nothing. The source of the Styrene is unknown.
Is Noteworthy for Reports:	No
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Terry Corpus
Notified Agencies:	Solid and Hazardous Waste Branch
Response Measures Taken:	Not reported

AIM WAIKIKI (Continued) **U001235162**

Incident Report Number:	Not reported
Coordination Needed:	Referred
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Dec 14, 2020
Comments:	referred to SHWB
Latitude:	Not reported
Longitude:	Not reported

HI Financial Assurance:

Name:	AIM WAIKIKI
Address:	2025 KALAKAUA AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100328
Tank Id:	3-CS
Tank Status:	Currently in Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM WAIKIKI
Address:	2025 KALAKAUA AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100328
Tank Id:	1A-CS
Tank Status:	Currently in Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM WAIKIKI
Address:	2025 KALAKAUA AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100328
Tank Id:	4-CS
Tank Status:	Currently in Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM WAIKIKI
Address:	2025 KALAKAUA AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100328
Tank Id:	2B-CS
Tank Status:	Currently in Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM WAIKIKI
Address:	2025 KALAKAUA AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100328

AIM WAIKIKI (Continued) **U001235162**

Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/16/2017
FR Archive: True

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: 4-CS
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/16/2017
FR Archive: True

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: 3-CS
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/16/2017
FR Archive: True

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: 2B-CS
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/16/2017
FR Archive: True

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: 1A-CS
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/16/2017
FR Archive: True

Name: AIM WAIKIKI

AIM WAIKIKI (Continued) **U001235162**

Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: 2B-CS
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: 1A-CS
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: 4-CS
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

Name: AIM WAIKIKI
Address: 2025 KALAKAUA AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100328
Tank Id: 3-CS
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/15/2020
FR Archive: False

277
NE
1/8-1/4
0.161 mi.
851 ft.

KAPAHULU PUMPING STATION
HONOLULU, HI

FUDS **1024901993**
N/A

Actual:
23 ft.

Focus Map:
8

FUDS:

EPA Region:	09
Installation ID:	HI99799F390000
Congressional District Number:	1
Name:	KAPAHULU PUMPING STATION
FUDS Number:	H09HI0162
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	5934
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=54598
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	WAS ACQUIRED ON AUGUST 24,1910 BY A DECREE OF THE US DISTRICT COURT FOR THE TERRITORY OF HAWAII FROM WILLIAM R. CASTLE AND IDA B. CASTLE FOR $801.00; ON AUGUST 15,1934, 2,030 SF.AREA OF THE KAPAHULF P UMPING STATION PROJECT SITE WAS GRANTED TO THE TERRITORY OF HAWAII FOR THE ROAD WIDENING OF KAPAHULU AVENUE. ON NOVEMBER 29,1967, THE PROJECT SITE WAS TRANSFERED BY THE GSA TO THE US DEPARTMENT OF THE INTERIOR.
Project Required:	No
Feature Description:	Not reported
Latitude:	21.28166667
Longitude:	-157.81333333

278
North
1/8-1/4
0.161 mi.
851 ft.

KALAKAUA GARDENS
1723 KALAKAUA AVE
HONOLULU, HI 96813

HI UST **U004225788**
HI Financial Assurance **N/A**

Actual:
3 ft.

Focus Map:
5

UST:

Name:	KALAKAUA GARDENS
Address:	1723 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96813
Facility ID:	9-103945
Owner:	Island Paradise Investments, LP
Owner Address:	3130 La Selva St #109
Owner City,St,Zip:	Honolulu, 96813 96813
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	M-1
Date Installed:	02/19/2015
Tank Status:	**Currently In Use**
Date Closed:	Not reported

KALAKAUA GARDENS (Continued) **U004225788**

Tank Capacity: 4000
Substance: Diesel

Name: KALAKAUA GARDENS
Address: 1723 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96813

Tank ID: M-1
Date Installed: 02/19/2015
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 4000
Substance: Diesel

Name: KALAKAUA GARDENS
Address: 1723 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96813

Tank ID: M-1
Date Installed: 02/19/2015
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 4000
Substance: Diesel

HI Financial Assurance:
Name: KALAKAUA GARDENS
Address: 1723 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96813
Alt Facility ID: 9-103945
Tank Id: M-1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/20/2017
FR Archive: True

Name: KALAKAUA GARDENS
Address: 1723 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96813
Alt Facility ID: 9-103945
Tank Id: M-1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/20/2022
FR Archive: False

---

279 **MATSUSHITA INVESTMENT AND DEVELO** **HI LUST 1006842075**
SW **2237 KUHIO AVE** **HI UST N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.163 mi.
862 ft.

Actual:
3 ft.

Focus Map:
8

LUST:
Name: MATSUSHITA INVESTMENT AND DEVELO
Address: 2237 KUHIO AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-103083

MATSUSHITA INVESTMENT AND DEVELO (Continued) **1006842075**

Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 03/11/1996
Release ID: 960007
Project Officer: Jose Ruiz

UST:
Name: MATSUSHITA INVESTMENT AND DEVELO
Address: 2237 KUHIO AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-103083
Owner: UNDETERMINED AT THIS TIME
Owner Address: Address Unknown
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.280482
Longitude: -157.827563
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 05/10/1995
Tank Capacity: 500
Substance: Diesel

AV280 **ONE KALAKAUA PARTNERS** **HI UST** **U003154847**
SSW **1314 KALAKAUA AVE** **N/A**
1/8-1/4 **HONOLULU, HI 96823**
0.166 mi.
878 ft. **Site 2 of 2 in cluster AV**

Actual:
27 ft.

Focus Map:
5

UST:
Name: ONE KALAKAUA PARTNERS
Address: 1314 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96823
Facility ID: 9-103140
Owner: UNDETERMINED AT THIS TIME
Owner Address: Address Unknown
Owner City,St,Zip: Honolulu, 96823 96823
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 550
Substance: Not Listed

BD281 **HOBRON HOTEL** **HI SHWS** **S106817744**
SSE **1744 KAIOO DR** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.166 mi.
878 ft. **Site 1 of 2 in cluster BD**

Actual:
3 ft.

Focus Map:
7

SHWS:

Name:	HOBRON HOTEL
Address:	1744 KAIOO DR
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Hobron Hotel
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Clarence Callahan
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Hobron Hotel
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: diesel fuel from leaking UST
Nature of Residual Contamination:	Petroleum from UST
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	01/15/2004
Document Number:	2004-015-CAC
Document Subject:	NFA Additional Site Assessment, Former Hobron Hotel, 1744 Kaioo Dr, Honolulu HI (TMK 1-2-6-012-042)
Project Manager:	Clarence Callahan
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	989
Location Description:	1744 Kaioo Dr
Is Public:	True
Update On:	2020-01-07 14:35:17
Latitude:	21.285665
Longitude:	-157.837595

BE282 **OUTRIGGER HOTELS** **HI UST** **U001235483**
SSW **1315 KALAKAUA AVE** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.166 mi.
879 ft. **Site 1 of 2 in cluster BE**

Actual:
27 ft.

Focus Map:
5

UST:

Name:	OUTRIGGER HOTELS
Address:	1315 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101431
Owner:	RICHARD R. KELLY - LIVING TRUST
Owner Address:	2375 KUHIO AVENUE
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	07/03/1991
Tank Capacity:	300
Substance:	Diesel

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283 **LA PIETRA HAWAII SCHOOL FOR GIRLS** **RCRA NonGen / NLR** **1006806682**
East **2933 PONI MOI ROAD** **ICIS** **HIR000132837**
1/8-1/4 **HONOLULU, HI 96815** **FINDS**
0.168 mi. **ECHO**
886 ft.

Actual:
80 ft.

Focus Map:
11

RCRA Listings:

Date Form Received by Agency:		20030124
Handler Name:	LA PIETRA HAWAII SCHOOL FOR GIRLS	
Handler Address:		2933 PONI MOI ROAD
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIR000132837
Contact Name:		ALAN MORITA
Contact Address:		PONI MOI ROAD
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-922-2744
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not reported
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PONI MOI ROAD
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	OWNER	
Owner Type:		Private
Operator Name:	OPERATOR	
Operator Type:		Private

LA PIETRA HAWAII SCHOOL FOR GIRLS (Continued) **1006806682**

Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20030127
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

LA PIETRA HAWAII SCHOOL FOR GIRLS (Continued) **1006806682**

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: OPERATOR
Legal Status: Private
Date Became Current: 20030124
Date Ended Current: Not reported
Owner/Operator Address: 2933 PONI MOI RD
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: OWNER
Legal Status: Private
Date Became Current: 20030124
Date Ended Current: Not reported
Owner/Operator Address: 2933 PONI MOI RD
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20001228
Handler Name: LA PIETRA HAWAII SCHOOL FOR GIRLS
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20030124
Handler Name: LA PIETRA HAWAII SCHOOL FOR GIRLS
Federal Waste Generator Description: Not reported
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

LA PIETRA HAWAII SCHOOL FOR GIRLS (Continued) **1006806682**

Facility Has Received Notices of Violation:
- Found Violation: No
- Agency Which Determined Violation: Not reported
- Violation Short Description: Not reported
- Date Violation was Determined: Not reported
- Actual Return to Compliance Date: Not reported
- Return to Compliance Qualifier: Not reported
- Violation Responsible Agency: Not reported
- Scheduled Compliance Date: Not reported
- Enforcement Identifier: Not reported
- Date of Enforcement Action: Not reported
- Enforcement Responsible Agency: Not reported
- Enforcement Docket Number: Not reported
- Enforcement Attorney: Not reported
- Corrective Action Component: Not reported
- Appeal Initiated Date: Not reported
- Appeal Resolution Date: Not reported
- Disposition Status Date: Not reported
- Disposition Status: Not reported
- Disposition Status Description: Not reported
- Consent/Final Order Sequence Number: Not reported
- Consent/Final Order Respondent Name: Not reported
- Consent/Final Order Lead Agency: Not reported
- Enforcement Type: Not reported
- Enforcement Responsible Person: Not reported
- Enforcement Responsible Sub-Organization: Not reported
- SEP Sequence Number: Not reported
- SEP Expenditure Amount: Not reported
- SEP Scheduled Completion Date: Not reported
- SEP Actual Date: Not reported
- SEP Defaulted Date: Not reported
- SEP Type: Not reported
- SEP Type Description: Not reported
- Proposed Amount: Not reported
- Final Monetary Amount: Not reported
- Paid Amount: Not reported
- Final Count: Not reported
- Final Amount: Not reported

Evaluation Action Summary:
- Evaluation Date: 20000627
- Evaluation Responsible Agency: State
- Found Violation: No
- Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
- Evaluation Responsible Person Identifier: R9STA
- Evaluation Responsible Sub-Organization: Not reported
- Actual Return to Compliance Date: Not reported
- Scheduled Compliance Date: Not reported
- Date of Request: Not reported
- Date Response Received: Not reported
- Request Agency: Not reported
- Former Citation: Not reported

ICIS:
- Enforcement Action ID: 09-200066814

LA PIETRA HAWAII SCHOOL FOR GIRLS (Continued) **1006806682**

FRS ID:	110013387566
Action Name:	HI-TSCA-FY12-AES- La Pietra Hawaii School for Girls Inspection
Facility Name:	LA PIETRA HAWAII SCHOOL FOR GIRLS
Facility Address:	2933 PONI MOI ROAD HONOLULU, HI 96815
Enforcement Action Type:	Notice of Noncompliance Issued
Facility County:	HONOLULU
Program System Acronym:	ICIS
Enforcement Action Forum Desc:	Administrative - Informal
EA Type Code:	NONC
Facility SIC Code:	Not reported
Federal Facility ID:	Not reported
Latitude in Decimal Degrees:	21.260395
Longitude in Decimal Degrees:	-157.817389
Permit Type Desc:	Not reported
Program System Acronym:	3000005817
Facility NAICS Code:	Not reported
Tribal Land Code:	Not reported

Enforcement Action ID:	09-200063879
FRS ID:	110013387566
Action Name:	HI-TSCA-FY12-AES- La Pietra Hawaii School for Girls Inspection
Facility Name:	LA PIETRA HAWAII SCHOOL FOR GIRLS
Facility Address:	2933 PONI MOI ROAD HONOLULU, HI 96815
Enforcement Action Type:	Notice of Noncompliance Issued
Facility County:	HONOLULU
Program System Acronym:	ICIS
Enforcement Action Forum Desc:	Administrative - Informal
EA Type Code:	NONC
Facility SIC Code:	Not reported
Federal Facility ID:	Not reported
Latitude in Decimal Degrees:	21.260395
Longitude in Decimal Degrees:	-157.817389
Permit Type Desc:	Not reported
Program System Acronym:	3000005817
Facility NAICS Code:	Not reported
Tribal Land Code:	Not reported

FINDS:
Registry ID: 110013387566

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with

LA PIETRA HAWAII SCHOOL FOR GIRLS (Continued) **1006806682**

a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1006806682
Registry ID:	110013387566
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110013387566
Name:	LA PIETRA HAWAII SCHOOL FOR GIRLS
Address:	2933 PONI MOI ROAD
City,State,Zip:	HONOLULU, HI 96815

284
NW
1/8-1/4
0.168 mi.
887 ft.

HAWAIIAN HUMANE SOCIETY
2700 WAIALAE AVE
HONOLULU, HI 96826

HI UST **U001235534**
N/A

Actual:
35 ft.

Focus Map:
5

UST:

Name:	HAWAIIAN HUMANE SOCIETY
Address:	2700 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-101528
Owner:	HAWAIIAN HUMANE SOCIETY
Owner Address:	2700 WAIALAE AVENUE
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-001
Date Installed:	01/07/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	01/16/1989
Tank Capacity:	1000
Substance:	Gasoline

AU285 **OUTRIGGER EAST** **RCRA-VSQG** **1004689030**
SW **150 KAIULANI AVE** **FINDS** **HIR000094706**
1/8-1/4 **HONOLULU, HI 96815** **ECHO**
0.168 mi. **CA HAZNET**
888 ft. **Site 4 of 4 in cluster AU**

Actual: **3 ft.**

Focus Map: **8**

RCRA Listings:

Date Form Received by Agency:		20010410
Handler Name:	OUTRIGGER EAST	
Handler Address:		150 KAIULANI AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIR000094706
Contact Name:		EDWARD VIERRA
Contact Address:		150 KAIULANI AVE
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-921-6795
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		150 KAIULANI AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	OUTRIGGER EAST	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

OUTRIGGER EAST (Continued) **1004689030**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20021007
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: OUTRIGGER EAST	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	150 KAIULANI AVE
Owner/Operator City,State,Zip:	HONOLULU, HI 96815
Owner/Operator Telephone:	808-921-6795
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	20010410
Handler Name: OUTRIGGER EAST	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator

OUTRIGGER EAST (Continued) **1004689030**

State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110012198718

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1004689030
Registry ID: 110012198718
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110012198718
Name: OUTRIGGER EAST
Address: 150 KAIULANI AVE
City,State,Zip: HONOLULU, HI 96815

HAZNET:
Name: OUTRIGGER EAST
Address: 150 KAIULANI AVE
Address 2: Not reported
City,State,Zip: HONOLULU, HI 96815
Contact: Edward Vierra
Telephone: 8089216795
Mailing Name: Not reported
Mailing Address: 150 Kaiulani Ave

Year: 2002

OUTRIGGER EAST (Continued) **1004689030**

Gepaid: HIR000094706
TSD EPA ID: CAT000646117
CA Waste Code: 331 - Off-specification, aged or surplus organics
Disposal Method: H01 - Transfer Station
Tons: 0.25

Year: 2001
Gepaid: HIR000094706
TSD EPA ID: CAT000646117
CA Waste Code: 141 - Off-specification, aged or surplus inorganics
Disposal Method: T01 - Treatment, Tank
Tons: 0.005

Year: 2001
Gepaid: HIR000094706
TSD EPA ID: CAT000646117
CA Waste Code: 331 - Off-specification, aged or surplus organics
Disposal Method: H01 - Transfer Station
Tons: 0.355

Year: 2001
Gepaid: HIR000094706
TSD EPA ID: CAT000646117
CA Waste Code: 181 - Other inorganic solid waste
Disposal Method: D80 - Disposal, Land Fill
Tons: 0.025

Additional Info:
Year: 2002
Gen EPA ID: HIR000094706

Shipment Date: 20020904
Creation Date: 1/28/2003 18:32:43
Receipt Date: 20020920
Manifest ID: 21823681
Trans EPA ID: HIR000050336
Trans Name: Not reported
Trans 2 EPA ID: HID000076851
Trans 2 Name: Not reported
TSDF EPA ID: CAT000646117
Trans Name: Not reported
TSDF Alt EPA ID: Not reported
TSDF Alt Name: Not reported
Waste Code Description: 331 - Off-specification, aged, or surplus organics
RCRA Code: D001
Meth Code: H01 - Transfer Station
Quantity Tons: 0.25
Waste Quantity: 500
Quantity Unit: P
Additional Code 1: Not reported
Additional Code 2: Not reported
Additional Code 3: Not reported
Additional Code 4: Not reported
Additional Code 5: Not reported

OUTRIGGER EAST (Continued) **1004689030**

Additional Info:

Year:	2001
Gen EPA ID:	HIR000094706
Shipment Date:	20010502
Creation Date:	Not reported
Receipt Date:	Not reported
Manifest ID:	20141052
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	512 - Other empty containers 30 gallons or more
RCRA Code:	Not reported
Meth Code:	D80 - Disposal, Land Fill
Quantity Tons:	0.0375
Waste Quantity:	75
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20010502
Creation Date:	7/30/2001 0:00:00
Receipt Date:	20010522
Manifest ID:	20141052
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	141 - Off-specification, aged, or surplus inorganics
RCRA Code:	D002
Meth Code:	T01 - Treatment, Tank
Quantity Tons:	0.005
Waste Quantity:	10
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20010502
Creation Date:	7/30/2001 0:00:00
Receipt Date:	20010522
Manifest ID:	20141052
Trans EPA ID:	HIR000050336

OUTRIGGER EAST (Continued) **1004689030**

Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.005
Waste Quantity:	10
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20010502
Creation Date:	7/30/2001 0:00:00
Receipt Date:	20010522
Manifest ID:	20141052
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	181 - Other inorganic solid waste Organics
RCRA Code:	Not reported
Meth Code:	D80 - Disposal, Land Fill
Quantity Tons:	0.025
Waste Quantity:	50
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20010502
Creation Date:	7/30/2001 0:00:00
Receipt Date:	20010522
Manifest ID:	20141052
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001

OUTRIGGER EAST (Continued) **1004689030**

Meth Code:	H01 - Transfer Station
Quantity Tons:	0.35
Waste Quantity:	700
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

---

286 **KUHIO ELEMENTARY SCHOOL** **HI SHWS** **1006819396**
NW **2759 S KING ST** **HI SPILLS** **N/A**
1/8-1/4 **HONOLULU, HI 96826**
0.168 mi.
889 ft.

Actual:
23 ft.

Focus Map:
5

SHWS:

Name:	KUHIO ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	2759 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2920
Location Description:	2759 S King St, Honolulu, HI 96826, USA
Is Public:	True
Update On:	2021-11-10 16:49:23
Latitude:	21.289194
Longitude:	-157.819706

KUHIO ELEMENTARY SCHOOL (Continued) **1006819396**

SPILLS:

Name:	KUHIO ELEMENTARY SCHOOL
Address:	2759 S KING ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96826
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19960308-1205
Facility Registry ID:	110013771917
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Kuhio Elementary, Teachers' Work Room
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	State of Hawaii, Department of Education
Substances:	Mercury
Quanity:	2
Units:	Milliliter
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.289681999999999
Longitude:	-157.819605

BF287 **TENNEY'S MANOA SHELL** **RCRA NonGen / NLR** **1000288832**
NW **2740 E MANOA RD** **HID981159361**
1/8-1/4 **HONOLULU, HI 96822**
0.169 mi.
892 ft. **Site 1 of 2 in cluster BF**

Actual:
165 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		19851018
Handler Name:	TENNEY'S MANOA SHELL	
Handler Address:		2740 E MANOA RD

TENNEY'S MANOA SHELL (Continued) **1000288832**

Handler City,State,Zip:		HONOLULU, HI 96822
EPA ID:		HID981159361
Contact Name:		SONDRA BIENVENU
Contact Address:		2740 E MANOA RD
Contact City,State,Zip:		HONOLULU, HI 96822
Contact Telephone:		713-241-2258
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Other
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		P O BOX 6249
Mailing City,State,Zip:		CARSON, CA 90749
Owner Name:	TENNEY'S MANOA SHELL	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No

TENNEY'S MANOA SHELL (Continued) **1000288832**

TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe: No
TSDFs Only Subject to CA under Discretionary Auth Universe: No
Corrective Action Priority Ranking: No NCAPS ranking
Environmental Control Indicator: No
Institutional Control Indicator: No
Human Exposure Controls Indicator: N/A
Groundwater Controls Indicator: N/A
Operating TSDF Universe: Not reported
Full Enforcement Universe: Not reported
Significant Non-Complier Universe: No
Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20020729
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: TENNEY'S MANOA SHELL
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19851018
Handler Name: TENNEY'S MANOA SHELL
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No

TENNEY'S MANOA SHELL (Continued) **1000288832**

Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 4471
NAICS Description: GASOLINE STATIONS

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 19951212
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9

TENNEY'S MANOA SHELL (Continued) **1000288832**

Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

BF288 **SHELL SERVICE STATION** **HI LUST** **U003221594**
NW **2740 E MANOA RD** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96822** **HI SPILLS**
0.169 mi. **HI Financial Assurance**
892 ft. **Site 2 of 2 in cluster BF**

Actual:
165 ft.

Focus Map:
5

LUST:

Name:	SHELL SERVICE STATION
Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100312
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	04/17/2000
Release ID:	000072
Project Officer:	Renato Maniulit

UST:

Name:	SHELL SERVICE STATION
Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100312
Owner:	EQUILON ENTERPRISES, LLC DBA SHELL OIL PRODUCTS US
Owner Address:	2555 13TH AVE, SW
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	21.308813
Longitude:	-157.812229
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	04/18/1985
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/2000
Tank Capacity:	10000
Substance:	Gasoline
Name:	SHELL SERVICE STATION
Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-2
Date Installed:	04/18/1985
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/2000
Tank Capacity:	10000
Substance:	Gasoline
Name:	SHELL SERVICE STATION

SHELL SERVICE STATION (Continued) **U003221594**

Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-3
Date Installed:	04/18/1985
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/2000
Tank Capacity:	10000
Substance:	Gasoline
Name:	SHELL SERVICE STATION
Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Tank ID:	R-4
Date Installed:	04/18/1985
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/2000
Tank Capacity:	550
Substance:	Used Oil

SPILLS:

Name:	SHELL SERVICE STATION (TENNEY'S MANOA SHELL)
Address:	2740 E MANOA RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19920618
Facility Registry ID:	110005723468
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	2740 E Manoa Rd
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Shell Oil Company
Substances:	Antifreeze
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported

SHELL SERVICE STATION (Continued) **U003221594**

Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

HI Financial Assurance:

Name:	SHELL SERVICE STATION
Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100312
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Self Insured
Expiration Date:	Not reported
FR Archive:	False

Name:	SHELL SERVICE STATION
Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100312
Tank Id:	R-3
Tank Status:	Permanently Out of Use
FRTYPE:	Self Insured
Expiration Date:	Not reported
FR Archive:	False

Name:	SHELL SERVICE STATION
Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100312
Tank Id:	R-4
Tank Status:	Permanently Out of Use
FRTYPE:	Self Insured
Expiration Date:	Not reported
FR Archive:	False

Name:	SHELL SERVICE STATION
Address:	2740 E MANOA RD
City,State,Zip:	HONOLULU, HI 96822
Alt Facility ID:	9-100312
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Self Insured
Expiration Date:	Not reported
FR Archive:	False

289
NNE
1/8-1/4
0.170 mi.
899 ft.

ROOSEVELT HIGH SCHOOL FIRING RANGE
1120 NEHOA ST
HONOLULU, HI 96822

HI SHWS **S123106623**
N/A

Actual:
123 ft.

Focus Map:
4

SHWS:

Name:	ROOSEVELT HIGH SCHOOL FIRING RANGE
Address:	1120 NEHOA ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Roosevelt High School Firing Range
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	PA/SI
Project Manager:	Laura Young
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Roosevelt High School Firing Range
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Laura Young
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	4
Location Description:	1120 Nehoa St
Is Public:	True
Update On:	2019-06-19 12:37:34
Latitude:	21.312625
Longitude:	-157.838457

290
WNW
1/8-1/4
0.172 mi.
910 ft.

MOANA PARK WASTEWATER PUMP STATION
1501 ALA MOANA BLVD
HONOLULU, HI 96814

HI UST **U003762121**
HI Financial Assurance **N/A**

Actual:
3 ft.

Focus Map:
4

UST:

Name:	MOANA PARK WASTEWATER PUMP STATION
Address:	1501 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-103665

MOANA PARK WASTEWATER PUMP STATION (Continued) **U003762121**

Owner: C&C HNL - DEPT OF ENVIRONMENTAL SERVICES
Owner Address: 1000 ULU'OHIA STREET, SUITE 308
Owner City,St,Zip: Honolulu, 96814 96814
Latitude: 21.288915
Longitude: -157.842169
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Map

Tank ID: M-1
Date Installed: 12/01/1994
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 600
Substance: Diesel

Name: MOANA PARK WASTEWATER PUMP STATION
Address: 1501 ALA MOANA BLVD
City,State,Zip: HONOLULU, HI 96814

Tank ID: M-1
Date Installed: 12/01/1994
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 600
Substance: Diesel

Name: MOANA PARK WASTEWATER PUMP STATION
Address: 1501 ALA MOANA BLVD
City,State,Zip: HONOLULU, HI 96814

Tank ID: M-1
Date Installed: 12/01/1994
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 600
Substance: Diesel

HI Financial Assurance:
Name: MOANA PARK WASTEWATER PUMP STATION
Address: 1501 ALA MOANA BLVD
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-103665
Tank Id: M-1
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: 06/30/2014
FR Archive: True

Name: MOANA PARK WASTEWATER PUMP STATION
Address: 1501 ALA MOANA BLVD
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-103665
Tank Id: M-1
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: 08/15/2020
FR Archive: False

291
ESE
1/8-1/4
0.173 mi.
915 ft.

KAPIOLANI MEDICAL CENTER FOR WOMEN & CHILDREN
1637 BINGHAM ST
HONOLULU, HI 96826

HI UST **U004190454**
HI Financial Assurance **N/A**

Actual:
45 ft.

Focus Map:
5

UST:

Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN & CHILDREN
Address:	1637 BINGHAM ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-103919
Owner:	Kapiolani Medical Center for Women & Childred
Owner Address:	55 Merchant St , 27th floor
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	1
Date Installed:	07/05/2012
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	20000
Substance:	Diesel
Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN & CHILDREN
Address:	1637 BINGHAM ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2
Date Installed:	07/05/2012
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	20000
Substance:	Diesel

HI Financial Assurance:

Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN & CHILDREN
Address:	1637 BINGHAM ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-103919
Tank Id:	2
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	08/01/2018
FR Archive:	True
Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN & CHILDREN
Address:	1637 BINGHAM ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-103919
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	08/01/2018
FR Archive:	True
Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN & CHILDREN

KAPIOLANI MEDICAL CENTER FOR WOMEN & CHILDREN (Continued) **U004190454**

Address:	1637 BINGHAM ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-103919
Tank Id:	2
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	08/01/2022
FR Archive:	False

Name:	KAPIOLANI MEDICAL CENTER FOR WOMEN & CHILDREN
Address:	1637 BINGHAM ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-103919
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	08/01/2022
FR Archive:	False

292
SW
1/8-1/4
0.173 mi.
916 ft.

KING KALAKAUA PLAZA
2080 KALAKAUA AVE
HONOLULU, HI 96815

HI SHWS **U003154872**
HI LUST **N/A**
HI UST

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	KING KALAKAUA PLAZA DEVELOPMENT
Address:	2080 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported

KING KALAKAUA PLAZA (Continued) **U003154872**

Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	908
Location Description:	2080 Kalakaua Ave
Is Public:	True
Update On:	2019-09-27 20:03:55
Latitude:	21.282900
Longitude:	-157.831000

LUST:

Name:	KING KALAKAUA PLAZA
Address:	2080 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103235
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/17/2000
Release ID:	960085
Project Officer:	Renato Maniulit

UST:

Name:	KING KALAKAUA PLAZA
Address:	2080 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103235
Owner:	K. YOUNG KALAKAUA PARTNERS INC.
Owner Address:	841 BISHOP ST, SUITE 2250
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.282881
Longitude:	-157.831128
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	07/24/1996
Tank Capacity:	300
Substance:	Diesel

BG293 **7-11 SECOND AVENUE** **HI UST** **U001235408**
SE **3105 WAIALAE AVE** **HI Financial Assurance** **N/A**
1/8-1/4 **HONOLULU, HI 96816**
0.178 mi.
941 ft. **Site 1 of 2 in cluster BG**

Actual:
73 ft.

Focus Map:
5

UST:

Name:	7-11 SECOND AVENUE
Address:	3105 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101191
Owner:	ALOHA PETROLEUM, LTD.
Owner Address:	1132 BISHOP STREET, SUITE 1700
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.288306
Longitude:	-157.810274
Horizontal Reference Datum Name:	NAD83

7-11 SECOND AVENUE (Continued) **U001235408**

Horizontal Collection Method Name: GPS

Tank ID: r-87
Date Installed: 04/04/1978
Tank Status: **Permanently out of Use**
Date Closed: 07/06/2009
Tank Capacity: 10000
Substance: Gasoline

Name: 7-11 SECOND AVENUE
Address: 3105 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-89
Date Installed: 04/04/1978
Tank Status: **Permanently out of Use**
Date Closed: 07/06/2009
Tank Capacity: 10000
Substance: Gasoline

Name: 7-11 SECOND AVENUE
Address: 3105 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-92
Date Installed: 04/04/1978
Tank Status: **Permanently out of Use**
Date Closed: 07/06/2009
Tank Capacity: 10000
Substance: Gasoline

HI Financial Assurance:
Name: 7-11 SECOND AVENUE
Address: 3105 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101191
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 04/01/2009
FR Archive: False

Name: 7-11 SECOND AVENUE
Address: 3105 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101191
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 04/01/2009
FR Archive: False

Name: 7-11 SECOND AVENUE
Address: 3105 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101191
Tank Id: r-89

7-11 SECOND AVENUE (Continued) **U001235408**

Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	04/01/2009
FR Archive:	False

AX294 **KUHIO VILLAGE RESORT AOAO** **RCRA-VSQG** **1001112108**
SW **2463 KUHIO AVE** **HI SPILLS** **HIR000000802**
1/8-1/4 **HONOLULU, HI 96815** **FINDS**
0.180 mi. **ECHO**
952 ft. **Site 3 of 3 in cluster AX**

Actual: **3 ft.**

Focus Map: **8**

RCRA Listings:

Date Form Received by Agency:		20070312
Handler Name:	KUHIO VILLAGE RESORT AOAO	
Handler Address:		2463 KUHIO AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIR000000802
Contact Name:		JIM MESSINGER
Contact Address:		2463 KUHIO AVE
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-926-3242
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		KUHIO AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	KVR INC	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N

KUHIO VILLAGE RESORT AOAO (Continued) **1001112108**

Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20070312
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: KVR INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	90 N KING ST STE 207
Owner/Operator City,State,Zip:	HONOLULU, HI 96817-5111
Owner/Operator Telephone:	808-531-1621
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: KVR INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	90 N KING ST STE 207

KUHIO VILLAGE RESORT AOAO (Continued) **1001112108**

Owner/Operator City,State,Zip: HONOLULU, HI 96817-5111
Owner/Operator Telephone: 808-531-1621
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20070312
Handler Name: KUHIO VILLAGE RESORT AOAO
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 19961001
Handler Name: KUHIO VILLAGE RESORT AOAO
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported

KUHIO VILLAGE RESORT AOAO (Continued) **1001112108**

Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20060907
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: AALLE
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

SPILLS:
Name: KUHIO VILLAGE RESORT HOTEL OIL INCIDENT
Address: 2463 KUHIO AVE
Address 2: Not reported
City,State,Zip: HONOLULU, HI 96815
Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 19951106-2
Facility Registry ID: Not reported
HID Number: Not reported
Lead and Program: HEER EP&R
ER: Not reported
Less Or Greater Than: Not reported
Units: Kuhio Village Resort Hotel Oil Incident
Activity Type: Response
Activity Lead: Bill Perry
Assignment End Date: Not reported
Result: SOSC NFA
File Under: Not reported
Substances: Oil, Waste
Quanity: Not reported
Units: Not reported

KUHIO VILLAGE RESORT AOAO (Continued) **1001112108**

Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.27589
Longitude:	-157.82316700000001

FINDS:
Registry ID: 110005729603

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1001112108
Registry ID:	110005729603
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005729603
Name:	KUHIO VILLAGE RESORT AOAO
Address:	2463 KUHIO AVE
City,State,Zip:	HONOLULU, HI 96815

BE295 **76 KALAKAUA/YOUNG 7-11 #160** **HI SHWS** **U001235396**
South **1323 KALAKAUA AVE** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96826** **HI Financial Assurance**
0.184 mi.
971 ft. **Site 2 of 2 in cluster BE**

Actual:
25 ft.

Focus Map:
5

SHWS:

Name:	ALOHA 7-ELEVEN KALAKAUA
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Kalakaua Ave & Young St
Island:	Oahu
Environmental Interest:	Aloha 7-Eleven Kalakaua
HID Number:	Not reported
Facility Registry Identifier:	110013782184
Lead Agency:	HEER Office
Program:	State
Project Manager:	Mark Sutterfield
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Aloha 7-Eleven Kalakaua
HID Number:	Not reported
Facility Registry Identifier:	110013782184
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Assessment Ongoing
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	05/20/2004
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Mark Sutterfield
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1416
Location Description:	1323 Kalakaua Ave
Is Public:	True
Update On:	2020-05-27 15:09:40
Latitude:	21.298331
Longitude:	-157.836560

UST:

Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-101172
Owner:	ALOHA PETROLEUM, LTD.
Owner Address:	1132 BISHOP STREET, SUITE 1700
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.298427
Longitude:	-157.836658

76 KALAKAUA/YOUNG 7-11 #160 (Continued) **U001235396**

Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1A
Date Installed: 06/19/2009
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 7000
Substance: Gasohol

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1A
Date Installed: 06/19/2009
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 7000
Substance: Gasohol

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1A
Date Installed: 06/19/2009
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 7000
Substance: Gasohol

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 06/19/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 06/19/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826

76 KALAKAUA/YOUNG 7-11 #160 (Continued) **U001235396**

Tank ID:	1B
Date Installed:	06/19/2009
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasohol
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-87
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-87
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-87
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-89
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-89
Date Installed:	04/04/1985

76 KALAKAUA/YOUNG 7-11 #160 (Continued) **U001235396**

Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-89
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-92
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-92
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-92
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	06/12/2009
Tank Capacity:	8000
Substance:	Gasoline

HI Financial Assurance:

Name:	76 KALAKAUA/YOUNG 7-11 #160
Address:	1323 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-101172
Tank Id:	r-89
Tank Status:	Permanently out of Use
FRTYPE:	Insurance

76 KALAKAUA/YOUNG 7-11 #160 (Continued) **U001235396**

Expiration Date: 03/31/2015
FR Archive: True

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172
Tank Id: 1A
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 03/31/2015
FR Archive: True

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172
Tank Id: 1B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 03/31/2015
FR Archive: True

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2015
FR Archive: True

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2015
FR Archive: True

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172

76 KALAKAUA/YOUNG 7-11 #160 (Continued) **U001235396**

Tank Id: r-89
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172
Tank Id: 1B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172
Tank Id: 1A
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 KALAKAUA/YOUNG 7-11 #160
Address: 1323 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101172
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

BD296 **DISCOVERY BAY** **HI LUST** **U001235625**
SSE **1778 ALA MOANA BLVD** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.186 mi.
983 ft. **Site 2 of 2 in cluster BD**

Actual:
3 ft.

Focus Map:
7

LUST:
Name: DISCOVERY BAY
Address: 1778 ALA MOANA BLVD
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-101921
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 08/31/1995
Release ID: 900018
Project Officer: Not Assigned

UST:
Name: DISCOVERY BAY
Address: 1778 ALA MOANA BLVD
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-101921

DISCOVERY BAY (Continued) **U001235625**

Owner:	DISCOVERY BAY
Owner Address:	1778 ALA MOANA BLVD
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.285033
Longitude:	-157.837962
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	02/05/1977
Tank Status:	**Permanently Out of Use**
Date Closed:	01/04/1990
Tank Capacity:	2000
Substance:	Diesel

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297 WNW 1/8-1/4 0.186 mi. 984 ft. **CARTWRIGHT NEIGHBORHOOD PARK** **HI SHWS** **1006820122**
KEEAUMOKU ST & MATLOCK AVE **N/A**
HONOLULU, HI 96814

Actual: **30 ft.**
Focus Map: **4**

SHWS:

Name:	CARTWRIGHT NEIGHBORHOOD PARK
Address:	KEEAUMOKU ST & MATLOCK AVE
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Cartwright Neighborhood Park
HID Number:	Not reported
Facility Registry Identifier:	110013780257
Lead Agency:	HEER Office
Program:	State
Project Manager:	Steve Mow
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Cartwright Neighborhood Park
HID Number:	Not reported
Facility Registry Identifier:	110013780257
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Transformer oil (no PCBs) found on site.
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present for Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	05/12/2005
Document Number:	2005-257-SPM
Document Subject:	No Further Action Required at Cartwright Neighborhood Park
Project Manager:	Steve Mow
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	664

CARTWRIGHT NEIGHBORHOOD PARK (Continued) **1006820122**

Location Description:	Keeaumoku St & Matlock Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.301400
Longitude:	-157.838000

BA298 **2051-2057 KALAKAUA AVENUE** **HI SHWS** **S118422780**
SW **2051-2057 KALAKAUA AVE** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.190 mi.
1002 ft. **Site 2 of 2 in cluster BA**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	2051-2057 KALAKAUA AVENUE
Address:	2051-2057 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	2051-2057 Kalakaua Avenue
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	2051-2057 Kalakaua Avenue
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Found: Lead in soil, arsenic in groundwater
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1055
Location Description:	2051-2057 Kalakaua Ave, Honolulu, HI 96815
Is Public:	True
Update On:	2021-01-04 09:36:21
Latitude:	21.283300
Longitude:	-157.832000

BB299 **76 DON'S MAKIKI #111** **HI LUST** **U001235010**
WSW **1406 S BERETANIA ST** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96814** **HI Financial Assurance**
0.191 mi.
1008 ft. **Site 2 of 3 in cluster BB**

Actual:
24 ft.

Focus Map:
4

LUST:

Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100035
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/29/2010
Release ID:	920175
Project Officer:	Shunsheng Fu

Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100035
Facility Status:	Site Cleanup Completed with EHMP
Facility Status Date:	12/21/2010
Release ID:	000082
Project Officer:	Shunsheng Fu

UST:

Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100035
Owner:	Mid Pac Petroleum LLC
Owner Address:	677 Ala Moana Blvd Suite 625
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.300210
Longitude:	-157.838820
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	1
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	15000
Substance:	Gasohol

Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814

Tank ID:	1
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	15000
Substance:	Gasohol

Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814

76 DON'S MAKIKI #111 (Continued) **U001235010**

Tank ID:	1
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	15000
Substance:	Gasohol
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	1
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	15000
Substance:	Gasohol
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2A
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7500
Substance:	Gasohol
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2A
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7500
Substance:	Gasohol
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2A
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7500
Substance:	Gasohol
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2A
Date Installed:	12/01/1996

76 DON'S MAKIKI #111 (Continued) **U001235010**

Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7500
Substance:	Gasohol
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2B
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7500
Substance:	Diesel
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2B
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7500
Substance:	Diesel
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2B
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7500
Substance:	Diesel
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2B
Date Installed:	12/01/1996
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7500
Substance:	Diesel
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-0344-2
Date Installed:	05/26/1964
Tank Status:	**Permanently Out of Use**
Date Closed:	12/30/1987

76 DON'S MAKIKI #111 (Continued) **U001235010**

Tank Capacity: 6000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-2
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 6000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-2
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 6000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-2
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 6000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-3
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 3000
Substance: Diesel

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-3
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 3000
Substance: Diesel

76 DON'S MAKIKI #111 (Continued) **U001235010**

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-3
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 3000
Substance: Diesel

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-3
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 3000
Substance: Diesel

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-4
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-4
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-4
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST

76 DON'S MAKIKI #111 (Continued) **U001235010**

City,State,Zip: HONOLULU, HI 96814

Tank ID: R-0344-4
Date Installed: 05/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 12000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 12000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 12000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 12000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

76 DON'S MAKIKI #111 (Continued) **U001235010**

Tank ID: R-1-1
Date Installed: 03/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 6000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1-1
Date Installed: 03/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 6000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1-1
Date Installed: 03/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 6000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1-1
Date Installed: 03/26/1964
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 6000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1-2
Date Installed: 03/26/1965
Tank Status: **Permanently Out of Use**
Date Closed: 12/30/1987
Tank Capacity: 4000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1-2
Date Installed: 03/26/1965

76 DON'S MAKIKI #111 (Continued) **U001235010**

Tank Status:	**Permanently Out of Use**
Date Closed:	12/30/1987
Tank Capacity:	4000
Substance:	Gasoline
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-1-2
Date Installed:	03/26/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	12/30/1987
Tank Capacity:	4000
Substance:	Gasoline
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-1-2
Date Installed:	03/26/1965
Tank Status:	**Permanently Out of Use**
Date Closed:	12/30/1987
Tank Capacity:	4000
Substance:	Gasoline
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-2
Date Installed:	12/29/1987
Tank Status:	**Permanently Out of Use**
Date Closed:	10/01/1996
Tank Capacity:	12000
Substance:	Gasoline
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-2
Date Installed:	12/29/1987
Tank Status:	**Permanently Out of Use**
Date Closed:	10/01/1996
Tank Capacity:	12000
Substance:	Gasoline
Name:	76 DON'S MAKIKI #111
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-2
Date Installed:	12/29/1987
Tank Status:	**Permanently Out of Use**
Date Closed:	10/01/1996

76 DON'S MAKIKI #111 (Continued) **U001235010**

Tank Capacity: 12000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-2
Date Installed: 12/29/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 12000
Substance: Gasoline

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-3
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 10000
Substance: Diesel

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-3
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 10000
Substance: Diesel

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-3
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 10000
Substance: Diesel

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-3
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 10000
Substance: Diesel

76 DON'S MAKIKI #111 (Continued) **U001235010**

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: 12/31/1987
Tank Status: **Permanently Out of Use**
Date Closed: 10/01/1996
Tank Capacity: 550
Substance: Used Oil

HI Financial Assurance:
Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-1-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST

76 DON'S MAKIKI #111 (Continued) **U001235010**

City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-0344-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-1-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-0344-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-0344-3
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

76 DON'S MAKIKI #111 (Continued) **U001235010**

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: 2A
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: 2B
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance

76 DON'S MAKIKI #111 (Continued) **U001235010**

Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-1-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-0344-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035

76 DON'S MAKIKI #111 (Continued) **U001235010**

Tank Id: R-0344-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: 2B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-1-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: 2A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

Name: 76 DON'S MAKIKI #111
Address: 1406 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100035
Tank Id: R-0344-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2021
FR Archive: False

BB300 **UNOCAL 76 SS L 0344** **RCRA NonGen / NLR** **1000823233**
WSW **1406 S BERETANIA ST** **FINDS** **HID984468728**
1/8-1/4 **HONOLULU, HI 96814** **ECHO**
0.191 mi.
1008 ft. **Site 3 of 3 in cluster BB**

Actual:
24 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:		20180228
Handler Name:	UNOCAL 76 SS L 0344	
Handler Address:		1406 S BERETANIA ST
Handler City,State,Zip:		HONOLULU, HI 96814
EPA ID:		HID984468728
Contact Name:		A FRITZ
Contact Address:		PO BOX 659
Contact City,State,Zip:		HONOLULU, HI 96809
Contact Telephone:		808-522-7657
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PO BOX 659
Mailing City,State,Zip:		HONOLULU, HI 96809
Owner Name:	UNOCAL 76	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

UNOCAL 76 SS L 0344 (Continued) **1000823233**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20180228
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: UNOCAL 76	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	911 WILSHIRE BLVD STE 1010
Owner/Operator City,State,Zip:	LOS ANGELES, CA 90011
Owner/Operator Telephone:	213-977-7600
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: UNOCAL 76	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	911 WILSHIRE BLVD STE 1010
Owner/Operator City,State,Zip:	LOS ANGELES, CA 90011
Owner/Operator Telephone:	213-977-7600
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

UNOCAL 76 SS L 0344 (Continued) **1000823233**

Historic Generators:

Receive Date:		20180228
Handler Name:	UNOCAL 76 SS L 0344	
Federal Waste Generator Description:		Not a generator, verified
State District Owner:		Not reported
Large Quantity Handler of Universal Waste:		No
Recognized Trader Importer:		No
Recognized Trader Exporter:		No
Spent Lead Acid Battery Importer:		No
Spent Lead Acid Battery Exporter:		No
Current Record:		Yes
Non Storage Recycler Activity:		No
Electronic Manifest Broker:		No

Receive Date:		19930827
Handler Name:	UNOCAL 76 SS L 0344	
Federal Waste Generator Description:		Not a generator, verified
State District Owner:		Not reported
Large Quantity Handler of Universal Waste:		No
Recognized Trader Importer:		No
Recognized Trader Exporter:		No
Spent Lead Acid Battery Importer:		No
Spent Lead Acid Battery Exporter:		No
Current Record:		No
Non Storage Recycler Activity:		Not reported
Electronic Manifest Broker:		Not reported

Receive Date:		19960206
Handler Name:	DONS MAKIKI UNOCAL NO 0344	
Federal Waste Generator Description:		Large Quantity Generator
State District Owner:		Not reported
Large Quantity Handler of Universal Waste:		No
Recognized Trader Importer:		No
Recognized Trader Exporter:		No
Spent Lead Acid Battery Importer:		No
Spent Lead Acid Battery Exporter:		No
Current Record:		No
Non Storage Recycler Activity:		Not reported
Electronic Manifest Broker:		Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	4471
NAICS Description:	GASOLINE STATIONS

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

FINDS:

Registry ID:	110013782335

UNOCAL 76 SS L 0344 (Continued) **1000823233**

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1000823233
Registry ID:	110013782335
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110013782335
Name:	UNOCAL 76 SS L 0344
Address:	1406 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814

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301 WSW 1/8-1/4 0.191 mi. 1011 ft. **BASE YARD NO 16 & 17** **FUDS** **1024901904** **N/A**
KAPIOLANI, HI

Actual: 3 ft.
Focus Map: 8

FUDS:

EPA Region:	09
Installation ID:	HI99799F377700
Congressional District Number:	1
Name:	BASE YARD NO 16 & 17
FUDS Number:	H09HI0030
City:	KAPIOLANI
State:	HI
County:	HONOLULU
Object ID:	1740
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=57885
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	THE SITE WAS ACQUIRED FROM THE TERRIOTRY OF HAWAIUI BY INFORMAL AGREEMENTS RE NO. 306 AND 3330 IN FEBRUARY AND NOVEMBER 1942, RESPECTIVELY. IN MAY 1948, THE U.S. RELINQUISHED CUSTODY AND CARE OF T HE 23 ACRES AND IMPROVEMENTS THEREONE TO THE TERRITORY OF HAWAII WITH ONE ACRE TRANSFERRED IN AUGUST 1947 AND THE REMAINING TWENTY-TWO ACRES WERE TRANSFERRED IN 1948. NO EVIDENCE OF THE BASE YARD S REMAINS TODAY AND NO OBSERVED ENVIRONMENTAL HAZARDS WERE NOTED.
Project Required:	No
Feature Description:	Not reported
Latitude:	21.27166667
Longitude:	-157.81944444

BH302 **WESTERN GUN SCHOOL OF HAWAII** **RCRA NonGen / NLR** **1012178112**
SW **339 ROYAL HAWAIIAN AVE** **HIP000035147**
1/8-1/4 **HONOLULU, HI 96815**
0.192 mi.
1013 ft. **Site 1 of 5 in cluster BH**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		20090814
Handler Name:	WESTERN GUN SCHOOL OF HAWAII	
Handler Address:		339 ROYAL HAWAIIAN AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIP000035147
Contact Name:		TIMMY AKAU
Contact Address:		339 ROYAL HAWAIIAN AVE
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-923-2769
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		339 ROYAL HAWAIIAN AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	ICHIRYO ENTERPRISES INC	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

WESTERN GUN SCHOOL OF HAWAII (Continued) **1012178112**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20090814
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: ICHIRYO ENTERPRISES INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	339 ROYAL HAWAIIAN AVE
Owner/Operator City,State,Zip:	HONOLULU, HI 96815
Owner/Operator Telephone:	808-923-2769
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: ICHIRYO ENTERPRISES INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	339 ROYAL HAWAIIAN AVE
Owner/Operator City,State,Zip:	HONOLULU, HI 96815
Owner/Operator Telephone:	808-923-2769
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

WESTERN GUN SCHOOL OF HAWAII (Continued) **1012178112**

Historic Generators:
Receive Date: 19980108
Handler Name: WESTERN GUN SCHOOL OF HAWAII
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20090814
Handler Name: WESTERN GUN SCHOOL OF HAWAII
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

BH303 **HAWAII GUN CLUB** **RCRA-VSQG** **1007202222**
SW **339 ROYAL HAWAIIAN AVE** **HIR000135509**
1/8-1/4 **HONOLULU, HI 96815**
0.192 mi.
1013 ft. **Site 2 of 5 in cluster BH**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:
Date Form Received by Agency: 20040202
Handler Name: HAWAII GUN CLUB
Handler Address: 339 ROYAL HAWAIIAN AVE
Handler City,State,Zip: HONOLULU, HI 96815
EPA ID: HIR000135509
Contact Name: THOMAS PARK
Contact Address: 339 ROYAL HAWAIIAN AVE
Contact City,State,Zip: HONOLULU, HI 96815
Contact Telephone: 808-924-8337
Contact Fax: Not reported
Contact Email: Not reported
Contact Title: Not reported

HAWAII GUN CLUB (Continued) **1007202222**

EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		339 ROYAL HAWAIIAN AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	CHRISTOPHER HAN	
Owner Type:		Private
Operator Name:	THOMAS PARK	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported

HAWAII GUN CLUB (Continued) **1007202222**

Significant Non-Complier Universe: No
Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20040204
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Hazardous Waste Summary:
Waste Code: D008
Waste Description: LEAD

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: THOMAS PARK
Legal Status: Private
Date Became Current: 20010306
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: CHRISTOPHER HAN
Legal Status: Private
Date Became Current: 20010306
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20040202
Handler Name: HAWAII GUN CLUB
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported

HAWAII GUN CLUB (Continued) **1007202222**

Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 71399
NAICS Description: ALL OTHER AMUSEMENT AND RECREATION INDUSTRIES

Facility Has Received Notices of Violation:
Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20091209
Actual Return to Compliance Date: 20100204
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20091209
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Permits - General Information
Date Violation was Determined: 20040317
Actual Return to Compliance Date: 20040426
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20040317
Enforcement Responsible Agency: State

HAWAII GUN CLUB (Continued) **1007202222**

Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Listing - General
Date Violation was Determined: 20091209
Actual Return to Compliance Date: 20100204
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20091209
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported

HAWAII GUN CLUB (Continued) **1007202222**

SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Permits - General Information
Date Violation was Determined:	20091209
Actual Return to Compliance Date:	20100204
Return to Compliance Qualifier:	Documented
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20091209
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	TBRAN
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported

HAWAII GUN CLUB (Continued) **1007202222**

Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20040317
Actual Return to Compliance Date: 20040426
Return to Compliance Qualifier: Documented
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20040317
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: TBRAN
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported

HAWAII GUN CLUB (Continued) **1007202222**

SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20090918
Evaluation Responsible Agency: State
Found Violation: Yes
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: TBRAN
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: 20100204
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported

HAWAII GUN CLUB (Continued) **1007202222**

Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20031211
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20040426
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20090918
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20100204
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20090918
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20100204
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20101222
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20031211
Evaluation Responsible Agency:	State

HAWAII GUN CLUB (Continued) **1007202222**

Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	TBRAN
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20040426
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20051214
Evaluation Responsible Agency:	EPA
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	MREED
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

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304 **SAINT LOUIS COLLEGE HOSP** **FUDS** **1024902111**
East **N/A**
1/8-1/4 **HONOLULU, HI**
0.193 mi.
1018 ft.

Actual:
173 ft.

Focus Map:
6

FUDS:

EPA Region:	09
Installation ID:	HI99799F404600
Congressional District Number:	1
Name:	SAINT LOUIS COLLEGE HOSP
FUDS Number:	H09HI0323
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	4733
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62462
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	THE SITE WAS COMMANDEERED BY THE MILITARY GOVERNOR IN DECEMBER 1941 TO BE CONVERTED INTO A HOSPITAL. IT WAS EXPANDED TO 2,500 BEDS WHICH SERVED ABOUT 33,000 PATIENTS. FOURTEEN BUILDING ERECTED BY TRHE ARMY WAS PURCHASED BY THE MARIANISTS FOR SCHOOL USE. THE SCHOOL WAS RETURNED TO THE MARIANISTS SHORTLY AFTER WORLD WAR II. FOUR USTS WERE FOUND AND REMOVED IN 1970 BY THE SCHOOL. THE SCHOO L USED THOSE TANKS TO FUEL THEIR VEHICLES UNTIL 1990.
Project Required:	No

SAINT LOUIS COLLEGE HOSP (Continued) **1024902111**

Feature Description: Not reported
Latitude: 21.29333333
Longitude: -157.80944444

---

305 NNW 1/8-1/4 0.194 mi. 1022 ft. **NOAA - HONOLULU LABORATORY** **HI LUST U003221905**
2570 DOLE ST **HI UST N/A**
HONOLULU, HI 96822

Actual: 82 ft.

Focus Map: 5

LUST:
Name: NOAA - HONOLULU LABORATORY
Address: 2570 DOLE ST
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-103311
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 01/19/1999
Release ID: 970130
Project Officer: Jose Ruiz

UST:
Name: NOAA - HONOLULU LABORATORY
Address: 2570 DOLE ST
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-103311
Owner: U.S. DEPT OF COMMERCE - NOAA
Owner Address: 7600 SAND POINT WAY NE
Owner City,St,Zip: Honolulu, 96822 96822
Latitude: 21.296188
Longitude: -157.813873
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 05/01/1949
Tank Status: **Permanently Out of Use**
Date Closed: 09/04/1997
Tank Capacity: 500
Substance: Heating Oil

Name: NOAA - HONOLULU LABORATORY
Address: 2570 DOLE ST
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-2
Date Installed: 05/01/1949
Tank Status: **Permanently Out of Use**
Date Closed: 09/06/1997
Tank Capacity: 500
Substance: Gasoline

BI306 **DAVENROYE DRY CLEANERS** **HI SHWS** **1000601538**
SSW **1042 KAPAHULU AVE** **HI LUST** **HID984467746**
1/8-1/4 **HONOLULU, HI 96816** **HI UST**
0.194 mi. **RCRA NonGen / NLR**
1024 ft. **Site 1 of 2 in cluster BI** **FINDS**
ECHO

Actual:
28 ft.

Focus Map:
8

SHWS:

Name:	DAVENROYE DRY CLEANERS
Address:	1042 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	876
Location Description:	1042 Kapahulu Ave, Honolulu, HI 96816
Is Public:	True
Update On:	2021-09-27 16:19:44
Latitude:	21.287050
Longitude:	-157.813407

LUST:

Name:	DAVENROY DRY CLEANERS & LAUNDRY
Address:	1042 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101540
Facility Status:	Site Cleanup Completed with EHE/EHMP
Facility Status Date:	09/18/2007
Release ID:	910038
Project Officer:	Shaobin Li

DAVENROYE DRY CLEANERS (Continued) **1000601538**

UST:

Name:	DAVENROY DRY CLEANERS & LAUNDRY
Address:	1042 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101540
Owner:	DAVENROYE ENTRPRISES, LTD
Owner Address:	45-643 KENEKE ST
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.286132
Longitude:	-157.813691
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Map
Tank ID:	R-1
Date Installed:	04/28/1969
Tank Status:	**Permanently Out of Use**
Date Closed:	11/29/1990
Tank Capacity:	6000
Substance:	Gasoline
Name:	DAVENROY DRY CLEANERS & LAUNDRY
Address:	1042 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-2
Date Installed:	04/28/1969
Tank Status:	**Permanently Out of Use**
Date Closed:	11/29/1990
Tank Capacity:	2000
Substance:	Other
Name:	DAVENROY DRY CLEANERS & LAUNDRY
Address:	1042 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-3
Date Installed:	04/28/1969
Tank Status:	**Permanently Out of Use**
Date Closed:	11/29/1990
Tank Capacity:	1000
Substance:	Other
Name:	DAVENROY DRY CLEANERS & LAUNDRY
Address:	1042 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-4
Date Installed:	04/28/1969
Tank Status:	**Permanently Out of Use**
Date Closed:	11/29/1990
Tank Capacity:	1000
Substance:	Other
Name:	DAVENROY DRY CLEANERS & LAUNDRY
Address:	1042 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816

DAVENROYE DRY CLEANERS (Continued) **1000601538**

Tank ID: R-5
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 04/09/1996
Tank Capacity: 550
Substance: Other

Name: DAVENROY DRY CLEANERS & LAUNDRY
Address: 1042 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-6
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 04/09/1996
Tank Capacity: 750
Substance: Kerosene

Name: DAVENROY DRY CLEANERS & LAUNDRY
Address: 1042 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-7
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 04/09/1996
Tank Capacity: 1000
Substance: Heating Oil

RCRA Listings:
Date Form Received by Agency: 19930806
Handler Name: DAVENROYE DRY CLEANERS
Handler Address: 1042 KAPAHULU AVE
Handler City,State,Zip: HONOLULU, HI 96816
EPA ID: HID984467746
Contact Name: DAVID YAMADA
Contact Address: CO 1517 MAKIKI ST 402
Contact City,State,Zip: HONOLULU, HI 96822
Contact Telephone: 808-949-8868
Contact Fax: Not reported
Contact Email: Not reported
Contact Title: Not reported
EPA Region: 09
Land Type: Private
Federal Waste Generator Description: Not a generator, verified
Non-Notifier: Not reported
Biennial Report Cycle: Not reported
Accessibility: Not reported
Active Site Indicator: Not reported
State District Owner: Not reported
State District: Not reported
Mailing Address: CO 1517 MAKIKI ST 402
Mailing City,State,Zip: HONOLULU, HI 96822
Owner Name: LESLIE K YMADA
Owner Type: Private
Operator Name: Not reported
Operator Type: Not reported

DAVENROYE DRY CLEANERS (Continued) **1000601538**

Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20000915
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

DAVENROYE DRY CLEANERS (Continued) **1000601538**

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: LESLIE K YMADA
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: MITA KOKUSAI BLDG 11TH FLOOR
Owner/Operator City,State,Zip: 4-28 MITA 1-CHOME JN 108, ME 99999
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19930806
Handler Name: DAVENROYE DRY CLEANERS
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005727730

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

DAVENROYE DRY CLEANERS (Continued) **1000601538**

Envid:	1000601538
Registry ID:	110005727730
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005727730
Name:	DAVENROYE DRY CLEANERS
Address:	1042 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816

BJ307 **PUNAHOU SCHOOL** **RCRA-VSQG** **1007092151**
ENE **1601 PUNAHOU STREET** **FINDS** **HIR000135350**
1/8-1/4 **HONOLULU, HI 96822** **ECHO**
0.196 mi.
1035 ft. **Site 1 of 6 in cluster BJ**

Actual:
76 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20190329
Handler Name:	PUNAHOU SCHOOL	
Handler Address:		1601 PUNAHOU ST
Handler City,State,Zip:		HONOLULU, HI 96822
EPA ID:		HIR000135350
Contact Name:		CHARLOTTE KAMIKAWA
Contact Address:		PUNAHOU ST
Contact City,State,Zip:		HONOLULU, HI 96822
Contact Telephone:		808-943-3297
Contact Fax:		808-478-9644
Contact Email:		CKAMIKAWA@PUNAHOU.EDU
Contact Title:		DIRECTOR OF FACILITIES
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		2017
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PUNAHOU ST
Mailing City,State,Zip:		HONOLULU, HI 96822
Owner Name:	PUNAHOU SCHOOL	
Owner Type:		Private
Operator Name:	PUNAHOU SCHOOL	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---

PUNAHOU SCHOOL (Continued) **1007092151**

Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20190329
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Biennial: List of Years
Year: 2017

Click Here for Biennial Reporting System Data:

Hazardous Waste Summary:
Waste Code: D001
Waste Description: IGNITABLE WASTE

Waste Code: D020
Waste Description: CHLORDANE

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: PUNAHOU SCHOOL
Legal Status: Private
Date Became Current: 18300101

PUNAHOU SCHOOL (Continued) **1007092151**

Date Ended Current:	Not reported
Owner/Operator Address:	1601 PUNAHOU ST
Owner/Operator City,State,Zip:	HONOLULU, HI 96822
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	PUNAHOU SCHOOL
Legal Status:	Private
Date Became Current:	18300101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name:	PUNAHOU SCHOOL
Legal Status:	Private
Date Became Current:	18300101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name:	PUNAHOU SCHOOL
Legal Status:	Private
Date Became Current:	18300101
Date Ended Current:	Not reported
Owner/Operator Address:	1601 PUNAHOU ST
Owner/Operator City,State,Zip:	HONOLULU, HI 96822
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator
Owner/Operator Name:	PUNAHOU SCHOOL
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Operator

PUNAHOU SCHOOL (Continued) **1007092151**

Owner/Operator Name: PUNAHOU SCHOOL
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: PUNAHOU SCHOOL
Legal Status: Private
Date Became Current: 18300101
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: PUNAHOU SCHOOL
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20190329
Handler Name: PUNAHOU SCHOOL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20070124
Handler Name: PUNAHOU SCHOOL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No

PUNAHOU SCHOOL (Continued) **1007092151**

Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20190109
Handler Name: PUNAHOU SCHOOL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20030923
Handler Name: PUNAHOU SCHOOL
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 61111
NAICS Description: ELEMENTARY AND SECONDARY SCHOOLS

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported

PUNAHOU SCHOOL (Continued) **1007092151**

Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	20060915
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	AALLE
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110013387101

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and

PUNAHOU SCHOOL (Continued) **1007092151**

corrective action activities required under RCRA.
HAZARDOUS WASTE BIENNIAL REPORTER
STATE MASTER
ICIS (Integrated Compliance Information System) is the Integrated Compliance Information System and provides a database that, when complete, will contain integrated Enforcement and Compliance information across most of EPA's programs. The vision for ICIS is to replace EPA's independent databases that contain Enforcement data with a single repository for that information. Currently, ICIS contains all Federal Administrative and Judicial enforcement actions. This information is maintained in ICIS by EPA in the Regional offices and it Headquarters. A future release of ICIS will replace the Permit Compliance System (PCS) which supports the NPDES and will integrate that information with Federal actions already in the system. ICIS also has the capability to track other activities occurring in the Region that support Compliance and Enforcement programs. These include; Incident Tracking, Compliance Assistance, and Compliance Monitoring.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1007092151
Registry ID:	110013387101
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110013387101
Name:	PUNAHOU SCHOOL
Address:	1601 PUNAHOU STREET
City,State,Zip:	HONOLULU, HI 96822

BJ308 **PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE** **HI LUST** **U003541737**
ENE **1601 PUNAHOU ST.** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96822** **HI Financial Assurance**
0.196 mi.
1035 ft. **Site 2 of 6 in cluster BJ**

Actual:
76 ft.

Focus Map:
5

LUST:

Name:	PUNAHOU SCHOOL - MAINTENANCE SHOP
Address:	1601 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-100297
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	02/08/2007
Release ID:	900015
Project Officer:	Shaobin Li

Name:	PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address:	1601 PUNAHOU ST.
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-101653
Facility Status:	Confirmed Release
Facility Status Date:	07/10/2020
Release ID:	200014
Project Officer:	Miranda Fleisher

UST:

Name:	PUNAHOU SCHOOL - BARWICK PLAYGROUND
Address:	1601 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96822

PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE (Continued) **U003541737**

Facility ID:	9-101654
Owner:	PUNAHOU SCHOOL
Owner Address:	1601 PUNAHOU ST
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported

Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	12/06/1990
Tank Capacity:	Not reported
Substance:	Not Listed

Name:	PUNAHOU SCHOOL - MAINTENANCE SHOP
Address:	1601 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96822

Tank ID:	R-1
Date Installed:	03/13/1956
Tank Status:	**Permanently Out of Use**
Date Closed:	12/11/1989
Tank Capacity:	500
Substance:	Gasoline

Name:	PUNAHOU SCHOOL - BARWICK PLAYGROUND
Address:	1601 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96822

Tank ID:	R-2
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	12/06/1990
Tank Capacity:	Not reported
Substance:	Not Listed

Name:	PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address:	1601 PUNAHOU ST.
City,State,Zip:	HONOLULU, HI 96822

Tank ID:	r-1
Date Installed:	12/01/1985
Tank Status:	**Permanently out of Use**
Date Closed:	11/05/2020
Tank Capacity:	2000
Substance:	Diesel

Name:	PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address:	1601 PUNAHOU ST.
City,State,Zip:	HONOLULU, HI 96822

Tank ID:	r-1
Date Installed:	12/01/1985
Tank Status:	**Permanently out of Use**
Date Closed:	11/05/2020

PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE (Continued) **U003541737**

Tank Capacity: 2000
Substance: Diesel

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822

Tank ID: r-1
Date Installed: 12/01/1985
Tank Status: **Permanently out of Use**
Date Closed: 11/05/2020
Tank Capacity: 2000
Substance: Diesel

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822

Tank ID: r-2
Date Installed: 12/01/1985
Tank Status: **Permanently out of Use**
Date Closed: 11/05/2020
Tank Capacity: 1000
Substance: Gasoline

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822

Tank ID: r-2
Date Installed: 12/01/1985
Tank Status: **Permanently out of Use**
Date Closed: 11/05/2020
Tank Capacity: 1000
Substance: Gasoline

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822

Tank ID: r-2
Date Installed: 12/01/1985
Tank Status: **Permanently out of Use**
Date Closed: 11/05/2020
Tank Capacity: 1000
Substance: Gasoline

HI Financial Assurance:
Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101653
Tank Id: r-1
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: 10/15/2004
FR Archive: True

PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE (Continued) **U003541737**

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101653
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: 10/15/2004
FR Archive: True

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101653
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 10/15/2016
FR Archive: True

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101653
Tank Id: r-1
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 10/15/2016
FR Archive: True

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101653
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 10/15/2019
FR Archive: False

Name: PUNAHOU SCHOOL - PHYSCIAL PLANT OFFICE
Address: 1601 PUNAHOU ST.
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101653
Tank Id: r-1
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 10/15/2019
FR Archive: False

BJ309 **PUNAHOU SCHOOL** **RCRA NonGen / NLR** **1006806694**
ENE **1601 PUNAHOU STREET** **FTTS** **HIR000133991**
1/8-1/4 **HONOLULU, HI 96822**
0.196 mi.
1035 ft. **Site 3 of 6 in cluster BJ**

Actual:
76 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		20030124
Handler Name:	PUNAHOU SCHOOL	
Handler Address:		1601 PUNAHOU STREET
Handler City,State,Zip:		HONOLULU, HI 96822
EPA ID:		HIR000133991
Contact Name:		Not reported
Contact Address:		PUNAHOU STREET
Contact City,State,Zip:		HONOLULU, HI 96822
Contact Telephone:		Not reported
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not reported
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PUNAHOU STREET
Mailing City,State,Zip:		HONOLULU, HI 96822
Owner Name:	OWNER	
Owner Type:		Private
Operator Name:	OPERATOR	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

PUNAHOU SCHOOL (Continued) **1006806694**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20090820
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: OWNER	
Legal Status:	Private
Date Became Current:	20030124
Date Ended Current:	Not reported
Owner/Operator Address:	1601 PUNAHOU ST
Owner/Operator City,State,Zip:	HONOLULU, HI 96822
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name: OPERATOR	
Legal Status:	Private
Date Became Current:	20030124
Date Ended Current:	Not reported
Owner/Operator Address:	1601 PUNAHOU ST
Owner/Operator City,State,Zip:	HONOLULU, HI 96822
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

PUNAHOU SCHOOL (Continued) **1006806694**

Historic Generators:

Receive Date:	20021108
Handler Name: PUNAHOU SCHOOL	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20030124
Handler Name: PUNAHOU SCHOOL	
Federal Waste Generator Description:	Not reported
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Codes:	No NAICS Codes Found

Facility Has Received Notices of Violation:

Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Generators - General
Date Violation was Determined:	20000711
Actual Return to Compliance Date:	20000810
Return to Compliance Qualifier:	Observed
Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20000711
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	R9STA
Enforcement Responsible Sub-Organization:	Not reported

PUNAHOU SCHOOL (Continued) **1006806694**

SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported
Found Violation:	Yes
Agency Which Determined Violation:	State
Violation Short Description:	Used Oil - Generators
Date Violation was Determined:	20000711
Actual Return to Compliance Date:	20000810
Return to Compliance Qualifier:	Observed

PUNAHOU SCHOOL (Continued) **1006806694**

Violation Responsible Agency:	State
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	001
Date of Enforcement Action:	20000711
Enforcement Responsible Agency:	State
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	No
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	WRITTEN INFORMAL
Enforcement Responsible Person:	R9STA
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	20000608
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9STA
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20000810
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

Evaluation Date:	20040405
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9STA
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported

PUNAHOU SCHOOL (Continued) **1006806694**

Former Citation:	Not reported
Evaluation Date:	20000608
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9STA
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20000810
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FTTS INSP:

Inspection Number:	20070727HI-08 1
Region:	09
Inspection Date:	07/27/07
Inspector:	KATHY VONGELDERN
Violation occurred:	Yes
Investigation Type:	AHERA, Enforcement, State Conducted
Investigation Reason:	Neutral Scheme, State
Legislation Code:	TSCA
Facility Function:	User

BJ310 **PUNAHOU SCHOOL GRADES 2-5 PROJECT** **HI SHWS** **S118943716**
ENE **1601 PUNAHOU ST** **N/A**
1/8-1/4 **HONOLULU, HI 96822**
0.196 mi.
1035 ft. **Site 4 of 6 in cluster BJ**

Actual:
76 ft.

Focus Map:
5

SHWS:

Name:	PUNAHOU SCHOOL GRADES 2-5 PROJECT
Address:	1601 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Punahou School Grades 2-5 Project
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	Medium
Potential Hazards And Controls:	Hazard Present
Island:	Oahu
SDAR Environmental Interest Name:	Punahou School Grades 2-5 Project
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Present
Priority:	Medium
Assessment:	Response Necessary
Response:	Response Ongoing

PUNAHOU SCHOOL GRADES 2-5 PROJECT (Continued) **S118943716**

Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	843
Location Description:	1601 Punahou St
Is Public:	True
Update On:	2019-06-13 09:40:11
Latitude:	21.302265
Longitude:	-157.827713

BJ311 **PUNAHOU SCHOOL FIRING RANGE** **HI SHWS** **S121406246**
ENE **1601 PUNAHOU ST** **N/A**
1/8-1/4 **HONOLULU, HI 96822**
0.196 mi.
1035 ft. **Site 5 of 6 in cluster BJ**

Actual:
76 ft.

Focus Map:
5

SHWS:

Name:	PUNAHOU SCHOOL FIRING RANGE
Address:	1601 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Punahou School Firing Range
Island:	Oahu
Environmental Interest:	Punahou School Firing Range
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Kelton Otsuka
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Punahou School Firing Range
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Lead in soil.
Nature of Residual Contamination:	Confirmation samples were below HDOH EALs for unrestricted use.
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	04/06/2010

PUNAHOU SCHOOL FIRING RANGE (Continued) **S121406246**

Document Number:	2010-228-KO
Document Subject:	No Further Action Determination at the Punahou School Firing Range Site
Project Manager:	Kelton Otsuka
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2423
Location Description:	1601 Punahou St, Honolulu, HI 96822
Is Public:	True
Update On:	2021-02-05 09:32:48
Latitude:	21.303505
Longitude:	-157.826282

BJ312 **PUNAHOU SCHOOL WINNE UNITS C AND D** **HI SHWS** **S121406247**
ENE **1601 PUNAHOU ST** **HI INST CONTROL** **N/A**
1/8-1/4 **HONOLULU, HI 96822**
0.196 mi.
1035 ft. **Site 6 of 6 in cluster BJ**

Actual:
76 ft.

Focus Map:
5

SHWS:

Name:	PUNAHOU SCHOOL WINNE UNITS C AND D
Address:	1601 PUNAHOU ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Punahou School Winne Units C and D
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	Medium
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Punahou School Winne Units C and D
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	Medium
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	844
Location Description:	1601 Punahou St
Is Public:	True
Update On:	2019-06-13 09:39:47

PUNAHOU SCHOOL WINNE UNITS C AND D (Continued) **S121406247**

Latitude: 21.301830
Longitude: -157.827575

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

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BG313 **RRR RECYCLING - WAIALAE REDEMPTION CENTER** **HI SWRCY** **S125958506**
SE **3109 WAIALAE AVE.** **N/A**
1/8-1/4 **HONOLULU, HI**
0.197 mi.
1038 ft. **Site 2 of 2 in cluster BG**

Actual:
79 ft.

Focus Map:
5

SWRCY:
Permit Number: RY-0037-17
Name: RRR RECYCLING - WAIALAE REDEMPTION CENTER
Address: 3109 WAIALAE AVE.
City,State,Zip: HONOLULU, HI
Materials: dbc, cardboard, newspaper, office paper
Island: Oahu
TMK: 1-3-2-001:031
Closure Date: Not reported
Type: general
Status: Not reported

BK314 **AVIS RENT- A-CAR SYSTEM INC** **HI LUST** **U001235079**
SW **148 KAIULANI AVE** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96815** **HI Financial Assurance**
0.198 mi.
1047 ft. **Site 1 of 4 in cluster BK**

Actual:
3 ft.

Focus Map:
8

LUST:
Name: AVIS RENT- A-CAR SYSTEM INC
Address: 148 KAIULANI AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100173
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 11/21/1994
Release ID: 920032
Project Officer: Raymond Seid

UST:
Name: AVIS RENT- A-CAR SYSTEM INC
Address: 148 KAIULANI AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100173
Owner: AVIS RENT A CAR
Owner Address: 6 SYLVAN WAY DEPT 29-093-36
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.277514
Longitude: -157.825000
Horizontal Reference Datum Name: NAD83

AVIS RENT- A-CAR SYSTEM INC (Continued) **U001235079**

Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 04/14/1972
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 1500
Substance: Gasoline

HI Financial Assurance:
Name: AVIS RENT- A-CAR SYSTEM INC
Address: 148 KAIULANI AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100173
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

BH315 **ROYAL HAWAIIAN MARKET PLACE** **HI UST** **U003221622**
SW **333 ROYAL HAWAIIAN AVE** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.200 mi.
1058 ft. **Site 3 of 5 in cluster BH**

Actual:
3 ft.

Focus Map:
8

UST:
Name: ROYAL HAWAIIAN MARKET PLACE
Address: 333 ROYAL HAWAIIAN AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100874
Owner: ATELIER USA INC
Owner Address: C/O KENNETH WONG, ESQ 745 FORT ST, STE 600
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1999
Tank Capacity: 5000
Substance: Gasoline

BI316 **LONGS DRUG STORES #10851** **RCRA-VSQG** **1018155844**
South **1029 KAPAHULU AVE STE 303** **FINDS** **HIR000143438**
1/8-1/4 **HONOLULU, HI 96816** **ECHO**
0.205 mi.
1082 ft. **Site 2 of 2 in cluster BI**

Actual:
30 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:	20210718
Handler Name:	LONGS DRUG STORES #10851
Handler Address:	1029 KAPAHULU AVE STE 303
Handler City,State,Zip:	HONOLULU, HI 96816
EPA ID:	HIR000143438
Contact Name:	NICOLE WILKINSON
Contact Address:	CVS DRIVE MC2340
Contact City,State,Zip:	WOONSOCKET, RI 02895
Contact Telephone:	401-770-7132
Contact Fax:	Not reported
Contact Email:	NICOLE.WILKINSON@CVSHEALTH.COM
Contact Title:	DIRECTOR, ENVIRONMENTAL MANAGEMENT
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	CVS DRIVE MC2340
Mailing City,State,Zip:	WOONSOCKET, RI 02895
Owner Name:	SKC PROPERTIES
Owner Type:	Private
Operator Name:	LONGS DRUG STORES CALIFORNIA, LLC
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported

LONGS DRUG STORES #10851 (Continued) **1018155844**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210721
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	H

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D004
Waste Description:	ARSENIC
Waste Code:	D005
Waste Description:	BARIUM
Waste Code:	D006
Waste Description:	CADMIUM
Waste Code:	D007
Waste Description:	CHROMIUM
Waste Code:	D008
Waste Description:	LEAD
Waste Code:	D009
Waste Description:	MERCURY

LONGS DRUG STORES #10851 (Continued) **1018155844**

Waste Code: D010
Waste Description: SELENIUM

Waste Code: D011
Waste Description: SILVER

Waste Code: D016
Waste Description: 2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)

Waste Code: D018
Waste Description: BENZENE

Waste Code: D024
Waste Description: M-CRESOL

Waste Code: D027
Waste Description: 1,4-DICHLOROBENZENE

Waste Code: D035
Waste Description: METHYL ETHYL KETONE

Waste Code: D039
Waste Description: TETRACHLOROETHYLENE

Waste Code: P001
Waste Description: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

Waste Code: P012
Waste Description: ARSENIC OXIDE AS2O3 (OR) ARSENIC TRIOXIDE

Waste Code: P075
Waste Description: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

Waste Code: P188
Waste Description: BENZOIC ACID, 2-HYDROXY-, COMPD. WITH (3AS-CIS)-1,2,3,3A,8,8A-HEXAHYDRO-1,3A,8-TRIMETHYLPYRROLO[2,3-B]INDOL-5-YL METHYLCARBAMATE ESTER (1:1) (OR) PHYSOSTIGMINE SALICYLATE

Waste Code: U002
Waste Description: 2-PROPANONE (I) (OR) ACETONE (I)

Waste Code: U010
Waste Description: AZIRINO [2',3':3,4]PYRROLO[1,2-A]INDOLE-4,7-DIONE, 6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1A,2,8,8A,8B-HEXAHYDRO-8A-METHOXY-5-METHYL-, [1AS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]- (OR) MITOMYCIN C

Waste Code: U031
Waste Description: 1-BUTANOL (I) (OR) N-BUTYL ALCOHOL (I)

Waste Code: U034
Waste Description: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

Waste Code: U035

LONGS DRUG STORES #10851 (Continued) **1018155844**

Waste Description: BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) CHLORAMBUCIL

Waste Code: U044
Waste Description: CHLOROFORM (OR) METHANE, TRICHLORO-

Waste Code: U058
Waste Description: 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS(2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE (OR) CYCLOPHOSPHAMIDE

Waste Code: U059
Waste Description: 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHA-L-LYXO-HEXOPYRANOSYL)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)- (OR) DAUNOMYCIN

Waste Code: U070
Waste Description: BENZENE, 1,2-DICHLORO- (OR) O-DICHLOROBENZENE

Waste Code: U072
Waste Description: BENZENE, 1,4-DICHLORO- (OR) P-DICHLOROBENZENE

Waste Code: U089
Waste Description: DIETHYLSTILBESTEROL (OR) PHENOL, 4,4'-(1,2-DIETHYL-1,2-ETHENEDIYL)BIS, (E)-

Waste Code: U122
Waste Description: FORMALDEHYDE

Waste Code: U129
Waste Description: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

Waste Code: U132
Waste Description: HEXACHLOROPHENE (OR) PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-

Waste Code: U150
Waste Description: L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) MELPHALAN

Waste Code: U151
Waste Description: MERCURY

Waste Code: U154
Waste Description: METHANOL (I) (OR) METHYL ALCOHOL (I)

Waste Code: U165
Waste Description: NAPHTHALENE

Waste Code: U188
Waste Description: PHENOL

Waste Code: U200
Waste Description: RESERPINE (OR) YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-

Waste Code: U201
Waste Description: 1,3-BENZENEDIOL (OR) RESORCINOL

LONGS DRUG STORES #10851 (Continued) **1018155844**

Waste Code: U204
Waste Description: SELENIOUS ACID (OR) SELENIUM DIOXIDE

Waste Code: U205
Waste Description: SELENIUM SULFIDE (OR) SELENIUM SULFIDE SES2 (R,T)

Waste Code: U206
Waste Description: D-GLUCOSE, 2-DEOXY-2-[[(METHYLNITROSOAMINO)-CARBONYL]AMINO]- (OR) GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-,D- (OR) STREPTOZOTOCIN

Waste Code: U210
Waste Description: ETHENE, TETRACHLORO- (OR) TETRACHLOROETHYLENE

Waste Code: U279
Waste Description: U279

Waste Code: U411
Waste Description: U411

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: SKC PROPERTIES
Legal Status: Private
Date Became Current: 20130901
Date Ended Current: Not reported
Owner/Operator Address: 1029 KAPAHULU AVE STE 300
Owner/Operator City,State,Zip: HONOLULU, HI 96816
Owner/Operator Telephone: 808-729-9090
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20150413
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE MC2340
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: SKC PROPERTIES
Legal Status: Private
Date Became Current: 20130901
Date Ended Current: Not reported
Owner/Operator Address: 1029 KAPAHULU AVE STE 300
Owner/Operator City,State,Zip: HONOLULU, HI 96816
Owner/Operator Telephone: 808-729-9090
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

LONGS DRUG STORES #10851 (Continued) **1018155844**

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20150413
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20151112
Handler Name: LONGS DRUG STORES #10851
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20210718
Handler Name: LONGS DRUG STORES #10851
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 44611
NAICS Description: PHARMACIES AND DRUG STORES

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110067000943

Click Here for FRS Facility Detail Report:

LONGS DRUG STORES #10851 (Continued) **1018155844**

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1018155844
Registry ID:	110067000943
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110067000943
Name:	LONGS DRUG STORES #10851
Address:	1029 KAPAHULU AVE STE 303
City,State,Zip:	HONOLULU, HI 96816

317
SW
1/8-1/4
0.206 mi.
1089 ft.

Actual:
3 ft.

Focus Map:
8

CM&D **HI LUST U003832855**
2112 KALAKAUA AVE **HI UST N/A**
HONOLULU, HI 96815

LUST:

Name:	CM&D
Address:	2112 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103734
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	06/14/2002
Release ID:	020003
Project Officer:	Shaobin Li

UST:

Name:	CM&D
Address:	2112 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103734
Owner:	THE HONU GROUP
Owner Address:	999 BISHOP ST, SUTE 2750
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.282204
Longitude:	-157.830786
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	10/17/2001
Tank Capacity:	250
Substance:	Diesel

BL318 **KAPIOLANI RESIDENCE** **HI UST** **U004364817**
NNW **1631 KAPIOLANI BLVD** **N/A**
1/8-1/4 **HONOLULU, HI**
0.207 mi.
1095 ft. **Site 1 of 3 in cluster BL**

Actual: UST:
3 ft.
Name: KAPIOLANI RESIDENCE
Focus Map: Address: 1631 KAPIOLANI BLVD
4 City,State,Zip: HONOLULU, HI
Facility ID: 9-103963
Owner: SAMKOO Pacific LLC
Owner Address: 1391 Kapiolani Blvd.,Ste 103
Owner City,St,Zip: Honolulu, 96814 96814
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: r-1
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 09/01/2017
Tank Capacity: 1000
Substance: Unknown

Name: KAPIOLANI RESIDENCE
Address: 1631 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI

Tank ID: r-2
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 10/13/2017
Tank Capacity: 1000
Substance: Gasoline

Name: KAPIOLANI RESIDENCE
Address: 1631 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI

Tank ID: r-3
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 10/16/2017
Tank Capacity: 250
Substance: Gasoline

BL319 **KAPIOLANI RESIDENCE** **HI LUST** **S120822113**
NNW **1631 KAPIOLANI BLVD** **N/A**
1/8-1/4 **HONOLULU, HI 96814**
0.207 mi.
1095 ft. **Site 2 of 3 in cluster BL**

Actual: LUST:
3 ft.
Name: KAPIOLANI RESIDENCE
Focus Map: Address: 1631 KAPIOLANI BLVD
4 City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-103963
Facility Status: Site Cleanup Completed with EHE

KAPIOLANI RESIDENCE (Continued) **S120822113**

Facility Status Date:	04/30/2018
Release ID:	180004
Project Officer:	Shunsheng Fu
Name:	KAPIOLANI RESIDENCE
Address:	1631 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-103963
Facility Status:	Site Cleanup Completed with EHE
Facility Status Date:	04/30/2018
Release ID:	170014
Project Officer:	Shunsheng Fu

BM320 **ROGERS REPAIR INC** **RCRA-VSQG 1000742297**
NNW **1687 KALAKAUA AVE** **FINDS HID981615222**
1/8-1/4 **HONOLULU, HI 96826** **ECHO**
0.209 mi.
1102 ft. **Site 1 of 2 in cluster BM**

Actual:
3 ft.

Focus Map:
5

RCRA Listings:

Date Form Received by Agency:		19930719
Handler Name:	ROGERS REPAIR INC	
Handler Address:		1687 KALAKAUA AVE
Handler City,State,Zip:		HONOLULU, HI 96826
EPA ID:		HID981615222
Contact Name:		ROGER NISHIMURA
Contact Address:		1687 KALAKAUA AVE
Contact City,State,Zip:		HONOLULU, HI 96826
Contact Telephone:		808-949-4137
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Other
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		1687 KALAKAUA AVE
Mailing City,State,Zip:		HONOLULU, HI 96826
Owner Name:	ROGER NISHIMURA	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No

ROGERS REPAIR INC (Continued) **1000742297**

Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: ROGER NISHIMURA	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported

ROGERS REPAIR INC (Continued) **1000742297**

Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19930719
Handler Name: ROGERS REPAIR INC
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 811121
NAICS Description: AUTOMOTIVE BODY, PAINT, AND INTERIOR REPAIR AND MAINTENANCE

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported

ROGERS REPAIR INC (Continued) **1000742297**

Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 19970113
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

FINDS:
Registry ID: 110005723903

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1000742297
Registry ID: 110005723903
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005723903
Name: ROGERS REPAIR INC
Address: 1687 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826

BM321 **ROGER'S REPAIR INC** **HI SHWS** **S106820247**
NNW **1687 KALAKAUA AVE** **N/A**
1/8-1/4 **HONOLULU, HI 96826**
0.209 mi.
1102 ft. **Site 2 of 2 in cluster BM**

Actual:
3 ft.

Focus Map:
5

SHWS:

Name:	ROGER'S REPAIR INC
Address:	1687 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Roger's Repair Inc
HID Number:	Not reported
Facility Registry Identifier:	110005723903
Lead Agency:	HEER Office
Program:	State
Project Manager:	Laura Young
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Roger's Repair Inc
HID Number:	Not reported
Facility Registry Identifier:	110005723903
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action - Type Undetermined
Document Date:	06/04/1999
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Laura Young
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	3
Location Description:	1687 Kalakaua Ave
Is Public:	True
Update On:	2021-11-16 16:44:47
Latitude:	21.292000
Longitude:	-157.837000

BK322 **AZABU USA CORP DBA KINGS VILLAGE** **RCRA-VSQG** **1004688997**
SW **131 KAIULANI AVE** **FINDS** **HIR000069344**
1/8-1/4 **HONOLULU, HI 96815** **ECHO**
0.212 mi.
1117 ft. **Site 2 of 4 in cluster BK**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:	20000403
Handler Name:	AZABU USA CORP DBA KINGS VILLAGE
Handler Address:	131 KAIULANI AVE
Handler City,State,Zip:	HONOLULU, HI 96815

AZABU USA CORP DBA KINGS VILLAGE (Continued) **1004688997**

EPA ID:		HIR000069344
Contact Name:		LARRY GILL
Contact Address:		131 KAIULANI AVE
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-924-7395
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		131 KAIULANI AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	AZABU USA CORP	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No

AZABU USA CORP DBA KINGS VILLAGE (Continued) **1004688997**

TSDFs Only Subject to CA under Discretionary Auth Universe: No
Corrective Action Priority Ranking: No NCAPS ranking
Environmental Control Indicator: No
Institutional Control Indicator: No
Human Exposure Controls Indicator: N/A
Groundwater Controls Indicator: N/A
Operating TSDF Universe: Not reported
Full Enforcement Universe: Not reported
Significant Non-Complier Universe: No
Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20021007
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Hazardous Waste Summary:
Waste Code: D001
Waste Description: IGNITABLE WASTE

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: AZABU USA CORP
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 410 ATKINSON DR STE 200
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-944-6855
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20000403
Handler Name: AZABU USA CORP DBA KINGS VILLAGE
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:

AZABU USA CORP DBA KINGS VILLAGE (Continued) **1004688997**

NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005730735

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1004688997
Registry ID: 110005730735
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005730735
Name: AZABU USA CORP DBA KINGS VILLAGE
Address: 131 KAIULANI AVE
City,State,Zip: HONOLULU, HI 96819

BK323 **KING'S VILLAGE SHOPPING CENTER** **HI LUST** **U003711757**
SW **131 KAIULANI AVE** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96819**
0.212 mi.
1117 ft. **Site 3 of 4 in cluster BK**

Actual:
3 ft.

Focus Map:
8

LUST:
Name: KING'S VILLAGE SHOPPING CENTER
Address: 131 KAIULANI AVE
City,State,Zip: HONOLULU, HI 96819
Facility ID: 9-103611
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 12/13/1999
Release ID: 000038
Project Officer: Richard Takaba

UST:
Name: KING'S VILLAGE SHOPPING CENTER
Address: 131 KAIULANI AVE
City,State,Zip: HONOLULU, HI 96819
Facility ID: 9-103611
Owner: KING'S VILLAGE SHOPPING CENTER
Owner Address: 131 KAIULANI AVE

KING'S VILLAGE SHOPPING CENTER (Continued) **U003711757**

Owner City,St,Zip:	Honolulu, 96819 96819
Latitude:	21.276850
Longitude:	-157.824933
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	11/26/1999
Tank Capacity:	6000
Substance:	Gasoline

---

324 NNW 1/8-1/4 0.214 mi. 1130 ft. **FUDS BASE YARD NOS. 16 & 17 (HONOLULU ZOO AND WAIK** **HI SHWS** **S128196256 N/A**

HONOLULU (County), HI

Actual: 3 ft.

Focus Map: 8

SHWS:

Name:	FUDS BASE YARD NOS. 16 & 17 (HONOLULU ZOO AND WAIKIKI SHELL)
Address:	Not reported
City,State,Zip:	HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	3158
Location Description:	Honolulu Zoo, an asphaltic concrete parking lot ancillary to the Waikiki Shell Ampitheater & Kapiolani Park,

FUDS BASE YARD NOS. 16 & 17 (HONOLULU ZOO AND WAIKIKI SHELL) (Continued) **S128196256**

Is Public:	True
Update On:	2021-12-22 18:26:47
Latitude:	21.270521
Longitude:	-157.820875

---

325 NW 1/8-1/4 0.214 mi. 1131 ft. **THE SHERWIN-WILLIAMS STORE #8240** **RCRA-VSQG** **1014389641**
2733 S KING ST **HIR000139840**
HONOLULU, HI 96826

Actual: 14 ft.

Focus Map: 5

RCRA Listings:

Date Form Received by Agency:	20100819
Handler Name:	THE SHERWIN-WILLIAMS STORE #8240
Handler Address:	2733 S KING ST
Handler City,State,Zip:	HONOLULU, HI 96826
EPA ID:	HIR000139840
Contact Name:	SHAY ROSEMAN
Contact Address:	101 PROSPECT AVE, NW
Contact City,State,Zip:	CLEVELAND, OH 44115
Contact Telephone:	216-566-1710
Contact Fax:	216-566-1745
Contact Email:	SHAY.ROSEMAN@SHERWIN.COM
Contact Title:	STORES SAFETY & ENVIRONMENTAL SPECIALIST
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Handler Activities
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	2733 S KING ST
Mailing City,State,Zip:	HONOLULU, HI 96826
Owner Name:	MARCUS & ASSOCS., INC.
Owner Type:	Private
Operator Name:	THE SHERWIN-WILLIAMS CO.
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N

THE SHERWIN-WILLIAMS STORE #8240 (Continued) **1014389641**

Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20100823
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name:	THE SHERWIN-WILLIAMS CO.
Legal Status:	Private
Date Became Current:	20000104
Date Ended Current:	Not reported
Owner/Operator Address:	101 PROSPECT AVE, NW
Owner/Operator City,State,Zip:	CLEVELAND, OH 44115
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner

THE SHERWIN-WILLIAMS STORE #8240 (Continued) **1014389641**

Owner/Operator Name: MARCUS & ASSOCS., INC.
Legal Status: Private
Date Became Current: 20000104
Date Ended Current: Not reported
Owner/Operator Address: 1045 MAPUNAPUNA ST
Owner/Operator City,State,Zip: HONOLULU, HI 96819
Owner/Operator Telephone: 808-839-7446
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20100819
Handler Name: THE SHERWIN-WILLIAMS STORE #8240
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 44412
NAICS Description: PAINT AND WALLPAPER RETAILERS

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

BK326 **SAND ISLAND WASTE WATER TREATMENT PLANT** **RCRA-VSQG** **1004688907**
SW **120 KAIULANI AUCNUE** **FINDS** **HID984469007**
1/8-1/4 **HONOLULU, HI 96815** **ECHO**
0.215 mi.
1135 ft. **Site 4 of 4 in cluster BK**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:
Date Form Received by Agency: 19920727
Handler Name: SHERATON PRINCESS KAIULANI
Handler Address: 120 KAIULANI AUCNUE
Handler City,State,Zip: HONOLULU, HI 96815
EPA ID: HID984469007
Contact Name: MARTIN HEEDE
Contact Address: 120 KAIULANI AUCNUE
Contact City,State,Zip: HONOLULU, HI 96815
Contact Telephone: 808-922-5811
Contact Fax: Not reported
Contact Email: Not reported
Contact Title: Not reported
EPA Region: 09

SAND ISLAND WASTE WATER TREATMENT PLANT (Continued) **1004688907**

Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		KAIULANI AUCNUE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	KYO YA COMPANY LTD	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No

SAND ISLAND WASTE WATER TREATMENT PLANT (Continued) **1004688907**

Unaddressed Significant Non-Complier Universe: No
Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20000915
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: KYO YA COMPANY LTD
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: PO BOX 8559
Owner/Operator City,State,Zip: HONOLULU, HI 96815
Owner/Operator Telephone: 808-924-5105
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19920727
Handler Name: SHERATON PRINCESS KAIULANI
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005728383

SAND ISLAND WASTE WATER TREATMENT PLANT (Continued) **1004688907**

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004688907
Registry ID:	110005728383
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005728383
Name:	SAND ISLAND WASTE WATER TREATMENT PLANT
Address:	120 KAIULANI AUCNUE
City,State,Zip:	HONOLULU, HI 96815

BN327 **WAIKIKI GUN CLUB** **RCRA-VSQG** **1007370449**
SW **2142 KALAKAUA AVE** **HIR000135764**
1/8-1/4 **HONOLULU, HI 96815**
0.216 mi.
1139 ft. **Site 1 of 3 in cluster BN**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		20040406
Handler Name:	WAIKIKI GUN CLUB	
Handler Address:		2142 KALAKAUA AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIR000135764
Contact Name:		THOMAS C PARK
Contact Address:		2142 KALAKAUA AVE
Contact City,State,Zip:		HONOLULU, HI 96815
Contact Telephone:		808-922-6442
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		2142 KALAKAUA AVE
Mailing City,State,Zip:		HONOLULU, HI 96815
Owner Name:	CHRISTOPHER HAN	
Owner Type:		Private
Operator Name:	THOMAS C PARK	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No

WAIKIKI GUN CLUB (Continued) **1007370449**

Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20040429
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:
Waste Code: D008

WAIKIKI GUN CLUB (Continued) **1007370449**

Waste Description: LEAD

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: THOMAS C PARK
Legal Status: Private
Date Became Current: 20020201
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: CHRISTOPHER HAN
Legal Status: Private
Date Became Current: 20020201
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20040406
Handler Name: WAIKIKI GUN CLUB
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 71399
NAICS Description: ALL OTHER AMUSEMENT AND RECREATION INDUSTRIES

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported

WAIKIKI GUN CLUB (Continued) **1007370449**

Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Permits - General Information
Date Violation was Determined: 20091103
Actual Return to Compliance Date: 20100809
Return to Compliance Qualifier: Observed
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20091214
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: BROGI
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported

WAIKIKI GUN CLUB (Continued) **1007370449**

SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Found Violation: Yes
Agency Which Determined Violation: State
Violation Short Description: Generators - General
Date Violation was Determined: 20091103
Actual Return to Compliance Date: 20100809
Return to Compliance Qualifier: Observed
Violation Responsible Agency: State
Scheduled Compliance Date: Not reported
Enforcement Identifier: 001
Date of Enforcement Action: 20091214
Enforcement Responsible Agency: State
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: No
Appeal Initiated Date: Not reported
Appeal Resolution Date: Not reported
Disposition Status Date: Not reported
Disposition Status: Not reported
Disposition Status Description: Not reported
Consent/Final Order Sequence Number: Not reported
Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: WRITTEN INFORMAL
Enforcement Responsible Person: BROGI
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 20051214
Evaluation Responsible Agency: EPA
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: MREED
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported

WAIKIKI GUN CLUB (Continued) **1007370449**

Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20090918
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	BROGI
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20100809
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported
Evaluation Date:	20090918
Evaluation Responsible Agency:	State
Found Violation:	Yes
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	BROGI
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	20100809
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

BO328 **MEADOW GOLD ICE CREAM PLANT FUEL OIL SPILL** **HI SHWS S110169363**
WSW **1401 S BERETANIA ST** **HI SPILLS N/A**
1/8-1/4 **HONOLULU, HI 96814**
0.216 mi.
1143 ft. **Site 1 of 4 in cluster BO**

Actual:
23 ft.

Focus Map:
4

SHWS:

Name:	MEADOW GOLD ICE CREAM PLANT FUEL OIL SPILL
Address:	1401 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported

MEADOW GOLD ICE CREAM PLANT FUEL OIL SPILL (Continued) **S110169363**

Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	957
Location Description:	1418 Young St-Former
Is Public:	True
Update On:	2019-08-21 18:20:13
Latitude:	21.299484
Longitude:	-157.839326

SPILLS:

Name:	PAWAA BUILDING
Address:	1401 S BERETANIA ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Pawaa Building
Case Number:	20091021-1400
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	Not reported
Units:	Insulating Material Airborne
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2009-10-28 00:00:00
Result:	Refer to CAB
File Under:	Not reported
Substances:	particulates
Quanity:	0
Units:	Unknown
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported

MEADOW GOLD ICE CREAM PLANT FUEL OIL SPILL (Continued) **S110169363**

Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

BO329 **LONGS DRUG STORE #10845** **RCRA NonGen / NLR** **1018155847**
WSW **1401 S BERETANIA ST STE 110** **FINDS** **HIR000143461**
1/8-1/4 **HONOLULU, HI 96814** **ECHO**
0.216 mi.
1143 ft. **Site 2 of 4 in cluster BO**

Actual:
23 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:	20190829
Handler Name:	LONGS DRUG STORE #10845
Handler Address:	1401 S BERETANIA ST STE 110
Handler City,State,Zip:	HONOLULU, HI 96814
EPA ID:	HIR000143461
Contact Name:	NICOLE WILKINSON
Contact Address:	ONE CVS DRIVE MAIL CODE 2340
Contact City,State,Zip:	WOONSOCKET, RI 02895
Contact Telephone:	401-770-7132
Contact Fax:	Not reported
Contact Email:	NICOLE.WILKINSON@CVSHEALTH.COM
Contact Title:	DIRECTOR, ENVIRONMENTAL MANAGEMENT
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Not a generator, verified
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Not reported
State District Owner:	Not reported
State District:	Not reported
Mailing Address:	ONE CVS DRIVE MAIL CODE 2340
Mailing City,State,Zip:	WOONSOCKET, RI 02895
Owner Name:	HEALTHCARE REALTY TRUST INCORPORATED
Owner Type:	Private
Operator Name:	LONGS DRUG STORES CALIFORNIA, LLC
Operator Type:	Private
Short-Term Generator Activity:	No
Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No

LONGS DRUG STORE #10845 (Continued) **1018155847**

Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20190829
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D004
Waste Description:	ARSENIC
Waste Code:	D005

LONGS DRUG STORE #10845 (Continued) **1018155847**

Waste Description:	BARIUM
Waste Code:	D006
Waste Description:	CADMIUM
Waste Code:	D007
Waste Description:	CHROMIUM
Waste Code:	D008
Waste Description:	LEAD
Waste Code:	D009
Waste Description:	MERCURY
Waste Code:	D010
Waste Description:	SELENIUM
Waste Code:	D011
Waste Description:	SILVER
Waste Code:	D016
Waste Description:	2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)
Waste Code:	D018
Waste Description:	BENZENE
Waste Code:	D024
Waste Description:	M-CRESOL
Waste Code:	D027
Waste Description:	1,4-DICHLOROBENZENE
Waste Code:	P001
Waste Description:	2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%
Waste Code:	P012
Waste Description:	ARSENIC OXIDE AS2O3 (OR) ARSENIC TRIOXIDE
Waste Code:	P075
Waste Description:	NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS
Waste Code:	P188
Waste Description:	BENZOIC ACID, 2-HYDROXY-, COMPD. WITH (3AS-CIS)-1,2,3,3A,8,8A-HEXAHYDRO-1,3A,8-TRIMETHYLPYRROLO[2,3-B]INDOL-5-YL METHYLCARBAMATE ESTER (1:1) (OR) PHYSOSTIGMINE SALICYLATE
Waste Code:	U002
Waste Description:	2-PROPANONE (I) (OR) ACETONE (I)
Waste Code:	U010
Waste Description:	AZIRINO [2',3':3,4]PYRROLO[1,2-A]INDOLE-4,7-DIONE, 6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1A,2,8,8A,8B-HEXAHYDRO-8A-METHOXY-5-METHYL-, [1AS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]- (OR) MITOMYCIN C

LONGS DRUG STORE #10845 (Continued) **1018155847**

Waste Code: U031
Waste Description: 1-BUTANOL (I) (OR) N-BUTYL ALCOHOL (I)

Waste Code: U034
Waste Description: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

Waste Code: U035
Waste Description: BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) CHLORAMBUCIL

Waste Code: U044
Waste Description: CHLOROFORM (OR) METHANE, TRICHLORO-

Waste Code: U058
Waste Description: 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS(2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE (OR) CYCLOPHOSPHAMIDE

Waste Code: U059
Waste Description: 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHA-L-LYXO-HEXOPYRANOSYL)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)- (OR) DAUNOMYCIN

Waste Code: U070
Waste Description: BENZENE, 1,2-DICHLORO- (OR) O-DICHLOROBENZENE

Waste Code: U072
Waste Description: BENZENE, 1,4-DICHLORO- (OR) P-DICHLOROBENZENE

Waste Code: U089
Waste Description: DIETHYLSTILBESTEROL (OR) PHENOL, 4,4'-(1,2-DIETHYL-1,2-ETHENEDIYL)BIS, (E)-

Waste Code: U122
Waste Description: FORMALDEHYDE

Waste Code: U129
Waste Description: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

Waste Code: U132
Waste Description: HEXACHLOROPHENE (OR) PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-

Waste Code: U150
Waste Description: L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) MELPHALAN

Waste Code: U151
Waste Description: MERCURY

Waste Code: U154
Waste Description: METHANOL (I) (OR) METHYL ALCOHOL (I)

Waste Code: U165
Waste Description: NAPHTHALENE

Waste Code: U188
Waste Description: PHENOL

LONGS DRUG STORE #10845 (Continued) **1018155847**

Waste Code: U200
Waste Description: RESERPINE (OR) YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-

Waste Code: U201
Waste Description: 1,3-BENZENEDIOL (OR) RESORCINOL

Waste Code: U204
Waste Description: SELENIOUS ACID (OR) SELENIUM DIOXIDE

Waste Code: U205
Waste Description: SELENIUM SULFIDE (OR) SELENIUM SULFIDE SES2 (R,T)

Waste Code: U206
Waste Description: D-GLUCOSE, 2-DEOXY-2-[[(METHYLNITROSOAMINO)-CARBONYL]AMINO]- (OR) GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-,D- (OR) STREPTOZOTOCIN

Waste Code: U210
Waste Description: ETHENE, TETRACHLORO- (OR) TETRACHLOROETHYLENE

Waste Code: U279
Waste Description: U279

Waste Code: U411
Waste Description: U411

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20150413
Date Ended Current: Not reported
Owner/Operator Address: ONE CVS DRIVE MAIL CODE 2340
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: HEALTHCARE REALTY TRUST INCORPORATED
Legal Status: Private
Date Became Current: 20100601
Date Ended Current: Not reported
Owner/Operator Address: 1401 BERETANIA ST STE 390
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-585-8050
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: HEALTHCARE REALTY TRUST INCORPORATED
Legal Status: Private
Date Became Current: 20100601

LONGS DRUG STORE #10845 (Continued) **1018155847**

Date Ended Current: Not reported
Owner/Operator Address: 1401 BERETANIA ST STE 390
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-585-8050
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20150413
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20151201
Handler Name: LONGS DRUG STORE #10845
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20190829
Handler Name: LONGS DRUG STORE #10845
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

List of NAICS Codes and Descriptions:
NAICS Code: 44611
NAICS Description: PHARMACIES AND DRUG STORES

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:

LONGS DRUG STORE #10845 (Continued) **1018155847**

Evaluations: No Evaluations Found

FINDS:
Registry ID: 110067047136

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1018155847
Registry ID:	110067047136
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110067047136
Name:	LONGS DRUG STORE #10845
Address:	1401 S BERETANIA ST STE 110
City,State,Zip:	HONOLULU, HI 96814

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330 NNW 1/8-1/4 0.220 mi. 1161 ft. **BARBERS POINT NAVAL AIR STATION** **PFAS ECHO** **1027329035**
21.296188/-157.813873 **N/A**
BARBERS POINT, HI

Actual: 66 ft.
Focus Map: 5

PFAS ECHO:

Name:	BARBERS POINT NAVAL AIR STATION
Address:	21.296188/-157.813873
City,State,Zip:	BARBERS POINT, HI
Latitude:	21.296188
Longitude:	-157.813873
Count:	-1
County:	HONOLULU
Status:	Active
Region:	09
Industry:	National Defense
ECHO Facility Report:	https://echo.epa.gov/detailed-facility-report?fid=110014030235
Facility Percent Minority:	79.191
Facility Derived Tribes:	Not reported
Facility Population:	8130.04
EJSCREEN Flag US:	Y
EJSCREEN Report:	https://ejscreen.epa.gov/mapper/mobile/EJSCREEN_mobile.aspx?geometry=%7B%22x%22:-157.813873,%22y%22:21.296188,%22spatialReference%22:%7B%22wkid%22:4326%7D%7D&unit=9035&areatype=&areaid=&basemap=streets&distance=1
EPA Programs:	CWA; RCRA
Federal Facility:	Yes
Federal Agency:	Not reported
Facility FIPS Code:	15003

BARBERS POINT NAVAL AIR STATION (Continued) **1027329035**

Facility Indian Country Flag:	N
Facility Collection Method:	ADDRESS MATCHING-OTHER
Facility Derived HUC:	20060000
Facility Derived WBD:	200600000303
Facility Derived CD113:	01
Facility Derived CB2010:	150030027011006
Facility Major Flag:	Not reported
Facility Active Flag:	Y
Facility Inspection Count:	0
Facility Date Last Inspection:	6/1/2011
Facility Days Last Inspection:	3,867
Facility Informal Count:	0
Facility Date Last Informal Action:	5/19/1994
Facility Formal Action Count:	0
Facility Date Last Formal Action:	Not reported
Facility Total Penalties:	0
Facility Penalty Count:	Not reported
Facility Date Last Penalty:	Not reported
Facility Last Penalty AMT:	Not reported
Facility QTRS With NC:	0
Facility Programs With SNC:	0
Facility Compliance Status:	No Violation Identified
Facility SNC Flag:	N
AIR Flag:	N
NPDES Flag:	Y
SDWIS Flag:	Y
RCRA Flag:	Y
TRI Flag:	N
GHG Flag:	N
AIR IDS:	Not reported
CAA Permit Types:	Not reported
CAA NAICS:	Not reported
CAA SICS:	Not reported
NPDES IDS:	HI0110043 HIU000215
CWA Permit Types:	Minor
CWA NAICS:	Not reported
CWA SICS:	9711
RCRA IDS:	HI1170024326 HI1170090004 HI5170090067 HI8170090049 HIR000138560
RCRA Permit Types:	Other, VSQG
RCRA NAICS:	92811 48811
SDWA IDS:	HI0000355
SDWA System Types:	Community water system
SDWA Compliance Status:	No Violation Identified
SDWA SNC Flag:	N
TRI IDS:	Not reported
TRI Releases Transfers:	Not reported
TRI On Site Releases:	Not reported
TRI Off Site Transfers:	Not reported
TRI Reporter:	Not reported
Facility IMP Water Flag:	Y

331 SW 1/8-1/4 0.223 mi. 1179 ft. **FORT DERUSSY, FORMER LEAKING UST SITE (BUILDING 10** **HI SHWS** **S126282427 N/A**

FORT DERUSSY, HI

Actual: 3 ft.
Focus Map: 8

SHWS:

Name:	FORT DERUSSY, FORMER LEAKING UST SITE (BUILDING 107 & BUILDING 108)
Address:	Not reported
City,State,Zip:	FORT DERUSSY, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2123
Location Description:	Not reported
Is Public:	True
Update On:	2020-03-02 11:50:02
Latitude:	21.282575
Longitude:	-157.831899

BP332 NE 1/8-1/4 0.223 mi. 1179 ft. **LOVES BAKERY** **HI SHWS** **U001235444**
836 KAPAHULU AVE **HI LUST** **N/A**
HONOLULU, HI 96816 **HI UST**

Site 1 of 2 in cluster BP

Actual: 15 ft.
Focus Map: 8

SHWS:

Name:	836 KAPAHULU AVENUE
Address:	836 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported

LOVES BAKERY (Continued) **U001235444**

Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1614
Location Description:	836 Kapahulu Ave, Honolulu, HI 96815
Is Public:	True
Update On:	2021-01-20 16:21:07
Latitude:	21.283784
Longitude:	-157.814348

LUST:

Name:	LOVES BAKERY
Address:	836 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101278
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/25/1993
Release ID:	910059
Project Officer:	Jose Ruiz

UST:

Name:	LOVES BAKERY
Address:	836 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101278
Owner:	LOVES BAKERY
Owner Address:	836 KAPAHULU AVE
Owner City,St,Zip:	Honolulu, 96816 96816

LOVES BAKERY (Continued) **U001235444**

Latitude:	21.282907
Longitude:	-157.814123
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	03/25/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	8000
Substance:	Diesel
Name:	LOVES BAKERY
Address:	836 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-2
Date Installed:	03/24/1966
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	2000
Substance:	Gasoline
Name:	LOVES BAKERY
Address:	836 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-3
Date Installed:	03/24/1966
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	500
Substance:	Used Oil
Name:	LOVES BAKERY
Address:	836 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-4
Date Installed:	03/24/1966
Tank Status:	**Permanently Out of Use**
Date Closed:	12/01/1981
Tank Capacity:	5000
Substance:	Diesel
Name:	LOVES BAKERY
Address:	836 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-5
Date Installed:	03/24/1966
Tank Status:	**Permanently Out of Use**
Date Closed:	12/01/1981
Tank Capacity:	Not reported
Substance:	Diesel

BQ333 **1414 KALAKAUA AVENUE-ALOHA/KING LLC** **HI SHWS** **S106816203**
SSW **1414 KALAKAUA AVE** **HI ENG CONTROLS** **N/A**
1/8-1/4 **HONOLULU, HI 96826** **HI INST CONTROL**
0.223 mi. **HI VCP**
1179 ft. **Site 1 of 2 in cluster BQ**

Actual:
20 ft.

Focus Map:
5

SHWS:

Name:	1414 KALAKAUA AVENUE-ALOHA/KING LLC
Address:	1414 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	VRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2693
Location Description:	1414 Kalakaua Ave, Honolulu, HI 96826
Is Public:	True
Update On:	2021-02-05 08:27:56
Latitude:	21.297812
Longitude:	-157.837292

ENG CONTROLS:

Supplemental Location Text:	1524 S King St corner (property on both addresses)
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls

1414 KALAKAUA AVENUE-ALOHA/KING LLC (Continued) **S106816203**

Supplemental Location: 1524 S King St corner (property on both addresses)
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

VCP:
Name: 1414 KALAKAUA AVENUE-ALOHA/KING LLC
Address: 1414 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96826
Program: VRP
Zip Suffix: Not reported
Supplemental Location: Not reported
Island: Oahu
Facility ID: 2693
Location Description: 1414 Kalakaua Ave, Honolulu, HI 96826
Latitude: 21.297812
Longitude: -157.837292

BR334 **ILIKAI** **RCRA NonGen / NLR** **1007092117**
SSE **1777 ALA MOANA BLVD** **FINDS** **HID982402166**
1/8-1/4 **HONOLULU, HI 96815** **ECHO**
0.224 mi.
1185 ft. **Site 1 of 2 in cluster BR**

Actual:
3 ft.

Focus Map:
7

RCRA Listings:
Date Form Received by Agency: 20210517
Handler Name: RENAISSANCE ILIKAI WAIKIKI
Handler Address: 1777 ALA MOANA BLVD
Handler City,State,Zip: HONOLULU, HI 96815
EPA ID: HID982402166
Contact Name: Not reported
Contact Address: Not reported
Contact City,State,Zip: HI
Contact Telephone: 808-942-1828 x1
Contact Fax: Not reported
Contact Email: Not reported
Contact Title: Not reported
EPA Region: 09
Land Type: Private
Federal Waste Generator Description: Not a generator, verified
Non-Notifier: Not reported
Biennial Report Cycle: Not reported
Accessibility: Not reported
Active Site Indicator: Not reported
State District Owner: Not reported
State District: Not reported
Mailing Address: ALA MOANA BLVD
Mailing City,State,Zip: HONOLULU, HI 96815
Owner Name: FORWARD ONE LLC
Owner Type: Private
Operator Name: INTERSTATE HOTELS AND RESORTS
Operator Type: Private
Short-Term Generator Activity: No
Importer Activity: No
Mixed Waste Generator: No
Transporter Activity: No
Transfer Facility Activity: No

ILIKAI (Continued) **1007092117**

Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210517
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002

ILIKAI (Continued) **1007092117**

Waste Description: CORROSIVE WASTE

Waste Code: D003
Waste Description: REACTIVE WASTE

Waste Code: D004
Waste Description: ARSENIC

Waste Code: D005
Waste Description: BARIUM

Waste Code: D006
Waste Description: CADMIUM

Waste Code: D007
Waste Description: CHROMIUM

Waste Code: D008
Waste Description: LEAD

Waste Code: D009
Waste Description: MERCURY

Waste Code: D010
Waste Description: SELENIUM

Waste Code: D011
Waste Description: SILVER

Waste Code: D018
Waste Description: BENZENE

Waste Code: D035
Waste Description: METHYL ETHYL KETONE

Waste Code: F001
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

ILIKAI (Continued) **1007092117**

Owner/Operator Indicator:	Owner
Owner/Operator Name:	FORWARD ONE LLC
Legal Status:	Private
Date Became Current:	20000201
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	INTERSTATE HOTELS AND RESORTS
Legal Status:	Private
Date Became Current:	20000201
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	JOWA HAWAII COMPANY LTD
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	FORWARD ONE LLC
Legal Status:	Private
Date Became Current:	20000201
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	INTERSTATE HOTELS AND RESORTS
Legal Status:	Private
Date Became Current:	20000201
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported

ILIKAI (Continued) **1007092117**

Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20210517
Handler Name: RENAISSANCE ILIKAI WAIKIKI
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 19891101
Handler Name: ILIKAI HOTEL
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20030521
Handler Name: RENAISSANCE ILIKAI WAIKIKI
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 72111
NAICS Description: HOTELS (EXCEPT CASINO HOTELS) AND MOTELS

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

ILIKAI (Continued) **1007092117**

FINDS:
Registry ID: 110005726385

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER
Registry ID: 110059703922

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
US National Pollutant Discharge Elimination System (NPDES) module of the Compliance Information System (ICIS) tracks surface water permits issued under the Clean Water Act. Under NPDES, all facilities that discharge pollutants from any point source into waters of the United States are required to obtain a permit. The permit will likely contain limits on what can be discharged, impose monitoring and reporting requirements, and include other provisions to ensure that the discharge does not adversely affect water quality.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1007092117
Registry ID:	110059703922
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110059703922
Name:	ILIKAI HOTEL AND SUITES
Address:	1777 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815

Envid:	1007092117
Registry ID:	110005726385
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005726385
Name:	ILIKAI
Address:	1777 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815

BR335 **ILIKAI HOTEL** **HI LUST** **1000267863**
SSE **1777 ALA MOANA BLVD** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.224 mi.
1185 ft. **Site 2 of 2 in cluster BR**

Actual:
3 ft.

Focus Map:
7

LUST:

Name:	ILIKAI HOTEL
Address:	1777 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102181
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	09/26/1994
Release ID:	900084
Project Officer:	Eric Sadoyama

UST:

Name:	ILIKAI HOTEL
Address:	1777 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102181
Owner:	ILIKAI HOTEL
Owner Address:	1777 ALA MOANA BLVD
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.284460
Longitude:	-157.838160
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	05/15/1990
Tank Capacity:	10000
Substance:	Diesel

BQ336 **GAS PLUS** **HI LUST** **U001235103**
SSW **1524 S KING ST** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96826**
0.226 mi.
1193 ft. **Site 2 of 2 in cluster BQ**

Actual:
20 ft.

Focus Map:
4

LUST:

Name:	GAS PLUS
Address:	1524 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100224
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	06/01/2011
Release ID:	960030
Project Officer:	To VRP

UST:

Name:	GAS PLUS
Address:	1524 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100224
Owner:	FIRST DISCOUNT AUTO LEASING CORP
Owner Address:	1580 MAKALOA ST., SUITE 880

GAS PLUS (Continued) **U001235103**

Owner City,St,Zip: Honolulu, 96826 96826
Latitude: 21.297626
Longitude: -157.837237
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Map

Tank ID: R-001
Date Installed: 05/16/1985
Tank Status: **Permanently Out of Use**
Date Closed: 07/20/1995
Tank Capacity: 10000
Substance: Gasoline

Name: GAS PLUS
Address: 1524 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-002
Date Installed: 05/16/1985
Tank Status: **Permanently Out of Use**
Date Closed: 07/21/1995
Tank Capacity: 12000
Substance: Gasoline

Name: GAS PLUS
Address: 1524 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-003
Date Installed: 05/16/1985
Tank Status: **Permanently Out of Use**
Date Closed: 07/21/1995
Tank Capacity: 12000
Substance: Gasoline

BO337 **BERETANIA TEXACO 90423** **HI LUST** **U003221686**
West **1378 S BERETANIA ST** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96814** **HI Financial Assurance**
0.229 mi.
1209 ft. **Site 3 of 4 in cluster BO**

Actual: **23 ft.**
Focus Map: **4**

LUST:
Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-101720
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 04/20/1999
Release ID: 960076
Project Officer: Shunsheng Fu

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-101720
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 07/11/2018
Release ID: 170008

BERETANIA TEXACO 90423 (Continued) **U003221686**

Project Officer: Shunsheng Fu

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-101720
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 12/28/1994
Release ID: 880012
Project Officer: Shunsheng Fu

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-101720
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 08/08/2005
Release ID: 040024
Project Officer: Shunsheng Fu

UST:
Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-101720
Owner: CHEVRON PRODUCTS COMPANY
Owner Address: 91-480 MALAKOLE ST.
Owner City,St,Zip: Honolulu, 96814 96814
Latitude: 21.300820
Longitude: -157.839600
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1
Date Installed: 05/29/1987
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Diesel

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: 1
Date Installed: 05/29/1987
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Diesel

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: 1
Date Installed: 05/29/1987

BERETANIA TEXACO 90423 (Continued) **U003221686**

Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Diesel
Name:	BERETANIA TEXACO 90423
Address:	1378 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	1
Date Installed:	05/29/1987
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Diesel
Name:	BERETANIA TEXACO 90423
Address:	1378 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2
Date Installed:	05/29/1987
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	BERETANIA TEXACO 90423
Address:	1378 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2
Date Installed:	05/29/1987
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	BERETANIA TEXACO 90423
Address:	1378 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2
Date Installed:	05/29/1987
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasohol
Name:	BERETANIA TEXACO 90423
Address:	1378 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	2
Date Installed:	05/29/1987
Tank Status:	**Currently in Use**
Date Closed:	Not reported

BERETANIA TEXACO 90423 (Continued) **U003221686**

Tank Capacity: 10000
Substance: Gasohol

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: 3
Date Installed: 05/29/1987
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: 3
Date Installed: 05/29/1987
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: 3
Date Installed: 05/29/1987
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: 3
Date Installed: 05/29/1987
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

HI Financial Assurance:
Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

BERETANIA TEXACO 90423 (Continued) **U003221686**

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 04/27/2012
FR Archive: True

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Guarantee
Expiration Date: 04/27/2012
FR Archive: True

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Guarantee
Expiration Date: 04/27/2012
FR Archive: True

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Guarantee

BERETANIA TEXACO 90423 (Continued) **U003221686**

Expiration Date: 04/24/2016
FR Archive: False

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 04/24/2016
FR Archive: False

Name: BERETANIA TEXACO 90423
Address: 1378 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101720
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Guarantee
Expiration Date: 04/24/2016
FR Archive: False

BO338 **IES RETAIL S. BERETANIA STREET** **RCRA-VSQG** **1008880419**
West **1378 S BERETANIA ST** **HIR000136960**
1/8-1/4 **HONOLULU, HI 96814**
0.229 mi.
1209 ft. **Site 4 of 4 in cluster BO**

Actual:
23 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:		20161024
Handler Name:	IES RETAIL S. BERETANIA STREET	
Handler Address:		1378 S BERETANIA ST
Handler City,State,Zip:		HONOLULU, HI 96814
EPA ID:		HIR000136960
Contact Name:		MARC DEXTER
Contact Address:		91-480 MALAKOLE ST.
Contact City,State,Zip:		KAPOLEI, HI 96707
Contact Telephone:		808-682-5711
Contact Fax:		808-682-2214
Contact Email:		MARC.DEXTER@ISLANDENERGYSERVICES.COM
Contact Title:		EHS MANAGER
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		91-480 MALAKOLE ST.
Mailing City,State,Zip:		KAPOLEI, HI 96707
Owner Name:	IES RETAIL, LLC	
Owner Type:		Private
Operator Name:	IES RETAIL, LLC	
Operator Type:		Private
Short-Term Generator Activity:		No

IES RETAIL S. BERETANIA STREET (Continued) **1008880419**

Importer Activity:	No
Mixed Waste Generator:	No
Transporter Activity:	No
Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20161027
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

IES RETAIL S. BERETANIA STREET (Continued) **1008880419**

Hazardous Waste Summary:
Waste Code: D018
Waste Description: BENZENE

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: CHEVRON USA INC
Legal Status: Private
Date Became Current: 19910701
Date Ended Current: Not reported
Owner/Operator Address: PO BOX 6004
Owner/Operator City,State,Zip: SAN RAMON, CA 94583
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: IES RETAIL, LLC
Legal Status: Private
Date Became Current: 20161101
Date Ended Current: Not reported
Owner/Operator Address: 30 ROCKEFELLER PLAZA
Owner/Operator City,State,Zip: NEW YORK, NY 10115
Owner/Operator Telephone: 212-605-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: CHEVRON USA INC
Legal Status: Private
Date Became Current: 19910701
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: IES RETAIL, LLC
Legal Status: Private
Date Became Current: 20161101
Date Ended Current: Not reported
Owner/Operator Address: 30 ROCKEFELLER PLAZA
Owner/Operator City,State,Zip: NEW YORK, NY 10115
Owner/Operator Telephone: 212-605-6000
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20050916
Handler Name: CHEVRON 90423

IES RETAIL S. BERETANIA STREET (Continued) **1008880419**

Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20161024
Handler Name:	IES RETAIL S. BERETANIA STREET
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	44711
NAICS Description:	GASOLINE STATIONS WITH CONVENIENCE STORES

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

BN339 **KYOTARU HAWAII CORPORATION** **HI LUST** **U003790350**
SW **2160 KALAKAUA AVE** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.231 mi.
1219 ft. **Site 2 of 3 in cluster BN**

Actual:
3 ft.

Focus Map:
8

LUST:

Name:	KYOTARU HAWAII CORPORATION
Address:	2160 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103722
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	12/11/2001
Release ID:	010043
Project Officer:	Richard Takaba

UST:

Name:	KYOTARU HAWAII CORPORATION
Address:	2160 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103722

KYOTARU HAWAII CORPORATION (Continued) **U003790350**

Owner: KYOTARU HAWAII CORPORATION
Owner Address: 770 KAPIOLANI BLVD, SUITE 702
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.280839
Longitude: -157.830037
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 01/01/1969
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1986
Tank Capacity: 8000
Substance: Gasoline

---

340 ENE 1/8-1/4 0.231 mi. 1220 ft. **DOROTHY TANAKA** **HI UST** **U001235303**
3423 CAMPBELL AVE **N/A**
HONOLULU, HI 96815

Actual: 20 ft.
Focus Map: 8

UST:
Name: DOROTHY TANAKA
Address: 3423 CAMPBELL AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100947
Owner: DOROTHY TANAKA
Owner Address: 3423 CAMPBELL AVE
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-001
Date Installed: 05/04/1941
Tank Status: **Permanently Out of Use**
Date Closed: 03/01/1985
Tank Capacity: 120
Substance: Gasoline

BH341 SW 1/8-1/4 0.231 mi. 1221 ft. **WAIKIKI SHOPPING PLAZA** **HI UST** **U004364800**
2250 KALAKAUA AVE **HI Financial Assurance** **N/A**
HONOLULU, HI
Site 4 of 5 in cluster BH

Actual: 3 ft.
Focus Map: 8

UST:
Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-103520
Owner: WAIKIKI SHOPPING PLAZA
Owner Address: 2270 KALAKAUA AVE SUTE 1800
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.279877

WAIKIKI SHOPPING PLAZA (Continued) **U004364800**

Longitude: -157.828422
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: r-2
Date Installed: 01/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 07/02/2009
Tank Capacity: 200
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: r-2
Date Installed: 01/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 07/02/2009
Tank Capacity: 200
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: r-2
Date Installed: 01/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 07/02/2009
Tank Capacity: 200
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: r-2
Date Installed: 01/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 07/02/2009
Tank Capacity: 200
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: r-2
Date Installed: 01/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 07/02/2009
Tank Capacity: 200
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE

WAIKIKI SHOPPING PLAZA (Continued) **U004364800**

City,State,Zip: HONOLULU, HI

Tank ID: r-2
Date Installed: 01/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 07/02/2009
Tank Capacity: 200
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-M-1
Date Installed: 09/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 06/16/2018
Tank Capacity: 1000
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: r-M-1
Date Installed: 09/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 06/16/2018
Tank Capacity: 1000
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: r-M-1
Date Installed: 09/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 06/16/2018
Tank Capacity: 1000
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: r-M-1
Date Installed: 09/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 06/16/2018
Tank Capacity: 1000
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

WAIKIKI SHOPPING PLAZA (Continued) **U004364800**

Tank ID: r-M-1
Date Installed: 09/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 06/16/2018
Tank Capacity: 1000
Substance: Diesel

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI

Tank ID: r-M-1
Date Installed: 09/01/1977
Tank Status: **Permanently out of Use**
Date Closed: 06/16/2018
Tank Capacity: 1000
Substance: Diesel

HI Financial Assurance:
Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-103520
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 11/28/2016
FR Archive: True

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-103520
Tank Id: r-M-1
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 11/28/2016
FR Archive: True

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-103520
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 11/28/2018
FR Archive: False

Name: WAIKIKI SHOPPING PLAZA
Address: 2250 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-103520
Tank Id: r-M-1
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 11/28/2018

WAIKIKI SHOPPING PLAZA (Continued) **U004364800**

FR Archive: False

BH342 **WAIKIKI SHOPPING PLAZA** **HI LUST** **S109842040**
SW **2250 KALAKAUA AVE** **N/A**
1/8-1/4 **HONOLULU, HI 96815**
0.231 mi.
1221 ft. **Site 5 of 5 in cluster BH**

Actual: **3 ft.**

Focus Map: **8**

LUST:

Name:	WAIKIKI SHOPPING PLAZA
Address:	2250 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-103520
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	09/04/2009
Release ID:	090022
Project Officer:	Richard Takaba

BS343 **SAFEWAY INC** **RCRA NonGen / NLR** **1025883855**
East **900 KAPAHULU AVE** **HIP000138230**
1/8-1/4 **HONOLULU, HI 96815**
0.232 mi.
1223 ft. **Site 1 of 2 in cluster BS**

Actual: **14 ft.**

Focus Map: **8**

RCRA Listings:

Date Form Received by Agency:		20070923
Handler Name:	SAFEWAY INC	
Handler Address:		900 KAPAHULU AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIP000138230
Contact Name:		JEFF M BROWN
Contact Address:		4410 ROSEWOOD DR
Contact City,State,Zip:		PLEASANTON, CA 94588
Contact Telephone:		925-226-5845
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		4410 ROSEWOOD DR
Mailing City,State,Zip:		PLEASANTON, CA 94588
Owner Name:	SAFEWAY INC	
Owner Type:		Private
Operator Name:	SAFEWAY INC	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No

SAFEWAY INC (Continued) **1025883855**

Transfer Facility Activity:	No
Recycler Activity with Storage:	No
Small Quantity On-Site Burner Exemption:	No
Smelting Melting and Refining Furnace Exemption:	No
Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20071002
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D018
Waste Description:	BENZENE

SAFEWAY INC (Continued) **1025883855**

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name:	SAFEWAY INC
Legal Status:	Private
Date Became Current:	20060101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	SAFEWAY INC
Legal Status:	Private
Date Became Current:	20060101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	SAFEWAY INC
Legal Status:	Private
Date Became Current:	20060101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	SAFEWAY INC
Legal Status:	Private
Date Became Current:	20060101
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	20070923
Handler Name: SAFEWAY INC	
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No

SAFEWAY INC (Continued) **1025883855**

Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20070608
Handler Name: SAFEWAY INC	
Federal Waste Generator Description:	Large Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	45322
NAICS Description:	GIFT, NOVELTY, AND SOUVENIR STORES

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

BS344 **FORMERLY DUNKIN DOUGHNUTS** **HI LUST U004109512**
East **900 KAPAHULU AVE** **HI UST N/A**
1/8-1/4 **HONOLULU, HI 96816**
0.232 mi.
1223 ft. **Site 2 of 2 in cluster BS**

Actual:
14 ft.

Focus Map:
8

LUST:

Name:	FORMERLY DUNKIN DOUGHNUTS
Address:	900 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-103835
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/17/2007
Release ID:	070023
Project Officer:	Richard Takaba

UST:

Name:	FORMERLY DUNKIN DOUGHNUTS
Address:	900 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-103835
Owner:	Safeway Inc.
Owner Address:	4410 Rosewood Drive
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.284283

FORMERLY DUNKIN DOUGHNUTS (Continued) **U004109512**

Longitude: -157.814001
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: r-1
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 05/24/2007
Tank Capacity: 300
Substance: Used Oil

Name: FORMERLY DUNKIN DOUGHNUTS
Address: 900 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-2
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 05/30/2007
Tank Capacity: 500
Substance: Not Listed

Name: FORMERLY DUNKIN DOUGHNUTS
Address: 900 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: r-3
Date Installed: Not reported
Tank Status: **Permanently out of Use**
Date Closed: 05/30/2007
Tank Capacity: 500
Substance: Not Listed

BT345 **YONEOKA AND ASSOCIATES** **HI LUST** **U003154769**
SW **2174/2190 KALAKAUA AVE** **HI UST** **N/A**
1/8-1/4 **HONOLULU, HI 96800**
0.234 mi.
1234 ft. **Site 1 of 2 in cluster BT**

Actual:
5 ft.

Focus Map:
8

LUST:
Name: YONEOKA AND ASSOCIATES
Address: 2174/2190 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96800
Facility ID: 9-103024
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 07/29/1996
Release ID: 950056
Project Officer: Steven Okoji

UST:
Name: YONEOKA AND ASSOCIATES
Address: 2174/2190 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96800
Facility ID: 9-103024
Owner: YONEOKA AND ASSOCIATES
Owner Address: 1088 BISHOP ST, SUITE 1212
Owner City,St,Zip: Honolulu, 96800 96800

YONEOKA AND ASSOCIATES (Continued) **U003154769**

Latitude:	21.280591
Longitude:	-157.829827
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	500
Substance:	Diesel

BT346 **WAIKIKI BAZAAR** **HI SHWS** **1006819697**
SW **2174 KALAKAUA AVE** **HI SPILLS** **N/A**
1/8-1/4 **HONOLULU, HI 96816**
0.234 mi.
1234 ft. **Site 2 of 2 in cluster BT**

Actual:
5 ft.

Focus Map:
8

SHWS:

Name:	WAIKIKI BAZAAR
Address:	2174 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	2174/2190 Kalakaua Ave
Island:	Oahu
Environmental Interest:	Waikiki Bazaar
HID Number:	Not reported
Facility Registry Identifier:	110013775478
Lead Agency:	HEER Office
Program:	State
Project Manager:	Diane England
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Waikiki Bazaar
HID Number:	Not reported
Facility Registry Identifier:	110013775478
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Petroleum in soil
Nature of Residual Contamination:	No (petroleum in soil) contamination left on site is above EALs.
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	11/09/2005
Document Number:	2005-573-DE
Document Subject:	No Further Action Determination for Release ID 19950222-2
Project Manager:	Diane England
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1047
Location Description:	2174 Kalakaua Ave, Honolulu, HI 96816
Is Public:	True
Update On:	2021-02-05 11:13:14

WAIKIKI BAZAAR (Continued) **1006819697**

Latitude: 21.280619
Longitude: -157.829837

SPILLS:
Name: WAIKIKI BAZAAR
Address: 2174 KALAKAUA AVE
Address 2: Not reported
City,State,Zip: HONOLULU, HI 96816
Island: Oahu
Supplemental Loc. Text: 2174/2190 Kalakaua Ave
Case Number: 19950222-2
Facility Registry ID: 110013775478
HID Number: Not reported
Lead and Program: HEER EP&R
ER: Not reported
Less Or Greater Than: Not reported
Units: Waikiki Bazaar
Activity Type: Response
Activity Lead: Terry Corpus
Assignment End Date: Not reported
Result: Refer to ISST
File Under: Yoneoka and Associates
Substances: petroleum
Quanity: Not reported
Units: Not reported
Reported Date: Not reported
Release Date: Not reported
Release Duration: Not reported
Media: Not reported
Waterbody: Not reported
Summary: Not reported

Is Noteworthy for Reports: Not reported
Is the Release a Fugitive Dumping: Not reported
Tax Map Key: Not reported
Assigned SOSC: Not reported
Notified Agencies: Not reported
Response Measures Taken: Not reported
Incident Report Number: Not reported
Coordination Needed: Not reported
Tier II Facility: Not reported
RMP: Not reported
Follow-up Received On: Not reported
Cost Recovery: Not reported
Invoice To: Not reported
Closed Date: Not reported
Comments: Not reported
Latitude: 21.295943000000001
Longitude: -157.789548

Name: WAIKIKI BAZAAR
Address: 2174 KALAKAUA AVE
Address 2: Not reported
City,State,Zip: HONOLULU, HI 96816
Island: Oahu
Supplemental Loc. Text: 2174/2190 Kalakaua Ave
Case Number: 19950222-2

WAIKIKI BAZAAR (Continued) **1006819697**

Facility Registry ID:	110013775478
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Waikiki Bazaar
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Yoneoka and Associates
Substances:	petroleum
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.280588000000002
Longitude:	-157.829838
Name:	WAIKIKI BAZAAR
Address:	2174 KALAKAUA AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	2174/2190 Kalakaua Ave
Case Number:	19950222-2
Facility Registry ID:	110013775478
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Waikiki Bazaar
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Yoneoka and Associates

WAIKIKI BAZAAR (Continued) **1006819697**

Substances:	petroleum
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.280816999999999
Longitude:	-157.83013199999999

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347 SW 1/8-1/4 0.234 mi. 1238 ft. **MILL CAMOUFLAGE 1.2** **FUDS** **1024902050 N/A**

HONOLULU, HI

Actual: 3 ft.

Focus Map: 8

FUDS:

EPA Region:	09
Installation ID:	HI99799F396700
Congressional District Number:	1
Name:	MILL CAMOUFLAGE 1.2
FUDS Number:	H09HI0232
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	1763
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=55915
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	SITE WAS USED TO DYE AND WEAVE GARLANDS INTO CAMOUFLAGE NETS AND MANUFACTURING DUMMY ARTICLES. THE MILL AREAS DISSOLVED ON 15 SEPTEMBER 1945.
Project Required:	No
Feature Description:	Not reported

MILL CAMOUFLAGE 1.2 (Continued) **1024902050**

Latitude: 21.285
Longitude: -157.835

BU348 **HECO POLE-MOUNT TRANSFORMERS NO. 51098 (15), 51099** **HI SHWS** **S113230446**
SE **3133 WAIALAE AVE** **HI SPILLS** **N/A**
1/8-1/4 **HONOLULU, HI 96816**
0.235 mi.
1242 ft. **Site 1 of 2 in cluster BU**

Actual:
85 ft.

Focus Map:
9

SHWS:

Name:	HECO POLE-MOUNT TRANSFORMERS NO. 51098, 51099 AND 51100
Address:	3133 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2549
Location Description:	3133 Waialae Ave, Palolo
Is Public:	True
Update On:	2020-01-18 18:45:40
Latitude:	21.288093
Longitude:	-157.809690

SPILLS:

Name:	HECO POLE-MOUNT TRANSFORMERS NO. 51098 (15), 51099 (15), 51100 (3)
Address:	3133 WAIALAE AVE
Address 2:	PALOLO
City,State,Zip:	HONOLULU, HI 96816

HECO POLE-MOUNT TRANSFORMERS NO. 51098 (15), 51099 (15), 511 (Continued) **S113230446**

Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20070719-0815
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	Not reported
Units:	HECO Pole-Mount Transformers No. 51098 (15)
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to SDAR
File Under:	Hawaiian Electric Co., Inc. (HECO)
Substances:	Oil Lubricating
Quanity:	33
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

BV349 **1003 AND 1013 KAHEKA STREET** **HI SHWS** **S118943644**
SSW **1003 KAHEKA ST** **N/A**
1/8-1/4 **HONOLULU, HI 96814**
0.237 mi.
1254 ft. **Site 1 of 2 in cluster BV**

Actual:
19 ft.

Focus Map:
4

SHWS:

Name:	1003 AND 1013 KAHEKA STREET
Address:	1003 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	1003 and 1013 Kaheka Street
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office

1003 AND 1013 KAHEKA STREET (Continued) **S118943644**

Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	1003 and 1013 Kaheka Street
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Found: Lead-only one hit at 2 to 3 feet bgs over residential EAL.
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	08/25/2016
Document Number:	2016-449-ES
Document Subject:	Review of Additional Limited Phase II Environmental Investigation, 1003 and 1013 Kaheka St, TMK 1-2-4-005-005 and -006, Honolulu, Oahu HI, Aug 24, 2016, Project No 17016-016076.00
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1051
Location Description:	1003 Kaheka St, 1013 Kaheka St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.298001
Longitude:	-157.837792

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350 SSE 1/8-1/4 0.239 mi. 1262 ft. **FORT DERUSSY CENTRAL OFFICE** **HI UST** **U003221692**
ALA MOANA BLVD & KALIA RD **HI Financial Assurance** **N/A**
HONOLULU, HI 96815

Actual: 3 ft.
Focus Map: 8

UST:

Name:	FORT DERUSSY CENTRAL OFFICE
Address:	ALA MOANA BLVD & KALIA RD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101787
Owner:	Hawaiian Telcom
Owner Address:	1177 Bishop Street, Suite 30
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-M-1
Date Installed:	07/02/1987
Tank Status:	**Permanently Out of Use**
Date Closed:	11/12/1998

FORT DERUSSY CENTRAL OFFICE (Continued) **U003221692**

Tank Capacity: 550
Substance: Gasoline

HI Financial Assurance:
Name: FORT DERUSSY CENTRAL OFFICE
Address: ALA MOANA BLVD & KALIA RD
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101787
Tank Id: R-M-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

BL351 **PAN AM BLDG** **RCRA-VSQG** **1004688981**
NNW **1600 KAPIOLANI BLVD** **FINDS** **HIR000052431**
1/8-1/4 **HONOLULU, HI 96814** **ECHO**
0.241 mi.
1272 ft. **Site 3 of 3 in cluster BL**

Actual:
3 ft.

Focus Map:
4

RCRA Listings:

Date Form Received by Agency:		19990520
Handler Name:	PAN AM BLDG	
Handler Address:		1600 KAPIOLANI BLVD
Handler City,State,Zip:		HONOLULU, HI 96814
EPA ID:		HIR000052431
Contact Name:		TIMOTHY RYCHLEC
Contact Address:		1600 KAPIOLANI BLVD
Contact City,State,Zip:		HONOLULU, HI 96814
Contact Telephone:		808-944-8100
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		1600 KAPIOLANI BLVD
Mailing City,State,Zip:		HONOLULU, HI 96814
Owner Name:	STATE TEACHERS RETIREMNT SYS	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No

PAN AM BLDG (Continued) **1004688981**

Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	STATE TEACHERS RETIREMNT SYS
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	1600 KAPIOLANI BLVD
Owner/Operator City,State,Zip:	HONOLULU, HI 96814
Owner/Operator Telephone:	808-944-8100

PAN AM BLDG (Continued) **1004688981**

Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19990520
Handler Name: PAN AM BLDG
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

FINDS:
Registry ID: 110005730389

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
NCDB (National Compliance Data Base) supports implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). The system tracks inspections in regions and states with cooperative agreements, enforcement actions, and settlements.
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1004688981
Registry ID: 110005730389
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110005730389
Name: PAN AM BLDG
Address: 1600 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI 96814

BN352 **LONGS DRUG STORE #10621** **RCRA-VSQG** **1018155841**
SW **2155 KALAKAUA AVE** **FINDS** **HIR000143396**
1/8-1/4 **HONOLULU, HI 96815** **ECHO**
0.243 mi.
1285 ft. **Site 3 of 3 in cluster BN**

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		20210718
Handler Name:	LONGS DRUG STORE #10621	
Handler Address:		2155 KALAKAUA AVE
Handler City,State,Zip:		HONOLULU, HI 96815
EPA ID:		HIR000143396
Contact Name:		NICOLE WILKINSON
Contact Address:		CVS DRIVE MC2340
Contact City,State,Zip:		WOONSOCKET, RI 02895
Contact Telephone:		401-770-7132
Contact Fax:		Not reported
Contact Email:		NICOLE.WILKINSON@CVSHEALTH.COM
Contact Title:		DIRECTOR, CORPORATE ENVIRONMENTAL
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		CVS DRIVE MC2340
Mailing City,State,Zip:		WOONSOCKET, RI 02895
Owner Name:	S2155 SPE, LLC	
Owner Type:		Private
Operator Name:	LONGS DRUG STORES CALIFORNIA, LLC	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

LONGS DRUG STORE #10621 (Continued) **1018155841**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210721
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	H

Biennial: List of Years
Year: 2019

Click Here for Biennial Reporting System Data:
Year: 2017

Click Here for Biennial Reporting System Data:

Hazardous Waste Summary:
Waste Code: D001
Waste Description: IGNITABLE WASTE

Waste Code: D002
Waste Description: CORROSIVE WASTE

Waste Code: D004
Waste Description: ARSENIC

Waste Code: D005
Waste Description: BARIUM

Waste Code: D006
Waste Description: CADMIUM

Waste Code: D007

LONGS DRUG STORE #10621 (Continued) **1018155841**

Waste Description:	CHROMIUM
Waste Code:	D008
Waste Description:	LEAD
Waste Code:	D009
Waste Description:	MERCURY
Waste Code:	D010
Waste Description:	SELENIUM
Waste Code:	D011
Waste Description:	SILVER
Waste Code:	D016
Waste Description:	2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)
Waste Code:	D018
Waste Description:	BENZENE
Waste Code:	D024
Waste Description:	M-CRESOL
Waste Code:	D027
Waste Description:	1,4-DICHLOROBENZENE
Waste Code:	D035
Waste Description:	METHYL ETHYL KETONE
Waste Code:	D039
Waste Description:	TETRACHLOROETHYLENE
Waste Code:	P001
Waste Description:	2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%
Waste Code:	P012
Waste Description:	ARSENIC OXIDE AS2O3 (OR) ARSENIC TRIOXIDE
Waste Code:	P075
Waste Description:	NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS
Waste Code:	P188
Waste Description:	BENZOIC ACID, 2-HYDROXY-, COMPD. WITH (3AS-CIS)-1,2,3,3A,8,8A-HEXAHYDRO-1,3A,8-TRIMETHYLPYRROLO[2,3-B]INDOL-5-YL METHYLCARBAMATE ESTER (1:1) (OR) PHYSOSTIGMINE SALICYLATE
Waste Code:	U002
Waste Description:	2-PROPANONE (I) (OR) ACETONE (I)
Waste Code:	U010
Waste Description:	AZIRINO [2',3':3,4]PYRROLO[1,2-A]INDOLE-4,7-DIONE, 6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1A,2,8,8A,8B-HEXAHYDRO-8A-METHOXY-5-METHYL-, [1AS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]- (OR) MITOMYCIN C

LONGS DRUG STORE #10621 (Continued) **1018155841**

Waste Code: U031
Waste Description: 1-BUTANOL (I) (OR) N-BUTYL ALCOHOL (I)

Waste Code: U034
Waste Description: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

Waste Code: U035
Waste Description: BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) CHLORAMBUCIL

Waste Code: U044
Waste Description: CHLOROFORM (OR) METHANE, TRICHLORO-

Waste Code: U058
Waste Description: 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS(2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE (OR) CYCLOPHOSPHAMIDE

Waste Code: U059
Waste Description: 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHA-L-LYXO-HEXOPYRANOSYL)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)- (OR) DAUNOMYCIN

Waste Code: U070
Waste Description: BENZENE, 1,2-DICHLORO- (OR) O-DICHLOROBENZENE

Waste Code: U072
Waste Description: BENZENE, 1,4-DICHLORO- (OR) P-DICHLOROBENZENE

Waste Code: U089
Waste Description: DIETHYLSTILBESTEROL (OR) PHENOL, 4,4'-(1,2-DIETHYL-1,2-ETHENEDIYL)BIS, (E)-

Waste Code: U122
Waste Description: FORMALDEHYDE

Waste Code: U129
Waste Description: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

Waste Code: U132
Waste Description: HEXACHLOROPHENE (OR) PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-

Waste Code: U150
Waste Description: L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) MELPHALAN

Waste Code: U151
Waste Description: MERCURY

Waste Code: U154
Waste Description: METHANOL (I) (OR) METHYL ALCOHOL (I)

Waste Code: U165
Waste Description: NAPHTHALENE

Waste Code: U188
Waste Description: PHENOL

LONGS DRUG STORE #10621 (Continued) **1018155841**

Waste Code: U200
Waste Description: RESERPINE (OR) YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-

Waste Code: U201
Waste Description: 1,3-BENZENEDIOL (OR) RESORCINOL

Waste Code: U204
Waste Description: SELENIOUS ACID (OR) SELENIUM DIOXIDE

Waste Code: U205
Waste Description: SELENIUM SULFIDE (OR) SELENIUM SULFIDE SES2 (R,T)

Waste Code: U206
Waste Description: D-GLUCOSE, 2-DEOXY-2-[[(METHYLNITROSOAMINO)-CARBONYL]AMINO]- (OR) GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-,D- (OR) STREPTOZOTOCIN

Waste Code: U210
Waste Description: ETHENE, TETRACHLORO- (OR) TETRACHLOROETHYLENE

Waste Code: U279
Waste Description: U279

Waste Code: U411
Waste Description: U411

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: S2155 SPE, LLC
Legal Status: Private
Date Became Current: 20141027
Date Ended Current: Not reported
Owner/Operator Address: 1440 KAPIOLANI BLVD, STE 1010
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-921-2155
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20151011
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20151011

LONGS DRUG STORE #10621 (Continued) **1018155841**

Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: S2155 SPE, LLC
Legal Status: Private
Date Became Current: 20141027
Date Ended Current: Not reported
Owner/Operator Address: 1440 KAPIOLANI BLVD, STE 1010
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-921-2155
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20151011
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: S2155 SPE, LLC
Legal Status: Private
Date Became Current: 20141027
Date Ended Current: Not reported
Owner/Operator Address: 1440 KAPIOLANI BLVD, STE 1010
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-921-2155
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Owner
Owner/Operator Name: S2155 SPE, LLC
Legal Status: Private
Date Became Current: 20141027
Date Ended Current: Not reported
Owner/Operator Address: 1440 KAPIOLANI BLVD, STE 1010
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-921-2155
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Owner

LONGS DRUG STORE #10621 (Continued) **1018155841**

Owner/Operator Name: S2155 SPE, LLC
Legal Status: Private
Date Became Current: 20141027
Date Ended Current: Not reported
Owner/Operator Address: 1440 KAPIOLANI BLVD, STE 1010
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-921-2155
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20151011
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: S2155 SPE, LLC
Legal Status: Private
Date Became Current: 20141027
Date Ended Current: Not reported
Owner/Operator Address: 1440 KAPIOLANI BLVD, STE 1010
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-921-2155
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20151011
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Owner/Operator Indicator: Operator
Owner/Operator Name: LONGS DRUG STORES CALIFORNIA, LLC
Legal Status: Private
Date Became Current: 20151011
Date Ended Current: Not reported
Owner/Operator Address: 1 CVS DRIVE
Owner/Operator City,State,Zip: WOONSOCKET, RI 02895
Owner/Operator Telephone: 401-765-1500
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported

LONGS DRUG STORE #10621 (Continued) **1018155841**

Owner/Operator Email: NICOLE.WILKINSON@CVSHEALTH.COM

Historic Generators:

Receive Date: 20180228
Handler Name: LONGS DRUG STORE #10621
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20200228
Handler Name: LONGS DRUG STORE #10621
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20151030
Handler Name: LONGS DRUG STORE #10621
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20170530
Handler Name: LONGS DRUG STORE #10621
Federal Waste Generator Description: Large Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20201212
Handler Name: LONGS DRUG STORE #10621

LONGS DRUG STORE #10621 (Continued) **1018155841**

Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

Receive Date:	20210718
Handler Name:	LONGS DRUG STORE #10621
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

List of NAICS Codes and Descriptions:

NAICS Code:	44611
NAICS Description:	PHARMACIES AND DRUG STORES

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

FINDS:

Registry ID: 110066984552

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
HAZARDOUS WASTE BIENNIAL REPORTER
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1018155841
Registry ID:	110066984552

LONGS DRUG STORE #10621 (Continued) **1018155841**

DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110066984552
Name: LONGS DRUG STORE #10621
Address: 2155 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

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353 SW 1/8-1/4 0.245 mi. 1294 ft. **FORT DERUSSY MILITARY RESERVATION** **HI LUST U003711689**
BLDG 107 AND 108 **HI UST N/A**
HONOLULU, HI 96815

Actual: 3 ft.
Focus Map: 8

LUST:
Name: FORT DERUSSY MILITARY RESERVATION
Address: BLDG 107 AND 108
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-103512
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 04/19/2000
Release ID: 000068
Project Officer: To DERA

UST:
Name: FORT DERUSSY MILITARY RESERVATION
Address: BLDG 107 AND 108
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-103512
Owner: US ARMY PACIFIC
Owner Address: FORT DERUSSY
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.283867
Longitude: -157.833557
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 12/21/1993
Tank Capacity: 280
Substance: Diesel

Name: FORT DERUSSY MILITARY RESERVATION
Address: BLDG 107 AND 108
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 12/21/1993
Tank Capacity: 500
Substance: Diesel

BP354 **SAFEWAY STORE #2747** **RCRA-VSQG** **1017770198**
East **888 KAPAHULU AVENUE** **FINDS** **HIR000142935**
1/8-1/4 **HONOLULU, HI 96816**
0.245 mi.
1295 ft. **Site 2 of 2 in cluster BP**

Actual:
15 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		20210722
Handler Name:	SAFEWAY STORE #2747	
Handler Address:		888 KAPAHULU AVENUE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HIR000142935
Contact Name:		KEITH B POWERS
Contact Address:		STONERIDGE MALL ROAD
Contact City,State,Zip:		PLEASANTON, CA 94588
Contact Telephone:		510-246-0358
Contact Fax:		623-869-1548
Contact Email:		KEITH.POWERS@SAFEWAY.COM
Contact Title:		ENVIRONMENTAL COMPLIANCE MANAGER
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		STONERIDGE MALL ROAD
Mailing City,State,Zip:		PLEASANTON, CA 94588
Owner Name:	HONOLULU RETAIL OWNER INC	
Owner Type:		Private
Operator Name:	SAFEWAY	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported

SAFEWAY STORE #2747 (Continued) **1017770198**

Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210722
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	H

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D007
Waste Description:	CHROMIUM
Waste Code:	D010
Waste Description:	SELENIUM
Waste Code:	D011
Waste Description:	SILVER
Waste Code:	P001
Waste Description:	2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%
Waste Code:	P075
Waste Description:	NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

SAFEWAY STORE #2747 (Continued) **1017770198**

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	HONOLULU RETAIL OWNER INC
Legal Status:	Private
Date Became Current:	20070101
Date Ended Current:	Not reported
Owner/Operator Address:	ATTN ASSET MANAGER
Owner/Operator City,State,Zip:	DALLAS, TX 75240
Owner/Operator Telephone:	972-715-7400
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name:	HONOLULU RETAIL OWNER INC
Legal Status:	Private
Date Became Current:	20070101
Date Ended Current:	Not reported
Owner/Operator Address:	ATTN ASSET MANAGER
Owner/Operator City,State,Zip:	DALLAS, TX 75240
Owner/Operator Telephone:	972-715-7400
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	SAFEWAY
Legal Status:	Private
Date Became Current:	20071109
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	SAFEWAY
Legal Status:	Private
Date Became Current:	20071109
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	20140908
Handler Name: SAFEWAY STORE #2747	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No

SAFEWAY STORE #2747 (Continued) **1017770198**

Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

Receive Date:	20210722
Handler Name:	SAFEWAY STORE #2747
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

List of NAICS Codes and Descriptions:

NAICS Code:	445110
NAICS Description:	SUPERMARKETS AND OTHER GROCERY RETAILERS (EXCEPT CONVENIENCE RETAILERS)

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

FINDS:

Registry ID:	110063759687

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

BW355 **KALAKAUA TRANSMISSION** **HI SHWS** **S106817112**
NNW **1665 KALAKAUA AVE** **HI ENG CONTROLS** **N/A**
1/4-1/2 **HONOLULU, HI 96826** **HI INST CONTROL**
0.253 mi.
1336 ft. **Site 1 of 2 in cluster BW**

Actual:
3 ft.

Focus Map:
5

SHWS:

Name:	KALAKAUA TRANSMISSION
Address:	1665 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1028
Location Description:	1665 Kalakaua Ave, Honolulu, HI 96826
Is Public:	True
Update On:	2021-02-05 10:39:24
Latitude:	21.292700
Longitude:	-157.837000

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls

KALAKAUA TRANSMISSION (Continued) **S106817112**

Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

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356
NNE
1/4-1/2
0.254 mi.
1340 ft.

LUNALILO ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS **HI SHWS** **S126282914**
810 PUMEHANA ST **N/A**
HONOLULU, HI 96826

Actual:
3 ft.

Focus Map:
5

SHWS:

Name:	LUNALILO ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	810 PUMEHANA ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2926
Location Description:	810 Pumehana St, Honolulu, HI 96826, USA
Is Public:	True
Update On:	2021-11-10 16:51:53
Latitude:	21.292527
Longitude:	-157.833109

BX357 **PUNAHOU REPAIR SHOP** **HI LUST** **1000146579**
South **1558 S KING ST** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96826**
0.254 mi.
1341 ft. **Site 1 of 2 in cluster BX**

Actual:
18 ft.

Focus Map:
5

LUST:

Name:	PUNAHOU REPAIR SHOP
Address:	1558 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-101387
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	09/26/1997
Release ID:	920184
Project Officer:	David Hodges

UST:

Name:	PUNAHOU REPAIR SHOP
Address:	1558 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-101387
Owner:	PUNAHOU REPAIR SHOP
Owner Address:	1558 S KING ST
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.297281
Longitude:	-157.836347
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

Tank ID:	R-1
Date Installed:	03/15/1951
Tank Status:	**Permanently Out of Use**
Date Closed:	06/11/1992
Tank Capacity:	2000
Substance:	Used Oil

Name:	PUNAHOU REPAIR SHOP
Address:	1558 S KING ST
City,State,Zip:	HONOLULU, HI 96826

Tank ID:	R-2
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	06/11/1992
Tank Capacity:	3000
Substance:	Gasoline

Name:	PUNAHOU REPAIR SHOP
Address:	1558 S KING ST
City,State,Zip:	HONOLULU, HI 96826

Tank ID:	R-3
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	06/11/1992
Tank Capacity:	150
Substance:	Used Oil

BU358 **CHAMINADE UNIVERSITY** **HI LUST** **U001235151**
ESE **3140 WAIALAE AVE** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96816**
0.257 mi.
1359 ft. **Site 2 of 2 in cluster BU**

Actual:
82 ft.

Focus Map:
9

LUST:

Name:	CHAMINADE UNIVERSITY
Address:	3140 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100309
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	09/26/1997
Release ID:	900037
Project Officer:	Lene Ichinotsubo

UST:

Name:	CHAMINADE UNIVERSITY
Address:	3140 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100309
Owner:	ST. LOUIS-CHAMINADE ED. CENTER
Owner Address:	3140 WAIALAE AVE
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.288103
Longitude:	-157.809115
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-001
Date Installed:	04/01/1946
Tank Status:	**Permanently Out of Use**
Date Closed:	12/05/1989
Tank Capacity:	250
Substance:	Gasoline
Name:	CHAMINADE UNIVERSITY
Address:	3140 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-002
Date Installed:	04/01/1946
Tank Status:	**Permanently Out of Use**
Date Closed:	12/05/1989
Tank Capacity:	500
Substance:	Gasoline
Name:	CHAMINADE UNIVERSITY
Address:	3140 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Tank ID:	R-003
Date Installed:	04/01/1946
Tank Status:	**Permanently Out of Use**
Date Closed:	12/05/1989
Tank Capacity:	1500
Substance:	Diesel
Name:	CHAMINADE UNIVERSITY

CHAMINADE UNIVERSITY (Continued) **U001235151**

Address: 3140 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-004
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 12/05/1988
Tank Capacity: 4000
Substance: Diesel

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359 East 1/4-1/2 0.259 mi. 1369 ft.

SERVICE CLEANERS **HI SHWS** **S126283157**
936 KAPAHULU AVE **N/A**
HONOLULU, HI 96816

Actual: **17 ft.**

Focus Map: **8**

SHWS:

Name:	SERVICE CLEANERS
Address:	936 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	902
Location Description:	936 Kapahulu Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.285040
Longitude:	-157.813676

360
SW
1/4-1/2
0.259 mi.
1370 ft.

FORT DERUSSY TRANSFORMERS BY BUILDING T-111 AND 20
2058 MALUHIA RD
HONOLULU, HI

HI SHWS
S123640232
N/A

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	FORT DERUSSY TRANSFORMERS BY BUILDING T-111 AND 2058 MALUHIA ROAD
Address:	2058 MALUHIA RD
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	243
Location Description:	2058 Maluhia Rd
Is Public:	True
Update On:	2019-07-04 13:31:26
Latitude:	21.284022
Longitude:	-157.833197

361
NE
1/4-1/2
0.260 mi.
1375 ft.

1911 KEEAUMOKU STREET
1911 KEEAUMOKU ST
HONOLULU, HI 96822

HI SHWS
S128196193
N/A

Actual:
135 ft.

Focus Map:
5

SHWS:

Name:	1911 KEEAUMOKU STREET
Address:	1911 KEEAUMOKU ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported

1911 KEEAUMOKU STREET (Continued) **S128196193**

Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	3076
Location Description:	1911 Keeaumoku St, Honolulu, HI 96822
Is Public:	True
Update On:	2021-11-12 17:48:45
Latitude:	21.307938
Longitude:	-157.832618

362
NW
1/4-1/2
0.263 mi.
1390 ft.

2700 SOUTH KING STREET
2700 S KING ST
HONOLULU, HI 96826

HI SHWS **S106815419**
HI ENG CONTROLS **N/A**
HI INST CONTROL
HI SPILLS

Actual:
8 ft.

Focus Map:
5

SHWS:

Name:	2700 SOUTH KING STREET
Address:	2700 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	2700 South King Street
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Clarence Callahan
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls

2700 SOUTH KING STREET (Continued) **S106815419**

Island:	Oahu
SDAR Environmental Interest Name:	2700 South King Street
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Lead above industrial EALs is present under an asphalt cap.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	The Site is limited to commercial use. The parking lot cover (asphalt) must remain in place, otherwise the ash layer with lead contamination at 15 inches bgs must be removed.
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	02/03/2004
Document Number:	2004-039-CAC
Document Subject:	No Further Characterization Required
Project Manager:	Clarence Callahan
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	978
Location Description:	2700 S King St, Honolulu, HI 96826
Is Public:	True
Update On:	2021-02-05 08:29:48
Latitude:	21.291488
Longitude:	-157.819816

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SPILLS:

Name:	2700 SOUTH KING STREET
Address:	2700 S KING ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96826
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20031126-0717
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R

2700 SOUTH KING STREET (Continued) **S106815419**

ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Lead Above DOH Tier 1 Action Levels
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2003-11-25 00:00:00
Result:	Refer to ISST
File Under:	AMM Family Patners, C/o Mr. Roy Sekiguchi
Substances:	Lead
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.291354999999999
Longitude:	-157.819861
Name:	2700 SOUTH KING STREET
Address:	2700 S KING ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96826
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20031126-0717
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Lead Above DOH Tier 1 Action Levels
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2003-11-25 00:00:00
Result:	Refer to ISST
File Under:	AMM Family Patners, C/o Mr. Roy Sekiguchi
Substances:	Lead
Quanity:	Not reported
Units:	Not reported

2700 SOUTH KING STREET (Continued) **S106815419**

Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.291378999999999
Longitude:	-157.81989200000001
Name:	2700 SOUTH KING STREET
Address:	2700 S KING ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96826
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20031126-0717
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Lead Above DOH Tier 1 Action Levels
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2003-11-25 00:00:00
Result:	Refer to ISST
File Under:	AMM Family Patners, C/o Mr. Roy Sekiguchi
Substances:	Lead
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported

2700 SOUTH KING STREET (Continued) **S106815419**

Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.291408000000001
Longitude:	-157.82630499999999

BV363 **MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)** **HI LUST** **U001235016**
SSW **1505 S. KING ST.** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96826** **HI Financial Assurance**
0.264 mi.
1396 ft. **Site 2 of 2 in cluster BV**

Actual:
16 ft.

Focus Map:
4

LUST:

Name:	MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address:	1505 S. KING ST.
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100041
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/01/2007
Release ID:	070020
Project Officer:	Shunsheng Fu

Name:	MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address:	1505 S. KING ST.
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100041
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	12/09/1998
Release ID:	960074
Project Officer:	Shunsheng Fu

Name:	MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address:	1505 S. KING ST.
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100041
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	05/20/1996
Release ID:	930032
Project Officer:	Shunsheng Fu

UST:

Name:	MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address:	1505 S. KING ST.
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100041
Owner:	Mid Pac Petroleum LLC
Owner Address:	677 Ala Moana Blvd Suite 625
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.297313

MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL) (Continued) **U001235016**

Longitude: -157.837634
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-3943-1
Date Installed: 08/12/1956
Tank Status: **Permanently Out of Use**
Date Closed: 07/01/1996
Tank Capacity: 5000
Substance: Gasoline

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-3943-2
Date Installed: 08/12/1956
Tank Status: **Permanently Out of Use**
Date Closed: 07/01/1996
Tank Capacity: 7500
Substance: Gasoline

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-3943-4
Date Installed: 08/12/1956
Tank Status: **Permanently Out of Use**
Date Closed: 07/01/1996
Tank Capacity: 550
Substance: Used Oil

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 01/01/1990
Tank Status: **Permanently out of Use**
Date Closed: 03/29/2007
Tank Capacity: 12000
Substance: Gasoline

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/01/1990
Tank Status: **Permanently out of Use**
Date Closed: 03/29/2007
Tank Capacity: 12000
Substance: Gasoline

HI Financial Assurance:
Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)

MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL) (Continued) **U001235016**

Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: R-3943-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: R-3943-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported

MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL) (Continued) **U001235016**

FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: R-3943-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: R-3943-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: R-3943-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MID PAC PETROLEUM 253943 (PREV: LIONEL'S UNOCAL)
Address: 1505 S. KING ST.
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100041
Tank Id: R-3943-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

BY364 **STAN SHINKAWN INC** **SEMS-ARCHIVE** **1003879128**
SW **2330 KALAKAUA AVE** **HID980497325**
1/4-1/2 **HONOLULU, HI 96815**
0.267 mi.
1409 ft. **Site 1 of 2 in cluster BY**

Actual:
3 ft.

Focus Map:
8

SEMS Archive:
Site ID: 0902870
EPA ID: HID980497325
Name: STAN SHINKAWN INC
Address: 2330 KALAKAUA AVE
Address 2: Not reported
City,State,Zip: HONOLULU, HI 96815
Cong District: 01
FIPS Code: 15003
FF: N

STAN SHINKAWN INC (Continued) **1003879128**

NPL: Not on the NPL
Non NPL Status: NFRAP-Site does not qualify for the NPL based on existing information

SEMS Archive Detail:

Region: 09
Site ID: 0902870
EPA ID: HID980497325
Site Name: STAN SHINKAWN INC
NPL: N
FF: N
OU: 00
Action Code: VS
Action Name: ARCH SITE
SEQ: 1
Start Date: Not reported
Finish Date: 1984-09-01 05:00:00
Qual: Not reported
Current Action Lead: EPA Perf In-Hse

Region: 09
Site ID: 0902870
EPA ID: HID980497325
Site Name: STAN SHINKAWN INC
NPL: N
FF: N
OU: 00
Action Code: DS
Action Name: DISCVRY
SEQ: 1
Start Date: 1980-02-01 05:00:00
Finish Date: 1980-02-01 05:00:00
Qual: Not reported
Current Action Lead: EPA Perf

Region: 09
Site ID: 0902870
EPA ID: HID980497325
Site Name: STAN SHINKAWN INC
NPL: N
FF: N
OU: 00
Action Code: PA
Action Name: PA
SEQ: 1
Start Date: Not reported
Finish Date: 1984-09-01 05:00:00
Qual: N
Current Action Lead: EPA Perf

BY365
SW
1/4-1/2
0.267 mi.
1409 ft.

STAN SHINKAWA INC
2330 KALAKAUA AVE
HONOLULU, HI 96815

Site 2 of 2 in cluster BY

HI SHWS **1006819939**
N/A

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	STAN SHINKAWA INC
Address:	2330 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	International Marketplace
Island:	Oahu
Environmental Interest:	Stan Shinkawa Inc
HID Number:	HID980497325
Facility Registry Identifier:	110013778126
Lead Agency:	HEER Office
Program:	State
Project Manager:	Dan Chang
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Stan Shinkawa Inc
HID Number:	HID980497325
Facility Registry Identifier:	110013778126
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Found: Only small quantities of cyanide solution (1/2 pt/yr) and sulfuric acid (1 lb/yr), below RQs, are used in this jewelry manufacturing facility.
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	ISST NFA - No Letter
Document Date:	03/25/1996
Document Number:	Not reported
Document Subject:	Site Screening Sheet for Stan Shinkawa
Project Manager:	Dan Chang
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1011
Location Description:	2330 Kalakaua Ave, Halau Building Room 207
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.278361
Longitude:	-157.826592

BZ366 **DICK'S MONSARRAT SERVICE** **HI LUST** **U003221657**
East **3206 MONSARRAT AVE** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96815** **HI Financial Assurance**
0.267 mi.
1412 ft. **Site 1 of 2 in cluster BZ**

Actual:
46 ft.

Focus Map:
8

LUST:

Name:	DICK'S MONSARRAT SERVICE
Address:	3206 MONSARRAT AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101220
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	05/05/2003
Release ID:	030017
Project Officer:	Richard Takaba

UST:

Name:	DICK'S MONSARRAT SERVICE
Address:	3206 MONSARRAT AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101220
Owner:	CHEVRON PRODUCTS COMPANY
Owner Address:	91-480 MALAKOLE ST.
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.425260
Longitude:	-157.952090
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

Tank ID:	1
Date Installed:	Not reported
Tank Status:	**Permanently out of Use**
Date Closed:	Not reported
Tank Capacity:	12000
Substance:	Gasoline

Name:	DICK'S MONSARRAT SERVICE
Address:	3206 MONSARRAT AVE
City,State,Zip:	HONOLULU, HI 96815

Tank ID:	2
Date Installed:	Not reported
Tank Status:	**Permanently out of Use**
Date Closed:	Not reported
Tank Capacity:	12000
Substance:	Gasoline

Name:	DICK'S MONSARRAT SERVICE
Address:	3206 MONSARRAT AVE
City,State,Zip:	HONOLULU, HI 96815

Tank ID:	R-4
Date Installed:	09/15/1986
Tank Status:	**Permanently Out of Use**
Date Closed:	01/18/2003
Tank Capacity:	1000
Substance:	Used Oil

Name:	DICK'S MONSARRAT SERVICE

DICK'S MONSARRAT SERVICE (Continued) **U003221657**

Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-87
Date Installed: 09/15/1986
Tank Status: **Permanently Out of Use**
Date Closed: 01/08/2003
Tank Capacity: 10000
Substance: Gasoline

Name: DICK'S MONSARRAT SERVICE
Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-89
Date Installed: 09/15/1986
Tank Status: **Permanently Out of Use**
Date Closed: 01/08/2003
Tank Capacity: 10000
Substance: Gasoline

Name: DICK'S MONSARRAT SERVICE
Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-92
Date Installed: 09/15/1986
Tank Status: **Permanently Out of Use**
Date Closed: 01/08/2003
Tank Capacity: 10000
Substance: Gasoline

HI Financial Assurance:
Name: DICK'S MONSARRAT SERVICE
Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101220
Tank Id: R-87
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: DICK'S MONSARRAT SERVICE
Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101220
Tank Id: R-89
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: DICK'S MONSARRAT SERVICE
Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101220

DICK'S MONSARRAT SERVICE (Continued) **U003221657**

Tank Id: 2
Tank Status: Permanently out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: DICK'S MONSARRAT SERVICE
Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101220
Tank Id: 1
Tank Status: Permanently out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: DICK'S MONSARRAT SERVICE
Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101220
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: DICK'S MONSARRAT SERVICE
Address: 3206 MONSARRAT AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101220
Tank Id: R-92
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

367
SW
1/4-1/2
0.270 mi.
1423 ft.

HERTZ RENT- A-CAR (AREA 2602-10)
2424 KALAKAUA AVE
HONOLULU, HI 96815

HI LUST **U001235217**
HI UST **N/A**

Actual:
3 ft.

Focus Map:
8

LUST:
Name: HERTZ RENT- A-CAR (AREA 2602-10)
Address: 2424 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100759
Facility Status: Site Cleanup Completed with EHE/EHMP
Facility Status Date: 01/28/2014
Release ID: 080004
Project Officer: Shaobin Li

Name: BUDGET RENT-A-CAR SYSTEMS INC 2105
Address: 2424 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-101527
Facility Status: Site Cleanup Completed with EHE/EHMP
Facility Status Date: 01/28/2014

HERTZ RENT- A-CAR (AREA 2602-10) (Continued) **U001235217**

Release ID: 080003
Project Officer: Shaobin Li

UST:

Name:	HERTZ RENT- A-CAR (AREA 2602-10)
Address:	2424 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100759
Owner:	THE HERTZ CORPORATION
Owner Address:	225 BRAE BLVD
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.275885
Longitude:	-157.825459
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	r-1
Date Installed:	01/31/1975
Tank Status:	**Permanently out of Use**
Date Closed:	10/01/2007
Tank Capacity:	10000
Substance:	Gasoline
Name:	BUDGET RENT-A-CAR SYSTEMS INC 2105
Address:	2424 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	r-1
Date Installed:	04/23/1970
Tank Status:	**Permanently out of Use**
Date Closed:	10/09/2007
Tank Capacity:	6500
Substance:	Gasoline
Name:	BUDGET RENT-A-CAR SYSTEMS INC 2105
Address:	2424 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	r-1
Date Installed:	04/23/1970
Tank Status:	**Permanently out of Use**
Date Closed:	10/09/2007
Tank Capacity:	6500
Substance:	Gasoline

BW368 **GAS 'N GLO INC** **HI LUST** **U001235256**
NNW **1670 MAKALOA ST** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96814**
0.271 mi.
1430 ft. **Site 2 of 2 in cluster BW**

Actual:
3 ft.

Focus Map:
4

LUST:

Name:	GAS 'N GLO INC
Address:	1670 MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100834
Facility Status:	Site Cleanup Completed (NFA)

GAS 'N GLO INC (Continued) **U001235256**

Facility Status Date: 07/22/1998
Release ID: 980097
Project Officer: Lene Ichinotsubo

UST:

Name:	GAS 'N GLO INC
Address:	1670 MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100834
Owner:	GAS 'N GLO INC
Owner Address:	Not reported
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.292974
Longitude:	-157.837506
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	R-1
Date Installed:	04/03/1983
Tank Status:	**Permanently Out of Use**
Date Closed:	05/20/1998
Tank Capacity:	10000
Substance:	Gasoline

Name:	GAS 'N GLO INC
Address:	1670 MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814

Tank ID:	R-2
Date Installed:	04/03/1983
Tank Status:	**Permanently Out of Use**
Date Closed:	05/20/1998
Tank Capacity:	10000
Substance:	Gasoline

Name:	GAS 'N GLO INC
Address:	1670 MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814

Tank ID:	R-3
Date Installed:	04/03/1983
Tank Status:	**Permanently Out of Use**
Date Closed:	05/20/1998
Tank Capacity:	10000
Substance:	Gasoline

Name:	GAS 'N GLO INC
Address:	1670 MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814

Tank ID:	R-4
Date Installed:	04/03/1983
Tank Status:	**Permanently Out of Use**
Date Closed:	05/20/1998
Tank Capacity:	5000
Substance:	Gasoline

GAS 'N GLO INC (Continued) **U001235256**

Name: GAS 'N GLO INC
Address: 1670 MAKALOA ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-5
Date Installed: 04/03/1983
Tank Status: **Permanently Out of Use**
Date Closed: 05/20/1998
Tank Capacity: 5000
Substance: Diesel

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369 ABC STORE UNDERGROUND STORAGE TANK REMOVAL **HI SHWS 1006820346**
SW 2546 LEMON RD **HI SPILLS N/A**
1/4-1/2 HONOLULU, HI 96815
0.271 mi.
1433 ft.

Actual:
3 ft.

Focus Map:
8

SHWS:
Name: ABC STORE UNDERGROUND STORAGE TANK REMOVAL
Address: 2546 LEMON RD
City,State,Zip: HONOLULU, HI 96815
Supplemental Location: Paka Moana Apartments
Island: Oahu
Environmental Interest: ABC Store Underground Storage Tank Removal
HID Number: Not reported
Facility Registry Identifier: 110013782923
Lead Agency: HEER Office
Program: State
Project Manager: Mark Sutterfield
Hazard Priority: NFA
Potential Hazards And Controls: No Hazard
Island: Oahu
SDAR Environmental Interest Name: ABC Store Underground Storage Tank Removal
HID Number: Not reported
Facility Registry Identifier: 110013782923
Lead Agency: HEER Office
Potential Hazard And Controls: No Hazard
Priority: NFA
Assessment: Response Necessary
Response: Response Complete
Nature of Contamination: Found: Benzo[a]pyrene above HDOH EALs.
Nature of Residual Contamination: No contamination above HDOH EALs.
Use Restrictions: No Hazard Present for Unrestricted Residential Use
Engineering Control: Not reported
Description of Restrictions: Not reported
Institutional Control: Not reported
Within Designated Areawide Contamination: Not reported
Site Closure Type: No Further Action Letter - Unrestricted Residential Use
Document Date: 03/14/2005
Document Number: 2005-138-MS
Document Subject: NFA for UST removal
Project Manager: Mark Sutterfield
Contact Information: (808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID: 1411
Location Description: 2546 Lemon Rd, Honolulu, HI 96815
Is Public: True
Update On: 2021-09-01 11:01:07
Latitude: 21.273084

ABC STORE UNDERGROUND STORAGE TANK REMOVAL (Continued) **1006820346**

Longitude:	-157.821989

SPILLS:

Name:	ABC STORE UNDERGROUND STORAGE TANK REMOVAL
Address:	2546 LEMON RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Paka Moana Apartments
Case Number:	19981023-1015
Facility Registry ID:	110013782923
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	ABC Store Underground Storage Tank Removal
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	ABC Stores
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.272414999999999
Longitude:	-157.821797
Name:	ABC STORE UNDERGROUND STORAGE TANK REMOVAL
Address:	2546 LEMON RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Paka Moana Apartments
Case Number:	19981023-1015
Facility Registry ID:	110013782923

ABC STORE UNDERGROUND STORAGE TANK REMOVAL (Continued) **1006820346**

HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	ABC Store Underground Storage Tank Removal
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	ABC Stores
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.272535999999999
Longitude:	-157.821744

Name:	ABC STORE UNDERGROUND STORAGE TANK REMOVAL
Address:	2546 LEMON RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Paka Moana Apartments
Case Number:	19981023-1015
Facility Registry ID:	110013782923
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	ABC Store Underground Storage Tank Removal
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	ABC Stores
Substances:	Not reported

ABC STORE UNDERGROUND STORAGE TANK REMOVAL (Continued) **1006820346**

Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.271197000000001
Longitude:	-157.81720899999999

BZ370 **AIM DIAMOND HEAD** **HI LUST** **U001235165**
East **3203 MONSARRAT AVE.** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96815** **HI Financial Assurance**
0.275 mi.
1451 ft. **Site 2 of 2 in cluster BZ**

Actual:
50 ft.

Focus Map:
8

LUST:

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100337
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	02/12/2007
Release ID:	060018
Project Officer:	Allison Hutto

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100337
Facility Status:	Active Remediation
Facility Status Date:	05/08/2020
Release ID:	170003
Project Officer:	Allison Hutto

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100337
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/08/2006

AIM DIAMOND HEAD (Continued) **U001235165**

Release ID: 050026
Project Officer: Allison Hutto

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100337
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 09/21/2005
Release ID: 930096
Project Officer: Allison Hutto

UST:
Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100337
Owner: U.S. RESTAURANT PROPERTIES, INC
Owner Address: 12240 INWOOD RD #200
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.269527
Longitude: -157.811027
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 6A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

AIM DIAMOND HEAD (Continued) **U001235165**

Tank ID: 6A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 9000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 4800
Substance: Gasoline

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 4800
Substance: Gasoline

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 4800
Substance: Gasoline

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6B
Date Installed: 11/22/2016

AIM DIAMOND HEAD (Continued) **U001235165**

Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 4800
Substance: Gasoline

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 6B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 4800
Substance: Gasoline

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 7000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 7000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 7000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported

AIM DIAMOND HEAD (Continued) **U001235165**

Tank Capacity: 7000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7A
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 7000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 6800
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 6800
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 6800
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 6800
Substance: Diesel

AIM DIAMOND HEAD (Continued) **U001235165**

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: 7B
Date Installed: 11/22/2016
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 6800
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-3
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-3
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-3
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-3
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-3
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.

AIM DIAMOND HEAD (Continued) **U001235165**

City,State,Zip: HONOLULU, HI 96815

Tank ID: r-3
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Diesel

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-5
Date Installed: 02/07/1984
Tank Status: **Permanently Out of Use**
Date Closed: 11/01/2005
Tank Capacity: 550
Substance: Used Oil

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-5
Date Installed: 02/07/1984
Tank Status: **Permanently Out of Use**
Date Closed: 11/01/2005
Tank Capacity: 550
Substance: Used Oil

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-5
Date Installed: 02/07/1984
Tank Status: **Permanently Out of Use**
Date Closed: 11/01/2005
Tank Capacity: 550
Substance: Used Oil

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-5
Date Installed: 02/07/1984
Tank Status: **Permanently Out of Use**
Date Closed: 11/01/2005
Tank Capacity: 550
Substance: Used Oil

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

AIM DIAMOND HEAD (Continued) **U001235165**

Tank ID: r-5
Date Installed: 02/07/1984
Tank Status: **Permanently Out of Use**
Date Closed: 11/01/2005
Tank Capacity: 550
Substance: Used Oil

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87a
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87a
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87a
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87a
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87a
Date Installed: 02/07/1984

AIM DIAMOND HEAD (Continued) **U001235165**

Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87b
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87b
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87b
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87b
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-87b
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/03/2016

AIM DIAMOND HEAD (Continued) **U001235165**

Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-92
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-92
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-92
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-92
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-92
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Gasohol

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-92
Date Installed: 02/07/1984
Tank Status: **Permanently out of Use**
Date Closed: 11/04/2016
Tank Capacity: 10000
Substance: Gasohol

AIM DIAMOND HEAD (Continued) **U001235165**

HI Financial Assurance:

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100337
Tank Id:	6B
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100337
Tank Id:	7A
Tank Status:	Currently In Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100337
Tank Id:	r-5
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100337
Tank Id:	r-3
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100337
Tank Id:	r-87a
Tank Status:	Permanently out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	AIM DIAMOND HEAD
Address:	3203 MONSARRAT AVE.
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-100337
Tank Id:	6A
Tank Status:	Currently In Use

AIM DIAMOND HEAD (Continued) **U001235165**

FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-87b
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 7B
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-87b
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-87a
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815

AIM DIAMOND HEAD (Continued) **U001235165**

Alt Facility ID: 9-100337
Tank Id: r-5
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 6A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 7B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 7A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

AIM DIAMOND HEAD (Continued) **U001235165**

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 6B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 04/01/2014
FR Archive: True

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 7B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 6A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-87b
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 6B
Tank Status: Currently In Use
FRTYPE: Insurance

AIM DIAMOND HEAD (Continued) **U001235165**

Expiration Date: 09/15/2021
FR Archive: False

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-87a
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: 7A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-5
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

Name: AIM DIAMOND HEAD
Address: 3203 MONSARRAT AVE.
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-100337
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2021
FR Archive: False

CA371 **UH MANOA FACILITIES MANAGEMENT SHOP** **HI SHWS** **S110061848**
WSW **2002 EAST-WEST RD** **HI SPILLS** **N/A**
1/4-1/2 **HONOLULU, HI 96822**
0.278 mi.
1470 ft. **Site 1 of 3 in cluster CA**

Actual:
130 ft.

Focus Map:
5

SHWS:
Name: UH MANOA FACILITIES MANAGEMENT SHOP
Address: 2002 EAST-WEST RD
City,State,Zip: HONOLULU, HI 96822
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported

UH MANOA FACILITIES MANAGEMENT SHOP (Continued) **S110061848**

Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	858
Location Description:	Facilities Management Shop Adjacent to Warehouse #195 on access road
Is Public:	True
Update On:	2020-04-29 16:53:59
Latitude:	21.304095
Longitude:	-157.812481

SPILLS:

Name:	UNIVERSITY OF HAWAII AT MANOA
Address:	2002 EAST-WEST RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	Manoa Campus, Facility Management Shop
Case Number:	20100409-1225
Facility Registry ID:	110005723299
HID Number:	HID087190542
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	>
Units:	uh Gaartley Hall Transformer Spill
Activity Type:	Response
Activity Lead:	Curtis Martin
Assignment End Date:	Not reported
Result:	Not reported
File Under:	State of Hawaii, University of Hawaii
Substances:	Oil
Quanity:	25
Units:	Gallons
Reported Date:	Not reported

UH MANOA FACILITIES MANAGEMENT SHOP (Continued) **S110061848**

Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.319856999999999
Longitude:	-157.80983599999999
Name:	UNIVERSITY OF HAWAII AT MANOA
Address:	2002 EAST-WEST RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	Manoa Campus, Facility Management Shop
Case Number:	20100409-1225
Facility Registry ID:	110005723299
HID Number:	HID087190542
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	>
Units:	uh Gaartley Hall Transformer Spill
Activity Type:	Response
Activity Lead:	Curtis Martin
Assignment End Date:	Not reported
Result:	Not reported
File Under:	State of Hawaii, University of Hawaii
Substances:	Oil
Quanity:	25
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported

UH MANOA FACILITIES MANAGEMENT SHOP (Continued) **S110061848**

Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.296780999999999
Longitude:	-157.81999400000001

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372 **U.S. POSTAL SERVICE - WAIKIKI** **HI LUST** **U003221691**
SW **330 SARATOGA RD** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96815** **HI Financial Assurance**
0.279 mi.
1472 ft.

Actual:
3 ft.

Focus Map:
8

LUST:

Name:	U.S. POSTAL SERVICE - WAIKIKI
Address:	330 SARATOGA RD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101770
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	06/22/2000
Release ID:	890009
Project Officer:	Shaobin Li

Name:	U.S. POSTAL SERVICE - WAIKIKI
Address:	330 SARATOGA RD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101770
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	12/22/2005
Release ID:	040067
Project Officer:	Shaobin Li

UST:

Name:	U.S. POSTAL SERVICE - WAIKIKI
Address:	330 SARATOGA RD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-101770
Owner:	U.S. POSTAL SERVICE
Owner Address:	850 CHERRY AVENUE
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.281112
Longitude:	-157.831626
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

Tank ID:	87
Date Installed:	09/30/1990
Tank Status:	**Permanently Out of Use**
Date Closed:	08/11/2004
Tank Capacity:	6000
Substance:	Gasoline

U.S. POSTAL SERVICE - WAIKIKI (Continued) **U003221691**

Name: U.S. POSTAL SERVICE - WAIKIKI
Address: 330 SARATOGA RD
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-1
Date Installed: 01/07/1972
Tank Status: **Permanently Out of Use**
Date Closed: 07/30/1990
Tank Capacity: 6000
Substance: Gasoline

HI Financial Assurance:
Name: U.S. POSTAL SERVICE - WAIKIKI
Address: 330 SARATOGA RD
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101770
Tank Id: 87
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: U.S. POSTAL SERVICE - WAIKIKI
Address: 330 SARATOGA RD
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101770
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: U.S. POSTAL SERVICE - WAIKIKI
Address: 330 SARATOGA RD
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101770
Tank Id: 87
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: U.S. POSTAL SERVICE - WAIKIKI
Address: 330 SARATOGA RD
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-101770
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

373
SW
1/4-1/2
0.281 mi.
1484 ft.

ALA WAI HARBOR FUEL DOCK
HONOLULU, HI

HI SHWS **S111704670**
N/A

Actual:
2 ft.

Focus Map:
7

SHWS:

Name:	ALA WAI HARBOR FUEL DOCK
Address:	Not reported
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2707
Location Description:	Ala Wai Harbor
Is Public:	True
Update On:	2019-06-01 08:52:08
Latitude:	21.285285
Longitude:	-157.843646

374
North
1/4-1/2
0.282 mi.
1490 ft.

C&CH PAWAA FIRE STATION
1610 MAKALOA ST
HONOLULU, HI 96814

HI LUST **1006843337**
N/A

Actual:
3 ft.

Focus Map:
4

LUST:

Name:	C&CH PAWAA FIRE STATION
Address:	1610 MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100087

C&CH PAWAA FIRE STATION (Continued) **1006843337**

Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 01/06/1999
Release ID: 940137
Project Officer: Eric Sadoyama

BX375 **HELE KING KALAKAUA #61018** **HI LUST** **U003402801**
South **1549 S KING ST** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96826** **HI Financial Assurance**
0.284 mi.
1500 ft. **Site 2 of 2 in cluster BX**

Actual:
15 ft.

Focus Map:
5

LUST:
Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-100059
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 10/13/2016
Release ID: 100006
Project Officer: Shunsheng Fu

UST:
Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-100059
Owner: HIE Retail LLC
Owner Address: 1132 Bishop St., Ste 2500
Owner City,St,Zip: Honolulu, 96826 96826
Latitude: 21.296716
Longitude: -157.836209
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1
Date Installed: 03/07/2014
Tank Status: **Currently In Use**

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 2
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST

HELE KING KALAKAUA #61018 (Continued) **U003402801**

City,State,Zip: HONOLULU, HI 96826

Tank ID: 3
Date Installed: 03/07/2014
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-3
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/19/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-3
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/19/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-3
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/19/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-3
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/19/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Tank ID: r-3
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/19/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-3
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/19/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-3
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/19/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-3
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/19/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 01/25/1987

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Tank Status:	**Permanently out of Use**
Date Closed:	01/29/2014
Tank Capacity:	10000
Substance:	Gasoline
Name:	HELE KING KALAKAUA #61018
Address:	1549 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-87
Date Installed:	01/25/1987
Tank Status:	**Permanently out of Use**
Date Closed:	01/29/2014
Tank Capacity:	10000
Substance:	Gasoline
Name:	HELE KING KALAKAUA #61018
Address:	1549 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-87
Date Installed:	01/25/1987
Tank Status:	**Permanently out of Use**
Date Closed:	01/29/2014
Tank Capacity:	10000
Substance:	Gasoline
Name:	HELE KING KALAKAUA #61018
Address:	1549 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-87
Date Installed:	01/25/1987
Tank Status:	**Permanently out of Use**
Date Closed:	01/29/2014
Tank Capacity:	10000
Substance:	Gasoline
Name:	HELE KING KALAKAUA #61018
Address:	1549 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-87
Date Installed:	01/25/1987
Tank Status:	**Permanently out of Use**
Date Closed:	01/29/2014
Tank Capacity:	10000
Substance:	Gasoline
Name:	HELE KING KALAKAUA #61018
Address:	1549 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-87
Date Installed:	01/25/1987
Tank Status:	**Permanently out of Use**
Date Closed:	01/29/2014

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 01/25/1987
Tank Status: **Permanently out of Use**
Date Closed: 01/29/2014
Tank Capacity: 10000
Substance: Gasoline

HI Financial Assurance:
Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST

HELE KING KALAKAUA #61018 (Continued) **U003402801**

City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Trust Fund
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Trust Fund
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Trust Fund
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Trust Fund
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Trust Fund
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Trust Fund
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Self Insured

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Expiration Date: 03/31/2010
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Self Insured
Expiration Date: 03/31/2010
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Self Insured
Expiration Date: 03/31/2010
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Self Insured
Expiration Date: 03/31/2010
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Self Insured
Expiration Date: 03/31/2010
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Self Insured
Expiration Date: 03/31/2010
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Guarantee
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Guarantee
Expiration Date: 03/31/2012
FR Archive: True

Name: HELE KING KALAKAUA #61018

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/25/2014
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/25/2014
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/25/2014
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/25/2014
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/25/2014
FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/25/2014

HELE KING KALAKAUA #61018 (Continued) **U003402801**

FR Archive: True

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-3
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 3
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: HELE KING KALAKAUA #61018
Address: 1549 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100059
Tank Id: 1

HELE KING KALAKAUA #61018 (Continued) **U003402801**

Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

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376 **AIM KAPAHULU** **HI LUST** **U001235399**
East **1001 KAPAHULU AVE** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96816** **HI Financial Assurance**
0.286 mi.
1512 ft.

Actual:
20 ft.

Focus Map:
8

LUST:
Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101175
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 11/30/1990
Release ID: 900064
Project Officer: Josh Nagashima

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101175
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 08/22/2016
Release ID: 160008
Project Officer: Josh Nagashima

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101175
Facility Status: Site Cleanup Completed with EHE/EHMP
Facility Status Date: 08/22/2016
Release ID: 150020
Project Officer: Josh Nagashima

UST:
Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101175
Owner: ALOHA PETROLEUM, LTD.
Owner Address: 1132 BISHOP STREET, SUITE 1700
Owner City,St,Zip: Honolulu, 96816 96816
Latitude: 21.285660
Longitude: -157.813160
Horizontal Reference Datum Name: NAD27
Horizontal Collection Method Name: GPS

Tank ID: 1
Date Installed: 10/01/1990
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000

AIM KAPAHULU (Continued) **U001235399**

Substance: Gasohol

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 1
Date Installed: 10/01/1990
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 2
Date Installed: 10/01/1990
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 2
Date Installed: 10/01/1990
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 04/04/1970
Tank Status: **Permanently Out of Use**
Date Closed: 01/23/1991
Tank Capacity: 5000
Substance: Gasoline

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 04/04/1970
Tank Status: **Permanently Out of Use**
Date Closed: 01/23/1991
Tank Capacity: 5000
Substance: Gasoline

AIM KAPAHULU (Continued) **U001235399**

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-2
Date Installed: 04/04/1966
Tank Status: **Permanently Out of Use**
Date Closed: 01/23/1991
Tank Capacity: 3000
Substance: Gasoline

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-2
Date Installed: 04/04/1966
Tank Status: **Permanently Out of Use**
Date Closed: 01/23/1991
Tank Capacity: 3000
Substance: Gasoline

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 04/04/1966
Tank Status: **Permanently Out of Use**
Date Closed: 01/23/1991
Tank Capacity: 4000
Substance: Gasoline

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 04/04/1966
Tank Status: **Permanently Out of Use**
Date Closed: 01/23/1991
Tank Capacity: 4000
Substance: Gasoline

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/04/1966
Tank Status: **Permanently Out of Use**
Date Closed: 01/23/1991
Tank Capacity: 550
Substance: Used Oil

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE

AIM KAPAHULU (Continued) **U001235399**

City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/04/1966
Tank Status: **Permanently Out of Use**
Date Closed: 01/23/1991
Tank Capacity: 550
Substance: Used Oil

HI Financial Assurance:
Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Other

AIM KAPAHULU (Continued) **U001235399**

Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175

AIM KAPAHULU (Continued) **U001235399**

Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Risk Retention Group
Expiration Date: Not reported
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM KAPAHULU

AIM KAPAHULU (Continued) **U001235399**

Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2022

AIM KAPAHULU (Continued) **U001235399**

FR Archive: False

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM KAPAHULU
Address: 1001 KAPAHULU AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101175
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

CA377 **U.H. MOTOR POOL** **HI LUST** **U003346366**
WSW **2027 EAST WEST RD** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96822** **HI Financial Assurance**
0.288 mi.
1523 ft. **Site 2 of 3 in cluster CA**

Actual:
130 ft.

Focus Map:
5

LUST:
Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-102443
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 01/12/2001
Release ID: 990083
Project Officer: Richard Takaba

UST:
Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822
Facility ID: 9-102443
Owner: STATE UNIVERSITYOF HAWAII - MANOA
Owner Address: ENVIRONMENTAL OFFICE 2040 EAST-WEST RD
Owner City,St,Zip: Honolulu, 96822 96822
Latitude: 21.304579
Longitude: -157.814246
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 10/30/1976
Tank Status: **Permanently Out of Use**
Date Closed: 11/25/1998
Tank Capacity: 1000
Substance: Gasoline

U.H. MOTOR POOL (Continued) **U003346366**

Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-2
Date Installed: 10/30/1976
Tank Status: **Permanently Out of Use**
Date Closed: 11/25/1998
Tank Capacity: 3000
Substance: Gasoline

Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-3
Date Installed: 10/30/1976
Tank Status: **Permanently Out of Use**
Date Closed: 11/25/1998
Tank Capacity: 2000
Substance: Gasoline

Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-4
Date Installed: 01/01/1975
Tank Status: **Permanently Out of Use**
Date Closed: 11/20/1998
Tank Capacity: 550
Substance: Diesel

Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822

Tank ID: R-5
Date Installed: 01/01/1975
Tank Status: **Permanently Out of Use**
Date Closed: 11/20/1998
Tank Capacity: 550
Substance: Diesel

HI Financial Assurance:
Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-102443
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD

U.H. MOTOR POOL (Continued) **U003346366**

City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-102443
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-102443
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-102443
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: U.H. MOTOR POOL
Address: 2027 EAST WEST RD
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-102443
Tank Id: R-5
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

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378 **LINCOLN ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS** **HI SHWS** **S126282906**
North **615 AUWAIOLIMU ST** **N/A**
1/4-1/2 **HONOLULU, HI 96813**
0.289 mi.
1526 ft.

Actual:
108 ft.

Focus Map:
4

SHWS:
Name: LINCOLN ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address: 615 AUWAIOLIMU ST
City,State,Zip: HONOLULU, HI 96813
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Program: State
Project Manager: Not reported
Hazard Priority: Not reported
Potential Hazards And Controls: Not reported

LINCOLN ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S126282906**

Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2925
Location Description:	615 Auwaiolimu St, Honolulu, HI 96813, USA
Is Public:	True
Update On:	2021-11-10 16:51:41
Latitude:	21.312926
Longitude:	-157.840265

379
SW
1/4-1/2
0.289 mi.
1528 ft.

MOANA SURFRIDER HOTEL
2365 KALAKAUA AVE
HONOLULU, HI 96815

HI LUST **U004223411**
HI UST **N/A**
HI Financial Assurance

Actual:
3 ft.

Focus Map:
8

LUST:

Name:	MOANA SURFRIDER HOTEL
Address:	2365 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102647
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/17/1997
Release ID:	930059
Project Officer:	Steven Okoji

UST:

Name:	MOANA SURFRIDER HOTEL
Address:	2365 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102647
Owner:	KYO-YA COMPANY, INC
Owner Address:	2255 KALAKAUA AVE, 2ND FLOOR
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.277110
Longitude:	-157.827070
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

MOANA SURFRIDER HOTEL (Continued) **U004223411**

Tank ID: 1
Date Installed: 12/30/1992
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 2500
Substance: Diesel

Name: MOANA SURFRIDER HOTEL
Address: 2365 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 1
Date Installed: 12/30/1992
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 2500
Substance: Diesel

Name: MOANA SURFRIDER HOTEL
Address: 2365 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 1
Date Installed: 12/30/1992
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 2500
Substance: Diesel

Name: MOANA SURFRIDER HOTEL
Address: 2365 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-1
Date Installed: 12/30/1970
Tank Status: **Permanently Out of Use**
Date Closed: 11/30/1992
Tank Capacity: 4000
Substance: Diesel

Name: MOANA SURFRIDER HOTEL
Address: 2365 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-1
Date Installed: 12/30/1970
Tank Status: **Permanently Out of Use**
Date Closed: 11/30/1992
Tank Capacity: 4000
Substance: Diesel

Name: MOANA SURFRIDER HOTEL
Address: 2365 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-1
Date Installed: 12/30/1970

MOANA SURFRIDER HOTEL (Continued) **U004223411**

Tank Status:	**Permanently Out of Use**
Date Closed:	11/30/1992
Tank Capacity:	4000
Substance:	Diesel

HI Financial Assurance:

Name:	MOANA SURFRIDER HOTEL
Address:	2365 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102647
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	MOANA SURFRIDER HOTEL
Address:	2365 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102647
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	MOANA SURFRIDER HOTEL
Address:	2365 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102647
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	10/09/2015
FR Archive:	True

Name:	MOANA SURFRIDER HOTEL
Address:	2365 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102647
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	10/09/2015
FR Archive:	True

Name:	MOANA SURFRIDER HOTEL
Address:	2365 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102647
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	08/28/2021
FR Archive:	False

Name:	MOANA SURFRIDER HOTEL

MOANA SURFRIDER HOTEL (Continued) **U004223411**

Address:	2365 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102647
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	08/28/2021
FR Archive:	False

CA380 **UH MANOA BILGER ADDITION COMPRESSOR ROOM** **HI SHWS** **S106816988**
WSW **2040 EAST-WEST RD** **N/A**
1/4-1/2 **HONOLULU, HI 96822**
0.292 mi.
1541 ft. **Site 3 of 3 in cluster CA**

Actual:
126 ft.

Focus Map:
5

SHWS:

Name:	UH MANOA BILGER ADDITION COMPRESSOR ROOM
Address:	2040 EAST-WEST RD
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2524
Location Description:	2040 East-West Rd
Is Public:	True
Update On:	2019-12-16 10:09:31
Latitude:	21.298958
Longitude:	-157.816764

381
NW
1/4-1/2
0.294 mi.
1552 ft.

UH MANOA FREAR HALL CONSTRUCTION PROJECT
2569 DOLE ST
HONOLULU, HI 96822

HI SHWS **S126283189**
N/A

Actual:
59 ft.

Focus Map:
5

SHWS:

Name:	UH MANOA FREAR HALL CONSTRUCTION PROJECT
Address:	2569 DOLE ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	985
Location Description:	UH Manoa Frear Hall
Is Public:	True
Update On:	2021-10-29 17:23:39
Latitude:	21.295668
Longitude:	-157.813911

382
NNW
1/4-1/2
0.298 mi.
1571 ft.

HECO TRANSFORMER V8425
151 KAPAHULU AVE
HONOLULU, HI 96816

HI SHWS **1006820607**
HI INST CONTROL **N/A**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	HECO TRANSFORMER V8425
Address:	151 KAPAHULU AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Hawaiian Electric

HECO TRANSFORMER V8425 (Continued) **1006820607**

Island:	Oahu
Environmental Interest:	HECO Transformer V8425
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Jordan Nakagawa
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	HECO Transformer V8425
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Transformer oil at 215 mg/kg (less than the HDOH EAL of 5000 for <3 feet bgs.)
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	02/06/2014
Document Number:	2014-067-JIN
Document Subject:	No Further Action Determination for release notification for HECO Pad-Mounted Transformer 72798 (Incident ID 20131015-1440)
Project Manager:	Jordan Nakagawa
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2358
Location Description:	151 Kapahulu Ave
Is Public:	True
Update On:	2020-01-17 15:59:20
Latitude:	21.271618
Longitude:	-157.821491

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Hawaiian Electric
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

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383 **ALEXANDER TOWER** **HI LUST U003711696**
SE **1226 ALEXANDER ST** **HI UST N/A**
1/4-1/2 **HONOLULU, HI 96826**
0.306 mi.
1618 ft.

Actual:
27 ft.

Focus Map:
5

LUST:

Name:	ALEXANDER TOWER
Address:	1226 ALEXANDER ST
City,State,Zip:	HONOLULU, HI 96826

ALEXANDER TOWER (Continued) **U003711696**

Facility ID: 9-103531
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 06/13/2001
Release ID: 010007
Project Officer: Jose Ruiz

UST:
Name: ALEXANDER TOWER
Address: 1226 ALEXANDER ST
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-103531
Owner: ALEXANDER TOWER
Owner Address: 1226 ALEXANDER ST, APT 302
Owner City,St,Zip: Honolulu, 96826 96826
Latitude: 21.297907
Longitude: -157.832020
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-M-1
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 10/27/2000
Tank Capacity: 120
Substance: Diesel

---

384 **76 UNIVERSITY 7-11 #168** **HI LUST** **U001235397**
NW **2646 S KING ST** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96826** **HI Financial Assurance**
0.311 mi.
1640 ft.

Actual:
3 ft.

Focus Map:
5

LUST:
Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-101173
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 09/21/2009
Release ID: 090024
Project Officer: Josh Nagashima

UST:
Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-101173
Owner: Mid Pac Petroleum LLC
Owner Address: 1100 Alakea St., 8th Floor
Owner City,St,Zip: Honolulu, 96826 96826
Latitude: 21.291566
Longitude: -157.820758
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1A
Date Installed: 09/23/2009

76 UNIVERSITY 7-11 #168 (Continued) **U001235397**

Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7000
Substance:	Gasohol
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	1A
Date Installed:	09/23/2009
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7000
Substance:	Gasohol
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	1A
Date Installed:	09/23/2009
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7000
Substance:	Gasohol
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	1A
Date Installed:	09/23/2009
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7000
Substance:	Gasohol
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	1A
Date Installed:	09/23/2009
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	7000
Substance:	Gasohol
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	1A
Date Installed:	09/23/2009
Tank Status:	**Currently In Use**
Date Closed:	Not reported

76 UNIVERSITY 7-11 #168 (Continued) **U001235397**

Tank Capacity: 7000
Substance: Gasohol

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 09/23/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 09/23/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 09/23/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 09/23/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 09/23/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 09/23/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

76 UNIVERSITY 7-11 #168 (Continued) **U001235397**

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: 1B
Date Installed: 09/23/2009
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 5000
Substance: Gasohol

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST

76 UNIVERSITY 7-11 #168 (Continued) **U001235397**

City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-87
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-89
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-89
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-89
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

76 UNIVERSITY 7-11 #168 (Continued) **U001235397**

Tank ID: r-89
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-89
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-89
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 04/04/1985
Tank Status: **Permanently out of Use**
Date Closed: 07/07/2009
Tank Capacity: 8000
Substance: Gasoline

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-92
Date Installed: 04/04/1985

76 UNIVERSITY 7-11 #168 (Continued) **U001235397**

Tank Status:	**Permanently out of Use**
Date Closed:	07/07/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-92
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	07/07/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-92
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	07/07/2009
Tank Capacity:	8000
Substance:	Gasoline
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	r-92
Date Installed:	04/04/1985
Tank Status:	**Permanently out of Use**
Date Closed:	07/07/2009
Tank Capacity:	8000
Substance:	Gasoline

HI Financial Assurance:

Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-101173
Tank Id:	r-89
Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	03/31/2014
FR Archive:	True
Name:	76 UNIVERSITY 7-11 #168
Address:	2646 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-101173
Tank Id:	1A
Tank Status:	Currently In Use
FRTYPE:	Insurance
Expiration Date:	03/31/2014

76 UNIVERSITY 7-11 #168 (Continued) **U001235397**

FR Archive: True

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101173
Tank Id: 1B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101173
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101173
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101173
Tank Id: r-87
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101173
Tank Id: r-92
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101173
Tank Id: 1B

76 UNIVERSITY 7-11 #168 (Continued) **U001235397**

Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101173
Tank Id: 1A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 UNIVERSITY 7-11 #168
Address: 2646 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-101173
Tank Id: r-89
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

CB385 **SEARS ROEBUCK & COMPANY 1158** **HI LUST** **U001235603**
WNW **1450 ALA MOANA BLVD #1000** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96814** **HI SPILLS**
0.319 mi.
1686 ft. **Site 1 of 2 in cluster CB**

Actual:
3 ft.

Focus Map:
4

LUST:
Name: SEARS ROEBUCK & COMPANY 1158
Address: 1450 ALA MOANA BLVD #1000
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-101837
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 10/06/1998
Release ID: 930057
Project Officer: Eric Sadoyama

UST:
Name: SEARS ROEBUCK & COMPANY 1158
Address: 1450 ALA MOANA BLVD #1000
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-101837
Owner: D/E HAWAII c/o EQUITABLE LIFE
Owner Address: SOCIETY OF THE U.S. / 787 SEVENTH AVENUE
Owner City,St,Zip: Honolulu, 96814 96814
Latitude: 21.289838
Longitude: -157.844365
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 05/07/1959
Tank Status: **Permanently Out of Use**

SEARS ROEBUCK & COMPANY 1158 (Continued) **U001235603**

Date Closed: 02/01/1994
Tank Capacity: 2000
Substance: Used Oil

Name: SEARS ROEBUCK & COMPANY 1158
Address: 1450 ALA MOANA BLVD #1000
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-2
Date Installed: 05/07/1959
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1994
Tank Capacity: 2000
Substance: Other

Name: SEARS ROEBUCK & COMPANY 1158
Address: 1450 ALA MOANA BLVD #1000
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-3
Date Installed: 05/07/1959
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1994
Tank Capacity: 4000
Substance: Other

Name: SEARS ROEBUCK & COMPANY 1158
Address: 1450 ALA MOANA BLVD #1000
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: 05/07/1959
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1994
Tank Capacity: 4000
Substance: Other

Name: SEARS ROEBUCK & COMPANY 1158
Address: 1450 ALA MOANA BLVD #1000
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-5
Date Installed: 05/07/1959
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1994
Tank Capacity: 4000
Substance: Other

Name: SEARS ROEBUCK & COMPANY 1158
Address: 1450 ALA MOANA BLVD #1000
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-6
Date Installed: 05/07/1959
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1994
Tank Capacity: 4000

SEARS ROEBUCK & COMPANY 1158 (Continued) **U001235603**

Substance: Other

Name: SEARS ROEBUCK & COMPANY 1158
Address: 1450 ALA MOANA BLVD #1000
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-7
Date Installed: 05/07/1959
Tank Status: **Permanently Out of Use**
Date Closed: 02/01/1994
Tank Capacity: 3000
Substance: Other

SPILLS:
Name: ALA MOANA CENTER, CLEANING CHEMICALS
Address: 1450 ALA MOANA BLVD
Address 2: Not reported
City,State,Zip: HONOLULU, HI 96814
Island: Oahu
Supplemental Loc. Text: Not reported
Case Number: 20001102-1124
Facility Registry ID: Not reported
HID Number: Not reported
Lead and Program: HEER EP&R
ER: Not reported
Less Or Greater Than: Not reported
Units: Ala Moana Center, cleaning chemicals
Activity Type: Response
Activity Lead: Liz Galvez
Assignment End Date: 2016-02-22 00:00:00
Result: SOSC NFA
File Under: Not reported
Substances: Not reported
Quanity: Not reported
Units: Not reported
Reported Date: Not reported
Release Date: Not reported
Release Duration: Not reported
Media: Not reported
Waterbody: Not reported
Summary: Not reported

Is Noteworthy for Reports: Not reported
Is the Release a Fugitive Dumping: Not reported
Tax Map Key: Not reported
Assigned SOSC: Not reported
Notified Agencies: Not reported
Response Measures Taken: Not reported
Incident Report Number: Not reported
Coordination Needed: Not reported
Tier II Facility: Not reported
RMP: Not reported
Follow-up Received On: Not reported
Cost Recovery: Not reported
Invoice To: Not reported
Closed Date: Not reported
Comments: Not reported

SEARS ROEBUCK & COMPANY 1158 (Continued) **U001235603**

Latitude:	Not reported
Longitude:	Not reported

CB386 **SEARS ALA MOANA** **HI SHWS** **S115488724**
WNW **1450 ALA MOANA BLVD** **N/A**
1/4-1/2 **HONOLULU, HI 96814**
0.319 mi.
1686 ft. **Site 2 of 2 in cluster CB**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	SEARS ALA MOANA
Address:	1450 ALA MOANA BLVD
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Ala Moana Center
Island:	Oahu
Environmental Interest:	Sears Ala Moana
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Cal Miyahara
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Sears Ala Moana
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	TPH below Tier I EALs.
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	07/21/2014
Document Number:	2014-360-CMM
Document Subject:	NFA Letter for the Hydraulic Hoist Closure and Release Response, Former Sears Auto Care Facility, 1450 Ala Moana Blvd, Honolulu HI
Project Manager:	Cal Miyahara
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	964
Location Description:	1450 Ala Moana Blvd
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.292056
Longitude:	-157.845817

387 SW 1/4-1/2 0.322 mi. 1699 ft. | **HALE KOA HOTEL**
2055 KALIA RD
HONOLULU, HI 96815

RCRA-VSQG **1007092121**
HI SHWS **HID984469452**
CA HAZNET

Actual: 3 ft.

Focus Map: 8

RCRA Listings:

Date Form Received by Agency:		20210909
Handler Name:	HALE KOA HOTEL	
Handler Address:		2055 KALIA RD
Handler City,State,Zip:		HONOLULU, HI 96815-1998
EPA ID:		HID984469452
Contact Name:		DEREK BACIGAL
Contact Address:		KALIA RD
Contact City,State,Zip:		HONOLULU, HI 96815-1998
Contact Telephone:		808-955-9194
Contact Fax:		Not reported
Contact Email:		DEREK.BACIGAL@HALEKOA.COM
Contact Title:		DIRECTOR OF ENGINEERING
EPA Region:		09
Land Type:		Federal
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		KALIA RD
Mailing City,State,Zip:		HONOLULU, HI 96815-1998
Owner Name:	JOHN JEFFERIS	
Owner Type:		Federal
Operator Name:	FEDERAL GOVERNMENT (US ARMY)	
Operator Type:		Federal
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		The land is federally-owned, The site is federally-owned, The site is federally-operated
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline

HALE KOA HOTEL (Continued) **1007092121**

Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20210909
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D000
Waste Description:	Not Defined
Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D002
Waste Description:	CORROSIVE WASTE
Waste Code:	D005
Waste Description:	BARIUM
Waste Code:	D006
Waste Description:	CADMIUM
Waste Code:	D007
Waste Description:	CHROMIUM
Waste Code:	D008
Waste Description:	LEAD
Waste Code:	D018
Waste Description:	BENZENE

HALE KOA HOTEL (Continued) **1007092121**

Waste Code: D035
Waste Description: METHYL ETHYL KETONE

Waste Code: F001
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F002
Waste Description: THE FOLLOWING SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE, AND 1,1,2, TRICHLOROETHANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F003
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F004
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: CRESOLS, CRESYLIC ACID, AND NITROBENZENE; AND THE STILL BOTTOMS FROM THE RECOVERY OF THESE SOLVENTS; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Waste Code: F005
Waste Description: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, AND 2-NITROPROPANE; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F001, F002, OR F004; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: JOHN JEFFERIS

HALE KOA HOTEL (Continued) **1007092121**

Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	2055 KALIA RD
Owner/Operator City,State,Zip:	HONOLULU, HI 96815-1998
Owner/Operator Telephone:	808-955-0555
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name: JOHN JEFFERIS	
Legal Status:	Federal
Date Became Current:	19940217
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name: JOHN JEFFERIS	
Legal Status:	Federal
Date Became Current:	19940217
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name: JOHN JEFFERIS	
Legal Status:	Federal
Date Became Current:	19940217
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported
Owner/Operator Indicator:	Owner
Owner/Operator Name: JOHN JEFFERIS	
Legal Status:	Federal
Date Became Current:	19940217
Date Ended Current:	Not reported
Owner/Operator Address:	Not reported
Owner/Operator City,State,Zip:	Not reported
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

HALE KOA HOTEL (Continued) **1007092121**

Owner/Operator Indicator: Operator
Owner/Operator Name: FEDERAL GOVERNMENT (US ARMY)
Legal Status: Federal
Date Became Current: 19751001
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: FEDERAL GOVERNMENT (US ARMY)
Legal Status: Federal
Date Became Current: 19751001
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: US ARMY MWR
Legal Status: Federal
Date Became Current: 19740101
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: FEDERAL GOVERNMENT (US ARMY)
Legal Status: Federal
Date Became Current: 19751001
Date Ended Current: Not reported
Owner/Operator Address: Not reported
Owner/Operator City,State,Zip: Not reported
Owner/Operator Telephone: Not reported
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20180130
Handler Name: HALE KOA HOTEL
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No

HALE KOA HOTEL (Continued) **1007092121**

Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20210909
Handler Name: HALE KOA HOTEL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: No
Electronic Manifest Broker: No

Receive Date: 20000204
Handler Name: HALE KOA HOTEL
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20030610
Handler Name: HALE KOA HOTEL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

Receive Date: 20030710
Handler Name: HALE KOA HOTEL
Federal Waste Generator Description: Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: No
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

HALE KOA HOTEL (Continued) **1007092121**

List of NAICS Codes and Descriptions:
NAICS Code: 71213
NAICS Description: ZOOS AND BOTANICAL GARDENS

NAICS Code: 72111
NAICS Description: HOTELS (EXCEPT CASINO HOTELS) AND MOTELS

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

SHWS:

Name:	HALE KOA HOTEL
Address:	2055 KALIA RD
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2057
Location Description:	2055 Kalia Rd
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.281334

HALE KOA HOTEL (Continued) **1007092121**

Longitude:	-157.835335
Name:	FORT DERUSSY MILITARY RESERVATION UST SYSTEM
Address:	2055 KALIA RD
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	522
Location Description:	2055 Kalia Road
Is Public:	True
Update On:	2020-07-10 09:12:16
Latitude:	21.282417
Longitude:	-157.831800

HAZNET:

Name:	HALE KOA HOTEL
Address:	2055 KALIA RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 968150000
Contact:	MANAGER ENVIRONMENTAL
Telephone:	--
Mailing Name:	Not reported
Mailing Address:	2055 KALIA RD
Year:	2005
Gepaid:	HID984469452
TSD EPA ID:	CAT000646117

HALE KOA HOTEL (Continued) **1007092121**

CA Waste Code: 611 - Contaminated soil from site clean-up
Disposal Method: -
Tons: 10

Year: 2001
Gepaid: HID984469452
TSD EPA ID: CAT000646117
CA Waste Code: 731 - Liquids with polychloronated biphenyls >= 50 Mg./L
Disposal Method: -
Tons: 0.0551

Year: 2001
Gepaid: HID984469452
TSD EPA ID: CAT000646117
CA Waste Code: 223 - Unspecified oil-containing waste
Disposal Method: D80 - Disposal, Land Fill
Tons: 0.05

Year: 2000
Gepaid: HID984469452
TSD EPA ID: CAT000646117
CA Waste Code: 741 - Liquids with halogenated organic compounds >= 1,000 Mg./L
Disposal Method: H01 - Transfer Station
Tons: 0.11

Year: 2000
Gepaid: HID984469452
TSD EPA ID: CAT000646117
CA Waste Code: 352 - Other organic solids
Disposal Method: T01 - Treatment, Tank
Tons: 0.04

Year: 2000
Gepaid: HID984469452
TSD EPA ID: CAT000646117
CA Waste Code: 331 - Off-specification, aged or surplus organics
Disposal Method: H01 - Transfer Station
Tons: 0.109

Year: 2000
Gepaid: HID984469452
TSD EPA ID: CAT000646117
CA Waste Code: 221 - Waste oil and mixed oil
Disposal Method: H01 - Transfer Station
Tons: 0.075

Year: 2000
Gepaid: HID984469452
TSD EPA ID: CAT000646117
CA Waste Code: 291 - Latex waste
Disposal Method: D83 - Disposal, Surface Impoundment
Tons: 0.2

Year: 2000
Gepaid: HID984469452
TSD EPA ID: CAT000646117
CA Waste Code: 134 - Aqueous solution with total organic residues less than 10

HALE KOA HOTEL (Continued) **1007092121**

	percent
Disposal Method:	T01 - Treatment, Tank
Tons:	0.15
Year:	1999
Gepaid:	HID984469452
TSD EPA ID:	CAD000088252
CA Waste Code:	331 - Off-specification, aged or surplus organics
Disposal Method:	H01 - Transfer Station
Tons:	0.67

Click this hyperlink while viewing on your computer to access
6 additional CA HAZNET: record(s) in the EDR Site Report.

Additional Info:

Year:	2005
Gen EPA ID:	HID984469452
Shipment Date:	20051107
Creation Date:	3/11/2006 18:31:13
Receipt Date:	Not reported
Manifest ID:	21823969
Trans EPA ID:	HIR000050336
Trans Name:	HAZTECH ENVIRONMENTAL SERVICES
Trans 2 EPA ID:	HIR000001099
Trans 2 Name:	PINERIDGE FARMS
TSDF EPA ID:	CAT000646117
Trans Name:	CHEMICAL WASTE MANAGEMENT
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	611 - Contaminated soil from site clean-ups
RCRA Code:	Not reported
Meth Code:	- Not reported
Quantity Tons:	5
Waste Quantity:	10000
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20051107
Creation Date:	3/11/2006 18:31:13
Receipt Date:	Not reported
Manifest ID:	21823968
Trans EPA ID:	HIR000050336
Trans Name:	HAZTECH ENVIRONMENTAL SERVICES
Trans 2 EPA ID:	HIR000001099
Trans 2 Name:	PINERIDGE FARMS
TSDF EPA ID:	CAT000646117
Trans Name:	CHEMICAL WASTE MANAGEMENT
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	611 - Contaminated soil from site clean-ups
RCRA Code:	Not reported

HALE KOA HOTEL (Continued) **1007092121**

Meth Code:	- Not reported
Quantity Tons:	5
Waste Quantity:	10000
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	2001
Gen EPA ID:	HID984469452
Shipment Date:	20010820
Creation Date:	10/3/2001 0:00:00
Receipt Date:	Not reported
Manifest ID:	21462847
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	731 - Liquids with polychlorinated biphenyls > 50 mg/l
RCRA Code:	Not reported
Meth Code:	- Not reported
Quantity Tons:	0.0551
Waste Quantity:	50
Quantity Unit:	K
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20010507
Creation Date:	7/30/2001 0:00:00
Receipt Date:	20010522
Manifest ID:	20141063
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	223 - Unspecified oil-containing waste
RCRA Code:	Not reported
Meth Code:	D80 - Disposal, Land Fill
Quantity Tons:	0.05
Waste Quantity:	100
Quantity Unit:	P
Additional Code 1:	Not reported

HALE KOA HOTEL (Continued) **1007092121**

Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	2000
Gen EPA ID:	HID984469452
Shipment Date:	20000615
Creation Date:	9/25/2000 0:00:00
Receipt Date:	20000703
Manifest ID:	98031901
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	741 - Liquids with halogenated organic compounds > 1000 mg/l
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.11
Waste Quantity:	220
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20000518
Creation Date:	9/25/2000 0:00:00
Receipt Date:	20000606
Manifest ID:	98031860
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	352 - Other organic solids
RCRA Code:	Not reported
Meth Code:	T01 - Treatment, Tank
Quantity Tons:	0.04
Waste Quantity:	80
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

HALE KOA HOTEL (Continued) **1007092121**

Shipment Date:	20000518
Creation Date:	9/25/2000 0:00:00
Receipt Date:	20000606
Manifest ID:	98031860
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.075
Waste Quantity:	150
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20000113
Creation Date:	4/4/2000 0:00:00
Receipt Date:	20000131
Manifest ID:	98031680
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	291 - Latex waste
RCRA Code:	Not reported
Meth Code:	D83 - Disposal, Surface Impoundment
Quantity Tons:	0.2
Waste Quantity:	400
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20000113
Creation Date:	4/4/2000 0:00:00
Receipt Date:	20000131
Manifest ID:	98031680
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117

HALE KOA HOTEL (Continued) **1007092121**

Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.109
Waste Quantity:	218
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20000113
Creation Date:	4/4/2000 0:00:00
Receipt Date:	20000131
Manifest ID:	98031680
Trans EPA ID:	HIR000050336
Trans Name:	Not reported
Trans 2 EPA ID:	HID000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAT000646117
Trans Name:	Not reported
TSDF Alt EPA ID:	CAT000646117
TSDF Alt Name:	Not reported
Waste Code Description:	134 - Aqueous solution with <10% total organic residues
RCRA Code:	Not reported
Meth Code:	T01 - Treatment, Tank
Quantity Tons:	0.15
Waste Quantity:	300
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	1999
Gen EPA ID:	HID984469452

Shipment Date:	19990507
Creation Date:	Not reported
Receipt Date:	Not reported
Manifest ID:	95778778
Trans EPA ID:	HID984469056
Trans Name:	Not reported
Trans 2 EPA ID:	HI0000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD000088252
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001

HALE KOA HOTEL (Continued) **1007092121**

Meth Code:	H01 - Transfer Station
Quantity Tons:	0.2
Waste Quantity:	400
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	19990507
Creation Date:	Not reported
Receipt Date:	Not reported
Manifest ID:	95778778
Trans EPA ID:	HID984469056
Trans Name:	Not reported
Trans 2 EPA ID:	HI0000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD000088252
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	134 - Aqueous solution with <10% total organic residues
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.04
Waste Quantity:	80
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	19990507
Creation Date:	8/19/1999 0:00:00
Receipt Date:	19990519
Manifest ID:	95778778
Trans EPA ID:	HID984469056
Trans Name:	Not reported
Trans 2 EPA ID:	HI0000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD000088252
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	122 - Alkaline solution without metals (pH > 12.5
RCRA Code:	D002
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.225
Waste Quantity:	450
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

HALE KOA HOTEL (Continued) **1007092121**

Shipment Date:	19990507
Creation Date:	8/19/1999 0:00:00
Receipt Date:	19990519
Manifest ID:	95778778
Trans EPA ID:	HID984469056
Trans Name:	Not reported
Trans 2 EPA ID:	HI0000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD000088252
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.625
Waste Quantity:	1250
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	19990507
Creation Date:	8/19/1999 0:00:00
Receipt Date:	19990519
Manifest ID:	95778778
Trans EPA ID:	HID984469056
Trans Name:	Not reported
Trans 2 EPA ID:	HI0000076851
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD000088252
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	211 - Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.
RCRA Code:	F002
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.475
Waste Quantity:	950
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	19990507
Creation Date:	8/19/1999 0:00:00
Receipt Date:	19990519
Manifest ID:	95778778
Trans EPA ID:	HID984469056
Trans Name:	Not reported
Trans 2 EPA ID:	HI0000076851
Trans 2 Name:	Not reported

HALE KOA HOTEL (Continued) **1007092121**

TSDF EPA ID:	CAD000088252
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.045
Waste Quantity:	90
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	1998
Gen EPA ID:	HID984469452
Shipment Date:	19980414
Creation Date:	8/3/1998 0:00:00
Receipt Date:	19980424
Manifest ID:	96341194
Trans EPA ID:	HIR000000919
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000001099
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD059494310
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD059494310
TSDF Alt Name:	Not reported
Waste Code Description:	343 - Unspecified organic liquid mixture
RCRA Code:	D001
Meth Code:	D99 - Disposal, Other
Quantity Tons:	0.095
Waste Quantity:	190
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	19980414
Creation Date:	8/3/1998 0:00:00
Receipt Date:	19980424
Manifest ID:	96341194
Trans EPA ID:	HIR000000919
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000001099
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD059494310
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD059494310
TSDF Alt Name:	Not reported
Waste Code Description:	343 - Unspecified organic liquid mixture

HALE KOA HOTEL (Continued) **1007092121**

RCRA Code:	D001
Meth Code:	D99 - Disposal, Other
Quantity Tons:	0.02
Waste Quantity:	40
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	19980414
Creation Date:	8/3/1998 0:00:00
Receipt Date:	19980424
Manifest ID:	96341194
Trans EPA ID:	HIR000000919
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000001099
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD059494310
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD059494310
TSDF Alt Name:	Not reported
Waste Code Description:	741 - Liquids with halogenated organic compounds > 1000 mg/l
RCRA Code:	F002
Meth Code:	D99 - Disposal, Other
Quantity Tons:	0.35
Waste Quantity:	700
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	1997
Gen EPA ID:	HID984469452
Shipment Date:	19971016
Creation Date:	4/23/1998 0:00:00
Receipt Date:	19971031
Manifest ID:	96340906
Trans EPA ID:	HIR000000919
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000001099
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD059494310
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	212 - Oxygenated solvents (acetone, butanol, ethyl acetate, etc.
RCRA Code:	D001
Meth Code:	D99 - Disposal, Other
Quantity Tons:	0.0225
Waste Quantity:	45
Quantity Unit:	P

HALE KOA HOTEL (Continued) **1007092121**

Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	19971016
Creation Date:	4/23/1998 0:00:00
Receipt Date:	19971031
Manifest ID:	96340906
Trans EPA ID:	HIR000000919
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000001099
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD059494310
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	Not reported
Meth Code:	D99 - Disposal, Other
Quantity Tons:	0.0475
Waste Quantity:	95
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

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388 **C&CH MCCULLY FIRE STATION** **HI LUST** **U001235038**
NE **2425 DATE ST** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96826** **HI Financial Assurance**
0.328 mi.
1732 ft.

Actual:
3 ft.

Focus Map:
5

LUST:

Name:	C&CH MCCULLY FIRE STATION
Address:	2425 DATE ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100080
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	10/06/1995
Release ID:	910028
Project Officer:	Roger Brewer

UST:

Name:	C&CH MCCULLY FIRE STATION
Address:	2425 DATE ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100080
Owner:	C&C OF HNL - HONOLULU FIRE DEPARATMENT
Owner Address:	636 South Street
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.288098
Longitude:	-157.825100
Horizontal Reference Datum Name:	NAD83

C&CH MCCULLY FIRE STATION (Continued) **U001235038**

Horizontal Collection Method Name: GPS

Tank ID: R-1
Date Installed: 09/02/1955
Tank Status: **Permanently Out of Use**
Date Closed: 02/28/1991
Tank Capacity: 550
Substance: Diesel

Name: C&CH MCCULLY FIRE STATION
Address: 2425 DATE ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: r-2
Date Installed: 03/30/1991
Tank Status: **Permanently out of Use**
Date Closed: 07/02/2008
Tank Capacity: 1000
Substance: Diesel

HI Financial Assurance:
Name: C&CH MCCULLY FIRE STATION
Address: 2425 DATE ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100080
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: C&CH MCCULLY FIRE STATION
Address: 2425 DATE ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100080
Tank Id: r-2
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

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389 NNW 1/4-1/2 0.333 mi. 1759 ft. **NEW OFFICE LOUNGE**
1551 KAPIOLANI BLVD
HONOLULU, HI 96814

HI SHWS **1006843573**
HI LUST **N/A**
HI UST

Actual: 3 ft.
Focus Map: 4

SHWS:
Name: NEW OFFICE LOUNGE
Address: 1551 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI 96814
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: SHWB

NEW OFFICE LOUNGE (Continued) **1006843573**

Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1480
Location Description:	1551 Kapiolani Blvd
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.292007
Longitude:	-157.841237

LUST:

Name:	NEW OFFICE LOUNGE
Address:	1551 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-103517
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/10/2008
Release ID:	060033
Project Officer:	Shunsheng Fu

Name:	NEW OFFICE LOUNGE
Address:	1551 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-103517
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/10/2008
Release ID:	060012
Project Officer:	Shunsheng Fu

UST:

Name:	NEW OFFICE LOUNGE
Address:	1551 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814

NEW OFFICE LOUNGE (Continued) **1006843573**

Facility ID:	9-103517
Owner:	CEC HAWAII INC
Owner Address:	1517 kapiolani blvD, SUITE 201
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.292276
Longitude:	-157.841243
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	r-1
Date Installed:	Not reported
Tank Status:	**Permanently out of Use**
Date Closed:	01/15/2006
Tank Capacity:	1100
Substance:	Gasoline
Name:	NEW OFFICE LOUNGE
Address:	1551 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	r-2
Date Installed:	Not reported
Tank Status:	**Permanently out of Use**
Date Closed:	01/15/2006
Tank Capacity:	1100
Substance:	Gasoline
Name:	NEW OFFICE LOUNGE
Address:	1551 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	r-3
Date Installed:	Not reported
Tank Status:	**Permanently out of Use**
Date Closed:	01/15/2006
Tank Capacity:	420
Substance:	Gasoline

390
WSW
1/4-1/2
0.340 mi.
1797 ft.

YAJIMA OIL OF USA INC
1375 S KING ST
HONOLULU, HI 96814

HI LUST **U001235254**
HI UST **N/A**
HI Financial Assurance

Actual:
13 ft.

Focus Map:
4

LUST:

Name:	YAJIMA OIL OF USA INC
Address:	1375 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100832
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	04/25/2003
Release ID:	030031
Project Officer:	Shunsheng Fu
Name:	YAJIMA OIL OF USA INC
Address:	1375 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100832

YAJIMA OIL OF USA INC (Continued) **U001235254**

Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 06/30/2005
Release ID: 930001
Project Officer: Shunsheng Fu

UST:
Name: YAJIMA OIL OF USA INC
Address: 1375 S KING ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-100832
Owner: YAJIMA OIL OF USA, INC.
Owner Address: 1375 SOUTH KING ST
Owner City,St,Zip: Honolulu, 96814 96814
Latitude: 21.298494
Longitude: -157.840690
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1A
Date Installed: 10/01/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Gasohol

Name: YAJIMA OIL OF USA INC
Address: 1375 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: 2B
Date Installed: 10/01/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Gasohol

Name: YAJIMA OIL OF USA INC
Address: 1375 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: 3
Date Installed: 10/01/1985
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 8000
Substance: Gasohol

Name: YAJIMA OIL OF USA INC
Address: 1375 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1
Date Installed: 01/01/1953
Tank Status: **Permanently Out of Use**
Date Closed: 04/29/1993
Tank Capacity: 350
Substance: Used Oil

YAJIMA OIL OF USA INC (Continued) **U001235254**

HI Financial Assurance:

Name:	YAJIMA OIL OF USA INC
Address:	1375 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100832
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	04/01/2015
FR Archive:	True

Name:	YAJIMA OIL OF USA INC
Address:	1375 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100832
Tank Id:	1A
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	04/01/2015
FR Archive:	True

Name:	YAJIMA OIL OF USA INC
Address:	1375 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100832
Tank Id:	2B
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	04/01/2015
FR Archive:	True

Name:	YAJIMA OIL OF USA INC
Address:	1375 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100832
Tank Id:	3
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	04/01/2015
FR Archive:	True

Name:	YAJIMA OIL OF USA INC
Address:	1375 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100832
Tank Id:	R-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	04/01/2023
FR Archive:	False

Name:	YAJIMA OIL OF USA INC
Address:	1375 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100832
Tank Id:	3
Tank Status:	Currently in Use

YAJIMA OIL OF USA INC (Continued) **U001235254**

FRTYPE: Insurance
Expiration Date: 04/01/2023
FR Archive: False

Name: YAJIMA OIL OF USA INC
Address: 1375 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100832
Tank Id: 2B
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 04/01/2023
FR Archive: False

Name: YAJIMA OIL OF USA INC
Address: 1375 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100832
Tank Id: 1A
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 04/01/2023
FR Archive: False

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391 North 1/4-1/2 0.349 mi. 1845 ft.

FIRESTONE STORE
801 KAHEKA ST
HONOLULU, HI 96814

HI LUST **U001235963**
HI UST **N/A**

Actual: 3 ft.

Focus Map: 4

LUST:
Name: FIRESTONE STORE
Address: 801 KAHEKA ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-102403
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 10/21/1996
Release ID: 920148
Project Officer: Janet Sherrer

Name: HOLIDAY ACTION GAS - KAHEKA
Address: 801 KAHEKA ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-102591
Facility Status: Site Cleanup Completed with EHE/EHMP
Facility Status Date: 09/28/2010
Release ID: 980048
Project Officer: Shaobin Li

Name: HOLIDAY ACTION GAS - KAHEKA
Address: 801 KAHEKA ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-102591
Facility Status: Site Cleanup Completed with EHE/EHMP
Facility Status Date: 09/28/2010
Release ID: 970086
Project Officer: Shaobin Li

FIRESTONE STORE (Continued) **U001235963**

UST:

Name:	FIRESTONE STORE
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-102403
Owner:	HOLIDAY MART, INC
Owner Address:	801 KAHEKA ST
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.293549
Longitude:	-157.839085
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	03/23/1992
Tank Capacity:	550
Substance:	Used Oil
Name:	HOLIDAY ACTION GAS - KAHEKA
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-1
Date Installed:	01/01/1984
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1999
Tank Capacity:	10000
Substance:	Gasoline
Name:	HOLIDAY ACTION GAS - KAHEKA
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-2
Date Installed:	01/01/1984
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1999
Tank Capacity:	10000
Substance:	Gasoline
Name:	HOLIDAY ACTION GAS - KAHEKA
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-3
Date Installed:	01/01/1978
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1999
Tank Capacity:	4000
Substance:	Diesel
Name:	HOLIDAY ACTION GAS - KAHEKA
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814

FIRESTONE STORE (Continued) **U001235963**

Tank ID:	R-4
Date Installed:	01/01/1978
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1999
Tank Capacity:	4000
Substance:	Gasoline
Name:	HOLIDAY ACTION GAS - KAHEKA
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-5
Date Installed:	01/01/1978
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1999
Tank Capacity:	4000
Substance:	Gasoline
Name:	HOLIDAY ACTION GAS - KAHEKA
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-6
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1999
Tank Capacity:	4000
Substance:	Gasoline
Name:	HOLIDAY ACTION GAS - KAHEKA
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-7
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1999
Tank Capacity:	4000
Substance:	Gasoline
Name:	HOLIDAY ACTION GAS - KAHEKA
Address:	801 KAHEKA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-8
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	02/01/1999
Tank Capacity:	4000
Substance:	Gasoline

392
SW
1/4-1/2
0.361 mi.
1905 ft.

HALE PUA NUI UST REMOVAL
228 BEACH WALK
HONOLULU, HI 96815

HI SHWS **S108859671**
HI SPILLS **N/A**

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	HALE PUA NUI APARTMENTS UST REMOVAL
Address:	228 BEACH WALK
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	466
Location Description:	228 Beach Walk, Honolulu, HI 96815
Is Public:	True
Update On:	2020-09-09 10:06:16
Latitude:	21.279648
Longitude:	-157.831830

SPILLS:

Name:	HALE PUA NUI UST REMOVAL
Address:	228 BEACH WALK
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Former Hale Pua Nui Hotel
Case Number:	20061020-1430
Facility Registry ID:	Not reported
HID Number:	Not reported

HALE PUA NUI UST REMOVAL (Continued) **S108859671**

Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	UST Release Former Hale Pua Nui Hotel
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	Not reported
File Under:	Brett Hill Management Group
Substances:	Unknown
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.271197000000001
Longitude:	-157.81720899999999

393
North
1/4-1/2
0.361 mi.
1906 ft.

HECO SUBSTATION: MAKALOA SUBSTATION **HI SHWS** **S106817457**
1544 MAKALOA ST **HI INST CONTROL** **N/A**
HONOLULU, HI 96814

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	HECO MAKALOA SUBSTATION
Address:	1544 MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu

HECO SUBSTATION: MAKALOA SUBSTATION (Continued) **S106817457**

SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2465
Location Description:	1544 Makaloa St
Is Public:	True
Update On:	2020-01-18 19:34:14
Latitude:	21.293464
Longitude:	-157.840880

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

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394
SW
1/4-1/2
0.365 mi.
1929 ft.

Actual:
3 ft.

Focus Map:
8

ROYAL HAWAIIAN HOTEL
2259 KALAKAUA AVE
HONOLULU, HI 96815

RCRA-VSQG **1004689010**
HI LUST **HIR000076182**
HI UST
FINDS
ECHO
CA HAZNET

RCRA Listings:

Date Form Received by Agency:		20070124
Handler Name:	ROYAL HAWAIIAN HOTEL	
Handler Address:		2259 KALAKAUA AVE
Handler City,State,Zip:		HONOLULU, HI 96815-2579
EPA ID:		HIR000076182
Contact Name:		DAVID LEE
Contact Address:		2255 KALAKAUA AVE
Contact City,State,Zip:		HONOLULU, HI 96815-2579
Contact Telephone:		808-931-8888
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private

ROYAL HAWAIIAN HOTEL (Continued) **1004689010**

Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		2255 KALAKAUA AVE
Mailing City,State,Zip:		HONOLULU, HI 96815-2579
Owner Name:	KYO YA COMPANY LTD	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No

ROYAL HAWAIIAN HOTEL (Continued) **1004689010**

Addressed Significant Non-Complier Universe: No
Significant Non-Complier With a Compliance Schedule Universe: No
Financial Assurance Required: Not reported
Handler Date of Last Change: 20070130
Recognized Trader-Importer: No
Recognized Trader-Exporter: No
Importer of Spent Lead Acid Batteries: No
Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Hazardous Waste Summary:
Waste Code: D008
Waste Description: LEAD

Handler - Owner Operator:
Owner/Operator Indicator: Owner
Owner/Operator Name: KYO YA COMPANY LTD
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 2255 KALAKAUA AVE
Owner/Operator City,State,Zip: HONOLULU, HI 96815-2579
Owner/Operator Telephone: 808-931-8888
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: KYO YA COMPANY LTD
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 2255 KALAKAUA AVE
Owner/Operator City,State,Zip: HONOLULU, HI 96815-2579
Owner/Operator Telephone: 808-931-8888
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 20070124
Handler Name: ROYAL HAWAIIAN HOTEL
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

ROYAL HAWAIIAN HOTEL (Continued) **1004689010**

Receive Date:	20000622
Handler Name: ROYAL HAWAIIAN HOTEL	
Federal Waste Generator Description:	Large Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	No
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violations:
Violations: No Violations Found

Evaluation Action Summary:
Evaluations: No Evaluations Found

LUST:

Name:	ROYAL HAWAIIAN HOTEL
Address:	2259 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102646
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	05/17/1993
Release ID:	930047
Project Officer:	Not Assigned

UST:

Name:	ROYAL HAWAIIAN HOTEL
Address:	2259 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102646
Owner:	KYO-YA COMPANY, INC
Owner Address:	2255 KALAKAUA AVE, 2ND FLOOR
Owner City,St,Zip:	Honolulu, 96815 96815
Latitude:	21.277402
Longitude:	-157.830203
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-M-1
Date Installed:	12/30/1970
Tank Status:	**Permanently Out of Use**
Date Closed:	11/16/1992
Tank Capacity:	1000
Substance:	Diesel

FINDS:

ROYAL HAWAIIAN HOTEL (Continued) **1004689010**

Registry ID: 110005730815

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004689010
Registry ID:	110005730815
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005730815
Name:	ROYAL HAWAIIAN HOTEL
Address:	2259 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815

HAZNET:

Name:	ROYAL HAWAIIAN HOTEL
Address:	2259 KALAKAUA AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 968152579
Contact:	DAVID LEE/ENV MGR
Telephone:	8089318888
Mailing Name:	Not reported
Mailing Address:	2255 KALAKAUA AVE
Year:	2011
Gepaid:	HIR000076182
TSD EPA ID:	CAD059494310
CA Waste Code:	-
Disposal Method:	H141 - Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons:	0.2
Year:	2002
Gepaid:	HIR000076182
TSD EPA ID:	CAD028409019
CA Waste Code:	331 - Off-specification, aged or surplus organics
Disposal Method:	H01 - Transfer Station
Tons:	0.2145

Additional Info:

Year:	2011
Gen EPA ID:	HIR000076182
Shipment Date:	20110705
Creation Date:	7/19/2012 22:00:08
Receipt Date:	20110729

ROYAL HAWAIIAN HOTEL (Continued) **1004689010**

Manifest ID:	007497858JJK
Trans EPA ID:	HIR000097824
Trans Name:	PACIFIC COMMERCIAL SERVICES LLC
Trans 2 EPA ID:	CAD006912620
Trans 2 Name:	MATSON NAVIGATION COMPANY
TSDF EPA ID:	CAD059494310
Trans Name:	CLEAN HARBORS SAN JOSE LLC
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	- Not reported
RCRA Code:	F005
Meth Code:	H141 - Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Quantity Tons:	0.2
Waste Quantity:	400
Quantity Unit:	P
Additional Code 1:	D035
Additional Code 2:	D001
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	2002
Gen EPA ID:	HIR000076182
Shipment Date:	20020722
Creation Date:	3/17/2003 18:31:23
Receipt Date:	20020805
Manifest ID:	21069868
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.2145
Waste Quantity:	65
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

395
NNW
1/4-1/2
0.371 mi.
1957 ft.

WALGREENS STORE #12072 KEEAUMOKU
1460 KAPIOLANI BLVD
HONOLULU, HI 96814

HI SHWS **S115488729**
N/A

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	WALGREENS STORE #12072 KEEAUMOKU
Address:	1460 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Fast Track
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2402
Location Description:	1460 Kapiolani Blvd, 611 Keeaumoku Street
Is Public:	True
Update On:	2021-02-05 11:47:09
Latitude:	21.293209
Longitude:	-157.842133

396
East
1/4-1/2
0.381 mi.
2013 ft.

FUDS ST LOUIS COLLEGE (KALAEPOHAKU)
KAIMUKI, HI

HI SHWS **S121406002**
N/A

Actual:
173 ft.

Focus Map:
6

SHWS:

Name:	FUDS ST LOUIS COLLEGE (KALAEPOHAKU)
Address:	Not reported
City,State,Zip:	KAIMUKI, HI
Supplemental Location:	Not reported

FUDS ST LOUIS COLLEGE (KALAEPOHAKU) (Continued) **S121406002**

Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1956
Location Description:	Chaminade University campus
Is Public:	True
Update On:	2020-09-02 15:31:01
Latitude:	21.290137
Longitude:	-157.806585

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397 **HILTON HAWAIIAN VILLAGE** **HI LUST** **U003541711**
SSE **2005 KALIA RD** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96815**
0.382 mi.
2017 ft.

Actual:
3 ft.

Focus Map:
7

LUST:

Name:	HILTON HAWAIIAN VILLAGE
Address:	2005 KALIA RD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100818
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/20/2015
Release ID:	140024
Project Officer:	Shaobin Li

Name:	HILTON HAWAIIAN VILLAGE
Address:	2005 KALIA RD
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-100818

HILTON HAWAIIAN VILLAGE (Continued) **U003541711**

Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 11/11/1991
Release ID: 900106
Project Officer: Shaobin Li

UST:
Name: HILTON HAWAIIAN VILLAGE
Address: 2005 KALIA RD
City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-100818
Owner: HILTON HAWAIIAN VILLAGE
Owner Address: 2005 KALIA RD
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.284122
Longitude: -157.835750
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-3
Date Installed: 04/05/1971
Tank Status: **Permanently Out of Use**
Date Closed: 09/18/1990
Tank Capacity: 6500
Substance: Gasoline

Name: HILTON HAWAIIAN VILLAGE
Address: 2005 KALIA RD
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-3
Date Installed: 04/05/1971
Tank Status: **Permanently Out of Use**
Date Closed: 09/18/1990
Tank Capacity: 6500
Substance: Gasoline

Name: HILTON HAWAIIAN VILLAGE
Address: 2005 KALIA RD
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4
Date Installed: 04/04/1966
Tank Status: **Permanently Out of Use**
Date Closed: 09/18/1990
Tank Capacity: 550
Substance: Diesel

Name: HILTON HAWAIIAN VILLAGE
Address: 2005 KALIA RD
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-4
Date Installed: 04/04/1966
Tank Status: **Permanently Out of Use**
Date Closed: 09/18/1990
Tank Capacity: 550
Substance: Diesel

HILTON HAWAIIAN VILLAGE (Continued) **U003541711**

Name: HILTON HAWAIIAN VILLAGE
Address: 2005 KALIA RD
City,State,Zip: HONOLULU, HI 96815

Tank ID: r--1
Date Installed: 04/04/1981
Tank Status: **Permanently out of Use**
Date Closed: 08/23/2014
Tank Capacity: 12000
Substance: Diesel

Name: HILTON HAWAIIAN VILLAGE
Address: 2005 KALIA RD
City,State,Zip: HONOLULU, HI 96815

Tank ID: r--1
Date Installed: 04/04/1981
Tank Status: **Permanently out of Use**
Date Closed: 08/23/2014
Tank Capacity: 12000
Substance: Diesel

Name: HILTON HAWAIIAN VILLAGE
Address: 2005 KALIA RD
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-2
Date Installed: 04/04/1981
Tank Status: **Permanently out of Use**
Date Closed: 08/23/2014
Tank Capacity: 12000
Substance: Diesel

Name: HILTON HAWAIIAN VILLAGE
Address: 2005 KALIA RD
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-2
Date Installed: 04/04/1981
Tank Status: **Permanently out of Use**
Date Closed: 08/23/2014
Tank Capacity: 12000
Substance: Diesel

398
ESE
1/4-1/2
0.387 mi.
2042 ft.

PALOLO AUTO SERVICE, INC.
3236 WAIALAE AVE
HONOLULU, HI 96816

HI LUST **U003541720**
HI UST **N/A**
HI Financial Assurance

Actual:
94 ft.

Focus Map:
9

LUST:
Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-100939
Facility Status: Confirmed Release
Facility Status Date: 08/25/2020
Release ID: 200018

PALOLO AUTO SERVICE, INC. (Continued) **U003541720**

Project Officer: Miranda Fleisher

UST:

Name:	PALOLO AUTO SERVICE, INC.
Address:	3236 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100939
Owner:	PALOLO AUTO SERVICE, INC.
Owner Address:	3236 WAIALAE AVE
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.287779
Longitude:	-157.810729
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS

Tank ID:	1
Date Installed:	10/15/1989
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasoline

Name:	PALOLO AUTO SERVICE, INC.
Address:	3236 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816

Tank ID:	1
Date Installed:	10/15/1989
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasoline

Name:	PALOLO AUTO SERVICE, INC.
Address:	3236 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816

Tank ID:	2
Date Installed:	10/15/1989
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasoline

Name:	PALOLO AUTO SERVICE, INC.
Address:	3236 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816

Tank ID:	2
Date Installed:	10/15/1989
Tank Status:	**Currently in Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasoline

Name:	PALOLO AUTO SERVICE, INC.
Address:	3236 WAIALAE AVE

PALOLO AUTO SERVICE, INC. (Continued) **U003541720**

City,State,Zip: HONOLULU, HI 96816

Tank ID: 3
Date Installed: 10/15/1989
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 500
Substance: Used Oil

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 3
Date Installed: 10/15/1989
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 500
Substance: Used Oil

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 05/08/1956
Tank Status: **Permanently Out of Use**
Date Closed: 10/31/1959
Tank Capacity: 4000
Substance: Gasoline

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 05/08/1956
Tank Status: **Permanently Out of Use**
Date Closed: 10/31/1959
Tank Capacity: 4000
Substance: Gasoline

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-2
Date Installed: 05/08/1956
Tank Status: **Permanently Out of Use**
Date Closed: 10/31/1989
Tank Capacity: 3000
Substance: Gasoline

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

PALOLO AUTO SERVICE, INC. (Continued) **U003541720**

Tank ID: R-2
Date Installed: 05/08/1956
Tank Status: **Permanently Out of Use**
Date Closed: 10/31/1989
Tank Capacity: 3000
Substance: Gasoline

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 05/08/1955
Tank Status: **Permanently Out of Use**
Date Closed: 10/31/1989
Tank Capacity: 500
Substance: Used Oil

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 05/08/1955
Tank Status: **Permanently Out of Use**
Date Closed: 10/31/1989
Tank Capacity: 500
Substance: Used Oil

HI Financial Assurance:
Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 11/25/2012
FR Archive: True

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939
Tank Id: 3
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 11/25/2012
FR Archive: True

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939
Tank Id: 2
Tank Status: Currently in Use
FRTYPE: Insurance

PALOLO AUTO SERVICE, INC. (Continued) **U003541720**

Expiration Date: 11/25/2012
FR Archive: True

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Insurance
Expiration Date: 11/25/2012
FR Archive: True

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 11/25/2012
FR Archive: True

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 11/25/2012
FR Archive: True

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 11/25/2021
FR Archive: False

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 11/25/2021
FR Archive: False

Name: PALOLO AUTO SERVICE, INC.
Address: 3236 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-100939

PALOLO AUTO SERVICE, INC. (Continued) **U003541720**

Tank Id:	2
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	11/25/2021
FR Archive:	False
Name:	PALOLO AUTO SERVICE, INC.
Address:	3236 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100939
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	11/25/2021
FR Archive:	False
Name:	PALOLO AUTO SERVICE, INC.
Address:	3236 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100939
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	11/25/2021
FR Archive:	False
Name:	PALOLO AUTO SERVICE, INC.
Address:	3236 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Alt Facility ID:	9-100939
Tank Id:	3
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	11/25/2021
FR Archive:	False

---

399 **PUNAHOU SCHOOL** **FUDS** **1024902093**
ESE **N/A**
1/4-1/2 **HONOLULU, HI**
0.392 mi.
2072 ft.

Actual:
97 ft.

Focus Map:
5

FUDS:

EPA Region:	09
Installation ID:	HI99799F402000
Congressional District Number:	1
Name:	PUNAHOU SCHOOL
FUDS Number:	H09HI0290
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	5558
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=54607
Eligibility:	Eligible

PUNAHOU SCHOOL (Continued) **1024902093**

Has Projects: No
NPL Status: Not on the NPL
Property History: THE PUNAHOU SCHOOL WAS USED BY THE ARMY DIVISION AS THE HEADQUARTERS FOR ALL ASPECTS OF THE A.E.D. ADMINISTRATIVE OPERATIONS AND INCLUDING A MEDICAL UNIT, MACHINE SHOP, SUPPLY STORAGE, AND MOTOR TR ANSPORTATI9ON UNIT.

Project Required: No
Feature Description: Not reported
Latitude: 21.30166667
Longitude: -157.82833333

CC400 **TEXACO STATION 611000550** **HI LUST 1000431692**
NW **1119 UNIVERSITY AVE** **HI UST HID981638117**
1/4-1/2 **HONOLULU, HI 96826** **RCRA NonGen / NLR**
0.397 mi.
2097 ft. **Site 1 of 2 in cluster CC**

Actual:
8 ft.

Focus Map:
5

LUST:
Name: TEXACO STATION
Address: 1119 UNIVERSITY AVE
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-100342
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 05/12/1999
Release ID: 900103
Project Officer: Lene Ichinotsubo

UST:
Name: TEXACO STATION
Address: 1119 UNIVERSITY AVE
City,State,Zip: HONOLULU, HI 96826
Facility ID: 9-100342
Owner: TEXACO REFINING & MARKETING INC.
Owner Address: ENVIRONMENTAL SERVICES 800 SW FIRST AVE., SUITE 180
Owner City,St,Zip: Honolulu, 96826 96826
Latitude: 21.293007
Longitude: -157.821064
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-002
Date Installed: 02/06/1966
Tank Status: **Permanently Out of Use**
Date Closed: 09/18/1996
Tank Capacity: 4000
Substance: Gasoline

Name: TEXACO STATION
Address: 1119 UNIVERSITY AVE
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-003
Date Installed: 02/06/1966
Tank Status: **Permanently Out of Use**
Date Closed: 09/18/1996
Tank Capacity: 4000

TEXACO STATION 611000550 (Continued) **1000431692**

Substance: Gasoline

Name: TEXACO STATION
Address: 1119 UNIVERSITY AVE
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-004
Date Installed: 02/06/1966
Tank Status: **Permanently Out of Use**
Date Closed: 09/18/1996
Tank Capacity: 4000
Substance: Gasoline

Name: TEXACO STATION
Address: 1119 UNIVERSITY AVE
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-005
Date Installed: 02/06/1966
Tank Status: **Permanently Out of Use**
Date Closed: 09/18/1996
Tank Capacity: 4000
Substance: Gasoline

Name: TEXACO STATION
Address: 1119 UNIVERSITY AVE
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-1
Date Installed: 02/06/1966
Tank Status: **Permanently Out of Use**
Date Closed: 10/27/1992
Tank Capacity: 550
Substance: Used Oil

RCRA Listings:

Date Form Received by Agency:	19870126
Handler Name:	TEXACO STATION 611000550
Handler Address:	1119 UNIVERSITY AVE
Handler City,State,Zip:	HONOLULU, HI 96826
EPA ID:	HID981638117
Contact Name:	DALE ANDERT
Contact Address:	1800 SW FIRST AVE STE 180
Contact City,State,Zip:	PORTLAND, OR 97201
Contact Telephone:	503-226-3575
Contact Fax:	Not reported
Contact Email:	Not reported
Contact Title:	Not reported
EPA Region:	09
Land Type:	Private
Federal Waste Generator Description:	Not a generator, verified
Non-Notifier:	Not reported
Biennial Report Cycle:	Not reported
Accessibility:	Not reported
Active Site Indicator:	Not reported
State District Owner:	Not reported
State District:	Not reported

TEXACO STATION 611000550 (Continued) **1000431692**

Mailing Address:		1119 UNIVERSITY AVE
Mailing City,State,Zip:		HONOLULU, HI 96826
Owner Name:	UNIVERSITY VILLAGE APTS WJ OKI	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20020729
Recognized Trader-Importer:		No
Recognized Trader-Exporter:		No
Importer of Spent Lead Acid Batteries:		No

TEXACO STATION 611000550 (Continued) **1000431692**

Exporter of Spent Lead Acid Batteries: No
Recycler Activity Without Storage: No
Manifest Broker: No
Sub-Part P Indicator: No

Handler - Owner Operator:
Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Owner
Owner/Operator Name: UNIVERSITY VILLAGE APTS WJ OKI
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: 1281 S KING ST RM 5
Owner/Operator City,State,Zip: HONOLULU, HI 96814
Owner/Operator Telephone: 808-523-5933
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19870126
Handler Name: TEXACO STATION 611000550
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Codes: No NAICS Codes Found

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported

TEXACO STATION 611000550 (Continued) **1000431692**

Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19951212
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

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401 West 1/4-1/2 0.406 mi. 2145 ft.

Actual: 20 ft.

Focus Map: 4

SCHUMAN CARRIAGE MOTORS, LTD.
1234 S BERETANIA ST
HONOLULU, HI 96814

HI SHWS **U003221663**
HI LUST **N/A**
HI UST
HI INST CONTROL
HI SPILLS
HI Financial Assurance

SHWS:

Name:	SAFEWAY 1234 SOUTH BERETANIA STREET HYDRAULIC FLUID
Address:	1234 S BERETANIA ST

SCHUMAN CARRIAGE MOTORS, LTD. (Continued) **U003221663**

City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2425
Location Description:	1234 S Beretania St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.301700
Longitude:	-157.842000

Name:	SCHUMAN CARRIAGE AUTOMATIC TRANSMISSION FLUID AND NEW ENGINE OIL TA
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported

SCHUMAN CARRIAGE MOTORS, LTD. (Continued) **U003221663**

Lead Agency:	SHWB
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	583
Location Description:	1234 S Beretania St, Honolulu, HI 96814
Is Public:	True
Update On:	2021-09-17 13:29:37
Latitude:	21.301590
Longitude:	-157.842174

LUST:

Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-101276
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	11/03/2005
Release ID:	060001
Project Officer:	Richard Takaba

Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-101276
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	04/19/2000
Release ID:	900058
Project Officer:	Richard Takaba

UST:

Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-101276
Owner:	SCHUMAN CARRIAGE MOTORS, LTD.
Owner Address:	1234 S BERETANIA ST P.O. BOX 2420
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.301406
Longitude:	-157.842441
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

SCHUMAN CARRIAGE MOTORS, LTD. (Continued) **U003221663**

Tank ID:	R-1
Date Installed:	05/05/1961
Tank Status:	**Permanently Out of Use**
Date Closed:	11/09/1999
Tank Capacity:	3000
Substance:	Gasoline
Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-2
Date Installed:	05/05/1961
Tank Status:	**Permanently Out of Use**
Date Closed:	11/08/1999
Tank Capacity:	550
Substance:	Other
Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-3
Date Installed:	05/05/1961
Tank Status:	**Permanently Out of Use**
Date Closed:	11/08/1999
Tank Capacity:	550
Substance:	Other
Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-4
Date Installed:	05/05/1961
Tank Status:	**Permanently Out of Use**
Date Closed:	12/01/1990
Tank Capacity:	500
Substance:	Used Oil
Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-6
Date Installed:	05/05/1961
Tank Status:	**Permanently Out of Use**
Date Closed:	12/01/1990
Tank Capacity:	550
Substance:	Other
Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	r-5
Date Installed:	03/01/1990

SCHUMAN CARRIAGE MOTORS, LTD. (Continued) **U003221663**

Tank Status:	**Permanently Out of Use**
Date Closed:	01/26/2005
Tank Capacity:	1000
Substance:	Used Oil

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SPILLS:

Name:	SAFEWAY 1234 SOUTH BERETANIA STREET
Address:	1234 S BERETANIA ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19991210-1047
Facility Registry ID:	110013778698
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Referred
Less Or Greater Than:	Not reported
Units:	Schuman Carriage
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Safeway, Inc.
Substances:	Hydraulic Fluid
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported

SCHUMAN CARRIAGE MOTORS, LTD. (Continued) **U003221663**

Latitude:	21.295252000000001
Longitude:	-157.84531899999999
Name:	SAFEWAY 1234 SOUTH BERETANIA STREET
Address:	1234 S BERETANIA ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19991210-1047
Facility Registry ID:	110013778698
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Referred
Less Or Greater Than:	Not reported
Units:	Schuman Carriage
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Safeway, Inc.
Substances:	Hydraulic Fluid
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.3017
Longitude:	-157.84219999999999
Name:	SAFEWAY 1234 SOUTH BERETANIA STREET
Address:	1234 S BERETANIA ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19991210-1047
Facility Registry ID:	110013778698

SCHUMAN CARRIAGE MOTORS, LTD. (Continued) **U003221663**

HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Referred
Less Or Greater Than:	Not reported
Units:	Schuman Carriage
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Safeway, Inc.
Substances:	Hydraulic Fluid
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.301354
Longitude:	-157.84250299999999

HI Financial Assurance:

Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-101276
Tank Id:	R-4
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	False

Name:	SCHUMAN CARRIAGE MOTORS, LTD.
Address:	1234 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-101276
Tank Id:	R-6
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported

SCHUMAN CARRIAGE MOTORS, LTD. (Continued) **U003221663**

FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: R-6
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: r-5
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: r-5
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: R-3

SCHUMAN CARRIAGE MOTORS, LTD. (Continued) **U003221663**

Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: SCHUMAN CARRIAGE MOTORS, LTD.
Address: 1234 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-101276
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

CD402 **CONTINENTAL AUTO SERVICES** **HI SHWS S104534121**
NNE **1918 ALGAROBA ST** **HI SPILLS N/A**
1/4-1/2 **HONOLULU, HI 96826**
0.407 mi.
2148 ft. **Site 1 of 2 in cluster CD**

Actual:
7 ft.

Focus Map:
5

SHWS:
Name: CONTINENTAL AUTO SERVICES
Address: 1918 ALGAROBA ST
City,State,Zip: HONOLULU, HI 96826
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Continental Auto Services

CONTINENTAL AUTO SERVICES (Continued) **S104534121**

HID Number:	Not reported
Facility Registry Identifier:	110005723850
Lead Agency:	HEER Office
Program:	State
Project Manager:	Charley Langer
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Continental Auto Services
HID Number:	Not reported
Facility Registry Identifier:	110005723850
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action - Type Undetermined
Document Date:	10/08/1999
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Charley Langer
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	974
Location Description:	1918 Algaroba St, Honolulu, HI 96826
Is Public:	True
Update On:	2020-09-18 09:42:35
Latitude:	21.294600
Longitude:	-157.831000

SPILLS:

Name:	CONTINENTAL AUTO SERVICES
Address:	1918 ALGAROBA ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96826
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19990119-1030
Facility Registry ID:	110005723850
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Continental Auto Service
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Continental Auto Services
Substances:	Hydraulic Fluid
Quanity:	Not reported

CONTINENTAL AUTO SERVICES (Continued) **S104534121**

Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.294563
Longitude:	-157.831031
Name:	CONTINENTAL AUTO SERVICES
Address:	1918 ALGAROBA ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96826
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19990119-1030
Facility Registry ID:	110005723850
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Continental Auto Service
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Continental Auto Services
Substances:	Hydraulic Fluid
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported

CONTINENTAL AUTO SERVICES (Continued) **S104534121**

Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.291408000000001
Longitude:	-157.82630499999999

403
SW
1/4-1/2
0.414 mi.
2186 ft.

205 BEACH WALK
205 BEACH WALK AVE
HONOLULU, HI 96815

HI SHWS **S108859866**
HI INST CONTROL **N/A**
HI SPILLS

Actual:
3 ft.

Focus Map:
8

SHWS:

Name:	205 BEACH WALK
Address:	205 BEACH WALK AVE
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1024

205 BEACH WALK (Continued) **S108859866**

Location Description:	205 Beach Walk Ave, Honolulu, HI 96815
Is Public:	True
Update On:	2021-02-05 10:59:36
Latitude:	21.279081
Longitude:	-157.831509

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Waikiki
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SPILLS:

Name:	WAIKIKI BEACH WALK RESORT
Address:	205 BEACH WALK AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Waikiki
Case Number:	20051116-1220
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Fuel Oil (Diesel) Release
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	2005-11-17 00:00:00
Result:	SOSC NFA
File Under:	Waikiki Beach Walk Resort
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported

205 BEACH WALK (Continued) **S108859866**

Comments:	Not reported
Latitude:	21.279568999999999
Longitude:	-157.83085600000001
Name:	WAIKIKI BEACH WALK RESORT
Address:	205 BEACH WALK AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Waikiki
Case Number:	20051116-1220
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Fuel Oil (Diesel) Release
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	2005-11-17 00:00:00
Result:	SOSC NFA
File Under:	Waikiki Beach Walk Resort
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.279752999999999
Longitude:	-157.83065400000001

CC404 **REYNOLDS RECYCLING - UNIVERSITY AVE. TRAILER** **HI SWRCY** **S125958490**
NW **1106 UNIVERSITY AVE.** **N/A**
1/4-1/2 **HONOLULU, HI**
0.420 mi.
2216 ft. **Site 2 of 2 in cluster CC**

Actual:
5 ft.

Focus Map:
5

SWRCY:

Permit Number:	RY-0025-18
Name:	REYNOLDS RECYCLING - UNIVERSITY AVE. TRAILER
Address:	1106 UNIVERSITY AVE.
City,State,Zip:	HONOLULU, HI
Materials:	dbc, select non-ferrous scrap, ADF glass
Island:	Oahu
TMK:	1-2-8-006:032
Closure Date:	Not reported
Type:	permit by rule
Status:	Not reported

CE405 **HALE MAKANA O MOILIILI** **HI SHWS** **S128196267**
NE **2139 ALGAROBA STREET** **HI BROWNFIELDS** **N/A**
1/4-1/2 **HONOLULU, HI**
0.420 mi.
2217 ft. **Site 1 of 2 in cluster CE**

Actual:
9 ft.

Focus Map:
5

SHWS:

Name:	HALE MAKANA O MOILIILI
Address:	2139 ALGAROBA STREET
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	SRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported

HALE MAKANA O MOILIILI (Continued) **S128196267**

Facility ID:	3169
Location Description:	2139 Algaroba Street
Is Public:	True
Update On:	2022-02-01 08:34:51
Latitude:	21.292902
Longitude:	-157.828163

BROWNFIELDS:

Name:	HALE MAKANA O MOILIILI
Address:	2139 ALGAROBA STREET
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Program:	SRP
Supplemental Location:	Not reported
Island:	Oahu
Zip Suffix:	Not reported
Facility ID:	3169
Location Description:	2139 Algaroba Street
Latitude:	21.292902
Longitude:	-157.828163

CF406 **GRACE OTSUKA APARTMENT COMPLEX** **HI SHWS** **S110061466**
West **1233 YOUNG ST** **HI ENG CONTROLS** **N/A**
1/4-1/2 **HONOLULU, HI 96814** **HI INST CONTROL**
0.420 mi.
2220 ft. **Site 1 of 2 in cluster CF**

Actual:
16 ft.

Focus Map:
4

SHWS:

Name:	GRACE OTSUKA APARTMENT COMPLEX
Address:	1233 YOUNG ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Grace Otsuka Apartment Complex
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Kelton Otsuka
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Grace Otsuka Apartment Complex
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Soil contaminated with diesel.
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported

GRACE OTSUKA APARTMENT COMPLEX (Continued) **S110061466**

Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	07/21/2008
Document Number:	2008-482-KO
Document Subject:	UST Closure and Release Response Report, Apr 2008, Grace Otsuka Apartment Complex, 1233 Young St, Honolulu HI 96814
Project Manager:	Kelton Otsuka
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2411
Location Description:	1233 Young St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.300130
Longitude:	-157.842663

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

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407 SW 1/4-1/2 0.421 mi. 2223 ft. **SHERATON WAIKIKI RESORT** **2255 KALAKAUA AVE** **HONOLULU, HI 96815**

HI LUST **U001236003**
HI UST **N/A**
HI SPILLS
HI Financial Assurance

Actual: 3 ft.

Focus Map: 8

LUST:

Name:	SHERATON WAIKIKI RESORT
Address:	2255 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102650
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	09/03/1997
Release ID:	930027
Project Officer:	Shaobin Li

Name:	SHERATON WAIKIKI RESORT
Address:	2255 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Facility ID:	9-102650
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	02/16/2011
Release ID:	090001
Project Officer:	Shaobin Li

UST:

Name:	SHERATON WAIKIKI RESORT
Address:	2255 KALAKAUA AVE

SHERATON WAIKIKI RESORT (Continued) **U001236003**

City,State,Zip: HONOLULU, HI 96815
Facility ID: 9-102650
Owner: Kyo-ya Hotel & Resorts
Owner Address: Kalakaua Avenue
Owner City,St,Zip: Honolulu, 96815 96815
Latitude: 21.278964
Longitude: -157.830418
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Map

Tank ID: 1
Date Installed: 12/30/1992
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 2500
Substance: Diesel

Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: 1
Date Installed: 12/30/1992
Tank Status: **Currently in Use**
Date Closed: Not reported
Tank Capacity: 2500
Substance: Diesel

Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-M-1
Date Installed: 12/30/1971
Tank Status: **Permanently Out of Use**
Date Closed: 11/09/1992
Tank Capacity: 1000
Substance: Diesel

Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: R-M-1
Date Installed: 12/30/1971
Tank Status: **Permanently Out of Use**
Date Closed: 11/09/1992
Tank Capacity: 1000
Substance: Diesel

Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815

Tank ID: r-6
Date Installed: Not reported
Tank Status: **Permanently out of Use**

SHERATON WAIKIKI RESORT (Continued) **U001236003**

Date Closed:	10/09/2008
Tank Capacity:	2500
Substance:	Not reported
Name:	SHERATON WAIKIKI RESORT
Address:	2255 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Tank ID:	r-6
Date Installed:	Not reported
Tank Status:	**Permanently out of Use**
Date Closed:	10/09/2008
Tank Capacity:	2500
Substance:	Not reported

SPILLS:

Name:	SHERATON WAIKIKI HOTEL ROADWAY CONNECTING KALIA RD & HELUMOA RD
Address:	2255 KALAKAUA AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19930830-1
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Sheraton Waikiki Hotel roadway connecting Kalia Rd & Helumoa Rd
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Not reported
Substances:	Diesel Fuel #2
Quanity:	1.5
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported

SHERATON WAIKIKI RESORT (Continued) **U001236003**

Closed Date: Not reported
Comments: Not reported
Latitude: 21.277574000000001
Longitude: -157.82926699999999

HI Financial Assurance:
Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-102650
Tank Id: 1
Tank Status: Currently in Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-102650
Tank Id: r-6
Tank Status: Permanently out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-102650
Tank Id: R-M-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-102650
Tank Id: r-6
Tank Status: Permanently out of Use
FRTYPE: Insurance
Expiration Date: 10/09/2014
FR Archive: True

Name: SHERATON WAIKIKI RESORT
Address: 2255 KALAKAUA AVE
City,State,Zip: HONOLULU, HI 96815
Alt Facility ID: 9-102650
Tank Id: R-M-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 10/09/2014
FR Archive: True

Name: SHERATON WAIKIKI RESORT

SHERATON WAIKIKI RESORT (Continued) **U001236003**

Address:	2255 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102650
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	10/09/2014
FR Archive:	True

Name:	SHERATON WAIKIKI RESORT
Address:	2255 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102650
Tank Id:	1
Tank Status:	Currently in Use
FRTYPE:	Insurance
Expiration Date:	08/28/2021
FR Archive:	False

Name:	SHERATON WAIKIKI RESORT
Address:	2255 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102650
Tank Id:	r-6
Tank Status:	Permanently out of Use
FRTYPE:	Insurance
Expiration Date:	08/28/2021
FR Archive:	False

Name:	SHERATON WAIKIKI RESORT
Address:	2255 KALAKAUA AVE
City,State,Zip:	HONOLULU, HI 96815
Alt Facility ID:	9-102650
Tank Id:	R-M-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	08/28/2021
FR Archive:	False

CE408 **HALE MAKANA O MAILI** **HI SHWS** **S128196133**
NE **2193 ALGOROBA STREET** **N/A**
1/4-1/2 **HONOLULU, HI**
0.429 mi.
2266 ft. **Site 2 of 2 in cluster CE**

Actual:
10 ft.

Focus Map:
5

SHWS:

Name:	HALE MAKANA O MAILI
Address:	2193 ALGOROBA STREET
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported

HALE MAKANA O MAILI (Continued) **S128196133**

Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2666
Location Description:	2139 Algaroba Street
Is Public:	True
Update On:	2022-02-01 08:26:46
Latitude:	21.428347
Longitude:	-158.176527

CD409 **MCCULLY SERVICE STATION** **HI LUST U001235441**
NNE **1901 S KING ST** **HI UST N/A**
1/4-1/2 **HONOLULU, HI 96826**
0.431 mi.
2275 ft. **Site 2 of 2 in cluster CD**

Actual:
8 ft.

Focus Map:
5

LUST:

Name:	MCCULLY SERVICE STATION
Address:	1901 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-101274
Facility Status:	Site Cleanup Completed with EHE/EHMP
Facility Status Date:	03/01/2019
Release ID:	180016
Project Officer:	Richard Takaba

UST:

Name:	MCCULLY SERVICE STATION
Address:	1901 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-101274
Owner:	LIN F. KAM
Owner Address:	1616 KEWALO ST
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	Not reported
Longitude:	Not reported
Horizontal Reference Datum Name:	Not reported

MCCULLY SERVICE STATION (Continued) **U001235441**

Horizontal Collection Method Name: Not reported

Tank ID: R-001
Date Installed: 04/26/1966
Tank Status: **Permanently Out of Use**
Date Closed: 07/01/1986
Tank Capacity: 1000
Substance: Gasoline

Name: MCCULLY SERVICE STATION
Address: 1901 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-002
Date Installed: 04/26/1966
Tank Status: **Permanently Out of Use**
Date Closed: 07/01/1986
Tank Capacity: 1000
Substance: Gasoline

Name: MCCULLY SERVICE STATION
Address: 1901 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-003
Date Installed: 04/26/1966
Tank Status: **Permanently Out of Use**
Date Closed: 07/01/1986
Tank Capacity: 500
Substance: Gasoline

Name: MCCULLY SERVICE STATION
Address: 1901 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-004
Date Installed: 04/26/1966
Tank Status: **Permanently Out of Use**
Date Closed: 07/01/1986
Tank Capacity: 200
Substance: Used Oil

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410 SW 1/4-1/2 0.433 mi. 2284 ft. **KAAHUMANU ELEMENTARY SCHOOL BUILDING EXTERIOR SOIL** **HI SHWS** **S126282735**
1141 KINAU ST **N/A**
HONOLULU, HI 96814

Actual: 24 ft.
Focus Map: 4

SHWS:
Name: KAAHUMANU ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address: 1141 KINAU ST
City,State,Zip: HONOLULU, HI 96814
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office

KAAHUMANU ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S126282735**

Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2995
Location Description:	1141 Kinau St, Honolulu, HI 96814, USA
Is Public:	True
Update On:	2021-11-10 16:42:32
Latitude:	21.302506
Longitude:	-157.843674

411
SW
1/4-1/2
0.437 mi.
2308 ft.

MID-PACIFIC INSTITUTE
2445 KAALA ST
HONOLULU, HI 96822

HI SHWS **U001235509**
HI LUST **N/A**
HI UST
HI Financial Assurance

Actual:
99 ft.

Focus Map:
5

SHWS:

Name:	MID PACIFIC INSTITUTE UNREGULATED UST
Address:	2445 KAALA ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office

MID-PACIFIC INSTITUTE (Continued) **U001235509**

Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	571
Location Description:	2445 Kaala St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.303764
Longitude:	-157.816666

LUST:

Name:	MID-PACIFIC INSTITUTE
Address:	2445 KAALA ST
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-101480
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	12/29/1999
Release ID:	980213
Project Officer:	Richard Takaba

UST:

Name:	MID-PACIFIC INSTITUTE
Address:	2445 KAALA ST
City,State,Zip:	HONOLULU, HI 96822
Facility ID:	9-101480
Owner:	MID-PACIFIC INSTITUTE
Owner Address:	2445 KAALA St
Owner City,St,Zip:	Honolulu, 96822 96822
Latitude:	21.303204
Longitude:	-157.818001
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	01/01/1970
Tank Status:	**Permanently Out of Use**
Date Closed:	06/10/1998
Tank Capacity:	1036
Substance:	Gasoline
Name:	MID-PACIFIC INSTITUTE
Address:	2445 KAALA ST

MID-PACIFIC INSTITUTE (Continued) **U001235509**

City,State,Zip: HONOLULU, HI 96822

Tank ID: R-2
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 06/10/1998
Tank Capacity: 261
Substance: Gasoline

HI Financial Assurance:
Name: MID-PACIFIC INSTITUTE
Address: 2445 KAALA ST
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101480
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

Name: MID-PACIFIC INSTITUTE
Address: 2445 KAALA ST
City,State,Zip: HONOLULU, HI 96822
Alt Facility ID: 9-101480
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: Not reported
FR Archive: False

CG412 **UH KENNEDY THEATER** **HI SHWS S111677954**
NNW **1770 EAST-WEST RD** **HI SPILLS N/A**
1/4-1/2 **HONOLULU, HI**
0.438 mi.
2313 ft. **Site 1 of 2 in cluster CG**

Actual:
92 ft.

Focus Map:
5

SHWS:
Name: UH MANOA KENNEDY THEATRE ORCHESTRA PLATFORM
Address: 1770 EAST-WEST RD
City,State,Zip: HONOLULU, HI
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Program: State
Project Manager: Not reported
Hazard Priority: Not reported
Potential Hazards And Controls: Not reported
Island: Oahu
SDAR Environmental Interest Name: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Potential Hazard And Controls: Not reported
Priority: Not reported

UH KENNEDY THEATER (Continued) **S111677954**

Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2525
Location Description:	1770 East-West Rd
Is Public:	True
Update On:	2019-12-16 10:09:59
Latitude:	21.299279
Longitude:	-157.814965

SPILLS:

Name:	UH KENNEDY THEATER
Address:	1770 EAST-WEST RD
Address 2:	1770 EAST-WEST ROAD
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	University of Hawaii @ Manoa
Case Number:	20110616-1000
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	Not reported
Units:	University of Hawaii - Kennedy Theatre oil leak
Activity Type:	Response
Activity Lead:	TC
Assignment End Date:	Not reported
Result:	Refer to SDAR
File Under:	State of Hawaii, University of Hawaii
Substances:	Citgo A/W Hydraulic Oil 32
Quanity:	0
Units:	Unknown
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported

UH KENNEDY THEATER (Continued) **S111677954**

Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

413
NW
1/4-1/2
0.441 mi.
2331 ft.

KYLE'S SERVICE STA. L-0995
2550 S BERETANIA ST
HONOLULU, HI 96826

HI LUST **U003221549**
HI UST **N/A**

Actual:
3 ft.

Focus Map:
5

LUST:

Name:	KYLE'S SERVICE STA. L-0995
Address:	2550 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100036
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	09/15/1994
Release ID:	910049
Project Officer:	Eric Sadoyama

UST:

Name:	KYLE'S SERVICE STA. L-0995
Address:	2550 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100036
Owner:	UNOCAL CORPORATION
Owner Address:	3915 Mission Avenue #7416
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.292552
Longitude:	-157.822523
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	03/27/1963
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	6000
Substance:	Gasoline
Name:	KYLE'S SERVICE STA. L-0995
Address:	2550 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-2
Date Installed:	03/27/1963
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	6000

KYLE'S SERVICE STA. L-0995 (Continued) **U003221549**

Substance:	Gasoline
Name:	KYLE'S SERVICE STA. L-0995
Address:	2550 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-4
Date Installed:	03/27/1963
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	280
Substance:	Used Oil

CH414 **CUTTER CHEVROLET** **HI SHWS** **U001235085**
NNW **1391 KAPIOLANI BLVD** **HI LUST** **N/A**
1/4-1/2 **HONOLULU, HI 96814** **HI UST**
0.445 mi. **HI Financial Assurance**
2351 ft. **Site 1 of 2 in cluster CH**

Actual: **3 ft.**
Focus Map: **4**

SHWS:

Name:	1391 KAPIOLANI BLVD
Address:	1391 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	668
Location Description:	1391 Kapiolani Blvd, Honolulu, HI 96814
Is Public:	True

CUTTER CHEVROLET (Continued) **U001235085**

Update On: 2020-03-23 10:39:23
Latitude: 21.293200
Longitude: -157.844000

LUST:
Name: CUTTER CHEVROLET
Address: 1391 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-100185
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 10/26/1999
Release ID: 950131
Project Officer: Renato Maniulit

UST:
Name: CUTTER CHEVROLET
Address: 1391 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-100185
Owner: MOTOR SUPPLY LTD
Owner Address: 726 SHERIDAN ST
Owner City,St,Zip: Honolulu, 96814 96814
Latitude: 21.293503
Longitude: -157.843954
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-1
Date Installed: 05/03/1971
Tank Status: **Permanently Out of Use**
Date Closed: 09/02/1995
Tank Capacity: 500
Substance: Used Oil

HI Financial Assurance:
Name: CUTTER CHEVROLET
Address: 1391 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100185
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Not Listed
Expiration Date: Not reported
FR Archive: False

Name: CUTTER CHEVROLET
Address: 1391 KAPIOLANI BLVD
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100185
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

415
NNE
1/4-1/2
0.448 mi.
2364 ft.

UNIVERSITY OF HAWAII FEDERAL CRE
2019 S KING ST
HONOLULU, HI 96826

HI LUST **U003154853**
HI UST **N/A**

Actual:
9 ft.

Focus Map:
5

LUST:

Name:	UNIVERSITY OF HAWAII FEDERAL CRE
Address:	2019 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-103157
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	01/30/1997
Release ID:	960056
Project Officer:	Jose Ruiz

UST:

Name:	UNIVERSITY OF HAWAII FEDERAL CRE
Address:	2019 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-103157
Owner:	UNDETERMINED AT THIS TIME
Owner Address:	Address Unknown
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.294530
Longitude:	-157.829727
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	03/01/1996
Tank Capacity:	1000
Substance:	Not Listed

Name:	UNIVERSITY OF HAWAII FEDERAL CRE
Address:	2019 S KING ST
City,State,Zip:	HONOLULU, HI 96826

Tank ID:	R-2
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	03/01/1996
Tank Capacity:	300
Substance:	Not Listed

Name:	UNIVERSITY OF HAWAII FEDERAL CRE
Address:	2019 S KING ST
City,State,Zip:	HONOLULU, HI 96826

Tank ID:	R-3
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	03/01/1996
Tank Capacity:	300
Substance:	Not Listed

Name: UNIVERSITY OF HAWAII FEDERAL CRE

UNIVERSITY OF HAWAII FEDERAL CRE (Continued) **U003154853**

Address:	2019 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-4
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	03/01/1996
Tank Capacity:	550
Substance:	Not Listed
Name:	UNIVERSITY OF HAWAII FEDERAL CRE
Address:	2019 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-5
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	03/01/1996
Tank Capacity:	300
Substance:	Not Listed

CI416 **76 MCCULLY SERVICE #136** **HI SHWS** **U001235168**
NNE **2105 S KING ST** **HI LUST** **N/A**
1/4-1/2 **HONOLULU, HI 96826** **HI UST**
0.449 mi. **HI ENG CONTROLS**
2371 ft. **Site 1 of 3 in cluster CI** **HI INST CONTROL**
HI Financial Assurance

Actual:
10 ft.

Focus Map:
5

SHWS:

Name:	FORMER ARCO AM/PM #82111
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1175
Location Description:	2105 S King St, Honolulu, HI 96826
Is Public:	True
Update On:	2021-01-29 10:06:52
Latitude:	21.294204
Longitude:	-157.828937

LUST:

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100341
Facility Status:	Site Cleanup Completed with EHE/EHMP
Facility Status Date:	04/10/2017
Release ID:	020038
Project Officer:	Shunsheng Fu

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100341
Facility Status:	Site Cleanup Completed with EHE/EHMP
Facility Status Date:	04/10/2017
Release ID:	940104
Project Officer:	Shunsheng Fu

UST:

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100341
Owner:	Par Hawaii, LLC
Owner Address:	1132 Bishop Street, Suite 2500
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.294320
Longitude:	-157.828890
Horizontal Reference Datum Name:	NAD27
Horizontal Collection Method Name:	GPS

Tank ID:	1
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	15000
Substance:	Gasohol

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Tank ID:	1
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	15000
Substance:	Gasohol
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	1
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	15000
Substance:	Gasohol
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	1
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	15000
Substance:	Gasohol
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2A
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2A
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2A
Date Installed:	04/21/2003

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2A
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	10000
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2B
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasohol
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2B
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasohol
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2B
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasohol
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	2B
Date Installed:	04/21/2003
Tank Status:	**Currently In Use**
Date Closed:	Not reported

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Tank Capacity: 5000
Substance: Gasohol

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-2
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-2
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-2
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-2
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-3
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-3
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-3
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-3
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-4
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-4
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST

76 MCCULLY SERVICE #136 (Continued) **U001235168**

City,State,Zip: HONOLULU, HI 96826

Tank ID: R-4
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-4
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-5
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-5
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-5
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/19/2002
Tank Capacity: 10000
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Tank ID:	R-5
Date Installed:	02/07/1983
Tank Status:	**Permanently Out of Use**
Date Closed:	07/19/2002
Tank Capacity:	10000
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A1
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A1
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A1
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A1
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A2
Date Installed:	01/01/1968

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A2
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A2
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A2
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A3
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983
Tank Capacity:	Not reported
Substance:	Gasoline
Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-A3
Date Installed:	01/01/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	01/01/1983

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Tank Capacity: Not reported
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A3
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A3
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Gasoline

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A4
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Diesel

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A4
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Diesel

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A4
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Diesel

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A4
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Diesel

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A5
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Used Oil

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A5
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Used Oil

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A5
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Used Oil

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-A5
Date Installed: 01/01/1968
Tank Status: **Permanently Out of Use**
Date Closed: 01/01/1983
Tank Capacity: Not reported
Substance: Used Oil

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST

76 MCCULLY SERVICE #136 (Continued) **U001235168**

City,State,Zip: HONOLULU, HI 96826

Tank ID: R-I-1
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/16/2002
Tank Capacity: 550
Substance: Used Oil

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-I-1
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/16/2002
Tank Capacity: 550
Substance: Used Oil

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-I-1
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/16/2002
Tank Capacity: 550
Substance: Used Oil

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

Tank ID: R-I-1
Date Installed: 02/07/1983
Tank Status: **Permanently Out of Use**
Date Closed: 07/16/2002
Tank Capacity: 550
Substance: Used Oil

ENG CONTROLS:
Supplemental Location Text: Not reported
Zip Suffix: Not reported
Island: Oahu
Potential Hazards And Controls: Hazard Managed With Controls
Engineering Control: Engineering Control Required

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

76 MCCULLY SERVICE #136 (Continued) **U001235168**

HI Financial Assurance:

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100341
Tank Id:	R-A4
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100341
Tank Id:	R-4
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100341
Tank Id:	R-3
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100341
Tank Id:	R-A2
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100341
Tank Id:	R-2
Tank Status:	Permanently Out of Use
FRTYPE:	Other
Expiration Date:	Not reported
FR Archive:	True

Name:	76 MCCULLY SERVICE #136
Address:	2105 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Alt Facility ID:	9-100341
Tank Id:	R-A3
Tank Status:	Permanently Out of Use

76 MCCULLY SERVICE #136 (Continued) **U001235168**

FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 2B
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 2A
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A5
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-5
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-I-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Alt Facility ID: 9-100341
Tank Id: R-A1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A5
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-I-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-5
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 2A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 2B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 03/31/2014
FR Archive: True

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-5
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Tank Id: R-I-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 2A
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A5
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136

76 MCCULLY SERVICE #136 (Continued) **U001235168**

Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-A2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

Name: 76 MCCULLY SERVICE #136
Address: 2105 S KING ST
City,State,Zip: HONOLULU, HI 96826
Alt Facility ID: 9-100341
Tank Id: 2B
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/30/2020
FR Archive: False

CF417 **CAL'S CLEANERS** **HI SHWS** **S106816747**
West **1234 S KING ST** **N/A**
1/4-1/2 **HONOLULU, HI 96814**
0.450 mi.
2377 ft. **Site 2 of 2 in cluster CF**

Actual:
13 ft.

Focus Map:
4

SHWS:

Name:	CAL'S CLEANERS
Address:	1234 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	875
Location Description:	1234 S King St, Honolulu, HI 96814
Is Public:	True
Update On:	2021-09-17 13:26:51
Latitude:	21.299649
Longitude:	-157.843099

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418 **FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEAS** **RCRA-VSQG** **1004688879**
SW **2199 KALIA RD** **HI SHWS** **HID984467464**
1/4-1/2 **HONOLULU, HI 96815** **HI SPILLS**
0.452 mi. **FINDS**
2389 ft. **ECHO**
CA HAZNET

Actual:
3 ft.

Focus Map:
8

RCRA Listings:

Date Form Received by Agency:		19920528
Handler Name:	HALEKULANI HOTEL	
Handler Address:		2199 KALIA RD

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Handler City,State,Zip:		HONOLULU, HI 96815-1988
EPA ID:		HID984467464
Contact Name:		MARK RUGENSTEIN
Contact Address:		2199 KALIA RD
Contact City,State,Zip:		HONOLUOU, HI 96815-1988
Contact Telephone:		808-923-2311
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Private
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		2199 KALIA RD
Mailing City,State,Zip:		HONOLULU, HI 96815-1988
Owner Name:	HALEKULANI CORP	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020905
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: HALEKULANI CORP	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	700 BISHOP ST
Owner/Operator City,State,Zip:	HONOLULU, HI 96813
Owner/Operator Telephone:	808-536-8794
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19920528
Handler Name: HALEKULANI HOTEL	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Codes:	No NAICS Codes Found

Facility Has Received Notices of Violation:

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	20070509
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	BROGI
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

SHWS:

Name:	HALEKULANI HOTEL DRY CLEANING DEPARTMENT
Address:	2199 KALIA RD

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	880
Location Description:	2199 Kalia Rd
Is Public:	True
Update On:	2020-08-31 18:35:34
Latitude:	21.278279
Longitude:	-157.831606

SPILLS:

Name:	HALEKULANI HOTEL
Address:	2199 KALIA RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19911210
Facility Registry ID:	110007502372
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Halekulani Hotel
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Result:	SOSC NFA
File Under:	Halekulani Hotel
Substances:	Gasoline
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

FINDS:
Registry ID: 110007502372

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

Envid:	1004688879
Registry ID:	110007502372
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110007502372
Name:	FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE
Address:	2199 KALIA RD
City,State,Zip:	HONOLULU, HI 96815

HAZNET:

Name:	HALEKULANI HOTEL

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Address:	2199 KALIA RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Contact:	MARK RUGENSTEIN
Telephone:	8089232311
Mailing Name:	Not reported
Mailing Address:	2199 KALIA RD
Year:	2004
Gepaid:	HID984467464
TSD EPA ID:	CAD008302903
CA Waste Code:	221 - Waste oil and mixed oil
Disposal Method:	R01 - Recycler
Tons:	0.175
Year:	2003
Gepaid:	HID984467464
TSD EPA ID:	CAD028409019
CA Waste Code:	221 - Waste oil and mixed oil
Disposal Method:	H01 - Transfer Station
Tons:	0.114
Year:	2003
Gepaid:	HID984467464
TSD EPA ID:	CAD028409019
CA Waste Code:	331 - Off-specification, aged or surplus organics
Disposal Method:	H01 - Transfer Station
Tons:	0.225
Year:	2002
Gepaid:	HID984467464
TSD EPA ID:	CAD028409019
CA Waste Code:	331 - Off-specification, aged or surplus organics
Disposal Method:	-
Tons:	0.045
Year:	2002
Gepaid:	HID984467464
TSD EPA ID:	CAD028409019
CA Waste Code:	221 - Waste oil and mixed oil
Disposal Method:	-
Tons:	0.19
Year:	2001
Gepaid:	HID984467464
TSD EPA ID:	CAD028409019
CA Waste Code:	221 - Waste oil and mixed oil
Disposal Method:	H01 - Transfer Station
Tons:	0.836
Year:	1997
Gepaid:	HID984467464
TSD EPA ID:	CAD059494310
CA Waste Code:	751 - Solids or sludges with halogenated organic compounds >= 1,000 Mg./L
Disposal Method:	-
Tons:	0.175

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Year:	1996
Gepaid:	HID984467464
TSD EPA ID:	CAD981375983
CA Waste Code:	751 - Solids or sludges with halogenated organic compounds >= 1,000 Mg./L
Disposal Method:	R01 - Recycler
Tons:	0.175

Year:	1995
Gepaid:	HID984467464
TSD EPA ID:	CAD981375983
CA Waste Code:	751 - Solids or sludges with halogenated organic compounds >= 1,000 Mg./L
Disposal Method:	R01 - Recycler
Tons:	0.35

Year:	1993
Gepaid:	HID984467464
TSD EPA ID:	CAD097854541
CA Waste Code:	141 - Off-specification, aged or surplus inorganics
Disposal Method:	R01 - Recycler
Tons:	0.1

Click this hyperlink while viewing on your computer to access
3 additional CA HAZNET: record(s) in the EDR Site Report.

Additional Info:

Year:	2004
Gen EPA ID:	HID984467464
Shipment Date:	20040728
Creation Date:	1/11/2005 18:31:27
Receipt Date:	20040818
Manifest ID:	20171829
Trans EPA ID:	HIR000000562
Trans Name:	GLOBAL ENVIRONMENTAL SVS GRP
Trans 2 EPA ID:	HIR000000133
Trans 2 Name:	HAWAII LOGISTIC SERVICES
TSDF EPA ID:	CAD008302903
Trans Name:	ONYX ENVIRONMENTAL SERVICES
TSDF Alt EPA ID:	CAD008302903
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	R01 - Recycler
Quantity Tons:	0.175
Waste Quantity:	350
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Year:	2003
Gen EPA ID:	HID984467464
Shipment Date:	20030429
Creation Date:	7/20/2004 12:51:42
Receipt Date:	20030512
Manifest ID:	22484003
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000001065
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD028409019
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.225
Waste Quantity:	450
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20030203
Creation Date:	5/20/2003 18:32:06
Receipt Date:	20030218
Manifest ID:	21069960
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000001065
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD028409019
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.114
Waste Quantity:	30
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	2002
Gen EPA ID:	HID984467464
Shipment Date:	20020307
Creation Date:	9/5/2002 18:30:37

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Receipt Date:	20020322
Manifest ID:	21069787
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	331 - Off-specification, aged, or surplus organics
RCRA Code:	D001
Meth Code:	- Not reported
Quantity Tons:	0.045
Waste Quantity:	90
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20020307
Creation Date:	9/5/2002 18:30:37
Receipt Date:	20020322
Manifest ID:	21069787
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	- Not reported
Quantity Tons:	0.19
Waste Quantity:	50
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	2001
Gen EPA ID:	HID984467464

Shipment Date:	20010711
Creation Date:	10/23/2001 0:00:00
Receipt Date:	20010801
Manifest ID:	21069649
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD028409019
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.418
Waste Quantity:	110
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Shipment Date:	20010711
Creation Date:	10/23/2001 0:00:00
Receipt Date:	20010801
Manifest ID:	21069649
Trans EPA ID:	HIR000000562
Trans Name:	Not reported
Trans 2 EPA ID:	HID981654023
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD028409019
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD028409019
TSDF Alt Name:	Not reported
Waste Code Description:	221 - Waste oil and mixed oil
RCRA Code:	Not reported
Meth Code:	H01 - Transfer Station
Quantity Tons:	0.418
Waste Quantity:	110
Quantity Unit:	G
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	1997
Gen EPA ID:	HID984467464

Shipment Date:	19970905
Creation Date:	4/23/1998 0:00:00
Receipt Date:	19971010
Manifest ID:	96825288
Trans EPA ID:	HID984467464
Trans Name:	Not reported
Trans 2 EPA ID:	HIR000000695
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD059494310
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Waste Code Description:	751 - Solids or sludge with halogenated organic comp. > 1000 mg/kg
RCRA Code:	D039
Meth Code:	- Not reported
Quantity Tons:	0.175
Waste Quantity:	350
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	1996
Gen EPA ID:	HID984467464
Shipment Date:	19960828
Creation Date:	9/12/1997 0:00:00
Receipt Date:	19960911
Manifest ID:	95713008
Trans EPA ID:	HID980886485
Trans Name:	Not reported
Trans 2 EPA ID:	CAD006912620
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD981375983
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD981375983
TSDF Alt Name:	Not reported
Waste Code Description:	751 - Solids or sludge with halogenated organic comp. > 1000 mg/kg
RCRA Code:	F002
Meth Code:	R01 - Recycler
Quantity Tons:	0.175
Waste Quantity:	350
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	1995
Gen EPA ID:	HID984467464
Shipment Date:	19950313
Creation Date:	3/29/1996 0:00:00
Receipt Date:	19950327
Manifest ID:	93441225
Trans EPA ID:	HID980886485
Trans Name:	Not reported
Trans 2 EPA ID:	CAD006912620
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD981375983
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD981375983
TSDF Alt Name:	Not reported

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Waste Code Description:	751 - Solids or sludge with halogenated organic comp. > 1000 mg/kg
RCRA Code:	F002
Meth Code:	R01 - Recycler
Quantity Tons:	0.35
Waste Quantity:	700
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

Additional Info:

Year:	1993
Gen EPA ID:	HID984467464
Shipment Date:	19930208
Creation Date:	9/7/1995 0:00:00
Receipt Date:	19930222
Manifest ID:	91635373
Trans EPA ID:	HID980886485
Trans Name:	Not reported
Trans 2 EPA ID:	CAD006912620
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD981375983
Trans Name:	Not reported
TSDF Alt EPA ID:	CAD981375983
TSDF Alt Name:	Not reported
Waste Code Description:	251 - Not reported
RCRA Code:	F002
Meth Code:	R01 - Recycler
Quantity Tons:	0
Waste Quantity:	700
Quantity Unit:	*
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	19930111
Creation Date:	9/15/1995 0:00:00
Receipt Date:	19930205
Manifest ID:	92127598
Trans EPA ID:	HID981654023
Trans Name:	Not reported
Trans 2 EPA ID:	CAD006912620
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD097854541
Trans Name:	Not reported
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
Waste Code Description:	141 - Off-specification, aged, or surplus inorganics
RCRA Code:	D002
Meth Code:	R01 - Recycler
Quantity Tons:	0.1
Waste Quantity:	200

FORT SHAFTER BUILDING 346 MOANALUA CHLORINE RELEASE (Continued) **1004688879**

Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

419
NW
1/4-1/2
0.453 mi.
2390 ft.

UNIVERSITY OF HAWAII INTERCHANGE
H-1 AND UNIVERSITY AVE
HONOLULU, HI

HI SHWS **S118943721**
N/A

Actual:
39 ft.

Focus Map:
5

SHWS:

Name:	UNIVERSITY OF HAWAII INTERCHANGE
Address:	H-1 AND UNIVERSITY AVE
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	University of Hawaii Interchange
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Paul Chong
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	University of Hawaii Interchange
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Low
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Paul Chong
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	513
Location Description:	H-1 and University Ave
Is Public:	True
Update On:	2020-12-01 13:56:32
Latitude:	21.294611
Longitude:	-157.820706

420
SE
1/4-1/2
0.457 mi.
2413 ft.

WALLYS GARDEN CENTER
1935 S BERETANIA ST
HONOLULU, HI 96826

HI SHWS **S111678012**
HI SPILLS **N/A**

Actual:
19 ft.

Focus Map:
5

SHWS:

Name:	WALLYS GARDEN CENTER
Address:	1935 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Wallys Garden Center
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Cal Miyahara
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Present
Island:	Oahu
SDAR Environmental Interest Name:	Wallys Garden Center
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Present
Priority:	Low
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Found: TPH diesel (326 mg/kg) and oil (2390 mg/kg) in the parking lot at 4.5 ft bgs.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Cal Miyahara
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	970
Location Description:	1935 S Beretania St
Is Public:	True
Update On:	2019-09-10 11:54:21
Latitude:	21.296557
Longitude:	-157.830463

SPILLS:

Name:	WALLYS GARDEN CENTER
Address:	1935 S BERETANIA ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20100518-1410
Facility Registry ID:	Not reported

WALLYS GARDEN CENTER (Continued) **S111678012**

HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	None
Less Or Greater Than:	Not reported
Units:	1935 South Beretania Street
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	2010-06-21 00:00:00
Result:	Refer to SDAR
File Under:	Asanoma Trust
Substances:	Oil
Quanity:	0
Units:	Unknown
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.296600000000002
Longitude:	-157.8304

421
WSW
1/4-1/2
0.458 mi.
2416 ft.

1310 PENSACOLA STREET **HI SHWS** **S111704658**
1310 PENSACOLA ST **N/A**
HONOLULU, HI 96814

Actual:
30 ft.

Focus Map:
4

SHWS:

Name:	1310 PENSACOLA STREET
Address:	1310 PENSACOLA ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	1310 Pensacola Street
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Paul Chong
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard

1310 PENSACOLA STREET (Continued) **S111704658**

Island:	Oahu
SDAR Environmental Interest Name:	1310 Pensacola Street
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	07/26/2011
Document Number:	2011-433-PC
Document Subject:	No Further Action Determination for the UST Closure and Release Report, Mar 2004
Project Manager:	Paul Chong
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	384
Location Description:	1310 Pensacola St
Is Public:	True
Update On:	2019-08-13 10:47:03
Latitude:	21.303730
Longitude:	-157.844601

CH422 **SKY ALA MOANA** **HI SHWS** **S126283161**
NNW **1388 KAPIOLANI BLVD** **N/A**
1/4-1/2 **HONOLULU, HI 96814**
0.458 mi.
2420 ft. **Site 2 of 2 in cluster CH**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	SKY ALA MOANA
Address:	1388 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported

SKY ALA MOANA (Continued) **S126283161**

Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2987
Location Description:	1388 Kapiolani Blvd, Honolulu, HI 96814
Is Public:	True
Update On:	2021-11-21 16:31:52
Latitude:	21.293898
Longitude:	-157.843369

423
NNE
1/4-1/2
0.463 mi.
2444 ft.

HAWAII LAW ENFORCEMENT FEDERAL CREDIT UNION
1936 S KING ST
HONOLULU, HI 96826

HI SHWS **S126282574**
N/A

Actual:
10 ft.

Focus Map:
5

SHWS:

Name:	HAWAII LAW ENFORCEMENT FEDERAL CREDIT UNION
Address:	1936 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported

HAWAII LAW ENFORCEMENT FEDERAL CREDIT UNION (Continued) **S126282574**

Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	3043
Location Description:	1936 S King St, Honolulu, HI 96826, USA
Is Public:	True
Update On:	2021-11-21 16:48:07
Latitude:	21.295526
Longitude:	-157.830854

424
NW
1/4-1/2
0.464 mi.
2452 ft.

HONOLULU LIMITED **HI LUST** **U003762116**
911 HAUSTEN ST **HI UST** **N/A**
HONOLULU, HI 96826

Actual:
6 ft.

Focus Map:
5

LUST:

Name:	HONOLULU LIMITED
Address:	911 HAUSTEN ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-103656
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	12/03/2001
Release ID:	010049
Project Officer:	Mark Sutterfield

UST:

Name:	HONOLULU LIMITED
Address:	911 HAUSTEN ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-103656
Owner:	HONOLULU LIMITED
Owner Address:	3660 WAIALAE AVE, SUITE 400
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.291532
Longitude:	-157.824129
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	07/19/2000
Tank Capacity:	1000
Substance:	Not Listed
Name:	HONOLULU LIMITED
Address:	911 HAUSTEN ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-2
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	07/19/2000
Tank Capacity:	1000

HONOLULU LIMITED (Continued) **U003762116**

Substance: Not Listed

CI425 **WILIWILI AND KING STREETS EXCAVATION** **HI SHWS** **1006819666**
NNE **KING ST & WILIWILI ST** **N/A**
1/4-1/2 **HONOLULU, HI 96826**
0.465 mi.
2457 ft. **Site 2 of 3 in cluster CI**

Actual:
10 ft.

Focus Map:
5

SHWS:

Name:	WILIWILI AND KING STREETS EXCAVATION
Address:	KING ST & WILIWILI ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	869
Location Description:	King St & Wiliwili St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.294400
Longitude:	-157.829000

CJ426 **SUPERBLOCK PROPERTIES** **HI LUST** **U001235973**
NNW **SOUTH BLOCK (BLDG S20) / MAKALOA ST** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96814**
0.466 mi.
2458 ft. **Site 1 of 3 in cluster CJ**

Actual:
3 ft.

Focus Map:
4

LUST:

Name:	SUPERBLOCK PROPERTIES
Address:	SOUTH BLOCK (BLDG S20) / MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-102602
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	12/06/1993
Release ID:	920143
Project Officer:	Stanton Enomoto

UST:

Name:	SUPERBLOCK PROPERTIES
Address:	SOUTH BLOCK (BLDG S20) / MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-102602
Owner:	KEEAUMOKU PARTNERS
Owner Address:	820 MILILANI ST, SUITE 820
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.294361
Longitude:	-157.842973
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-ST12
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	10/22/1991
Tank Capacity:	1000
Substance:	Used Oil

CI427 **MCDONALD'S RESTAURANT SOIL & GROUNDWATER CONTAMINA** **HI SHWS** **S105264711**
NNE **2121 S KING ST** **N/A**
1/4-1/2 **HONOLULU, HI 96826**
0.466 mi.
2463 ft. **Site 3 of 3 in cluster CI**

Actual:
10 ft.

Focus Map:
5

SHWS:

Name:	MCDONALD'S RESTAURANT SOIL & GROUNDWATER CONTAMINATION
Address:	2121 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported

MCDONALD'S RESTAURANT SOIL & GROUNDWATER CONTAMINATION (Continued) **S105264711**

Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	568
Location Description:	2121 S King St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.294109
Longitude:	-157.828438

428
SW
1/4-1/2
0.470 mi.
2479 ft.

WENS LIFE CO., INC
808 SHERIDAN ST
HONOLULU, HI 96814

HI LUST **U001235446**
HI UST **N/A**

Actual:
10 ft.

Focus Map:
4

LUST:

Name:	WENS LIFE CO., INC
Address:	808 SHERIDAN ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-101330
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	06/25/2003
Release ID:	030035
Project Officer:	Richard Takaba

UST:

Name:	WENS LIFE CO., INC
Address:	808 SHERIDAN ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-101330
Owner:	WENS LIFE CO., INC
Owner Address:	441 WALINA ST. #101
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.296729
Longitude:	-157.842204
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	04/22/1979

WENS LIFE CO., INC (Continued) **U001235446**

Tank Status:	**Permanently Out of Use**
Date Closed:	01/13/1998
Tank Capacity:	4000
Substance:	Gasoline
Name:	WENS LIFE CO., INC
Address:	808 SHERIDAN ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-2
Date Installed:	04/22/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	01/13/1998
Tank Capacity:	2000
Substance:	Gasoline
Name:	WENS LIFE CO., INC
Address:	808 SHERIDAN ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-3
Date Installed:	04/22/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	01/13/1998
Tank Capacity:	500
Substance:	Other
Name:	WENS LIFE CO., INC
Address:	808 SHERIDAN ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-4
Date Installed:	04/22/1979
Tank Status:	**Permanently Out of Use**
Date Closed:	01/13/1998
Tank Capacity:	500
Substance:	Other

CG429 **UH MANOA HENKE HALL** **HI SHWS** **S123106624**
NNW **1800 EAST-WEST RD** **N/A**
1/4-1/2 **HONOLULU, HI 96822**
0.473 mi.
2497 ft. **Site 2 of 2 in cluster CG**

Actual:
94 ft.

Focus Map:
5

SHWS:

Name:	UH MANOA HENKE HALL
Address:	1800 EAST-WEST RD
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	UH Manoa Henke Hall
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	Not reported
Potential Hazards And Controls:	Hazard Present

UH MANOA HENKE HALL (Continued) **S123106624**

Island:	Oahu
SDAR Environmental Interest Name:	UH Manoa Henke Hall
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Present
Priority:	Not reported
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	856
Location Description:	1800 East-West Rd
Is Public:	True
Update On:	2019-12-16 09:18:18
Latitude:	21.300300
Longitude:	-157.815000

Name:	UH MANOA HENKE HALL
Address:	1800 EAST-WEST RD
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	UH Manoa Henke Hall
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	Not reported
Potential Hazards And Controls:	Hazard Present
Island:	Oahu
SDAR Environmental Interest Name:	UH Manoa Henke Hall
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Present
Priority:	Not reported
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported

UH MANOA HENKE HALL (Continued) **S123106624**

Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	856
Location Description:	1800 East-West Rd
Is Public:	True
Update On:	2019-12-16 09:18:18
Latitude:	21.299141
Longitude:	-157.815617

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430 SW 1/4-1/2 0.474 mi. 2503 ft. **LIKE LIKE PLAZA PETROLEUM CONTAMINATION** **HI SHWS** **1006819347**
745 KEEAUMOKU ST **N/A**
HONOLULU, HI 96814

Actual: **7 ft.**

Focus Map: **4**

SHWS:

Name:	LIKE LIKE PLAZA PETROLEUM CONTAMINATION
Address:	745 KEEAUMOKU ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Like Like Plaza Petroleum Contamination
HID Number:	Not reported
Facility Registry Identifier:	110013771383
Lead Agency:	HEER Office
Program:	State
Project Manager:	Anna Fernandez
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Like Like Plaza Petroleum Contamination
HID Number:	Not reported
Facility Registry Identifier:	110013771383
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: petroleum-impacted soils
Nature of Residual Contamination:	Petroleum impacted soil
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	05/04/2006
Document Number:	2006-266-AF
Document Subject:	NFA determination
Project Manager:	Anna Fernandez
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2637
Location Description:	745 Keeaumoku St

LIKE LIKE PLAZA PETROLEUM CONTAMINATION (Continued) **1006819347**

Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.295600
Longitude:	-157.841000

431
WSW
1/4-1/2
0.475 mi.
2508 ft.

TEXACO STATION 611000090
1239 S KING ST
HONOLULU, HI 96814

HI LUST **1000601548**
HI UST **HID984467852**
RCRA NonGen / NLR
HI Financial Assurance

Actual:
11 ft.

Focus Map:
4

LUST:

Name:	TEXACO STATION
Address:	1239 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100340
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/08/1999
Release ID:	980250
Project Officer:	Richard Takaba

Name:	TEXACO STATION
Address:	1239 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100340
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/08/1999
Release ID:	980194
Project Officer:	Richard Takaba

UST:

Name:	TEXACO STATION
Address:	1239 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100340
Owner:	TEXACO REFINING & MARKETING INC.
Owner Address:	ENVIRONMENTAL SERVICES 800 SW FIRST AVE., SUITE 180
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.299342
Longitude:	-157.843259
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

Tank ID:	R-1
Date Installed:	02/06/1985
Tank Status:	**Permanently Out of Use**
Date Closed:	09/02/1998
Tank Capacity:	550
Substance:	Used Oil

Name:	TEXACO STATION
Address:	1239 S KING ST
City,State,Zip:	HONOLULU, HI 96814

Tank ID:	R-2
Date Installed:	02/06/1985
Tank Status:	**Permanently Out of Use**

TEXACO STATION 611000090 (Continued) **1000601548**

Date Closed: 09/03/1998
Tank Capacity: 10000
Substance: Gasoline

Name: TEXACO STATION
Address: 1239 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-3
Date Installed: 02/06/1985
Tank Status: **Permanently Out of Use**
Date Closed: 09/03/1998
Tank Capacity: 10000
Substance: Gasoline

Name: TEXACO STATION
Address: 1239 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: 02/06/1985
Tank Status: **Permanently Out of Use**
Date Closed: 09/03/1998
Tank Capacity: 10000
Substance: Gasoline

Name: TEXACO STATION
Address: 1239 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-5
Date Installed: 02/06/1985
Tank Status: **Permanently Out of Use**
Date Closed: 09/03/1998
Tank Capacity: 10000
Substance: Gasoline

RCRA Listings:
Date Form Received by Agency: 19920224
Handler Name: TEXACO STATION 611000090
Handler Address: 1239 S KING ST
Handler City,State,Zip: HONOLULU, HI 96814
EPA ID: HID984467852
Contact Name: DALE ANDERT
Contact Address: 1800 SW 1ST AVE STE 180
Contact City,State,Zip: PORTLAND, OR 97201
Contact Telephone: 503-226-3575
Contact Fax: Not reported
Contact Email: Not reported
Contact Title: Not reported
EPA Region: 09
Land Type: Private
Federal Waste Generator Description: Not a generator, verified
Non-Notifier: Not reported
Biennial Report Cycle: Not reported
Accessibility: Not reported
Active Site Indicator: Not reported

TEXACO STATION 611000090 (Continued) **1000601548**

State District Owner:		Not reported
State District:		Not reported
Mailing Address:		1239 S KING ST
Mailing City,State,Zip:		HONOLULU, HI 96814
Owner Name:	OKAMURA BOYS AND GIRLS HOME	
Owner Type:		Private
Operator Name:	Not reported	
Operator Type:		Not reported
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	
Handler Date of Last Change:		20020729
Recognized Trader-Importer:		No

TEXACO STATION 611000090 (Continued) **1000601548**

Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name:	OKAMURA BOYS AND GIRLS HOME
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	BUSINESS LN 98 211 PALI MOMI
Owner/Operator City,State,Zip:	AIEA, HI 96701
Owner/Operator Telephone:	808-538-4163
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19920224
Handler Name:	TEXACO STATION 611000090
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	4471
NAICS Description:	GASOLINE STATIONS

Facility Has Received Notices of Violation:

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported

TEXACO STATION 611000090 (Continued) **1000601548**

Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19951211
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

HI Financial Assurance:

Name:	TEXACO STATION
Address:	1239 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100340
Tank Id:	R-5
Tank Status:	Permanently Out of Use
FRTYPE:	Self Insured
Expiration Date:	Not reported
FR Archive:	False

Name:	TEXACO STATION
Address:	1239 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-100340
Tank Id:	R-4
Tank Status:	Permanently Out of Use
FRTYPE:	Self Insured

TEXACO STATION 611000090 (Continued) **1000601548**

Expiration Date: Not reported
FR Archive: False

Name: TEXACO STATION
Address: 1239 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100340
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: TEXACO STATION
Address: 1239 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100340
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

Name: TEXACO STATION
Address: 1239 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-100340
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

CJ432 **SUPERBLOCK PROPERTIES** **HI LUST U003221767**
NNW **NORTH BLOCK (BLDG N8) / KEEAUMOKU ST** **HI UST N/A**
1/4-1/2 **HONOLULU, HI 96814**
0.482 mi.
2547 ft. **Site 2 of 3 in cluster CJ**

Actual:
3 ft.

Focus Map:
4

LUST:
Name: SUPERBLOCK PROPERTIES
Address: NORTH BLOCK (BLDG N8) / KEEAUMOKU ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-102594
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 12/20/1993
Release ID: 920139
Project Officer: Stanton Enomoto

UST:
Name: SUPERBLOCK PROPERTIES
Address: NORTH BLOCK (BLDG N8) / KEEAUMOKU ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-102594
Owner: KEEAUMOKU PARTNERS
Owner Address: 820 MILILANI ST, SUITE 820
Owner City,St,Zip: Honolulu, 96814 96814

SUPERBLOCK PROPERTIES (Continued) **U003221767**

Latitude:	21.294681
Longitude:	-157.842828
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-NT3
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	07/23/1991
Tank Capacity:	250
Substance:	Used Oil
Name:	SUPERBLOCK PROPERTIES
Address:	NORTH BLOCK (BLDG N8) / KEEAUMOKU ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-NT4
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	07/23/1991
Tank Capacity:	8000
Substance:	Gasoline
Name:	SUPERBLOCK PROPERTIES
Address:	NORTH BLOCK (BLDG N8) / KEEAUMOKU ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-NT5
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	07/23/1991
Tank Capacity:	8000
Substance:	Gasoline

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433 **KAIMUKI TOYOTA** **RCRA-VSQG** **1000303484**
ESE **3282 WAIALAE AVE** **HI LUST** **HID981655400**
1/4-1/2 **HONOLULU, HI 96816** **HI UST**
0.482 mi.
2547 ft.

Actual:
111 ft.

Focus Map:
9

RCRA Listings:

Date Form Received by Agency:		19860910
Handler Name:	KAIMUKI TOYOTA	
Handler Address:		3282 WAIALAE AVE
Handler City,State,Zip:		HONOLULU, HI 96816
EPA ID:		HID981655400
Contact Name:		GEORGE ENDO
Contact Address:		3282 WAIALAE AVE
Contact City,State,Zip:		HONOLULU, HI 96816
Contact Telephone:		808-732-1439
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Other
Federal Waste Generator Description:		Conditionally Exempt Small Quantity Generator
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported

KAIMUKI TOYOTA (Continued) **1000303484**

Accessibility:		Not reported
Active Site Indicator:		Handler Activities
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		3282 WAIALAE AVE
Mailing City,State,Zip:		HONOLULU, HI 96816
Owner Name:	SERRVJCO PACIFIC INC	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site Converter Treatment storage and Disposal Facility:		Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:		Not reported
Active Site State-Reg Handler:		---
Federal Facility Indicator:		Not reported
Hazardous Secondary Material Indicator:		N
Sub-Part K Indicator:		Not reported
Commercial TSD Indicator:		No
Treatment Storage and Disposal Type:		Not reported
2018 GPRA Permit Baseline:		Not on the Baseline
2018 GPRA Renewals Baseline:		Not on the Baseline
Permit Renewals Workload Universe:		Not reported
Permit Workload Universe:		Not reported
Permit Progress Universe:		Not reported
Post-Closure Workload Universe:		Not reported
Closure Workload Universe:		Not reported
202 GPRA Corrective Action Baseline:		No
Corrective Action Workload Universe:		No
Subject to Corrective Action Universe:		No
Non-TSDFs Where RCRA CA has Been Imposed Universe:		No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:		No
TSDFs Only Subject to CA under Discretionary Auth Universe:		No
Corrective Action Priority Ranking:		No NCAPS ranking
Environmental Control Indicator:		No
Institutional Control Indicator:		No
Human Exposure Controls Indicator:		N/A
Groundwater Controls Indicator:		N/A
Operating TSDF Universe:		Not reported
Full Enforcement Universe:		Not reported
Significant Non-Complier Universe:		No
Unaddressed Significant Non-Complier Universe:		No
Addressed Significant Non-Complier Universe:		No
Significant Non-Complier With a Compliance Schedule Universe:		No
Financial Assurance Required:	Not reported	

KAIMUKI TOYOTA (Continued) **1000303484**

Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Operator
Owner/Operator Name: NOT REQUIRED	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Owner
Owner/Operator Name: SERRVJCO PACIFIC INC	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999
Owner/Operator Telephone:	415-555-1212
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19860910
Handler Name: KAIMUKI TOYOTA	
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	Not reported
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Code:	44111
NAICS Description:	NEW CAR DEALERS

Facility Has Received Notices of Violation:

Found Violation:	No

KAIMUKI TOYOTA (Continued) **1000303484**

Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Found Violation:	No
Agency Which Determined Violation:	Not reported
Violation Short Description:	Not reported
Date Violation was Determined:	Not reported
Actual Return to Compliance Date:	Not reported
Return to Compliance Qualifier:	Not reported
Violation Responsible Agency:	Not reported
Scheduled Compliance Date:	Not reported
Enforcement Identifier:	Not reported
Date of Enforcement Action:	Not reported
Enforcement Responsible Agency:	Not reported
Enforcement Docket Number:	Not reported
Enforcement Attorney:	Not reported
Corrective Action Component:	Not reported
Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported

KAIMUKI TOYOTA (Continued) **1000303484**

Consent/Final Order Respondent Name: Not reported
Consent/Final Order Lead Agency: Not reported
Enforcement Type: Not reported
Enforcement Responsible Person: Not reported
Enforcement Responsible Sub-Organization: Not reported
SEP Sequence Number: Not reported
SEP Expenditure Amount: Not reported
SEP Scheduled Completion Date: Not reported
SEP Actual Date: Not reported
SEP Defaulted Date: Not reported
SEP Type: Not reported
SEP Type Description: Not reported
Proposed Amount: Not reported
Final Monetary Amount: Not reported
Paid Amount: Not reported
Final Count: Not reported
Final Amount: Not reported

Evaluation Action Summary:
Evaluation Date: 19960412
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: R9
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

Evaluation Date: 20091029
Evaluation Responsible Agency: State
Found Violation: No
Evaluation Type Description: COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier: JUNG
Evaluation Responsible Sub-Organization: Not reported
Actual Return to Compliance Date: Not reported
Scheduled Compliance Date: Not reported
Date of Request: Not reported
Date Response Received: Not reported
Request Agency: Not reported
Former Citation: Not reported

LUST:
Name: KAIMUKI TOYOTA SERVICE
Address: 3282 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-100880
Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 10/20/1998
Release ID: 970103
Project Officer: Jose Ruiz

KAIMUKI TOYOTA (Continued) **1000303484**

UST:

Name:	KAIMUKI TOYOTA SERVICE
Address:	3282 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-100880
Owner:	SERVCO PACIFIC, INC.
Owner Address:	P.O. BOX 2788
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.286704
Longitude:	-157.806020
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	GPS
Tank ID:	R-1
Date Installed:	05/05/1974
Tank Status:	**Permanently Out of Use**
Date Closed:	06/07/1997
Tank Capacity:	500
Substance:	Used Oil

434
NE
1/4-1/2
0.485 mi.
2561 ft.

Actual:
10 ft.

Focus Map:
5

GREEN MILL FOOD MANUFACTURER LTD **HI LUST U003154827**
914 COOLIDGE ST **HI UST N/A**
HONOLULU, HI 96826

LUST:

Name:	GREEN MILL FOOD MANUFACTURER LTD
Address:	914 COOLIDGE ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-103103
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	12/28/1995
Release ID:	950127
Project Officer:	Eric Sadoyama

UST:

Name:	GREEN MILL FOOD MANUFACTURER LTD
Address:	914 COOLIDGE ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-103103
Owner:	GREEN MILL FOOD MANUFACTURER LTD
Owner Address:	732 WILIWILI ST
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.291991
Longitude:	-157.825266
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	08/04/1995
Tank Capacity:	250
Substance:	Diesel
Name:	GREEN MILL FOOD MANUFACTURER LTD

GREEN MILL FOOD MANUFACTURER LTD (Continued) **U003154827**

Address:	914 COOLIDGE ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-2
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	08/04/1995
Tank Capacity:	350
Substance:	Diesel

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435 SW 1/4-1/2 0.487 mi. 2570 ft. **UH MANOA FOOD SCIENCE TECHNOLOGY BUILDING** **HI SHWS** **1006820224**
1920 EDMONDSON RD **HI SPILLS** **N/A**
HONOLULU, HI 96822

Actual: **95 ft.**

Focus Map: **5**

SHWS:

Name:	UH MANOA FOOD SCIENCE TECHNOLOGY BUILDING
Address:	1920 EDMONDSON RD
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1501
Location Description:	1920 Edmondson Rd
Is Public:	True
Update On:	2019-12-16 10:09:46
Latitude:	21.302026
Longitude:	-157.815559

UH MANOA FOOD SCIENCE TECHNOLOGY BUILDING (Continued) **1006820224**

SPILLS:

Name:	FOOD SCIENCE TECHNOLOGY BUILDING
Address:	1920 EDMONDSON RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	Manoa Campus
Case Number:	20010329-1218
Facility Registry ID:	110013781489
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Food Science Technology Building UH Manoa
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	State of Hawaii, University of Hawaii
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.319856999999999
Longitude:	-157.80983599999999
Name:	FOOD SCIENCE TECHNOLOGY BUILDING
Address:	1920 EDMONDSON RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	Manoa Campus
Case Number:	20010329-1218
Facility Registry ID:	110013781489
HID Number:	Not reported
Lead and Program:	HEER EP&R

UH MANOA FOOD SCIENCE TECHNOLOGY BUILDING (Continued) **1006820224**

ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Food Science Technology Building UH Manoa
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	State of Hawaii, University of Hawaii
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.301445000000001
Longitude:	-157.81585999999999

CK436 **TOM ISHIIS UNION SERVICE** **HI SHWS** **S121406272**
NE **2114 S KING ST** **N/A**
1/4-1/2 **HONOLULU, HI 96826**
0.493 mi.
2603 ft. **Site 1 of 2 in cluster CK**

Actual:
10 ft.

Focus Map:
5

SHWS:

Name:	TOM ISHIIS UNION SERVICE
Address:	2114 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported

TOM ISHIIS UNION SERVICE (Continued) **S121406272**

HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1696
Location Description:	2114 S King St, Honolulu, HI 96826
Is Public:	True
Update On:	2021-02-05 11:30:39
Latitude:	21.294292
Longitude:	-157.827876

CK437 **TOM ISHII'S UNION L-4462** **HI LUST U001235017**
NE **2114 S KING ST** **HI UST N/A**
1/4-1/2 **HONOLULU, HI 96826**
0.493 mi.
2603 ft. **Site 2 of 2 in cluster CK**

Actual:
10 ft.

Focus Map:
5

LUST:

Name:	TOM ISHII'S UNION L-4462
Address:	2114 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100042
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	07/24/2001
Release ID:	900023
Project Officer:	Shaobin Li

UST:

Name:	TOM ISHII'S UNION L-4462
Address:	2114 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Facility ID:	9-100042
Owner:	UNOCAL CORPORATION
Owner Address:	3915 Mission Avenue #7416
Owner City,St,Zip:	Honolulu, 96826 96826
Latitude:	21.294216
Longitude:	-157.827884
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1

TOM ISHII'S UNION L-4462 (Continued) **U001235017**

Date Installed:	03/26/1958
Tank Status:	**Permanently Out of Use**
Date Closed:	11/30/1989
Tank Capacity:	4000
Substance:	Gasoline
Name:	TOM ISHII'S UNION L-4462
Address:	2114 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-1-2
Date Installed:	03/26/1958
Tank Status:	**Permanently Out of Use**
Date Closed:	07/01/1992
Tank Capacity:	4000
Substance:	Gasoline
Name:	TOM ISHII'S UNION L-4462
Address:	2114 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-2
Date Installed:	03/26/1958
Tank Status:	**Permanently Out of Use**
Date Closed:	07/01/1992
Tank Capacity:	5000
Substance:	Gasoline
Name:	TOM ISHII'S UNION L-4462
Address:	2114 S KING ST
City,State,Zip:	HONOLULU, HI 96826
Tank ID:	R-4
Date Installed:	03/26/1958
Tank Status:	**Permanently Out of Use**
Date Closed:	07/01/1992
Tank Capacity:	550
Substance:	Used Oil

CJ438 **SUPERBLOCK PROPERTIES** **HI LUST** **U001235974**
NNW **SOUTH BLOCK (BLDG S25) / MAKALOA ST** **HI UST** **N/A**
1/4-1/2 **HONOLULU, HI 96814**
0.494 mi.
2608 ft. **Site 3 of 3 in cluster CJ**

Actual:
3 ft.

Focus Map:
4

LUST:

Name:	SUPERBLOCK PROPERTIES
Address:	SOUTH BLOCK (BLDG S25) / MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-102603
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	12/06/1993
Release ID:	920144
Project Officer:	Stanton Enomoto

UST:

Name:	SUPERBLOCK PROPERTIES

SUPERBLOCK PROPERTIES (Continued) **U001235974**

Address:	SOUTH BLOCK (BLDG S25) / MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-102603
Owner:	KEEAUMOKU PARTNERS
Owner Address:	820 MILILANI ST, SUITE 820
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.294601
Longitude:	-157.843472
Horizontal Reference Datum Name:	Not reported
Horizontal Collection Method Name:	Not reported
Tank ID:	R-6
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	01/15/2003
Tank Capacity:	250
Substance:	Not Listed
Name:	SUPERBLOCK PROPERTIES
Address:	SOUTH BLOCK (BLDG S25) / MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-ST16
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	11/21/1991
Tank Capacity:	5000
Substance:	Gasoline
Name:	SUPERBLOCK PROPERTIES
Address:	SOUTH BLOCK (BLDG S25) / MAKALOA ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-ST17
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	11/21/1991
Tank Capacity:	5000
Substance:	Gasoline

439
NNW
1/2-1
0.508 mi.
2683 ft.

SUPERBLOCK PROJECT **HI SHWS** **S128196094**
700 KEEAUMOKU ST **N/A**
HONOLULU, HI 96814

Actual:
5 ft.

Focus Map:
4

SHWS:

Name:	SUPERBLOCK PROJECT
Address:	700 KEEAUMOKU ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported

SUPERBLOCK PROJECT (Continued) **S128196094**

Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2245
Location Description:	700 Keeaumoku St, Honolulu, HI 96814
Is Public:	True
Update On:	2020-09-18 10:55:05
Latitude:	21.295264
Longitude:	-157.842454

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440 West 1/2-1 0.511 mi. 2697 ft.

ANIN-PIIKOI BUILDING
1012 PIIKOI ST
HONOLULU, HI 96814

HI SHWS **S106815117**
HI SPILLS **N/A**

Actual: 13 ft.

Focus Map: 4

SHWS:

Name:	ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported

ANIN-PIIKOI BUILDING (Continued) **S106815117**

Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1419
Location Description:	1012 Piikoi St, Honolulu, HI 96814
Is Public:	True
Update On:	2021-02-05 08:51:34
Latitude:	21.300284
Longitude:	-157.844066

SPILLS:

Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	Chlordane
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported

ANIN-PIIKOI BUILDING (Continued) **S106815117**

Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.300339000000001
Longitude:	-157.844067
Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	Chlordane
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.300144
Longitude:	-157.84428399999999

ANIN-PIIKOI BUILDING (Continued) **S106815117**

Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	Chlordane
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.295252000000001
Longitude:	-157.84531899999999
Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported

ANIN-PIIKOI BUILDING (Continued) **S106815117**

Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	dieldrin
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.295252000000001
Longitude:	-157.84531899999999
Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	dieldrin
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported

ANIN-PIIKOI BUILDING (Continued) **S106815117**

Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.300339000000001
Longitude:	-157.844067
Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	dieldrin
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported

ANIN-PIIKOI BUILDING (Continued) **S106815117**

Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.300144
Longitude:	-157.84428399999999
Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	fluoranthene
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.295252000000001

ANIN-PIIKOI BUILDING (Continued) **S106815117**

Longitude:	-157.84531899999999
Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	fluoranthene
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.300339000000001
Longitude:	-157.844067
Name:	1012 PIIKOI STREET, ANIN-PIIKOI BUILDING
Address:	1012 PIIKOI ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Anin-Piikoi Building
Case Number:	20020523-1051
Facility Registry ID:	Not reported
HID Number:	Not reported

ANIN-PIIKOI BUILDING (Continued) **S106815117**

Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Anin-Piikoi Building Chemical Spill
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	2003-10-07 00:00:00
Result:	Refer to ISST
File Under:	SCI Noel
Substances:	fluoranthene
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.300144
Longitude:	-157.84428399999999

CL441 **UH MANOA BILGER HALL MERCURY IN STORM CATCHMENT** **HI SHWS** **S126283188**
NNW **2545 MCCARTHY MALL** **N/A**
1/2-1 **HONOLULU, HI 96822**
0.524 mi.
2766 ft. **Site 1 of 2 in cluster CL**

Actual:
79 ft.

Focus Map:
5

SHWS:

Name:	UH MANOA BILGER HALL MERCURY IN STORM CATCHMENT
Address:	2545 MCCARTHY MALL
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu

UH MANOA BILGER HALL MERCURY IN STORM CATCHMENT (Continued) **S126283188**

SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	529
Location Description:	2545 McCarthy Mall, Honolulu, HI 96822
Is Public:	True
Update On:	2020-03-13 11:48:48
Latitude:	21.299555
Longitude:	-157.816807

442
East
1/2-1
0.526 mi.
2779 ft.

FORT RUGER CANNON CLUB **HI SHWS** **S126282429**
4500 DIAMOND HEAD RD **HI BROWNFIELDS** **N/A**
HONOLULU, HI 96815

Actual:
144 ft.

Focus Map:
9

SHWS:

Name:	KAPIOLANI COMMUNITY COLLEGE CULINARY INSTITUTE OF THE PACIFIC
Address:	4500 DIAMOND HEAD RD
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported

FORT RUGER CANNON CLUB (Continued) **S126282429**

Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	3154
Location Description:	4500 Diamond Head Rd
Is Public:	True
Update On:	2021-11-30 11:26:24
Latitude:	21.269065
Longitude:	-157.806608

Name:	FORT RUGER CANNON CLUB
Address:	4500 DIAMOND HEAD RD
City,State,Zip:	HONOLULU, HI 96815
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	SRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1018
Location Description:	4500 Diamond Head Rd
Is Public:	True

FORT RUGER CANNON CLUB (Continued) **S126282429**

Update On:	2020-02-11 12:14:48
Latitude:	21.268800
Longitude:	-157.807000

BROWNFIELDS:

Name:	FORT RUGER CANNON CLUB
Address:	4500 DIAMOND HEAD RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96815
Program:	SRP
Supplemental Location:	Not reported
Island:	Oahu
Zip Suffix:	Not reported
Facility ID:	1018
Location Description:	4500 Diamond Head Rd
Latitude:	21.268800
Longitude:	-157.807000

443
WSW
1/2-1
0.527 mi.
2785 ft.

Actual:
10 ft.

Focus Map:
4

902 ALDER STREET
902 ALDER ST
HONOLULU, HI 96814

HI SHWS **S123492198**
HI SPILLS **N/A**
HI LEAD

SHWS:

Name:	902 ALDER STREET
Address:	902 ALDER ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported

902 ALDER STREET (Continued) **S123492198**

Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	30
Location Description:	902 Alder St
Is Public:	True
Update On:	2021-11-17 15:17:42
Latitude:	21.298923
Longitude:	-157.844046

SPILLS:

Name:	FORMER JUVENILE DETENTION CENTER CHLORDANE RELEASE
Address:	Not reported
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20190430-1444
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	Not reported
ER:	No
Less Or Greater Than:	Not reported
Units:	Not reported
Activity Type:	Not reported
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	Referred
File Under:	Not reported
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	04/30/19 8:44 PM EDT
Release Date:	Not reported
Release Duration:	Not reported
Media:	Soil
Waterbody:	Not reported
Summary:	Redevelopment being done on behalf of First Judiciary Court. Sampling indicated chlordane exceeding EALs
Is Noteworthy for Reports:	No
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Liz Galvez
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Off-scene
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	May 1, 2019
Comments:	SDAR - Sven
Latitude:	Not reported
Longitude:	Not reported

902 ALDER STREET (Continued) **S123492198**

LEAD:

Notification Number:	2019-0013
Type:	Complaint
Name:	FAMILY COURT DETENTION FACILITY
Address:	902 ALDER STREET
City,State,Zip:	HONOLULU, HI 96814
Complaint Number:	2019-0002
Date:	2/22/2019
Date Closed:	Not reported
Contact:	Mr Shannon Kayatani
Report Date:	2/22/2019
Correction Date:	Not reported
Inspection Notes:	Not reported
Status:	Not reported

CL444 **UH MANOA SYNDER HALL** **HI SHWS** **S128196228**
NNW **2538 MCCARTHY MALL** **N/A**
1/2-1 **HONOLULU, HI 96822**
0.536 mi.
2832 ft. **Site 2 of 2 in cluster CL**

Actual:
79 ft.

Focus Map:
5

SHWS:

Name:	UH MANOA SYNDER HALL
Address:	2538 MCCARTHY MALL
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported

UH MANOA SYNDER HALL (Continued) **S128196228**

Facility ID:	3117
Location Description:	Snyder Hall
Is Public:	True
Update On:	2021-12-09 13:51:57
Latitude:	21.300066
Longitude:	-157.816594

445
ESE
1/2-1
0.537 mi.
2835 ft.

1800 VANCOUVER DRIVE
1800 VANCOUVER DRIVE
HONOLULU, HI 96822

HI SHWS **S110526102**
HI INST CONTROL **N/A**
HI CDL

Actual:
154 ft.

Focus Map:
5

SHWS:

Name:	1800 VANCOUVER DRIVE
Address:	1800 VANCOUVER DR
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	1800 Vancouver Drive
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Lynn Bailey
Hazard Priority:	Medium
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	1800 Vancouver Drive
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Medium
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Presumed: Suspected contamination associated with a clandestine meth lab
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Lynn Bailey
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	89
Location Description:	1800 Vancouver Dr, Honolulu, HI 96822
Is Public:	True
Update On:	2021-09-01 14:15:36
Latitude:	21.301555
Longitude:	-157.826004

1800 VANCOUVER DRIVE (Continued) **S110526102**

INST CONTROL:
Potential hazards and controls: Hazard Undetermined
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

CDL:
Date Notified: 8/4/2010
Cleanup Status: Ongoing

CM446 **HAWAII CITY PLAZA** **HI SHWS** **S126282566**
SW **710 AND 730 SHERIDAN ST** **N/A**
1/2-1 **HONOLULU, HI 96814**
0.540 mi.
2853 ft. **Site 1 of 2 in cluster CM**

Actual:
7 ft.

Focus Map:
4

SHWS:
Name: HAWAII CITY PLAZA
Address: 710 AND 730 SHERIDAN ST
City,State,Zip: HONOLULU, HI 96814
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Program: State
Project Manager: Not reported
Hazard Priority: Not reported
Potential Hazards And Controls: Not reported
Island: Oahu
SDAR Environmental Interest Name: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Potential Hazard And Controls: Not reported
Priority: Not reported
Assessment: Not reported
Response: Not reported
Nature of Contamination: Not reported
Nature of Residual Contamination: Not reported
Use Restrictions: Not reported
Engineering Control: Not reported
Description of Restrictions: Not reported
Institutional Control: Not reported
Within Designated Areawide Contamination: Not reported
Site Closure Type: Not reported
Document Date: Not reported
Document Number: Not reported
Document Subject: Not reported
Project Manager: Not reported
Contact Information: Not reported
Facility ID: 935
Location Description: 710 and 730 Sheridan St
Is Public: True
Update On: 2021-09-21 15:18:26

HAWAII CITY PLAZA (Continued) **S126282566**

Latitude: 21.296069
Longitude: -157.843141

CM447 **MOTOR SUPPLY** **HI SHWS** **S108008592**
SW **726 SHERIDAN ST** **HI INST CONTROL** **N/A**
1/2-1 **HONOLULU, HI 96814**
0.541 mi.
2858 ft. **Site 2 of 2 in cluster CM**

Actual:
7 ft.

Focus Map:
4

SHWS:

Name:	MOTOR SUPPLY
Address:	726 SHERIDAN ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Motor Supply
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Steve Mow
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Motor Supply
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Tetrachloroethylene.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Prohibit Any Activity That May Disturb the Integrity of the Capping or Monitoring Systems
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	03/30/2011
Document Number:	2011-184-SPM
Document Subject:	No Further Action with Institutional Controls Determination for Clean Living - Hakuyosha International Inc, 710 & 730 Sheridan St, Honolulu HI 96814
Project Manager:	Steve Mow
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	51
Location Description:	726 Sheridan St, 710 Sheridan St
Is Public:	True
Update On:	2021-09-21 17:36:54
Latitude:	21.296105
Longitude:	-157.843060

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls

MOTOR SUPPLY (Continued) **S108008592**

Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

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448
East
1/2-1
0.541 mi.
2859 ft.

LIHOLIHO ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS **HI SHWS** **S126282898**
3430 MAUNALOA AVE **N/A**
HONOLULU, HI 96816

Actual:
160 ft.

Focus Map:
9

SHWS:

Name:	LIHOLIHO ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	3430 MAUNALOA AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2923
Location Description:	3430 Maunaloa Ave, Honolulu, HI 96816, USA
Is Public:	True
Update On:	2021-11-10 16:50:47
Latitude:	21.279157
Longitude:	-157.805912

449
NW
1/2-1
0.548 mi.
2896 ft.

ALOHA ALA MOANA
451 PIIKOI ST
HONOLULU, HI 96814

HI SHWS
HI LUST
HI UST

U001235401
N/A

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	ALA MOANA PLAZA
Address:	451 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2866
Location Description:	451 Piikoi St, Honolulu, HI 96814
Is Public:	True
Update On:	2022-01-31 07:56:48
Latitude:	21.293395
Longitude:	-157.846387

LUST:

Name:	ALOHA ALA MOANA
Address:	451 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-101180
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	03/11/1996
Release ID:	890004
Project Officer:	Roger Brewer

ALOHA ALA MOANA (Continued) **U001235401**

UST:

Name:	ALOHA ALA MOANA
Address:	451 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-101180
Owner:	ALOHA PETROLEUM, LTD.
Owner Address:	1132 BISHOP STREET, SUITE 1700
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.293379
Longitude:	-157.846439
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-01
Date Installed:	04/04/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	3000
Substance:	Gasoline
Name:	ALOHA ALA MOANA
Address:	451 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-02
Date Installed:	04/04/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	5000
Substance:	Gasoline
Name:	ALOHA ALA MOANA
Address:	451 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-03
Date Installed:	04/04/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Gasoline
Name:	ALOHA ALA MOANA
Address:	451 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-04
Date Installed:	04/04/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	08/30/1988
Tank Capacity:	550
Substance:	Used Oil
Name:	ALOHA ALA MOANA
Address:	451 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814

ALOHA ALA MOANA (Continued) **U001235401**

Tank ID:	R-05
Date Installed:	04/04/1968
Tank Status:	**Permanently Out of Use**
Date Closed:	08/30/1988
Tank Capacity:	285
Substance:	Diesel

CN450 **NOFA RECOMMENDED** **UXO** **1024714714**
West **N/A**
1/2-1 **MANOA HONOLULU, HI**
0.550 mi.
2903 ft. **Site 1 of 2 in cluster CN**

Actual: **486 ft.**

Focus Map: **5**

UXO:

DoD Component:	FUDS
Installation Name:	GUN BATTERY
Name:	NOFA RECOMMENDED
Address:	Not reported
Address 2:	Not reported
City,State,Zip:	MANOA HONOLULU, HI
Site ID:	02OEW
Site Type:	Unexploded Munitions and Ordnance Area
Latitude:	21.312627
Longitude:	-157.817945

CN451 **GUN BATTERY** **FUDS** **1024901947**
West **N/A**
1/2-1 **MANOA HONOLULU, HI**
0.550 mi.
2903 ft. **Site 2 of 2 in cluster CN**

Actual: **486 ft.**

Focus Map: **5**

FUDS:

EPA Region:	09
Installation ID:	HI99799F383700
Congressional District Number:	1
Name:	GUN BATTERY
FUDS Number:	H09HI0097
City:	MANOA HONOLULU
State:	HI
County:	HONOLULU
Object ID:	5796
USACE Division:	pod
USACE District:	poh
Status:	Properties with projects
Current Owner:	STATE: STATE State of Hawaii , STATE State of Hawaii
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=54379
Eligibility:	Eligible
Has Projects:	Yes
NPL Status:	Not on the NPL
Property History:	The gun battery was one of 32 mobile antiaircraft gun positions on the island of Oahu. The 4.7-in. gun battery was built on 26 June 1944 and was completed on 8 January 1945. Following World War II, the site was abandoned. This property is known or suspected to contain military munitions and unexploded ordnance and therefore may present an explosive hazard.

GUN BATTERY (Continued) **1024901947**

Project Required: Yes
Feature Description: Not reported
Latitude: 21.312627
Longitude: -157.817945

FUDS Detail as of Jan 2015:
Fiscal Year: 2013
Federal Facility ID: HI9799F3837
RAB: Not reported
NPL Status: Not Listed
Description: The site, identified by TMK:2-9-18:portion 1 in lower Manoa Valley, is located above Piihonua Street and it is owned by the State of Hawaii. The buildings have been abandoned after 1945 and no occupation has occurred since then.
History: The gun battery was one of 32 mobile antiaircraft gun positions on the island of Oahu. The 4.7-in. gun battery was built on 26 June 1944 and was completed on 8 January 1945. Following World War II, the site was abandoned. This property is known or suspected to contain military munitions and unexploded ordnance and therefore may present an explosive hazard.
CTC: 135.80000000000001
Current Program: Not reported
Future Program: Not reported
Institutional ID: 54379

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452 **GOODWILL BERETANIA STREET** **HI SHWS** **S121406031**
WSW **1075 S BERETANIA ST** **N/A**
1/2-1 **HONOLULU, HI 96814**
0.564 mi.
2979 ft.

Actual:
20 ft.

Focus Map:
4

SHWS:
Name: GOODWILL BERETANIA STREET
Address: 1075 S BERETANIA ST
City,State,Zip: HONOLULU, HI 96814
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Goodwill Beretania Street
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Program: State
Project Manager: Jordan Nakagawa
Hazard Priority: Low
Potential Hazards And Controls: Hazard Undetermined
Island: Oahu
SDAR Environmental Interest Name: Goodwill Beretania Street
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Potential Hazard And Controls: Hazard Undetermined
Priority: Low
Assessment: Assessment Ongoing
Response: Not reported
Nature of Contamination: Not reported
Nature of Residual Contamination: Not reported
Use Restrictions: Undetermined

GOODWILL BERETANIA STREET (Continued) **S121406031**

Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Jordan Nakagawa
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2357
Location Description:	1075 S Beretania St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.302361
Longitude:	-157.845935

453
SE
1/2-1
0.577 mi.
3048 ft.

LAUNDERLAND II **HI SHWS** **S126282891**
2043 S. BERETANIA ST. **HI DRYCLEANERS** **N/A**
HONOLULU, HI 96826

Actual:
13 ft.

Focus Map:
5

SHWS:

Name:	LAUNDERLAND II DRY CLEANING
Address:	2043 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96826
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported

LAUNDERLAND II (Continued) **S126282891**

Contact Information:	Not reported
Facility ID:	889
Location Description:	2043 S Beretania St
Is Public:	True
Update On:	2019-09-10 19:29:14
Latitude:	21.296169
Longitude:	-157.828687

HI DRYCLEANERS:

Name:	LAUNDERLAND II
Address:	2043 S. BERETANIA ST.
City,State,Zip:	HONOLULU, HI 96826
Pernit Number:	Not reported
Island:	Oahu
Issued Date:	Not reported
Phone Number:	Not reported
Responsible Official Name:	Howard Noh
Responsible Official Title:	Not reported
Responsible Official Address:	2043 S. Beretania St.
Responsible Official City,St,Zip:	Honolulu, HI 96826
Date Permit Expiration:	Not reported
Value:	Not reported
Last of Facility Description:	Not reported
Date Permit Closing:	Not reported
Gallons per Year:	159
Company:	Not reported
Status:	CLOSED as of 12/31/11.

454
ESE
1/2-1
0.586 mi.
3094 ft.

ALIIOLANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOIL **HI SHWS** **S126282218**
1240 7TH AVE **N/A**
HONOLULU, HI 96816

Actual:
117 ft.

Focus Map:
9

SHWS:

Name:	ALIIOLANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	1240 7TH AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported

ALIIOLANI ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS (Continued) **S126282218**

Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2882
Location Description:	1240 7th Ave, Honolulu, HI 96816, USA
Is Public:	True
Update On:	2021-11-10 12:11:00
Latitude:	21.286739
Longitude:	-157.804734

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455 WNW 1/2-1 0.586 mi. 3094 ft. **HAWAIIAN MACADAMIA NUT COMPANY PESTICIDE MIXING AR** **HI SHWS** **S121406057 N/A**
3280 ROUND TOP DR
HONOLULU, HI 96822

Actual: 861 ft.

Focus Map: 2

SHWS:

Name:	HAWAIIAN MACADAMIA NUT COMPANY PESTICIDE MIXING AREA
Address:	3280 ROUND TOP DR
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Hawaiian Macadamia Nut Company Pesticide Mixing Area
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	PA/SI
Project Manager:	Laura Young
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Hawaiian Macadamia Nut Company Pesticide Mixing Area
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Not Necessary
Response:	Not reported
Nature of Contamination:	Presumed: Pesticides in soil.
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	None - Site Discovery Clearance Only
Document Date:	10/19/2017

HAWAIIAN MACADAMIA NUT COMPANY PESTICIDE MIXING AREA (Continued) **S121406057**

Document Number:	2017-297-LY
Document Subject:	Site Screening Form for Hawaiian Macadamia Nut Company Pesticide Mixing Area
Project Manager:	Laura Young
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2461
Location Description:	3280 Round Top Dr, Honolulu, HI 96822
Is Public:	True
Update On:	2021-09-13 09:03:21
Latitude:	21.315900
Longitude:	-157.821000

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456 WNW 1/2-1 0.599 mi. 3163 ft. **FUDS BATTERY PUNCHBOWL** **HI SHWS** **S121405918 N/A**

HONOLULU (County), HI

Actual: 360 ft.

Focus Map: 4

SHWS:

Name:	FUDS BATTERY PUNCHBOWL
Address:	Not reported
City,State,Zip:	HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1876
Location Description:	Not reported
Is Public:	True
Update On:	2021-08-10 12:53:33

FUDS BATTERY PUNCHBOWL (Continued) **S121405918**

Latitude: 21.311643
Longitude: -157.847062

457
NW
1/2-1
0.601 mi.
3171 ft.

CENPAC PROPERTIES - OFFICE BUILDING
615 PIIKOI ST
HONOLULU, HI 96814

HI SHWS **U003402842**
HI LUST **N/A**
HI UST
HI Financial Assurance

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	HONOLULU HARBOR
Address:	Not reported
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2007
Location Description:	Honolulu Harbor
Is Public:	True
Update On:	2021-09-21 16:48:56
Latitude:	21.313432
Longitude:	-157.874034

Name:	HONOLULU HARBOR
Address:	Not reported
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported

CENPAC PROPERTIES - OFFICE BUILDING (Continued) **U003402842**

HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2007
Location Description:	Honolulu Harbor
Is Public:	True
Update On:	2021-09-21 16:48:56
Latitude:	21.314241
Longitude:	-157.873819
Name:	HONOLULU HARBOR
Address:	Not reported
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported

CENPAC PROPERTIES - OFFICE BUILDING (Continued) **U003402842**

Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2007
Location Description:	Honolulu Harbor
Is Public:	True
Update On:	2021-09-21 16:48:56
Latitude:	21.312231
Longitude:	-157.874750

Name:	HONOLULU HARBOR IWILEI DISTRICT OPERATING PARTIES
Address:	Not reported
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Admin
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2158

CENPAC PROPERTIES - OFFICE BUILDING (Continued) **U003402842**

Location Description:	Honolulu Harbor
Is Public:	True
Update On:	2021-11-17 16:19:15
Latitude:	21.312548
Longitude:	-157.872216

LUST:

Name:	CENPAC PROPERTIES - OFFICE BUILDING
Address:	615 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-103438
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	07/07/1999
Release ID:	990205
Project Officer:	David Hodges

UST:

Name:	CENPAC PROPERTIES - OFFICE BUILDING
Address:	615 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-103438
Owner:	CENPAC PROPERTIES
Owner Address:	1150 S KING ST SUITE 1101
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.295272
Longitude:	-157.845794
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching

Tank ID:	R-M-1
Date Installed:	Not reported
Tank Status:	**Permanently Out of Use**
Date Closed:	10/20/1998
Tank Capacity:	150
Substance:	Diesel

HI Financial Assurance:

Name:	CENPAC PROPERTIES - OFFICE BUILDING
Address:	615 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-103438
Tank Id:	R-M-1
Tank Status:	Permanently Out of Use
FRTYPE:	Insurance
Expiration Date:	Not reported
FR Archive:	False

Name:	CENPAC PROPERTIES - OFFICE BUILDING
Address:	615 PIIKOI ST
City,State,Zip:	HONOLULU, HI 96814
Alt Facility ID:	9-103438
Tank Id:	R-M-1
Tank Status:	Permanently Out of Use
FRTYPE:	Surety Bond
Expiration Date:	Not reported
FR Archive:	False

CO458 **DURANT PROPERTIES** **HI SHWS** **S109096045**
NW **1235 KONA ST** **HI INST CONTROL** **N/A**
1/2-1 **HONOLULU, HI 96814**
0.602 mi.
3180 ft. **Site 1 of 2 in cluster CO**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	DURANT PROPERTIES
Address:	1235 KONA ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	1226 Waimanu St
Island:	Oahu
Environmental Interest:	Durant Properties
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Durant Properties
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Nickel above Tier 1 EAL in GW and Cadmium above Tier 1 EAL in soil.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	06/17/2011
Document Number:	2011-323-CMM
Document Subject:	EHE & EHMP, 1235 Kona St, Feb 2011
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1173
Location Description:	1235 Kona St and 1226 Waimanu
Is Public:	True
Update On:	2019-10-11 11:24:24
Latitude:	21.293800
Longitude:	-157.847000

Name:	DURANT PROPERTIES
Address:	1235 KONA ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	1226 Waimanu St
Island:	Oahu
Environmental Interest:	Durant Properties
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office

DURANT PROPERTIES (Continued) **S109096045**

Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Durant Properties
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Nickel above Tier 1 EAL in GW and Cadmium above Tier 1 EAL in soil.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	06/17/2011
Document Number:	2011-323-CMM
Document Subject:	EHE & EHMP, 1235 Kona St, Feb 2011
Project Manager:	Eric Sadoyama
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1173
Location Description:	1235 Kona St and 1226 Waimanu
Is Public:	True
Update On:	2019-10-11 11:24:24
Latitude:	21.293772
Longitude:	-157.847573

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	1226 Waimanu St
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

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459 NW 1/2-1 0.607 mi. 3205 ft.

Actual: 83 ft.

Focus Map: 5

UH DUKE KAHANAMOKU SWIMMING POOL SODIUM HYPOCLORIT **HI SHWS S111677953**
2500 CAMPUS RD **HI SPILLS N/A**
HONOLULU, HI 96822

SHWS:

Name:	UH MANOA HAWAII HALL RENOVATION
Address:	2500 CAMPUS RD
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office

UH DUKE KAHANAMOKU SWIMMING POOL SODIUM HYPOCLORITE RELEASE (Continued) **S111677953**

Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	543
Location Description:	2500 Campus Rd, Varney Cir
Is Public:	True
Update On:	2019-12-16 10:08:37
Latitude:	21.300008
Longitude:	-157.819004

SPILLS:

Name:	UH DUKE KAHANAMOKU SWIMMING POOL SODIUM HYPOCLORITE RELEASE
Address:	2500 CAMPUS RD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96822
Island:	Oahu
Supplemental Loc. Text:	UH Manoa Duke Kahanamoku Swimming pool
Case Number:	20091103-1755
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	UH Duke Kahanamoku Swimming Pool Sodium Hypoclorite Release
Activity Type:	Response
Activity Lead:	Paul Chong
Assignment End Date:	2009-11-04 00:00:00
Result:	SOSC NFA
File Under:	Not reported
Substances:	Sodium Hypochlorite
Quanity:	600
Units:	Gallons
Reported Date:	Not reported
Release Date:	Not reported

UH DUKE KAHANAMOKU SWIMMING POOL SODIUM HYPOCLORITE RELEASE (Continued) **S111677953**

Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	Not reported
Longitude:	Not reported

460
NW
1/2-1
0.614 mi.
3242 ft.

UNIVERSITY LABORATORY SCHOOL BUILDINGS 1 AND 2
1776 UNIVERSITY AVENUE
HONOLULU, HI 96822

HI SHWS **S123640235**
HI ENG CONTROLS **N/A**
HI INST CONTROL

Actual:
69 ft.

Focus Map:
5

SHWS:

Name:	UNIVERSITY LABORATORY SCHOOL BUILDINGS 1 AND 2
Address:	1776 UNIVERSITY AVENUE
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	University Laboratory School Buildings 1 and 2
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Eric Sadoyama
Hazard Priority:	Low
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	University Laboratory School Buildings 1 and 2
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	Low
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Found: Organochlorine termiticides
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

UNIVERSITY LABORATORY SCHOOL BUILDINGS 1 AND 2 (Continued) **S123640235**

Within Designated Areawide Contamination: Not reported
Site Closure Type: Not reported
Document Date: Not reported
Document Number: Not reported
Document Subject: Not reported
Project Manager: Eric Sadoyama
Contact Information: (808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID: 857
Location Description: 1776 University Avenue
Is Public: True
Update On: 2019-12-16 10:06:27
Latitude: 21.297886
Longitude: -157.821678

ENG CONTROLS:
Supplemental Location Text: Not reported
Zip Suffix: Not reported
Island: Oahu
Potential Hazards And Controls: Hazard Managed With Controls
Engineering Control: Engineering Control Required

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: Not reported
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

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461 West 1/2-1 0.617 mi. 3259 ft. **PUNCHBOWL MILITARY RES** **FUDS** **1024902096**
HONOLULU, HI **N/A**

Actual: 169 ft.
Focus Map: 4

FUDS:
EPA Region: 09
Installation ID: HI99799F402300
Congressional District Number: 1
Name: PUNCHBOWL MILITARY RES
FUDS Number: H09HI0293
City: HONOLULU
State: HI
County: HONOLULU
Object ID: 5593
USACE Division: pod
USACE District: poh
Status: Properties without projects
Current Owner: Not reported
EMS Map Link: https://fudsportal.usace.army.mil/ems/inventory/map?id=53432
Eligibility: Eligible
Has Projects: No
NPL Status: Not on the NPL
Property History: Not reported

Project Required: No
Feature Description: Not reported
Latitude: 21.30833333

PUNCHBOWL MILITARY RES (Continued) **1024902096**

Longitude: -157.84833333

CO462 **MARIE LOUISE FINE GARMENT CARE, LLC** **HI SHWS** **S126282936**
NW **1221 KONA ST** **N/A**
1/2-1 **HONOLULU, HI 96814**
0.632 mi.
3335 ft. **Site 2 of 2 in cluster CO**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	MARIE LOUISE FINE GARMENT CARE, LLC
Address:	1221 KONA ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	895
Location Description:	1221 Kona St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.293983
Longitude:	-157.847680

463
NW
1/2-1
0.633 mi.
3343 ft.

OVERSEAS ASSEMBLY YARD
HONOLULU, HI

FUDS **1024901902**
N/A

Actual:
3 ft.

Focus Map:
4

FUDS:

EPA Region:	09
Installation ID:	HI99799F377400
Congressional District Number:	1
Name:	OVERSEAS ASSEMBLY YARD
FUDS Number:	H09HI0026
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	5323
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62336
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	The oversea assembly area was known as Base Yard #5 and was responsible for handling off-island shipments. Building demoilition and site clearance have removed all evidence of the military activiti es.
Project Required:	No
Feature Description:	Not reported
Latitude:	21.295
Longitude:	-157.84666667

464
NW
1/2-1
0.638 mi.
3367 ft.

MILL NO. 43
HONOLULU, HI

FUDS **1024902052**
N/A

Actual:
3 ft.

Focus Map:
4

FUDS:

EPA Region:	09
Installation ID:	HI99799F396900
Congressional District Number:	1
Name:	MILL NO. 43
FUDS Number:	H09HI0234
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	4611
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62423
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	SITE WAS USED TO MANUFACTURE CARGO NETS, CABLES, SLINGS, FENDERS, BUMPERS, AND VRIOUS OTHER STEVEDORING EQUIPMENT. SITE WAS ABANDONED

MILL NO. 43 (Continued) **1024902052**

SHORTLY AFTER WWII.

Project Required:	No
Feature Description:	Not reported
Latitude:	21.29333333
Longitude:	-157.84833333

465
NW
1/2-1
0.683 mi.
3607 ft.

KOOLANI TOWER PROJECT
1189 WAIMANU ST
HONOLULU, HI 96814

HI SHWS **S106818609**
HI ENG CONTROLS **N/A**
HI INST CONTROL
HI SPILLS

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	KOOLANI TOWER PROJECT
Address:	1189 WAIMANU ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Koolani Tower Project
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Mark Sutterfield
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	Koolani Tower Project
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Lead
Nature of Residual Contamination:	Thin layer of lead covered by new condominium building
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Prohibit Any Activity That May Disturb the Integrity of the Capping System. Thin layer of lead covered by new condominium building.
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	02/02/2006
Document Number:	2006-059-MS
Document Subject:	NFA for footprint of Building and parking Lot in Area 2
Project Manager:	Mark Sutterfield
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1465
Location Description:	1189 Waimanu St
Is Public:	True
Update On:	2019-09-18 18:30:06
Latitude:	21.293257
Longitude:	-157.848352

KOOLANI TOWER PROJECT (Continued) **S106818609**

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SPILLS:

Name:	KOOLANI TOWER PROJECT
Address:	1189 WAIMANU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20040615-1651
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Koolani Tower Project
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Cresent Heights
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Unknown
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported

KOOLANI TOWER PROJECT (Continued) **S106818609**

Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.293773999999999
Longitude:	-157.84865500000001
Name:	KOOLANI TOWER PROJECT
Address:	1189 WAIMANU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20040615-1651
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Koolani Tower Project
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Cresent Heights
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Unknown
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.293513000000001
Longitude:	-157.84920399999999
Name:	KOOLANI TOWER PROJECT
Address:	1189 WAIMANU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Not reported

KOOLANI TOWER PROJECT (Continued) **S106818609**

Case Number:	20040615-1651
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Koolani Tower Project
Activity Type:	Response
Activity Lead:	Liz Galvez
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Cresent Heights
Substances:	Diesel Fuel
Quanity:	Not reported
Units:	Unknown
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.295252000000001
Longitude:	-157.84531899999999

466
NW
1/2-1
0.688 mi.
3630 ft.

EVERSHINE X
1230 KAPIOLANI BLVD
HONOLULU, HI 96814

HI SHWS **S105262688**
HI VCP **N/A**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	EVERSHINE X
Address:	1230 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Evershine X
HID Number:	Not reported
Facility Registry Identifier:	110013780934
Lead Agency:	HEER Office
Program:	VRP
Project Manager:	Mark Sutterfield

EVERSHINE X (Continued) **S105262688**

Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Evershine X
HID Number:	Not reported
Facility Registry Identifier:	110013780934
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Petroleum products
Nature of Residual Contamination:	Petroleum contaminated soil
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Letter of Completion - Unrestricted Residential Use
Document Date:	08/18/2004
Document Number:	2004-338-MS
Document Subject:	LOC for Evershine X no conditions
Project Manager:	Mark Sutterfield
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1431
Location Description:	1230 Kapiolani Blvd
Is Public:	True
Update On:	2021-08-24 08:18:31
Latitude:	21.295895
Longitude:	-157.846755

VCP:

Name:	EVERSHINE X
Address:	1230 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Program:	VRP
Zip Suffix:	Not reported
Supplemental Location:	Not reported
Island:	Oahu
Facility ID:	1431
Location Description:	1230 Kapiolani Blvd
Latitude:	21.295895
Longitude:	-157.846755

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467 **MCKINLEY HIGH SCHOOL** **FUDS** **1024902049**
WSW **N/A**
1/2-1 **HONOLULU, HI**
0.701 mi.
3702 ft.

Actual:
3 ft.

Focus Map:
4

FUDS:

EPA Region:	09
Installation ID:	HI99799F396600
Congressional District Number:	1
Name:	MCKINLEY HIGH SCHOOL
FUDS Number:	H09HI0231
City:	HONOLULU

MCKINLEY HIGH SCHOOL (Continued) **1024902049**

State:	HI
County:	HONOLULU
Object ID:	4599
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62424
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	Not reported
Project Required:	No
Feature Description:	Not reported
Latitude:	21.29833333
Longitude:	-157.84666667

---

468 **UH MANOA SHIDLER COLLEGE OF BUSINESS SITE IMPROVEM** **HI SHWS** **S126283191**
WSW **2404 MAILE WAY** **N/A**
1/2-1 **HONOLULU, HI 96822**
0.711 mi.
3753 ft.

Actual:
129 ft.

Focus Map:
5

SHWS:

Name:	UH MANOA SHIDLER COLLEGE OF BUSINESS SITE IMPROVEMENTS
Address:	2404 MAILE WAY
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported

UH MANOA SHIDLER COLLEGE OF BUSINESS SITE IMPROVEMENTS (Continued) **S126283191**

Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2243
Location Description:	2404 Maile Way
Is Public:	True
Update On:	2019-12-16 10:09:10
Latitude:	21.301497
Longitude:	-157.820380

469
SW
1/2-1
0.712 mi.
3758 ft.

AUXILIARY SERVICES - DOE
1039 S KING ST
HONOLULU, HI 96814

HI SHWS **U003154583**
HI UST **N/A**
HI ENG CONTROLS
HI INST CONTROL
HI Financial Assurance

Actual:
11 ft.

Focus Map:
4

SHWS:

Name:	MCKINLEY HIGH SCHOOL SYNTHETIC TRACK AND FIELD
Address:	1039 S KING ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	McKinley High School Rifle Range Facility
Island:	Oahu
Environmental Interest:	McKinley High School Synthetic Track and Field
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Steve Mow
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Managed With Controls
Island:	Oahu
SDAR Environmental Interest Name:	McKinley High School Synthetic Track and Field
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Managed With Controls
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Lead found in soil above TCLP threshold; hazardous waste determination.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Engineering Control Required
Description of Restrictions:	Not reported
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Restricted Use
Document Date:	12/18/2017
Document Number:	2017-346-SPM
Document Subject:	No Further Action with Institutional Controls for McKinley High School Synthetic Track and Field Site
Project Manager:	Steve Mow
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1631
Location Description:	1039 S King St, Honolulu, HI 96814
Is Public:	True
Update On:	2021-09-17 13:26:19
Latitude:	21.296951

AUXILIARY SERVICES - DOE (Continued) **U003154583**

Longitude: -157.848716

UST:
Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814
Facility ID: 9-102337
Owner: STATE DOE - AUXILIARY SERVICES SECTION
Owner Address: 1037 S BERETANIA St
Owner City,St,Zip: Honolulu, 96814 96814
Latitude: Not reported
Longitude: Not reported
Horizontal Reference Datum Name: Not reported
Horizontal Collection Method Name: Not reported

Tank ID: R-003
Date Installed: 04/01/1967
Tank Status: **Permanently Out of Use**
Date Closed: 07/01/1970
Tank Capacity: 250
Substance: Gasoline

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-1
Date Installed: 04/01/1970
Tank Status: **Permanently Out of Use**
Date Closed: 12/22/1997
Tank Capacity: 850
Substance: Gasoline

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-2
Date Installed: 04/01/1967
Tank Status: **Permanently Out of Use**
Date Closed: 12/01/1997
Tank Capacity: 300
Substance: Diesel

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814

Tank ID: R-4
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: 12/22/1997
Tank Capacity: 1400
Substance: Gasoline

ENG CONTROLS:

AUXILIARY SERVICES - DOE (Continued) **U003154583**

Supplemental Location Text: McKinley High School Rifle Range Facility
Zip Suffix: Not reported
Island: Oahu
Potential Hazards And Controls: Hazard Managed With Controls
Engineering Control: Engineering Control Required

INST CONTROL:
Potential hazards and controls: Hazard Managed With Controls
Supplemental Location: McKinley High School Rifle Range Facility
Zip Suffix: Not reported
Island: Oahu
Institutional Control: Government - Hawaii Dept. of Health Letter Issued

HI Financial Assurance:
Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-102337
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Letter of Credit
Expiration Date: Not reported
FR Archive: False

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-102337
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-102337
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-102337
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST

AUXILIARY SERVICES - DOE (Continued) **U003154583**

City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-102337
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Letter of Credit
Expiration Date: Not reported
FR Archive: False

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-102337
Tank Id: R-003
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: False

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-102337
Tank Id: R-003
Tank Status: Permanently Out of Use
FRTYPE: Letter of Credit
Expiration Date: Not reported
FR Archive: False

Name: AUXILIARY SERVICES - DOE
Address: 1039 S KING ST
City,State,Zip: HONOLULU, HI 96814
Alt Facility ID: 9-102337
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Letter of Credit
Expiration Date: Not reported
FR Archive: False

---

470 NW 1/2-1 0.717 mi. 3788 ft. **FUDS SUGAR LOAF MILITARY RESERVATION** **HI SHWS** **S121406003 N/A**

TANTALUS, HI

Actual: 1455 ft.
Focus Map: 2

SHWS:
Name: FUDS SUGAR LOAF MILITARY RESERVATION
Address: Not reported
City,State,Zip: TANTALUS, HI
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported
HID Number: Not reported
Facility Registry Identifier: Not reported
Lead Agency: HEER Office
Program: DOD-IRP
Project Manager: Not reported
Hazard Priority: Not reported
Potential Hazards And Controls: Not reported

FUDS SUGAR LOAF MILITARY RESERVATION (Continued) **S121406003**

Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1957
Location Description:	Not reported
Is Public:	True
Update On:	2021-09-13 10:45:13
Latitude:	21.320929
Longitude:	-157.817383

471
ESE
1/2-1
0.721 mi.
3806 ft.

FORT RUGER FIRING RANGES
DIAMOND HEAD RD
HONOLULU, HI 96816

HI SHWS **S126282430**
HI PFAS **N/A**

Actual:
292 ft.

Focus Map:
12

SHWS:

Name:	FORT RUGER FIRING RANGES
Address:	DIAMOND HEAD RD
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported

FORT RUGER FIRING RANGES (Continued) **S126282430**

Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1439
Location Description:	Diamond Head State Monument
Is Public:	True
Update On:	2020-02-11 12:12:21
Latitude:	21.261270
Longitude:	-157.806238

PFAS:

Site ID:	1439
Name:	FORT RUGER FIRING RANGES
Address:	DIAMOND HEAD STATE MONUMENT
City,State,Zip:	HI
Island:	Oahu
Program:	State

472
WNW
1/2-1
0.726 mi.
3832 ft.

RESERVE HOUSING TOWER SOIL CONTAMINATION **HI SHWS** **1006819959**
1141 WAIMANU ST **HI SPILLS** **N/A**
HONOLULU, HI 96813

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	RESERVE HOUSING TOWER SOIL CONTAMINATION
Address:	1141 WAIMANU ST
City,State,Zip:	HONOLULU, HI 96813
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Reserve Housing Tower Soil Contamination
HID Number:	Not reported
Facility Registry Identifier:	110013778322
Lead Agency:	HEER Office
Program:	State
Project Manager:	Unassigned
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Reserve Housing Tower Soil Contamination
HID Number:	Not reported
Facility Registry Identifier:	110013778322
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Assessment Ongoing
Response:	Not reported

RESERVE HOUSING TOWER SOIL CONTAMINATION (Continued) **1006819959**

Nature of Contamination:	Found: oil
Nature of Residual Contamination:	contaminants below HDOH EALs, and under a parking garage.
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action - Type Undetermined
Document Date:	10/25/1995
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Unassigned
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2214
Location Description:	1141 Waimanu St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.294554
Longitude:	-157.850687

SPILLS:

Name:	RESERVE HOUSING TOWER SOIL CONTAMINATION
Address:	1141 WAIMANU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96813
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19951025-2
Facility Registry ID:	110013778322
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Reserve Housing Tower
Activity Type:	Response
Activity Lead:	Bill Perry
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Reserve Housing Tower
Substances:	oil/stained soil
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported

RESERVE HOUSING TOWER SOIL CONTAMINATION (Continued) **1006819959**

Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.328598
Longitude:	-157.827823

Name:	RESERVE HOUSING TOWER SOIL CONTAMINATION
Address:	1141 WAIMANU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96813
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19951025-2
Facility Registry ID:	110013778322
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Reserve Housing Tower
Activity Type:	Response
Activity Lead:	Bill Perry
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Reserve Housing Tower
Substances:	oil/stained soil
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.293496000000001
Longitude:	-157.849107

473
NW
1/2-1
0.730 mi.
3852 ft.

BOB CISCO
1152 WAIMANU ST
HONOLULU, HI 96814

HI SHWS
HI LUST
HI UST

U001235917
N/A

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	VERMICULITE OF HAWAII WAIMANU STREET
Address:	1152 WAIMANU ST
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	PA/SI
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2471
Location Description:	1152 Waimanu St
Is Public:	True
Update On:	2020-06-19 10:59:51
Latitude:	21.294514
Longitude:	-157.849556

LUST:

Name:	BOB CISCO
Address:	1152 WAIMANU ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-102450
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	04/20/2000
Release ID:	920070
Project Officer:	Renato Maniulit

BOB CISCO (Continued) **U001235917**

UST:

Name:	BOB CISCO
Address:	1152 WAIMANU ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-102450
Owner:	ROBERT CISCO & AMERICAN TRUST CO. OF HAWAII, INC.
Owner Address:	TRUSTEES OF LORNA AWAI BURGER TRUST / 380-A KAWAIHAE ST
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.294412
Longitude:	-157.849627
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	12/30/1946
Tank Status:	**Permanently Out of Use**
Date Closed:	02/05/1992
Tank Capacity:	550
Substance:	Gasoline

---

474 ESE 1/2-1 0.777 mi. 4102 ft. **FORT RUGER** **FUDS** **1012129406 N/A**

HONOLULU, HI

Actual: 292 ft.

Focus Map: 12

FUDS:

EPA Region:	09
Installation ID:	HI99799F383100
Congressional District Number:	1
Name:	FORT RUGER
FUDS Number:	H09HI0090
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	6063
USACE Division:	pod
USACE District:	poh
Status:	Properties with all projects at site closeout
Current Owner:	STATE: STATE 7.88 ACRES IA ACTIVE DOD SITE , STATE 7.88 ACRES IA ACTIVE DOD SITE FED: FEDERAL 7.88 ACRES IA ACTIVE DOD SITE , FEDERAL 7.88 ACRES IA ACTIVE DOD SITE PRIV: PRIVATE 7.88 ACRES IA ACTIVE DOD SITE , PRIVATE 7.88 ACRES IA ACTIVE DOD SITE
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62374
Eligibility:	Eligible
Has Projects:	Yes
NPL Status:	Not on the NPL
Property History:	USED FOR COASTAL DEFENSE OF OAHU.
Project Required:	Yes
Feature Description:	Not reported
Latitude:	21.26166667
Longitude:	-157.805

FUDS Detail as of Jan 2015:

Fiscal Year:	2013
Federal Facility ID:	HI9799F3831
RAB:	Not reported

FORT RUGER (Continued) **1012129406**

NPL Status:	Not Listed
Description:	718.60 ACRES FIVE COASTAL DEFENSE BATTERIES WERE BUILT.
History:	USED FOR COASTAL DEFENSE OF OAHU.
CTC:	439.60000000000002
Current Program:	Not reported
Future Program:	Not reported
Institutional ID:	62374

---

475 NW **FUDS OVERSEAS ASSEMBLY YARD** **HI SHWS** **S121405986**
1/2-1 **HONOLULU, HI** **N/A**
0.778 mi.
4110 ft.

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	FUDS OVERSEAS ASSEMBLY YARD
Address:	Not reported
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1941
Location Description:	Not reported
Is Public:	True
Update On:	2021-08-27 11:59:22
Latitude:	21.296644
Longitude:	-157.848085

476
West
1/2-1
0.788 mi.
4160 ft.

ROUND TOP MILITARY RES
MAKIKI, HI

FUDS **1024902109**
N/A

Actual:
851 ft.

Focus Map:
5

FUDS:

EPA Region:	09
Installation ID:	HI99799F404400
Congressional District Number:	1
Name:	ROUND TOP MILITARY RES
FUDS Number:	H09HI0321
City:	MAKIKI
State:	HI
County:	HONOLULU
Object ID:	4725
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=62466
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	SET ASIDE FOR USE AS AN ALTERNATE SITE FOR A FIRE CONTROL STATION.
Project Required:	No
Feature Description:	Not reported
Latitude:	21.31333333
Longitude:	-157.82166667

477
ESE
1/2-1
0.789 mi.
4168 ft.

3464-3466 WAIALAE AVENUE
3466 WAIALAE AVE
HONOLULU, HI 96816

HI SHWS **S105263506**
HI ENG CONTROLS **N/A**
HI INST CONTROL
HI SPILLS

Actual:
135 ft.

Focus Map:
9

SHWS:

Name:	3464-3466 WAIALAE AVENUE UST
Address:	3466 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported

3464-3466 WAIALAE AVENUE (Continued) **S105263506**

Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	387
Location Description:	3466 Waialae Ave, 3464 Waialae Ave
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.284400
Longitude:	-157.802000

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SPILLS:

Name:	3464-3466 WAIALAE AVENUE
Address:	3466 WAIALAE AVE
Address 2:	3464 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19960521-1040
Facility Registry ID:	Not reported
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Paradise Jet-Ski Sump Pump
Activity Type:	Response
Activity Lead:	Chris Takeno
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	B&B Properties, Inc.
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported

3464-3466 WAIALAE AVENUE (Continued) **S105263506**

Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.284441000000001
Longitude:	-157.801793

478
West
1/2-1
0.854 mi.
4508 ft.

FUDS ROUND TOP MILITARY RESERVATION (MAKIKI)
NUTRIDGE ST
HONOLULU, HI 96822

HI SHWS **S126282498**
N/A

Actual:
1046 ft.

Focus Map:
5

SHWS:

Name:	FUDS ROUND TOP MILITARY RESERVATION (MAKIKI)
Address:	NUTRIDGE ST
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported

FUDS ROUND TOP MILITARY RESERVATION (MAKIKI) (Continued) **S126282498**

Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1950
Location Description:	Puu Ualakaa State Park
Is Public:	True
Update On:	2020-09-02 12:53:50
Latitude:	21.313608
Longitude:	-157.822690

CP479 **HONOLULU LAUNDRY CO., LTD.** **HI SHWS** **U001235228**
NW **438 KAMAKEE ST** **HI LUST** **N/A**
1/2-1 **HONOLULU, HI 96814** **HI UST**
0.860 mi.
4539 ft. **Site 1 of 2 in cluster CP**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	HONOLULU LAUNDRY
Address:	438 KAMAKEE ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported

HONOLULU LAUNDRY CO., LTD. (Continued) **U001235228**

Facility ID:	1452
Location Description:	438 Kamakee St
Is Public:	True
Update On:	2021-10-01 16:11:29
Latitude:	21.295400
Longitude:	-157.851000

LUST:

Name:	HONOLULU LAUNDRY CO., LTD.
Address:	438 KAMAKEE ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100786
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	07/03/1997
Release ID:	930101
Project Officer:	Eric Sadoyama

UST:

Name:	HONOLULU LAUNDRY CO., LTD.
Address:	438 KAMAKEE ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100786
Owner:	HONOLULU LAUNDRY CO., LTD.
Owner Address:	438 KAMAKEE ST
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.295218
Longitude:	-157.851104
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	08/09/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	09/30/1990
Tank Capacity:	550
Substance:	Gasoline
Name:	HONOLULU LAUNDRY CO., LTD.
Address:	438 KAMAKEE ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-2
Date Installed:	08/09/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	09/30/1990
Tank Capacity:	3000
Substance:	Diesel
Name:	HONOLULU LAUNDRY CO., LTD.
Address:	438 KAMAKEE ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-3
Date Installed:	08/09/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	09/30/1990

HONOLULU LAUNDRY CO., LTD. (Continued) **U001235228**

Tank Capacity:	3000
Substance:	Diesel
Name:	HONOLULU LAUNDRY CO., LTD.
Address:	438 KAMAKEE ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-4
Date Installed:	08/09/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	09/30/1990
Tank Capacity:	550
Substance:	Other
Name:	HONOLULU LAUNDRY CO., LTD.
Address:	438 KAMAKEE ST
City,State,Zip:	HONOLULU, HI 96814
Tank ID:	R-5
Date Installed:	08/09/1960
Tank Status:	**Permanently Out of Use**
Date Closed:	09/30/1990
Tank Capacity:	550
Substance:	Kerosene

---

480 West 1/2-1 0.863 mi. 4557 ft. **1510A FREAR STREET** **1510 FREAR ST** **HONOLULU, HI 96813** **HI SHWS S107024174** **HI SPILLS N/A**

Actual: 76 ft.

Focus Map: 4

SHWS:

Name:	1510A FREAR STREET
Address:	1510 FREAR ST
City,State,Zip:	HONOLULU, HI 96813
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported

1510A FREAR STREET (Continued) **S107024174**

Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1053
Location Description:	1510 Frear St, Honolulu, HI 96813
Is Public:	True
Update On:	2021-01-04 09:29:45
Latitude:	21.308991
Longitude:	-157.852093

SPILLS:

Name:	1510 FREAR STREET
Address:	1510 FREAR ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96813
Island:	Oahu
Supplemental Loc. Text:	Unit A
Case Number:	19950404
Facility Registry ID:	110013783478
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	1510A Frear Street
Activity Type:	Response
Activity Lead:	Chris Takeno
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	1510A Frear Street
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported

1510A FREAR STREET (Continued) **S107024174**

Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.308776999999999
Longitude:	-157.85231099999999
Name:	1510 FREAR STREET
Address:	1510 FREAR ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96813
Island:	Oahu
Supplemental Loc. Text:	Unit A
Case Number:	19950404
Facility Registry ID:	110013783478
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	1510A Frear Street
Activity Type:	Response
Activity Lead:	Chris Takeno
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	1510A Frear Street
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.328598
Longitude:	-157.827823

481
NNW
1/2-1
0.865 mi.
4569 ft.

PAUOA ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
2301 PAUOA RD
HONOLULU, HI 96813

HI SHWS **S126283072**
N/A

Actual:
132 ft.

Focus Map:
1

SHWS:

Name:	PAUOA ELEMENTARY SCHOOL BUILDING EXTERIOR SOILS
Address:	2301 PAUOA RD
City,State,Zip:	HONOLULU, HI 96813
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2938
Location Description:	2301 Pauoa Rd, Honolulu, HI 96813, USA
Is Public:	True
Update On:	2021-11-10 16:57:10
Latitude:	21.318492
Longitude:	-157.843764

482
WSW
1/2-1
0.881 mi.
4654 ft.

801 SOUTH HOTEL STREET
801 S HOTEL ST
HONOLULU, HI 96813

HI SHWS **S115488669**
N/A

Actual:
14 ft.

Focus Map:
4

SHWS:

Name:	801 SOUTH HOTEL STREET
Address:	801 S HOTEL ST
City,State,Zip:	HONOLULU, HI 96813
Supplemental Location:	Not reported

801 SOUTH HOTEL STREET (Continued) **S115488669**

Island:	Oahu
Environmental Interest:	801 South Hotel Street
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Cal Miyahara
Hazard Priority:	Medium
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	801 South Hotel Street
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	Medium
Assessment:	Assessment Ongoing
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Cal Miyahara
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	2701
Location Description:	801 S Hotel St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.303352
Longitude:	-157.851687

CP483 **SPUDS DRY CLEANERS** **HI SHWS** **S126283166**
NW **1065 WAIMANU ST** **N/A**
1/2-1 **HONOLULU, HI**
0.883 mi.
4661 ft. **Site 2 of 2 in cluster CP**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	SPUDS DRY CLEANERS
Address:	1065 WAIMANU ST
City,State,Zip:	HONOLULU, HI
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported

SPUDS DRY CLEANERS (Continued) **S126283166**

Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	9
Location Description:	1065 Waimanu St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.295689
Longitude:	-157.851169

484
WNW
1/2-1
0.884 mi.
4670 ft.

BATTERY PUNCHBOWL **FUDS** **1024901911**
N/A

HONOLULU, HI

Actual:
155 ft.

Focus Map:
4

FUDS:

EPA Region:	09
Installation ID:	HI99799F378900
Congressional District Number:	1
Name:	BATTERY PUNCHBOWL
FUDS Number:	H09HI0045
City:	HONOLULU
State:	HI
County:	HONOLULU
Object ID:	6108
USACE Division:	pod
USACE District:	poh
Status:	Properties without projects
Current Owner:	Not reported
EMS Map Link:	https://fudsportal.usace.army.mil/ems/inventory/map?id=58351
Eligibility:	Eligible
Has Projects:	No
NPL Status:	Not on the NPL
Property History:	THE SITE WAS TRANSFERRED TO THE STATE OF HAWAII THROUGH VARIOUS TIMES AND EEVENTUALLY TO THE DEPARTMENT OF VETERAN AFFAIRS.
Project Required:	No
Feature Description:	Not reported

BATTERY PUNCHBOWL (Continued) **1024901911**

Latitude: 21.31333333
Longitude: -157.85111111

485
ESE
1/2-1
0.888 mi.
4689 ft.

LEAHI HOSPITAL
3675 KILAUEA AVE
HONOLULU, HI 96816

HI SHWS **U001235361**
HI LUST **N/A**
HI UST
HI AIRS
HI Financial Assurance

Actual:
221 ft.

Focus Map:
9

SHWS:

Name:	LEAHI HOSPITAL UST REMOVAL PROJECT
Address:	3675 KILAUEA AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	335
Location Description:	3675 Kilauea Ave
Is Public:	True
Update On:	2020-09-18 17:23:58
Latitude:	21.272596
Longitude:	-157.801700

LUST:

Name:	LEAHI HOSPITAL
Address:	3675 KILAUEA AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101062

LEAHI HOSPITAL (Continued) **U001235361**

Facility Status: Site Cleanup Completed (NFA)
Facility Status Date: 03/25/2004
Release ID: 990094
Project Officer: Richard Takaba

UST:
Name: LEAHI HOSPITAL
Address: 3675 KILAUEA AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101062
Owner: LEAHI HOSPITAL - HAWAII HEALTH SYSTEMS CORP
Owner Address: 3675 KILAUEA AVENUE
Owner City,St,Zip: Honolulu, 96816 96816
Latitude: 21.273602
Longitude: -157.801602
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: Address Matching

Tank ID: R-2
Date Installed: 05/06/1975
Tank Status: **Permanently Out of Use**
Date Closed: 12/14/1998
Tank Capacity: 2000
Substance: Diesel

AIRS:
Name: LEAHI HOSPITAL
Address: 3675 KILAUEA AVENUE
City,State,Zip: HONOLULU, HI
Facility Identifier: 0414-01-N
Island: Oahu
Mailing Address: Not reported
Locale: Not reported
Mailing City: Not reported
Contact Name: Not reported
Mailing State: Not reported
Mailing Zip: Not reported
Contact Phone: Not reported
Business Phone: Not reported
Issue Date: 10/07/2003
Expiration Date: 10/06/2008
Description: Three (3) 3.36 MMBtu/hr BoilersThis permit encompasses the following equipment:Unit No.DescriptionModel No.Serial No.13.36 MMBtu/hr Kewanee BoilerH-3S-80-6R-225323.36 MMBtu/hr Kewanee BoilerH-3S-80-6R-220533.36 MMBtu/hr Kewanee BoilerH-3S-80-6R-2203

HI Financial Assurance:
Name: LEAHI HOSPITAL
Address: 3675 KILAUEA AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101062
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Self Insured
Expiration Date: Not reported
FR Archive: False

CQ486 **JAS W GLOVER LTD** **HI SHWS** **1000135795**
NW **1046 WAIMAMU ST** **HI LUST** **HID981637861**
1/2-1 **HONOLULU, HI 96814** **HI UST**
0.915 mi. **RCRA NonGen / NLR**
4830 ft. **Site 1 of 4 in cluster CQ** **FINDS**
ECHO

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	GLOVER BUILDING
Address:	1046 WAIMANU ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Glover Building
HID Number:	Not reported
Facility Registry Identifier:	110005724252
Lead Agency:	HEER Office
Program:	State
Project Manager:	Melody Calisay
Hazard Priority:	NFA
Potential Hazards And Controls:	Hazard Undetermined
Island:	Oahu
SDAR Environmental Interest Name:	Glover Building
HID Number:	Not reported
Facility Registry Identifier:	110005724252
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Undetermined
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Hydraulic fluid/oil.
Nature of Residual Contamination:	Not reported
Use Restrictions:	Undetermined
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	ISST NFA - No Letter
Document Date:	10/25/1994
Document Number:	Not reported
Document Subject:	Surface Spill/1046 Waimanu St
Project Manager:	Melody Calisay
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	272
Location Description:	1046 Waimanu St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.296169
Longitude:	-157.850973

LUST:

Name:	JAS. W. GLOVER, LTD.
Address:	1046 WAIMANU ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100835
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	05/26/2004
Release ID:	020019
Project Officer:	Richard Takaba

JAS W GLOVER LTD (Continued) **1000135795**

UST:

Name:	JAS. W. GLOVER, LTD.
Address:	1046 WAIMANU ST
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-100835
Owner:	JAS W. GLOVER, LTD
Owner Address:	725 KAPIOLANI BLVD, SUITE 306
Owner City,St,Zip:	Honolulu, 96814 96814
Latitude:	21.296327
Longitude:	-157.851284
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	03/07/1937
Tank Status:	**Permanently Out of Use**
Date Closed:	11/12/1990
Tank Capacity:	600
Substance:	Gasoline

RCRA Listings:

Date Form Received by Agency:		19870109
Handler Name:	JAS W GLOVER LTD	
Handler Address:		1046 WAIMAMU ST
Handler City,State,Zip:		HONOLULU, HI 96814
EPA ID:		HID981637861
Contact Name:		ENVIRONMENTAL MANAGER
Contact Address:		1046 WAIMAMU ST
Contact City,State,Zip:		HONOLULU, HI 96814
Contact Telephone:		808-533-1777
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		09
Land Type:		Other
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		Not reported
State District:		Not reported
Mailing Address:		PO BOX 579
Mailing City,State,Zip:		HONOLULU, HI 96809
Owner Name:	JAS W GLOVER	
Owner Type:		Private
Operator Name:	NOT REQUIRED	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No

JAS W GLOVER LTD (Continued) **1000135795**

Underground Injection Control:	No
Off-Site Waste Receipt:	No
Universal Waste Indicator:	No
Universal Waste Destination Facility:	No
Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	N
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20020729
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: JAS W GLOVER	
Legal Status:	Private
Date Became Current:	Not reported
Date Ended Current:	Not reported
Owner/Operator Address:	NOT REQUIRED
Owner/Operator City,State,Zip:	NOT REQUIRED, ME 99999

JAS W GLOVER LTD (Continued) **1000135795**

Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Owner/Operator Indicator: Operator
Owner/Operator Name: NOT REQUIRED
Legal Status: Private
Date Became Current: Not reported
Date Ended Current: Not reported
Owner/Operator Address: NOT REQUIRED
Owner/Operator City,State,Zip: NOT REQUIRED, ME 99999
Owner/Operator Telephone: 415-555-1212
Owner/Operator Telephone Ext: Not reported
Owner/Operator Fax: Not reported
Owner/Operator Email: Not reported

Historic Generators:
Receive Date: 19870109
Handler Name: JAS W GLOVER LTD
Federal Waste Generator Description: Not a generator, verified
State District Owner: Not reported
Large Quantity Handler of Universal Waste: No
Recognized Trader Importer: No
Recognized Trader Exporter: No
Spent Lead Acid Battery Importer: No
Spent Lead Acid Battery Exporter: No
Current Record: Yes
Non Storage Recycler Activity: Not reported
Electronic Manifest Broker: Not reported

List of NAICS Codes and Descriptions:
NAICS Code: 23411
NAICS Description: HIGHWAY AND STREET CONSTRUCTION

NAICS Code: 23412
NAICS Description: BRIDGE AND TUNNEL CONSTRUCTION

NAICS Code: 2349
NAICS Description: OTHER HEAVY CONSTRUCTION

Facility Has Received Notices of Violation:
Found Violation: No
Agency Which Determined Violation: Not reported
Violation Short Description: Not reported
Date Violation was Determined: Not reported
Actual Return to Compliance Date: Not reported
Return to Compliance Qualifier: Not reported
Violation Responsible Agency: Not reported
Scheduled Compliance Date: Not reported
Enforcement Identifier: Not reported
Date of Enforcement Action: Not reported
Enforcement Responsible Agency: Not reported
Enforcement Docket Number: Not reported
Enforcement Attorney: Not reported
Corrective Action Component: Not reported

JAS W GLOVER LTD (Continued) **1000135795**

Appeal Initiated Date:	Not reported
Appeal Resolution Date:	Not reported
Disposition Status Date:	Not reported
Disposition Status:	Not reported
Disposition Status Description:	Not reported
Consent/Final Order Sequence Number:	Not reported
Consent/Final Order Respondent Name:	Not reported
Consent/Final Order Lead Agency:	Not reported
Enforcement Type:	Not reported
Enforcement Responsible Person:	Not reported
Enforcement Responsible Sub-Organization:	Not reported
SEP Sequence Number:	Not reported
SEP Expenditure Amount:	Not reported
SEP Scheduled Completion Date:	Not reported
SEP Actual Date:	Not reported
SEP Defaulted Date:	Not reported
SEP Type:	Not reported
SEP Type Description:	Not reported
Proposed Amount:	Not reported
Final Monetary Amount:	Not reported
Paid Amount:	Not reported
Final Count:	Not reported
Final Amount:	Not reported

Evaluation Action Summary:

Evaluation Date:	19951221
Evaluation Responsible Agency:	State
Found Violation:	No
Evaluation Type Description:	COMPLIANCE EVALUATION INSPECTION ON-SITE
Evaluation Responsible Person Identifier:	R9
Evaluation Responsible Sub-Organization:	Not reported
Actual Return to Compliance Date:	Not reported
Scheduled Compliance Date:	Not reported
Date of Request:	Not reported
Date Response Received:	Not reported
Request Agency:	Not reported
Former Citation:	Not reported

FINDS:
Registry ID: 110005724252

Click Here for FRS Facility Detail Report:

Environmental Interest/Information System:
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:

JAS W GLOVER LTD (Continued) **1000135795**

Envid:	1000135795
Registry ID:	110005724252
DFR URL:	http://echo.epa.gov/detailed-facility-report?fid=110005724252
Name:	JAS W GLOVER LTD
Address:	1046 WAIMAMU ST
City,State,Zip:	HONOLULU, HI 96814

487
East
1/2-1
0.915 mi.
4832 ft.

KAPIOLANI COMMUNITY COLLEGE **HI SHWS S125933690**
4303 DIAMOND HEAD ROAD - PARKING LOT E **HI LUST N/A**
HONOLULU, HI 96816

Actual:
146 ft.

Focus Map:
9

SHWS:

Name:	KAPIOLANI COMMUNITY COLLEGE PROPOSED SOLAR PHOTOVOLTAIC AND ENERG
Address:	4303 DIAMOND HEAD RD
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	911
Location Description:	Kapiolani Community College
Is Public:	True
Update On:	2021-12-13 14:40:36
Latitude:	21.270313
Longitude:	-157.798606

LUST:

KAPIOLANI COMMUNITY COLLEGE (Continued) **S125933690**

Name:	KAPIOLANI COMMUNITY COLLEGE
Address:	4303 DIAMOND HEAD ROAD - PARKING LOT E
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-103985
Facility Status:	Confirmed Release
Facility Status Date:	01/31/2020
Release ID:	200009
Project Officer:	Anay Shende

CQ488 **ARTSPACE** **HI SHWS** **S118943648**
NW **1025 WAIMANU ST** **HI BROWNFIELDS** **N/A**
1/2-1 **HONOLULU, HI 96814**
0.920 mi.
4858 ft. **Site 2 of 4 in cluster CQ**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	ARTSPACE
Address:	1025 WAIMANU ST
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	ARTSPACE
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	SRP
Project Manager:	Melody Calisay
Hazard Priority:	High
Potential Hazards And Controls:	Hazard Present
Island:	Oahu
SDAR Environmental Interest Name:	ARTSPACE
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Hazard Present
Priority:	High
Assessment:	Response Necessary
Response:	Response Ongoing
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Controls Required to Manage Contamination
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Melody Calisay
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	258
Location Description:	1025 Waimanu St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.296082
Longitude:	-157.851670

ARTSPACE (Continued) **S118943648**

BROWNFIELDS:

Name:	ARTSPACE
Address:	1025 WAIMANU ST
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Program:	SRP
Supplemental Location:	Not reported
Island:	Oahu
Zip Suffix:	Not reported
Facility ID:	258
Location Description:	1025 Waimanu St
Latitude:	21.296082
Longitude:	-157.851670

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489 **AIM PALOLO** **HI SHWS** **U001235400**
ENE **1841 PALOLO AVE** **HI LUST** **N/A**
1/2-1 **HONOLULU, HI 96816** **HI UST**
0.931 mi. **HI Financial Assurance**
4915 ft.

Actual:
172 ft.

Focus Map:
6

SHWS:

Name:	ALOHA IMM PALOLO UST
Address:	1841 PALOLO AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Program:	Consultation
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	592

AIM PALOLO (Continued) **U001235400**

Location Description: 1841 Palolo Ave, Honolulu, HI 96816
Is Public: True
Update On: 2021-08-17 16:50:15
Latitude: 21.296299
Longitude: -157.798618

LUST:
Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101176
Facility Status: Site Cleanup Completed with EHMP
Facility Status Date: 08/13/2009
Release ID: 930095
Project Officer: Shunsheng Fu

UST:
Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Facility ID: 9-101176
Owner: ALOHA PETROLEUM, LTD.
Owner Address: 1132 BISHOP STREET, SUITE 1700
Owner City,St,Zip: Honolulu, 96816 96816
Latitude: 21.296258
Longitude: -157.798598
Horizontal Reference Datum Name: NAD83
Horizontal Collection Method Name: GPS

Tank ID: 1
Date Installed: 02/01/1999
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: 2
Date Installed: 02/01/1999
Tank Status: **Currently In Use**
Date Closed: Not reported
Tank Capacity: 10000
Substance: Gasohol

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-1
Date Installed: 04/04/1953
Tank Status: **Permanently Out of Use**
Date Closed: 02/25/1999
Tank Capacity: 3000

AIM PALOLO (Continued) **U001235400**

Substance: Gasoline

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-2
Date Installed: 04/04/1953
Tank Status: **Permanently Out of Use**
Date Closed: 02/25/1999
Tank Capacity: 4000
Substance: Gasoline

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 04/04/1958
Tank Status: **Permanently Out of Use**
Date Closed: 02/25/1999
Tank Capacity: 3000
Substance: Gasoline

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/04/1953
Tank Status: **Permanently Out of Use**
Date Closed: 06/01/1993
Tank Capacity: 550
Substance: Used Oil

HI Financial Assurance:
Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM PALOLO

AIM PALOLO (Continued) **U001235400**

Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Other
Expiration Date: Not reported
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2015

AIM PALOLO (Continued) **U001235400**

FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: 2
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2015
FR Archive: True

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-3
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: 2

AIM PALOLO (Continued) **U001235400**

Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-4
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: 1
Tank Status: Currently In Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-1
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

Name: AIM PALOLO
Address: 1841 PALOLO AVE
City,State,Zip: HONOLULU, HI 96816
Alt Facility ID: 9-101176
Tank Id: R-2
Tank Status: Permanently Out of Use
FRTYPE: Insurance
Expiration Date: 09/15/2022
FR Archive: False

CR490 **SHIZUKO HAMAOKA TRUST** **HI SHWS** **1006819919**
ESE **3311 SIERRA DR** **HI INST CONTROL** **N/A**
1/2-1 **HONOLULU, HI 96816** **HI SPILLS**
0.941 mi.
4966 ft. **Site 1 of 2 in cluster CR**

Actual:
170 ft.

Focus Map:
9

SHWS:
Name: SHIZUKO HAMAOKA TRUST
Address: 3311 SIERRA DR
City,State,Zip: HONOLULU, HI 96816
Supplemental Location: Not reported
Island: Oahu
Environmental Interest: Not reported

SHIZUKO HAMAOKA TRUST (Continued) **1006819919**

HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1493
Location Description:	3311 Sierra Dr
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.283507
Longitude:	-157.799545

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SPILLS:

Name:	SHIZUKO & MASUO HAMAOKA TRUSTS
Address:	3311 SIERRA DR
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19991001-1139
Facility Registry ID:	110013777895
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported

SHIZUKO HAMAOKA TRUST (Continued) **1006819919**

Units:	Soil Contamination at 3311 Sierra Drive
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Hamaoka Trust
Substances:	Lead
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.295943000000001
Longitude:	-157.789548
Name:	SHIZUKO & MASUO HAMAOKA TRUSTS
Address:	3311 SIERRA DR
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19991001-1139
Facility Registry ID:	110013777895
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	No
Less Or Greater Than:	Not reported
Units:	Soil Contamination at 3311 Sierra Drive
Activity Type:	Response
Activity Lead:	Mike Cripps
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Hamaoka Trust
Substances:	Lead
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported

SHIZUKO HAMAOKA TRUST (Continued) **1006819919**

Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.283422000000002
Longitude:	-157.79979599999999

CQ491 **PACIFICA CONDOMINIUM** **HI SHWS** **S110765470**
NW **1009 KAPIOLANI BLVD** **HI LUST** **N/A**
1/2-1 **HONOLULU, HI 96814**
0.941 mi.
4968 ft. **Site 3 of 4 in cluster CQ**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	PACIFICA CONDOMINIUMS
Address:	1009 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Pacifica Condominiums
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Paul Chong
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Pacifica Condominiums
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Found: Low levels of contaminated soil left in place. Area capped with multistory building
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported

PACIFICA CONDOMINIUM (Continued) **S110765470**

Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	07/19/2011
Document Number:	2011-399-PC
Document Subject:	Subsurface Soil Assessment Report, Honolulu HI, Oct 28, 2010
Project Manager:	Paul Chong
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	504
Location Description:	1009 Kapiolani Blvd
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.296700
Longitude:	-157.851000

LUST:

Name:	PACIFICA CONDOMINIUM
Address:	1009 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96814
Facility ID:	9-103909
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	11/07/2011
Release ID:	110013
Project Officer:	Shunsheng Fu

CQ492 **HDC PROPERTIES STAINED SOILS** **HI SHWS** **1006821118**
NW **1015 KAPIOLANI BLVD** **HI SPILLS** **N/A**
1/2-1 **HONOLULU, HI 96813**
0.941 mi.
4968 ft. **Site 4 of 4 in cluster CQ**

Actual:
3 ft.

Focus Map:
4

SHWS:

Name:	HDC PROPERTIES STAINED SOILS
Address:	1015 KAPIOLANI BLVD
City,State,Zip:	HONOLULU, HI 96813
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported

HDC PROPERTIES STAINED SOILS (Continued) **1006821118**

Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2000
Location Description:	1015 Kapiolani Blvd
Is Public:	True
Update On:	2020-01-18 20:05:50
Latitude:	21.296787
Longitude:	-157.851374

SPILLS:

Name:	HDC PROPERTIES, STAINED SOILS
Address:	1015 KAPIOLANI BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96813
Island:	Oahu
Supplemental Loc. Text:	Kapiolani (Makai), between Ward Ave & Kamakee St
Case Number:	20020124-0904
Facility Registry ID:	110013791655
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	HDC Properties, stained soils
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Honolulu Design Center, LLC
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported

HDC PROPERTIES STAINED SOILS (Continued) **1006821118**

Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.297317
Longitude:	-157.851878
Name:	HDC PROPERTIES, STAINED SOILS
Address:	1015 KAPIOLANI BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96813
Island:	Oahu
Supplemental Loc. Text:	Kapiolani (Makai), between Ward Ave & Kamakee St
Case Number:	20020124-0904
Facility Registry ID:	110013791655
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	HDC Properties, stained soils
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Honolulu Design Center, LLC
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.296120999999999
Longitude:	-157.852735
Name:	HDC PROPERTIES, STAINED SOILS
Address:	1015 KAPIOLANI BLVD
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96813

HDC PROPERTIES STAINED SOILS (Continued) **1006821118**

Island:	Oahu
Supplemental Loc. Text:	Kapiolani (Makai), between Ward Ave & Kamakee St
Case Number:	20020124-0904
Facility Registry ID:	110013791655
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	HDC Properties, stained soils
Activity Type:	Response
Activity Lead:	Terry Corpus
Assignment End Date:	Not reported
Result:	Refer to ISST
File Under:	Honolulu Design Center, LLC
Substances:	Not reported
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.328598
Longitude:	-157.827823

493
East
1/2-1
0.945 mi.
4992 ft.

FUDS DIAMOND HEAD AMMUNITION STORAGE **HI SHWS** **S128196040**
DIAMOND HEAD RD **N/A**
HONOULULU, HI 96816

Actual:
225 ft.

Focus Map:
9

SHWS:

Name:	FUDS DIAMOND HEAD AMMUNITION STORAGE
Address:	DIAMOND HEAD RD
City,State,Zip:	HONOULULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office

FUDS DIAMOND HEAD AMMUNITION STORAGE (Continued) **S128196040**

Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1888
Location Description:	Diamond Head Rd, Honoululu, HI 96816
Is Public:	True
Update On:	2021-08-11 11:02:52
Latitude:	21.266353
Longitude:	-157.800681

CR494 **SHELL SERVICE STATION** **HI SHWS** **U001235347**
ESE **3562 WAIALAE AVE** **HI LUST** **N/A**
1/2-1 **HONOLULU, HI 96816** **HI UST**
0.949 mi. **HI ENG CONTROLS**
5012 ft. **Site 2 of 2 in cluster CR** **HI INST CONTROL**
HI SPILLS

Actual:
171 ft.

Focus Map:
9

SHWS:

Name:	SIERRA SHELL SERVICE STATION
Address:	3562 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported

SHELL SERVICE STATION (Continued) **U001235347**

Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2803
Location Description:	3562 Waialae Ave, Honolulu, HI 96816
Is Public:	True
Update On:	2021-04-06 18:14:59
Latitude:	21.283362
Longitude:	-157.799662

LUST:

Name:	SHELL SERVICE STATION
Address:	3562 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101030
Facility Status:	Site Cleanup Completed (NFA)
Facility Status Date:	07/28/1993
Release ID:	910012
Project Officer:	Sheila Mackenzie

UST:

Name:	SHELL SERVICE STATION
Address:	3562 WAIALAE AVE
City,State,Zip:	HONOLULU, HI 96816
Facility ID:	9-101030
Owner:	SHELL OIL COMPANY
Owner Address:	789 NIMITZ HWY
Owner City,St,Zip:	Honolulu, 96816 96816
Latitude:	21.283255
Longitude:	-157.799673
Horizontal Reference Datum Name:	NAD83
Horizontal Collection Method Name:	Address Matching
Tank ID:	R-1
Date Installed:	04/19/1971
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	4000
Substance:	Gasoline
Name:	SHELL SERVICE STATION

SHELL SERVICE STATION (Continued) **U001235347**

Address: 3562 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-2
Date Installed: 04/18/1966
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 4000
Substance: Gasoline

Name: SHELL SERVICE STATION
Address: 3562 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-3
Date Installed: 04/18/1956
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 4000
Substance: Gasoline

Name: SHELL SERVICE STATION
Address: 3562 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-4
Date Installed: 04/18/1976
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 6000
Substance: Gasoline

Name: SHELL SERVICE STATION
Address: 3562 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-5
Date Installed: Not reported
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: Not reported
Substance: Used Oil

Name: SHELL SERVICE STATION
Address: 3562 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

Tank ID: R-6
Date Installed: 04/18/1956
Tank Status: **Permanently Out of Use**
Date Closed: Not reported
Tank Capacity: 3000
Substance: Gasoline

Name: SHELL SERVICE STATION
Address: 3562 WAIALAE AVE
City,State,Zip: HONOLULU, HI 96816

SHELL SERVICE STATION (Continued) **U001235347**

Tank ID:	R-7
Date Installed:	04/18/1961
Tank Status:	**Permanently Out of Use**
Date Closed:	Not reported
Tank Capacity:	550
Substance:	Used Oil

ENG CONTROLS:

Supplemental Location Text:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Potential Hazards And Controls:	Hazard Managed With Controls
Engineering Control:	Engineering Control Required

INST CONTROL:

Potential hazards and controls:	Hazard Managed With Controls
Supplemental Location:	Not reported
Zip Suffix:	Not reported
Island:	Oahu
Institutional Control:	Government - Hawaii Dept. of Health Letter Issued

SPILLS:

Name:	SHELL SERVICE STATION (SIERRA SHELL SERVICE)
Address:	3562 WAIALAE AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19940729-30
Facility Registry ID:	110013777635
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Sierra Shell, Waialae Ave. 3562
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Shell Oil Company
Substances:	SEE INCIDENT DESCRIPTION
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported

SHELL SERVICE STATION (Continued) **U001235347**

Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.283113
Longitude:	-157.79975300000001

Name:	SHELL SERVICE STATION (SIERRA SHELL SERVICE)
Address:	3562 WAIALAE AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96816
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	19940729-30
Facility Registry ID:	110013777635
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Not reported
Less Or Greater Than:	Not reported
Units:	Sierra Shell, Waialae Ave. 3562
Activity Type:	Response
Activity Lead:	Not reported
Assignment End Date:	Not reported
Result:	SOSC NFA
File Under:	Shell Oil Company
Substances:	SEE INCIDENT DESCRIPTION
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported

Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.295943000000001
Longitude:	-157.789548

495
NNW
1/2-1
0.950 mi.
5018 ft.

WILLIAMSON RESIDENCE UST CLOSURE
4142 ROUND TOP DR
HONOLULU, HI 96822

HI SHWS **S106821155**
N/A

Actual:
1368 ft.

Focus Map:
2

SHWS:

Name:	WILLIAMSON RESIDENCE UST CLOSURE
Address:	4142 ROUND TOP DR
City,State,Zip:	HONOLULU, HI 96822
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Williamson Residence UST Closure
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Clarence Callahan
Hazard Priority:	NFA
Potential Hazards And Controls:	No Hazard
Island:	Oahu
SDAR Environmental Interest Name:	Williamson Residence UST Closure
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	No Hazard
Priority:	NFA
Assessment:	Response Necessary
Response:	Response Complete
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	No Hazard Present For Unrestricted Residential Use
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	No Further Action Letter - Unrestricted Residential Use
Document Date:	07/01/2004
Document Number:	2004-254-CAC
Document Subject:	NFA Letter for the Rex Williamson property
Project Manager:	Clarence Callahan
Contact Information:	(808) 586-4249 2385 Waimano Home Rd, Pearl City, HI 96782
Facility ID:	1006
Location Description:	4142 Round Top Dr
Is Public:	True
Update On:	2019-09-09 17:27:04
Latitude:	21.327100
Longitude:	-157.815000

496
East
1/2-1
0.953 mi.
5033 ft.

HECO FORMER PALOLO SUBSTATION
3419 PAALEA ST
HONOLULU, HI 96816

HI SHWS **S108008505**
N/A

Actual:
146 ft.

Focus Map:
6

SHWS:

Name:	HECO FORMER PALOLO SUBSTATION
Address:	3419 PAALEA ST
City,State,Zip:	HONOLULU, HI 96816
Supplemental Location:	Not reported

HECO FORMER PALOLO SUBSTATION (Continued) **S108008505**

Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	2621
Location Description:	3419 Paalea St
Is Public:	True
Update On:	2020-07-08 10:56:30
Latitude:	21.293452
Longitude:	-157.797736

497
WSW
1/2-1
0.954 mi.
5036 ft.

ONE ARCHER LANE PETROLEUM CONTAMINATION **HI SHWS** **1006818981**
801 S KING ST **N/A**
HONOLULU, HI 96813

Actual:
7 ft.

Focus Map:
4

SHWS:

Name:	ONE ARCHER LANE PETROLEUM CONTAMINATION
Address:	801 S KING ST
City,State,Zip:	HONOLULU, HI 96813
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported

ONE ARCHER LANE PETROLEUM CONTAMINATION (Continued) **1006818981**

Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	831
Location Description:	801 S King St
Is Public:	True
Update On:	2019-05-30 20:35:41
Latitude:	21.302600
Longitude:	-157.852000

498
WSW
1/2-1
0.957 mi.
5051 ft.

JOINT TRAFFIC MANAGEMENT CENTER
KING STREET
HONOLULU, HI 96814

HI SHWS **S128196191**
N/A

Actual:
12 ft.

Focus Map:
4

SHWS:

Name:	JOINT TRAFFIC MANAGEMENT CENTER
Address:	KING STREET
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Hawaii
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Hawaii
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported

JOINT TRAFFIC MANAGEMENT CENTER (Continued) **S128196191**

Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	3073
Location Description:	710 and 752 S King St
Is Public:	True
Update On:	2021-11-21 16:51:38
Latitude:	21.303758
Longitude:	-157.853016

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499 West 1/2-1 0.964 mi. 5088 ft.

BWS BERETANIA PUMPING STATION **HI SHWS** **S123640094**
650 S BERETANIA ST **N/A**
HONOLULU, HI 96813

Actual: **12 ft.**

Focus Map: **4**

SHWS:

Name:	BWS BERETANIA PUMPING STATION
Address:	650 S BERETANIA ST
City,State,Zip:	HONOLULU, HI 96813
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Program:	State
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	SHWB
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported

BWS BERETANIA PUMPING STATION (Continued) **S123640094**

Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	1832
Location Description:	650 S Beretania St, Honolulu, HI 96813
Is Public:	True
Update On:	2021-01-11 14:47:07
Latitude:	21.306032
Longitude:	-157.853815

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500 WSW 1/2-1 0.992 mi. 5236 ft. **NEAL BLAISDELL CENTER** **HI SHWS S110169342**
777 WARD AVE **HI SPILLS N/A**
HONOLULU, HI 96814

Actual: **3 ft.**
Focus Map: **4**

SHWS:

Name:	FUDS BASE YARD NO. 7 (BLAISDELL CENTER)
Address:	777 WARD AVENUE
City,State,Zip:	HONOLULU, HI 96814
Supplemental Location:	Not reported
Island:	Oahu
Environmental Interest:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Program:	DOD-IRP
Project Manager:	Not reported
Hazard Priority:	Not reported
Potential Hazards And Controls:	Not reported
Island:	Oahu
SDAR Environmental Interest Name:	Not reported
HID Number:	Not reported
Facility Registry Identifier:	Not reported
Lead Agency:	HEER Office
Potential Hazard And Controls:	Not reported
Priority:	Not reported
Assessment:	Not reported
Response:	Not reported
Nature of Contamination:	Not reported
Nature of Residual Contamination:	Not reported
Use Restrictions:	Not reported
Engineering Control:	Not reported
Description of Restrictions:	Not reported
Institutional Control:	Not reported
Within Designated Areawide Contamination:	Not reported
Site Closure Type:	Not reported
Document Date:	Not reported
Document Number:	Not reported
Document Subject:	Not reported
Project Manager:	Not reported
Contact Information:	Not reported
Facility ID:	3157
Location Description:	Corner of Ward Ave and Kapiolani Blvd., Honolulu
Is Public:	True
Update On:	2021-12-22 17:31:08
Latitude:	21.298942

NEAL BLAISDELL CENTER (Continued) **S110169342**

Longitude:	-157.851426

SPILLS:

Name:	NEAL BLAISDELL CENTER
Address:	777 WARD AVE
Address 2:	Not reported
City,State,Zip:	HONOLULU, HI 96814
Island:	Oahu
Supplemental Loc. Text:	Not reported
Case Number:	20081104-1308
Facility Registry ID:	110011657956
HID Number:	Not reported
Lead and Program:	HEER EP&R
ER:	Site Visit
Less Or Greater Than:	Not reported
Units:	Dead Birds
Activity Type:	Response
Activity Lead:	Paul Chong
Assignment End Date:	2008-11-06 00:00:00
Result:	Refer to DOA
File Under:	City and County of Honolulu, Department of Enterprise Services
Substances:	Unknown
Quanity:	Not reported
Units:	Not reported
Reported Date:	Not reported
Release Date:	Not reported
Release Duration:	Not reported
Media:	Not reported
Waterbody:	Not reported
Summary:	Not reported
Is Noteworthy for Reports:	Not reported
Is the Release a Fugitive Dumping:	Not reported
Tax Map Key:	Not reported
Assigned SOSC:	Not reported
Notified Agencies:	Not reported
Response Measures Taken:	Not reported
Incident Report Number:	Not reported
Coordination Needed:	Not reported
Tier II Facility:	Not reported
RMP:	Not reported
Follow-up Received On:	Not reported
Cost Recovery:	Not reported
Invoice To:	Not reported
Closed Date:	Not reported
Comments:	Not reported
Latitude:	21.299434000000002
Longitude:	-157.85037800000001

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	1003879146	ISLAND OF OAHU	HONOLULU	96822	SEMS-ARCHIVE
HONOLULU	1023676074	HONOLULU HARBOR PIER 60	PIER 60 HONOLULU HARBOR	96813	RCRA-VSQG
HONOLULU	1000906741	HONOLULU HARBOR PIER 2	PIER 2 HONOLULU HARBOR	96813	RCRA-VSQG
HONOLULU	1000906742	HONOLULU HARBOR PIERS 4 5 6	HONOLULU HARBOR PIERS 4 5 6	96813	RCRA-VSQG
HONOLULU	1000906743	HONOLULU HARBOR PIER 7	PIER 7 HONOLULU HARBOR	96813	RCRA-VSQG
HONOLULU	1000906751	HONOLULU HARBOR PIERS 13 14 15	PIERS 13 14 15 HONOLULU HARBOR	96813	RCRA-VSQG
HONOLULU	97395040		KEWALO BASIN	96813	ERNS
HONOLULU	2013068109		KEWALO BASIN	96813	ERNS
HONOLULU	99484464		KEWALO BASIN	96813	ERNS
HONOLULU	2001580211		KEWALO BASIN		ERNS
HONOLULU	2008881248		KEWALO BASIN		ERNS
HONOLULU	2008893684		KEWALO BASIN		ERNS
HONOLULU	2006810136		KEWALO BASIN HAROR		ERNS
HONOLULU	2007823316		KEWALO BASIN		ERNS
HONOLULU	2007855870		KEWALO BASIN		ERNS
HONOLULU	9049067		KEWALO SHIPYARD		ERNS
HONOLULU	9026526		KEWALO BASIN		ERNS
HONOLULU	9046485		KEWALO BASIN		ERNS
HONOLULU	2020270706		KEWALO BASIN, KEEHI LAGOO		ERNS
HONOLULU	97383755		WEST SIDE KEWALO BASIN		ERNS
HONOLULU	2004734029		KEWALO BASIN		ERNS
HONOLULU	9164055		KEWALO BASIN		ERNS
HONOLULU	9167658		IN THE KEWALO BASIN		ERNS
HONOLULU	9167754		KEWALO BASIN		ERNS
HONOLULU	9173065		KEWALO BASIN		ERNS
HONOLULU	9164533		KEWALO BASIN		ERNS
HONOLULU	9165275		KEWALO BASIN		ERNS
HONOLULU	9165276		KEWALO BASIN		ERNS
HONOLULU	9182980		KEWALO BASIN		ERNS
HONOLULU	9167075		KEWALO BASIN		ERNS
HONOLULU	9037796		KEWALO BASIN		ERNS
HONOLULU	9044143		KEWALO BASIN		ERNS
HONOLULU	2000542899		KEWALO BASIN		ERNS
HONOLULU	97398752		KEWALO BOAT HARBOR		ERNS
HONOLULU	97388442		KEWALO BASIN		ERNS
HONOLULU	2002603482		KEWALO BASIN STATE BOAT HARBOR		ERNS
HONOLULU	97401590		KEWALO BASIN ENTRANCE		ERNS
HONOLULU	97399123		KEWALO BASIN		ERNS
HONOLULU	97386519		KEWALO BASIN		ERNS
HONOLULU	97391769		KEWALO BASIN		ERNS
HONOLULU	2002628089		KEWALO BASIN		ERNS
HONOLULU	2017167953		KEWALO BASIN		ERNS
HONOLULU	2020281591		KEWALO BASIN		ERNS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	2009910848		KEWALO BASIN HARBOR		ERNS
HONOLULU	2009907296		KEWALO BASIN		ERNS
HONOLULU	2009914433		KEWALO HARBOR		ERNS
HONOLULU	2016151634		KEWALO BASIN MARINA		ERNS
HONOLULU	2016153344		KEWALO BASIN		ERNS
HONOLULU	2014083735		KEWALO BASIN HARBOR		ERNS
HONOLULU	2013056751		KEWALO BASIN		ERNS
HONOLULU	2007856396		KEWALO BASIN		ERNS
HONOLULU	2006791894		KEWALO HARBOR		ERNS
HONOLULU	2005777414		KEWALO BASIN MARINA		ERNS
HONOLULU	2012025636		KEWALO BASIN		ERNS
HONOLULU	2012013770		KEWALO BASIN		ERNS
HONOLULU	2010960315		KEWALO BASIN		ERNS
HONOLULU	2010937881		KEWALO BASIN		ERNS
HONOLULU	94231858		KEWALO BASIN		ERNS
HONOLULU	99498388		KEWALO BASIN		ERNS
HONOLULU	99492059		KEWALO BASIN HARBOR		ERNS
HONOLULU	98439689		KEWALO BAY		ERNS
HONOLULU	98443489		KEWALO BASIN ON THE NW		ERNS
HONOLULU	96368926		KEWALO BASIN		ERNS
HONOLULU	96338637		HONOLULU HARBOR	96813	ERNS
HONOLULU	95276348		HONOLULU HARBOR	96813	ERNS
HONOLULU	95290161		HONOLULU REEF RUNWAY	96813	ERNS
HONOLULU	2000544091		HONOLULU HARBOR	96813	ERNS
HONOLULU	2016167064		HONOLULU HARBOR	96813	ERNS
HONOLULU	97388858		HONOLULU HARBOR	96813	ERNS
HONOLULU	97411747		HONOLULU YACHT CLUB	96815	ERNS
HONOLULU	2000549119		HONOLULU HARBOR		ERNS
HONOLULU	2008868772		PIER 36 HONOLULU HARBOR		ERNS
HONOLULU	2008875867		HONOLULU HARBOR		ERNS
HONOLULU	2008873811		HONOLULU HARBOR		ERNS
HONOLULU	2008874394		HONOLULU HARBOR		ERNS
HONOLULU	2008889276		PIER 2 HONOLULU HARBOR		ERNS
HONOLULU	2008890729		HONOLULU HARBOR AND KE EHI LAGOON		ERNS
HONOLULU	2008877420		HONOLULU HARBOR PIER 20		ERNS
HONOLULU	2008877461		COAST GUARD PIER IN HONOLULU HARBOR		ERNS
HONOLULU	2008873114		HONOLULU HARBOR		ERNS
HONOLULU	2007828841		HONOLULU AIRPORT		ERNS
HONOLULU	2007825573		HONOLULU HARBOR		ERNS
HONOLULU	2006816002		HONOLULU HARBOR		ERNS
HONOLULU	2007824272		HONOLULU HARBOR		ERNS
HONOLULU	2007850924		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2007838363		HONOLULU HARBOR		ERNS
HONOLULU	2007838515		HONOLULU AIRPORT		ERNS
HONOLULU	2007836518		HONOLULU HARBOR		ERNS
HONOLULU	2007840887		HONOLULU HARBOR		ERNS
HONOLULU	2007843119		STATION HONOLULU PIER		ERNS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	2007855846		HONOLULU HARBOR		ERNS
HONOLULU	96327187		HONOLULU HARBOR		ERNS
HONOLULU	96357444		HONOLULU HARBOR		ERNS
HONOLULU	96324662		BETWEEN HONOLULU AND		ERNS
HONOLULU	2020273745		HONOLULU HARBOR		ERNS
HONOLULU	2020270476		HONOLULU HARBOR		ERNS
HONOLULU	2017196439		BASE HONOLULU HARBOR		ERNS
HONOLULU	2017197507		PIER 15- HONOLULU HARBOR		ERNS
HONOLULU	2017193611		HONOLULU HARBOR		ERNS
HONOLULU	2017192554		HONOLULU HARBOR		ERNS
HONOLULU	2017197577		HONOLULU HARBOR		ERNS
HONOLULU	2000533218		HONOLULU INTERNATIONAL		ERNS
HONOLULU	2002611323		HONOLULU SHHIP YARD		ERNS
HONOLULU	97389797		PIER 32 HONOLULU HARBOR		ERNS
HONOLULU	2018203238		HONOLULU HARBOR		ERNS
HONOLULU	2000528852		PIER 35 HONOLULU HARBOR		ERNS
HONOLULU	2005760827		HONOLULU HARBOR NEAR PIERS 26 AND 27		ERNS
HONOLULU	2005749861		HONOLULU HARBOR		ERNS
HONOLULU	2005750388		HONOLULU HARBOR PIER 43		ERNS
HONOLULU	2005760465		HONOLULU NATIONAL AIRPORT		ERNS
HONOLULU	2003641354		PORT OF HONOLULU		ERNS
HONOLULU	2003637046		GATE 8 OF HONOLULU INT AIRPORT		ERNS
HONOLULU	2003644215		ENROUTE TO HONOLULU		ERNS
HONOLULU	2003633395		HONOLULU INT AIRPORT GATE 11		ERNS
HONOLULU	2003645177		HONOLULU HARBOR		ERNS
HONOLULU	2017170678		HONOLULU HARBOR		ERNS
HONOLULU	2017175553		PIER 38 HONOLULU HARBOR		ERNS
HONOLULU	2017190338		USCG BASE HONOLULU		ERNS
HONOLULU	2017190363		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2017190366		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	871259		ALA WAI CHANNEL/HEADING TO HONOLULU YACHT CLUB		ERNS
HONOLULU	2017168671		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2017183483		HONOLULU HARBOR		ERNS
HONOLULU	2017188308		HONOLULU HARBOR		ERNS
HONOLULU	2017176245		HONOLULU HARBOR		ERNS
HONOLULU	2017176960		HONOLULU HARBOR		ERNS
HONOLULU	93177326		HONOLULU HARBOR		ERNS
HONOLULU	93185509		HONOLULU HARBOR		ERNS
HONOLULU	93179525		HONOLULU HARBOR		ERNS
HONOLULU	9175368		HONOLULU HARBOR		ERNS
HONOLULU	9158012		HONOLULU INTL AIRPORT		ERNS
HONOLULU	9171253		HONOLULU HARBOR		ERNS
HONOLULU	9193709		HONOLULU HARBOR		ERNS
HONOLULU	9176352		HONOLULU HARBOR		ERNS
HONOLULU	9155554		HONOLULU HARBOR		ERNS
HONOLULU	9169172		HONOLULU HARBOR		ERNS
HONOLULU	9174287		HONOLULU HARBOR		ERNS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	9182361		HONOLULU AIRPORT		ERNS
HONOLULU	9163273		PIER 1, HONOLULU HAR.		ERNS
HONOLULU	9175043		HONOLULU ENTRANCE BUOY		ERNS
HONOLULU	92103700		PIER NO. 32 HONOLULU		ERNS
HONOLULU	92123848		HONOLULU HARBOR PIER 1		ERNS
HONOLULU	92113680		HONOLULU HARBOR		ERNS
HONOLULU	9051077		HONOLULU HARBOR		ERNS
HONOLULU	2020272549		HONOLULU HARBOR		ERNS
HONOLULU	97394418		HONOLULU HARBOR		ERNS
HONOLULU	97380157		PIER 33 HONOLULU HARBOR		ERNS
HONOLULU	2000540222		HONOLULU HARBOR		ERNS
HONOLULU	95276511		HONOLULU HARBOR		ERNS
HONOLULU	95289301		HONOLULU HARBOR		ERNS
HONOLULU	95289141		PIER 38, HONOLULU HARBOR		ERNS
HONOLULU	97393679		HONOLULU HARBOR		ERNS
HONOLULU	97384042		PIER 40 HONOLULU HARBOR		ERNS
HONOLULU	97383754		PIER 6 HONOLULU HARBOR		ERNS
HONOLULU	97386539		PIER 34 HONOLULU HARBOR		ERNS
HONOLULU	97391274		HONOLULU HARBOR		ERNS
HONOLULU	95315189		PIER 41 HONOLULU HI		ERNS
HONOLULU	97400366		HONOLULU HARBOR		ERNS
HONOLULU	97404574		HONOLULU HARBOR, PIER		ERNS
HONOLULU	97383752		PIER 37 HONOLULU HARBOR		ERNS
HONOLULU	95290163		HONOLULU HARBOR		ERNS
HONOLULU	2000546712		PIER 34, HONOLULU HARBOR		ERNS
HONOLULU	97385424		HONOLULU HARBOR		ERNS
HONOLULU	97392780		HONOLULU SHIP YARD		ERNS
HONOLULU	2020276062		HONOLULU HARBOR		ERNS
HONOLULU	2018232486		HONOLULU HARBOR		ERNS
HONOLULU	2019235965		USCG BASE HONOLULU		ERNS
HONOLULU	2018216508		HONOLULU HARBOR		ERNS
HONOLULU	2022333532		HONOLULU AIRPORT		ERNS
HONOLULU	2001572261		PIER 32 HONOLULU AGENCY		ERNS
HONOLULU	2001573742		OUTSIDE HONOLULU HARBOR		ERNS
HONOLULU	2001553783		HONOLULU ANCHORAGE		ERNS
HONOLULU	97384702		HONOLULU HARBOR		ERNS
HONOLULU	97387235		BUOY 1 AT HONOLULU HARBOR		ERNS
HONOLULU	2013056027		USCG BASE HONOLULU		ERNS
HONOLULU	2013040731		STATION HONOLULU		ERNS
HONOLULU	8852786		HONOLULU PIER #2B		ERNS
HONOLULU	8870074		HONOLULU HARBOR/ OFF PIER 13		ERNS
HONOLULU	2017174963		PORT OF HONOLULU		ERNS
HONOLULU	2017172748		HONOLULU HARBOR		ERNS
HONOLULU	2017168036		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2019248520		HONOLULU HARBOR		ERNS
HONOLULU	2019244995		HONOLULU HARBOR		ERNS
HONOLULU	2019263309		HONOLULU HARBOR		ERNS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	2020293483		HONOLULU HARBOR		ERNS
HONOLULU	2020281383		HONOLULU HARBOR		ERNS
HONOLULU	2009920183		HONOLULU HARBOR		ERNS
HONOLULU	2009895354		HONOLULU HARBOR		ERNS
HONOLULU	2009900235		HONOLULU HARBOR		ERNS
HONOLULU	2009898308		HONOLULU HARBOR		ERNS
HONOLULU	2009905798		HONOLULU HARBOR		ERNS
HONOLULU	2009922043		HONOLULU HARBOR		ERNS
HONOLULU	2009927266		INBOUND TO HONOLULU HARBOR		ERNS
HONOLULU	2016166077		HONOLULU HARBOR		ERNS
HONOLULU	2016163243		1 NM S OF HONOLULU HARBOR		ERNS
HONOLULU	2016163944		HONOLULU HARBOR		ERNS
HONOLULU	2016146946		HONOLULU AIRPORT		ERNS
HONOLULU	2016163437		HONOLULU HARBOR		ERNS
HONOLULU	2016164659		PIER 11- PORT OF HONOLULU		ERNS
HONOLULU	2016143492		HONOLULU HARBOR		ERNS
HONOLULU	2016138768		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2014073318		HONOLULU HARBOR		ERNS
HONOLULU	2014076940		HONOLULU HARBOR		ERNS
HONOLULU	2014083941		HONOLULU WATERFRONT		ERNS
HONOLULU	2014104566		USCG BASE HONOLULU		ERNS
HONOLULU	2015124205		USCG BASE HONOLULU		ERNS
HONOLULU	2015133522		HONOLULU HARBOR		ERNS
HONOLULU	2015110324		HONOLULU HARBOR		ERNS
HONOLULU	2015105442		HONOLULU HARBOR		ERNS
HONOLULU	2015105591		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2015108517		PIER 29 HONOLULU HARBOR		ERNS
HONOLULU	2015121306		PORT OF HONOLULU		ERNS
HONOLULU	2015121309		HONOLULU HARBOR		ERNS
HONOLULU	2013038908		HONOLULU HARBOR		ERNS
HONOLULU	2013066129		BETWEEN HONOLULU HARBOR		ERNS
HONOLULU	2013045948		HONOLULU HARBOR PIER 37		ERNS
HONOLULU	2014075835		100 MILES E. OF HONOLULU		ERNS
HONOLULU	2019262915		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2022332350		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2021308717		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2021311773		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2007847901		HONOLULU HARBOR		ERNS
HONOLULU	2005770119		HONOLULU HARBOR PIER 17		ERNS
HONOLULU	2005772527		HONOLULU AIRPORT		ERNS
HONOLULU	2006791902		HONOLULU INT. AIRPORT		ERNS
HONOLULU	2005783301		GATE 6 OF HONOLULU INT AIRPORT		ERNS
HONOLULU	2005781338		HONOLULU INTL AIRPORT		ERNS
HONOLULU	2006787990		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2006790846		THE HONOLULU HARBOR		ERNS
HONOLULU	2013038045		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2012015693		HONOLULU HARBOR		ERNS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	2012015695		HONOLULU HARBOR		ERNS
HONOLULU	2012021237		HONOLULU HARBOR		ERNS
HONOLULU	2012031857		HONOLULU HARBOR		ERNS
HONOLULU	2012032177		HONOLULU HARBOR		ERNS
HONOLULU	2010959709		PIER 14 HONOLULU HARBOR		ERNS
HONOLULU	2010930085		HONOLULU HARBOR		ERNS
HONOLULU	2010944220		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU	2010937914		HONOLULU HARBOR		ERNS
HONOLULU	2011976152		HONOLULU INT'L AIRPORT		ERNS
HONOLULU	2009896790		HONOLULU HARBOR PIER 36		ERNS
HONOLULU	99501592		PIER 9, HONOLULU HARBOR		ERNS
HONOLULU	99497356		HONOLULU HARBOR		ERNS
HONOLULU	98428159		HONOLULU HARBOR		ERNS
HONOLULU	98447218		SUPPORT CENTER HONOLULU		ERNS
HONOLULU	98444049		HONOLULU HARBOR PIER 2		ERNS
HONOLULU	97407168		PIER 51 HONOLULU HARBOR		ERNS
HONOLULU	98426435		HONOLULU HARBOR BTWN		ERNS
HONOLULU	98445093		HONOLULU HARBOR		ERNS
HONOLULU	98437458		PIER 34 HONOLULU HARBOR		ERNS
HONOLULU	99490441		HONOLULU INTL AIRPORT		ERNS
HONOLULU	99486677		HONOLULU HARBOR		ERNS
HONOLULU	99475547		4 MILES OFF HONOLULU		ERNS
HONOLULU	98463234		HONOLULU HARBOR		ERNS
HONOLULU	99481134		.5 MILE OFF HONOLULU		ERNS
HONOLULU	2021299791		HONOLULU HARBOR		ERNS
HONOLULU	2021299792		HONOLULU HARBOR		ERNS
HONOLULU	2021297289		HONOLULU HARBOR		ERNS
HONOLULU	S128196163	HART CITY CENTER SEGMENT	DILLINGHAM, KAAAHI, NIMITZ, QUEEN, KONA		HI SHWS
HONOLULU	S126501011	DOT KEEHI BASEYARD	BENEATH H-1 FREEWAY, KEEHI VIADUCT, BORDERED BY EAS- AND WEST-BOUND NIMITZ HIGHWAY AND MOANALUA STREAM		HI SWF/LF
HONOLULU	U004364790	HERTZ RENT-A- CAR FACILITY (RAC #2601-11)	HONOLULU INTERNATIONAL AIRPORT 300 RODGERS BLVD.		HI UST, HI Financial Assurance
HONOLULU	2008436667	HONOLULU INTERNATIONAL AIRPORT	HONOLULU INTERNATIONAL AIRPORT		HMIRS
HONOLULU	9998100408		HONOLULU INTL AIRPORT		HMIRS
HONOLULU	S117391803	HONOLULU HIGH-CAPACITY TRANSIT CORRIDOR PROJECT	OFF KONA STREET BETWEEN PIIKOI AND KEEAUMOKU STREE		HI SPILLS
HONOLULU	S117391710	HART OIL DISCOVERY	KONA ST AND KEEAUMOKU ST		HI SPILLS
HONOLULU	S107023019	KEWALO BASIN, OIL SHEEN	KEWALO BASIN	96814	HI SPILLS
HONOLULU	S128677244	KATHERINE Y DIESEL FUEL SPILL	KEWALO BASIN	96814	HI SPILLS
HONOLULU	S128677526	KEWALO BASIN - UNKNOWN SHEEN	KEWALO BASIN		HI SPILLS
HONOLULU	S128677967	KEWALO BASIN UNKNOWN SHEEN 4/24/07	KEWALO BASIN		HI SPILLS
HONOLULU	S128677460	KEWALO BASIN UNKNOWN SHEEN 777414	KEWALO BASIN		HI SPILLS
HONOLULU	S127331356	UNKNOWN SHEEN IN KEWALO BASIN	KEWALO BASIN		HI SPILLS
HONOLULU	S111677091	BOAT SINKING AT KEWALO HARBOR	KEWALO HARBOR		HI SPILLS
HONOLULU	S128678630	KEWALO BASIN - UNKNOWN SHEEN	KEWALO BASIN		HI SPILLS
HONOLULU	S127331383	VESSEL/BOAT GOLDEN GIRL ALLEGEDLY DISCHARGING SEWAGE INTO WATER, KEWALO BASIN CHANNEL	CHANNEL TO KEWALO BASIN		HI SPILLS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	S128678706	KEWALO BASIN - UNKNOWN SHEEN	KEWALO BASIN		HI SPILLS
HONOLULU	S128677340	F/V SEAHAWK	KEWALO BASIN		HI SPILLS
HONOLULU	S115555354	M/Y MY SENSES JET A FUEL SPILL	KEWALO BASIN		HI SPILLS
HONOLULU	S115555307	KEWALO BASIN - DIESEL SPILL	KEWALO BASIN		HI SPILLS
HONOLULU	S115555306	KEWALO BASIN - BOAT PAINT SPILL	KEWALO BASIN		HI SPILLS
HONOLULU	S122337914	KEWALO BASIN HARBOR NRC 810136	KEWALO BASIN HARBOR		HI SPILLS
HONOLULU	S128677350	UNKNOWN SHEEN KEWALO BASIN - 753066	KEWALO BASIN		HI SPILLS
HONOLULU	S128677462	DIVE OAHU INC.	KEWALO BASIN		HI SPILLS
HONOLULU	S115555666	UNKNOWN SHEEN 951129	KEWALO BASIN		HI SPILLS
HONOLULU	S128132578	F/V ANGER MANAGEMENT FUEL SPILL, KEWALO BASIN	KEWALO BASIN		HI SPILLS
HONOLULU	S128677249	UNKNOWN VESSEL DISCHARGED MATERIAL	KEWALO BASIN		HI SPILLS
HONOLULU	S108859750	KEWALO FISHING ENTERPRISE	KEWALO BASIN		HI SPILLS
HONOLULU	S122337913	KEWALO BASIN HARBOR - B DOCK	KEWALO BASIN HARBOR		HI SPILLS
HONOLULU	S115554935	F/V MOON STAR RELEASE NRC 958224	2 NM SOUTH OF KEWALO BASIN		HI SPILLS
HONOLULU	S110169430	UNKNOWN SHEEN NRC 919120	KEWALO BASIN		HI SPILLS
HONOLULU	S115555691	UNKNOWN SHEEN AT KEWALO BASIN	KEWALO BASIN		HI SPILLS
HONOLULU	S115555754	WHITE CLOUDY DISCHARGE INTO KEWALO BASIN	KEWALO BASIN		HI SPILLS
HONOLULU	S110169165	DRILL - GALLAGHER MARINE SYSTEM	HONOLULU HARBOR ENTRANCE	96813	HI SPILLS
HONOLULU	S108009154	PIER 30 FUEL RELEASE, VESSEL NAUPAKA	HONOLULU HARBOR PIER 30	96813	HI SPILLS
HONOLULU	S111677411	HONOLULU HARBOR BUOY	HONOLULU HARBOR SEA BUOY	96813	HI SPILLS
HONOLULU	S128132665	MEDICAL WASTE NEEDLES DISCARDED AT PIER 1 PARKING LOT	HONOLULU HARBOR PIER 1, PASHA	96813	HI SPILLS
HONOLULU	S128677678	HONOLULU INTERNATIONAL AIRPORT GATE 11	HONOLULU INTERNATIONAL AIRPORT GATE 11	96815	HI SPILLS
HONOLULU	S127331345	UNKNOWN RELEASE BEACH AND LAGOON ADJACEI TO HILTON HAWAIIAN VILLAGE	2005 KALIA ROAD HONOLULU, HI 96815, HILTON HAWAIIN VILLAGE LAGOON & ADJACENT BEACH	96815	HI SPILLS
HONOLULU	S108009165	PIER 53 CONTAINER FACILITY	PIER 53, HONOLULU HARBOR		HI SPILLS
HONOLULU	S128132816	USCG SMALL DIESEL SPILL IN HONOLULU HARBOR	400 SAND ISLAND ACCESS ROAD, USCG HONOLULU STATION		HI SPILLS
HONOLULU	S128132747	SEWAGE SPILL HONOLULU INTERNATIONAL AIRPORT	HONOLULU INTERNATIONAL AIRPORT GATE F2		HI SPILLS
HONOLULU	S128132586	FUEL RELEASE FROM TRUCK AT GATE E-6, HONOLULU AIRPORT	HONOLULU AIRPORT, GATE E-6		HI SPILLS
HONOLULU	S108008721	B-1 BOMBER EMERGENCY GROUNDING	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S111677963	UNKNOWN SHEEN 925565	PIER 11 HONOLULU HARBOR		HI SPILLS
HONOLULU	S128679051	HONOLULU INTERNATIONAL AIRPORT CARGO AREA	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S117391653	FUEL SPILL AT GATE 26 HAWAIIAN AIRLINES	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128132754	SHEEN HONOLULU HARBOR PIERS 17/18	HONOLULU HARBOR PIER 17/18		HI SPILLS
HONOLULU	S128132751	SHEEN FROM GARBAGE PATCH NEAR COAST GUAR STATION	USCG SECTOR HONOLULU		HI SPILLS
HONOLULU	S128678815	FLOATING 55 GALLON DRUM IN HONOLULU HARBOF	HONOLULU HARBOR		HI SPILLS
HONOLULU	S118423185	SWIMMER IN A UNAUTHORIZED AREA	PIER 6 HONOLULU HARBOR		HI SPILLS
HONOLULU	S115555663	UNKNOWN SHEEN 933238	HONOLULU HARBOR NEAR PIER 19		HI SPILLS
HONOLULU	S128132813	USCG CUTTER MIDGETT HYDRAULIC OIL SPILL	USCG SAND ISLAND BASE, HONOLULU HARBOR		HI SPILLS
HONOLULU	S128132629	HYDRAULIC FUEL RELEASE FROM AIRPLANE	HONOLULU INTERNATIONAL AIRPORT, TAXI WAY R^		HI SPILLS
HONOLULU	S128132752	SHEEN FROM HONOLULU HARBOR MAINTENANCE DREDGING	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331082	DIESEL RELEASE FROM PIPELINE AT HONOLULU HARBOR PIER 32	HONOLULU HARBOR PIER 32		HI SPILLS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	S127331137	GAS TANK WASHED UP BY USCG STATION AND CREATED SHEEN	SECTOR HONOLULU COAST GUARD BASE		HI SPILLS
HONOLULU	S118423170	SEWAGE SPILL IN HONOLULU HARBOR FROM USCG	HONOLULU HARBOR		HI SPILLS
HONOLULU	S115554859	BOAT DUMPING OIL INTO HARBOR	PIER 37 HONOLULU HARBOR		HI SPILLS
HONOLULU	S115554868	BRADLEY PACIFIC SPILL ON PAVEMENT	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S117391897	NRC 1069905	HONOLULU HARBOR		HI SPILLS
HONOLULU	S115555615	SS PACIFIC TRACKER SOOT RELEASE	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331366	UNKNOWN WHITE SUBSTANCE IN WATER NEAR PIE 2A	HONOLULU HARBOR, PIER 2A		HI SPILLS
HONOLULU	S127331090	DRILL : HONOLULU RESPONSE TRAILER ANNUAL EXERCISE	KEEHI LAGOON, HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331100	DRILL FORK LIFT RUPTURED A FUEL TANKER TRUCK DRILL	HONOLULU HARBOR PIER 51		HI SPILLS
HONOLULU	S127331278	POTABLE WATER RELEASE INTO HONOLULU HARBO	HONOLULU HARBOR PIER 41		HI SPILLS
HONOLULU	S115555650	UNKNOWN MATERIAL LEAKING ON THE VESSEL	300 MILES NE FROM HONOLULU		HI SPILLS
HONOLULU	S127331192	HYDRAULIC OIL RELEASE FROM CRANE AT PIER 1	PIER 1, HONOLULU HARBOR		HI SPILLS
HONOLULU	S108009150	PIER 20 OIL SHEEN	HONOLULU HARBOR PIER 20		HI SPILLS
HONOLULU	S128132755	SHEEN IN HONOLULU HARBOR NEAR USCG BASE	HONOLULU HARBOR NEAR USCG BASE		HI SPILLS
HONOLULU	S128679150	HONOLULU INTERNATIONAL AIRPORT CARGO AREA	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S118423202	UNKNOWN SHEEN AT PIER 36	HONOLULU HARBOR PIER 36		HI SPILLS
HONOLULU	S117391880	MESA GO - HARD STAND 84 - HONOLULU AIRPORT	HONOLULU INTERNATIONAL AIRPORT - HARD STAND 84		HI SPILLS
HONOLULU	S118423201	UNKNOWN SHEEN AT PIER 1	HONOLULU HARBOR		HI SPILLS
HONOLULU	S128132555	DRILL DRILL DRILL YOUNG BROTHERS DRILL	HONOLULU HARBOR PIER 39D		HI SPILLS
HONOLULU	S127331314	SHEEN HONOLULU HARBOR KAPALAMA CHANNEL	HONOLULU HARBOR PIERS 33 & 34		HI SPILLS
HONOLULU	S117391569	AIR SERVICE HAWAII - KOREAN AIR	GATE 33 HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128132805	UNKNOWN SHEEN IN HONOLULU HARBOR	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331276	POSSIBLE RELEASE OF OIL FROM YOUNG BROTHEF BARGE	HONOLULU HARBOR, PIER 39		HI SPILLS
HONOLULU	S127331359	UNKNOWN SHEEN NEAR SECTOR HONOLULU	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331237	MYSTERIOUS SHEEN @ PIER 13, HONOLULU HARBOR	HONOLULU HARBOR, PIER 13		HI SPILLS
HONOLULU	S128132791	UNKNOWN OIL SHEEN HONOLULU HARBOR	HONOLULU HARBOR PIER 10		HI SPILLS
HONOLULU	S128132743	SEWAGE RELEASE FROM A MANHOLE AT HONOLUL AIRPORT	HONOLULU AIRPORT GATE 12		HI SPILLS
HONOLULU	S128132628	HOUSEHOLD HAZ WASTE FOUND IN STOLEN CAR	HONOLULU		HI SPILLS
HONOLULU	S128132684	OIL SHEEN-LIKE SUBSTANCE IN HONOLULU HARBOR	HONOLULU HARBOR PIER 13 & 14		HI SPILLS
HONOLULU	S128132804	UNKNOWN SHEEN IN HONOLULU HARBOR BY PIER 2C	PIER 2C, HONOLULU HARBOR		HI SPILLS
HONOLULU	S128132679	OIL RELEASE HART PROJECT AT HONOLULU AIRPORT	AT HONOLULU AIRPORT SEE SPECIFIC LAT/LONG SUPPORTING DOCUMENTS		HI SPILLS
HONOLULU	S127331238	MYSTERIOUS SHEEN @ USCG BASE HONOLULU HARBOR	USCG STATION HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331200	JET A SPILL BY SIGNATURE FLIGHT SUPPORT AT HONOLULU INTERNATIONAL AIRPORT	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128132780	THIS IS A DRILL DIESEL FUEL DISCHARGE FROM VESSEL	HONOLULU HARBOR PIER 52 , HONOLULU HAWAII		HI SPILLS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	S127331189	HONOLULU HARBOR PIER 18 HYDRAULIC SPILL	HONOLULU HARBOR PIER 18		HI SPILLS
HONOLULU	S127331315	SHEEN HONOLULU HARBOR PIER 13	HONOLULU HARBOR PIER 13		HI SPILLS
HONOLULU	S117391894	NRC 1067933 CASTLE & COOKE AVIATION	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128132676	OIL DISCHARGE FROM SINKING VESSEL ALA WAI HARBOR	ALA WAI HARBOR HONOLULU		HI SPILLS
HONOLULU	S128132604	HAWAIIAN AIRLINES RELEASE AT GATE C1	HONOLULU AIRPORT		HI SPILLS
HONOLULU	S111677132	CONTINENTAL AIRLINES HANGER	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S115554947	FUEL SPILL AT GATE 11, HONOLULU AIRPORT	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S118422906	AIR NEW ZEALAND 1105297	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128678786	OIL SHEEN 01-30-2010	HONOLULU HARBOR		HI SPILLS
HONOLULU	S115554906	DIESEL SPILL NEAR USCG BASE HONOLULU	USCG BASE HONOLULU		HI SPILLS
HONOLULU	S117391844	MATSON BARGE WAIALEALE HYDRAULIC SPILL	HONOLULU HARBOR PIER 52		HI SPILLS
HONOLULU	S117391925	RESURFACING REEF RUNWAY DIESEL SPILL	HONOLULU REEF RUNWAY		HI SPILLS
HONOLULU	S118423179	SMALL DIESEL SPILL BY HONOLULU AIRPORT	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S117391943	SMOKING BATTERY AT HONOLULU AIRPORT	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128679053	HONOLULU INTERNATIONAL AIRPORT GATE 7	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S115555478	NRC 1010442	HONOLULU HARBOR		HI SPILLS
HONOLULU	S111677980	USS PORT ROYAL (CG 73) AGROUND	1/2 MILE SOUTH OF HONOLULU REEF RUNWAY		HI SPILLS
HONOLULU	S117391818	JETSTAR 12-3-2013	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S117391648	F/V SKY MOON PAINT	PIER 37 HONOLULU HARBOR		HI SPILLS
HONOLULU	S117391919	PRIDE OF AMERICA	HONOLULU HARBOR		HI SPILLS
HONOLULU	S110169409	STAR OF HONOLULU	HONOLULU HARBOR		HI SPILLS
HONOLULU	S117391817	JET FUEL SPILL FROM HAWAIIAN AIRLINES PLANE	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S117391721	HAWAIIAN AIRLINES 12-3-2013	GATE 26 HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S127331321	SHEEN ON WATER BY COAST GUARD STATION HONOLULU	COAST GUARD STATION HONOLULU		HI SPILLS
HONOLULU	S111677962	UNKNOWN SHEEN 896941 AND 896942	NEAR THE HONOLULU REEF RUNWAY		HI SPILLS
HONOLULU	S117391809	HYDRAULIC OIL SPILL AT PIER ONE	PORT OF HONOLULU, PIER 1		HI SPILLS
HONOLULU	S128679665	CAR WASH WATER SPILL ALA WAI CANAL	2375 KANEKOPOLE HONOLULU		HI SPILLS
HONOLULU	S128679694	HONOLULU HARBOR PIER 19 UNKNOWN SHEEN	HONOLULU HARBOR PIER 19		HI SPILLS
HONOLULU	S115555544	PIER 30 HONOLULU MARINE TERMINAL	PIER 30 HONOLULU MARINE TERMINAL		HI SPILLS
HONOLULU	S128679300	FUEL SPILL AT HONOLULU AIRPORT GATE 30	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S117391632	DOLPHIN CARCASS - PIER 30	HONOLULU HARBOR PIER 30		HI SPILLS
HONOLULU	S117391647	F/V DOUBLE D NRC 1065804	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331316	SHEEN HONOLULU HARBOR PIER 20 SOURCE UNKNOWN	HONOLULU HARBOR PIER 20		HI SPILLS
HONOLULU	S127331102	DRILL HAWAII MARINE CLEANING DRILL	HONOLULU HARBOR PIER 20		HI SPILLS
HONOLULU	S127331093	DRILL DIESEL SPILL WHILE FUELING AT PIER 13 DRILL	PIER 13, HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331287	PRODUCT ON GROUNDWATER DURING PIER 28 UTILITY REPAIR	HONOLULU HARBOR PIER 28		HI SPILLS
HONOLULU	S128679357	JUDY K SINKING	HONOLULU HARBOR		HI SPILLS
HONOLULU	S111677107	C&C HONOLULU TRAFFIC TRANSFORMER	HONOLULU TRAFFIC TRANSFORMER		HI SPILLS
HONOLULU	S128677670	SAND ISLAND, SILVERY SHEEN SIGHTING	HONOLULU HARBOR		HI SPILLS
HONOLULU	S128132566	DRILL. YAMASHIRO INC. DIESEL SPILL INTO HONOLULU HARBOR	HONOLULU HARBOR, PIER 51		HI SPILLS

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	S115554955	GATE 24 JET FUEL RELEASE	GATE 24 HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128678405	HONOLULU HARBOR NRC 925862	HONOLULU HARBOR		HI SPILLS
HONOLULU	S117391816	JET FUEL SPILL AT GATE 26 HONOLULU AIRPORT	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S117391942	SMALL SHEEN SEEN IN HONOLULU HARBOR	HONOLULU HARBOR		HI SPILLS
HONOLULU	S110169310	M/V SOYANG NRC 921846	HONOLULU HARBOR PIER 32		HI SPILLS
HONOLULU	S115554912	DRILL - KEEHI LAGOON JET FUEL RELEASE	KEEHI LAGOON NEAR HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128132538	DIESEL RELEASE IN HONOLULU HARBOR, PIER 24	HONOLULU HARBOR PIER 24		HI SPILLS
HONOLULU	S128132579	FEDEX JET OVERFILL FUEL SPILL, HONOLULU AIRPORT	FEDEX TARMAC (HONOLULU AIRPORT) STORM DRAIN 5754 & 5755		HI SPILLS
HONOLULU	S127331291	REDUCTION OIL RELEASE FROM USCG VESSEL	0.5 MILES SOUTH OF HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331085	DIESEL SPILL HONOLULU HARBOR PIER 38	HONOLULU HARBOR PIER 38		HI SPILLS
HONOLULU	S127331031	ALOHA CONTRACT SERVICES HYDRAULIC OIL SPILL	HONOLULU INTERNATIONAL AIRPORT NORTH RAMP CART TO GATES E8		HI SPILLS
HONOLULU	S111677106	BYT PICK UP	HONOLULU HARBOR VEHICLE PICKUP AREA		HI SPILLS
HONOLULU	S117391618	DIESEL RELEASE AT PIER 1 ON 8-5-2013	PIER 1 HONOLULU HARBOR		HI SPILLS
HONOLULU	S128678452	NRC 891188	HONOLULU HARBOR		HI SPILLS
HONOLULU	S108009261	UNKNOWN SHEEN 735195	HONOLULU HARBOR CORNER OF PIERS 8 & 9		HI SPILLS
HONOLULU	S111677435	JAPAN TUNA NO. 3	PIER AT HONOLULU HARBOR		HI SPILLS
HONOLULU	S110169428	UNKNOWN SHEEN 922043	HONOLULU HARBOR		HI SPILLS
HONOLULU	S128675863	SAND ISLAND, SILVERY SHEEN SIGHTING	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331270	POSSIBLE COVID POSITIVE ON TUG BOAT	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331108	DRILL MARINE PETROLEUM RELEASE DRILL	HONOLULU HARBOR, PIER 13		HI SPILLS
HONOLULU	S115555603	SHEEN SPOTTED IN HONOLULU HARBOR 5/6	HONOLULU HARBOR		HI SPILLS
HONOLULU	S117391896	NRC 1069896	HONOLULU HARBOR		HI SPILLS
HONOLULU	S128132551	DRILL DRILL DRILL NRC S VESSEL CENTRY DRILL	HONOLULU HARBOR PIER 30		HI SPILLS
HONOLULU	S128132779	TEASPOON OF MOTOR OIL DISCHARGE TO HONOLULU HARBOR	USCG SECTOR HONOLULU		HI SPILLS
HONOLULU	S115555675	UNKNOWN SHEEN 958849	HONOLULU HARBOR BETWEEN BUOYS 5 & 7		HI SPILLS
HONOLULU	S128678465	DRILL UNITEK PIER 41 12/17/08 DRILL	HONOLULU HARBOR		HI SPILLS
HONOLULU	S115554957	GOLDEN PRINCESS 12-11-2012	PIER 11 HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331369	USCG CUTTER MIDGETT DIESEL SPILL, HONOLULU HARBOR	USCG BASE HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331223	MATSON CARGO VESSEL DANIEL K. INOUYE LSFO SPILL	HONOLULU HARBOR PIER 52		HI SPILLS
HONOLULU	S111677414	HONOLULU HARBOR SHEEN	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331349	UNKNOWN SHEEN BY SAND ISLAND	HONOLULU HARBOR, NEAR SAND ISLAND		HI SPILLS
HONOLULU	S127331129	FUEL SPILL AT HONOLULU AIRPORT GATE F1	HONOLULU AIRPORT, GATE F1		HI SPILLS
HONOLULU	S127331218	M/ SEA DRAGON OILY FILM SURROUNDING BOAT	PIER 38 HONOLULU HARBOR		HI SPILLS
HONOLULU	S128679078	HAWAIIAN AIRLINES NRC 986073	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S127331112	DRILL PRIDE OF AMERICA RELEASE TO HARBOR DRILL	HONOLULU HARBOR, PIER 10		HI SPILLS
HONOLULU	S128132649	KAPALAMA MARINE TERMINAL PROJECT SHEEN DISCOVERY	FORMER UH MARINE CENTER FACILITY HONOLULU HARBOR		HI SPILLS
HONOLULU	S128132776	SURFBOARD FIRE QUESTIONS	HONOLULU		HI SPILLS
HONOLULU	S127331111	DRILL PETRO PACIFIC	HONOLULU HARBOR PIER 17		HI SPILLS
HONOLULU	S115555683	UNKNOWN SHEEN 973474	HONOLULU HARBOR		HI SPILLS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	S128678814	HONOLULU HARBOR SHEEN 931735	HONOLULU HARBOR		HI SPILLS
HONOLULU	S118423209	UNKNOWN SHEEN NRC 1105185	HONOLULU HARBOR		HI SPILLS
HONOLULU	S108008796	F/V PACIFIC PARADISE AT PIER 38, HONOLULU	PIER 38, HONOLULU HARBOR		HI SPILLS
HONOLULU	S115554865	BRADLEY PACIFIC AVIATION FUEL SPILL GATE 11 UNITED AIRLINES	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128679376	HONOLULU INTERNATIONAL AIRPORT GATE 28	HONOLULU INTERNATIONAL AIRPORT		HI SPILLS
HONOLULU	S128678787	OIL SHEEN NRC 930094	HONOLULU HARBOR		HI SPILLS
HONOLULU	S127331257	PACIFIC AIR CARGO JET FUEL SPILL FROM KALITTA AIR 747	TAXI LANE HONOLULU AIRPORT		HI SPILLS
HONOLULU	S127331190	HONOLULU HARBOR PIER 31 OIL OOZING FROM TRENCH FLOOR	HONOLULU HARBOR PIER 31		HI SPILLS
HONOLULU	S108859663	F/V ISABELLA T	PIER 38, HONOLULU HARBOR		HI SPILLS
HONOLULU	1000860447	KEWALO BASIN HARBOR	KEWALO BASIN HARBOR	96814	RCRA NonGen / NLR, CA HAZNET
HONOLULU	1000978853	HAWAII MARITIME CENTER	HONOLULU HARBOR PIER 7 AREA A	96813	RCRA NonGen / NLR
HONOLULU	1001086558	AMERICAN HAWAII CRUISES INDEPE	PIER 10 HONOLULU HARBOR	96813	RCRA NonGen / NLR
HONOLULU	1000906746	HONOLULU HARBOR PIER 31	PIER 31 HONOLULU HARBOR	96813	RCRA NonGen / NLR, CA HAZNET
HONOLULU	1001485082	SHIP M S VISION OF THE SEAS 9116876	PIER 2 9 10 11 HONOLULU HARBOR	96813	RCRA NonGen / NLR
HONOLULU	1010042125	OAHU ISLAND OF	HONOLULU	96822	ICIS, FINDS, ECHO
HONOLULU	1015965415	SUPERBLOCK PROPERTIES	SOUTH BLOCK (BLDG S11) / KEEAUMOKU ST	96814	FINDS
HONOLULU	1023548338	WALGREENS STORE #12072	KAPIOLANI BLVD KEEAUMOKU ST.	96814	FINDS
HONOLULU	1004464634	CANADIAN AIRLINES INTERNATIONAL, LTD	HONOLULU INT AIRPORT TERMINAL	96814	FINDS
HONOLULU	1004464635	QUANTAS AIRWAYS LTD	HONOLULU INTL AIRPORT TERMINAL BOX 53	96814	FINDS
HONOLULU	1023385158	FISHERMANS WHARF REPAIRS PROJECT	KEWALO BASIN, NEAR INTERSECTION OF ALA MOANA BOULE	96814	FINDS
HONOLULU	1016209059	HAWAII MARITIME CENTER	HONOLULU HARBOR PIER 7 AREA A	96813	FINDS, ECHO
HONOLULU	1016209091	AMERICAN HAWAII CRUISES INDEPE	PIER 10 HONOLULU HARBOR	96813	FINDS, ECHO
HONOLULU	1015914193	HONOLULU HARBOR PIER 2	PIERS 1 & 2, HONOLULU HARBOR	96813	FINDS
HONOLULU	1015857593	HONOLULU HARBOR PIER 2	PIERS FIRST 2 HONOLULU HARBOR	96813	FINDS, ECHO
HONOLULU	1018320494	HONOLULU HARBOR PIERS 13 14 15	PIERS 13 14 15 HONOLULU HARBOR	96813	FINDS, ECHO
HONOLULU	1023385129	HONOLULU HARBOR, PIER 12 & 15 IMPROVEMENTS	HONOLULU HARBOR	96813	FINDS
HONOLULU	1023385166	HONOLULU HARBOR PIERS 23 AND 24 HARBOR WALL MAINTENANCE	HONOLULU HARBOR PIER 23 AND 24 (OFF OF NIMITZ HIGH	96813	FINDS
HONOLULU	1023709451	HONOLULU HARBOR PIER 60	PIER 60 HONOLULU HARBOR	96813	FINDS, ECHO
HONOLULU	1009403784	WASH WATER CONTAINMENT	HONOLULU INTERNATIONAL AIRPORT	00000	FINDS, ECHO
HONOLULU	1026184859	HNL T-HANGAR, BUILDING #429, HANGAR #127 (1)	END OF LAGOON DRIVE, HONOLULU HI	96814	ECHO
HONOLULU	1017532418	HONOLULU HARBOR PIER 2	PIERS 1 & 2, HONOLULU HARBOR	96813	ECHO
HONOLULU	S128791112	FLS COMPOSITES, LLC	PIER 24, HONOLULU HARBOR		HI AIRS
HONOLULU	S124516436	GLOBETECK GROUP, INC.	275 WOODLAWN DR., SUIT	96822	HI LEAD
HONOLULU	S125952935	GLOBOTECK GROUP, INC,	2800 WOODLAWN OR. #192	96822	HI LEAD
HONOLULU	S113183145	HONOLULU HARBOR	PIERS FIRST 2 HONOLULU HARBOR	96813	CA HAZNET
HONOLULU	S113183214	1X MITSUI O.S.K. LINES/ASTRA PEAK	PORT OF HONOLULU	96813	CA HAZNET
HONOLULU	S113183504	SHIP MS VISION OF THE SEAS 9116876	PIER 2 9 10 11 HONOLULU HARBOR	96813	CA HAZNET
HONOLULU COUNTY	2012025443		KEWALO BASIN HARBOR		ERNS
HONOLULU COUNTY	2010934468		KEWALO BASIN HARBOR		ERNS
HONOLULU COUNTY	2009919120		KEWALO BASIN		ERNS
HONOLULU COUNTY	2009924827		KEWALO BASIN HARBOR		ERNS
HONOLULU COUNTY	2008859605		HONOLULU INTERNATIONAL AIRPORT		ERNS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU COUNTY	2008876638		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2008869956		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2007853690		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2012010442		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2012028628		NUUANU ST & JUDD ST, HONOLULU		ERNS
HONOLULU COUNTY	2010927947		PIER 6 AND 7 OF HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2010939609		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2010958849		HONOLULU HARBOR BETWEEN		ERNS
HONOLULU COUNTY	2011995710		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2009894954		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2016147768		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2013056862		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2013067169		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU COUNTY	872302		PIPELINE LEAK ON THE HONOLULU WHITE OIL LINE, MILEPOSTS 1.35		ERNS
HONOLULU COUNTY	2017189333		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2017170564		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	2017181233		HONOLULU HARBOR		ERNS
HONOLULU COUNTY	9021710		HONOLULU INTERNATIONAL		ERNS
HONOLULU COUNTY	2019245049		HONOLULU HARBOR PIER 5		ERNS
HONOLULU COUNTY	2021313985		HONOLULU INTERNATIONAL AIRPORT		ERNS
HONOLULU COUNTY	S128132541	DIESEL SPILL, PIER 24 PACIFIC SHIPYARDS HONOLULU HARBOR	705 N. NIMITZ HIGHWAY PIER 24 HONOLULU, HI		HI SPILLS
HONOLULU COUNTY	S127331310	SHEEN AT HONOLULU HARBOR PIER 19 & 20	HONOLULU HARBOR PIERS 19 & 20		HI SPILLS
HONOLULU COUNTY	S128679683	DELTA AIRLINES OIL SPILL HONOLULU AIRPORT	HONOLULU AIRPORT GATE F1		HI SPILLS
HONOLULU COUNTY	S128132770	STRIKEOLOGY (VESSEL) OIL SPILL ALA WAI HARBOR	100 HOLOMOANA ST. ALA WAI CANAL (HARBOR) HONOLULU		HI SPILLS
HONOLULU COUNTY	S128132568	DRILL: TANKER TRUCK DIESEL SPILL HONOLULU	707 KAKOI ST HONOLULU HI 96819		HI SPILLS
HONOLULU COUNTY	S128132582	FISHING VESSEL FIRE	PIER 18 HONOLULU HARBOR		HI SPILLS
HONOLULU COUNTY	S128679688	BOMB THREAT	MARINE CORPS BASE HONOLULU		HI SPILLS
HONOLULU COUNTY	S128132536	DIESEL OIL SPILL BY USCG HONOLULU HARBOR	400 SAND ISLAND HONOLULU, HI 96819		HI SPILLS
HONOLULU COUNTY	S128132737	RELEASE OF SUBSTANCE FROM CARGO CONTAINE ON VESSEL	ON ROUT TO HONOLULU		HI SPILLS
HONOLULU COUNTY	S127331127	FOSTER VILLAGE ALLEGED OIL DUMPING INTO STORM DRAIN	4569 UKALI ST. HONOLULU, HI 96818		HI SPILLS
HONOLULU COUNTY	S127331078	COOKING OIL SPILL MICRONESIAN MART KALIHI	SELF LANE BY MICRONESIAN MART KALIHI 1717 N. KING HONOLULU		HI SPILLS
HONOLULU COUNTY	S128132782	THIS IS A DRILL PIPELINE DIESEL SPILL HONOLULU HARBOR	PIER 30 HONOLULU HARBOR HONOLULU HAWAII		HI SPILLS
HONOLULU COUNTY	S128679636	SEWAGE SPILL AT HONOLULU AIRPORT	HONOLULU AIRPORT		HI SPILLS
HONOLULU COUNTY	S128132608	HECO POLE MOUNTED TRANSFORMER OIL SPILL #67882, RELEASE ID10005028 HONOLULU	2258 PALOLO ST. HONOLULU, HI 96816		HI SPILLS
HONOLULU COUNTY	S128132688	OIL SPILL FROM VESSELL, ALA WAI HARBOR	100 HOLOMOANA ST (IN THE OCEAN TO THE LEFT OF THE ADDRESS NEAR RESTAURANT AREA.) HONOLULU, 96815		HI SPILLS
HONOLULU COUNTY	S128132498	ABANDONED PRESSURIZED CO2 CYLINDER, HONOLULU	ACROSS STREET 802 MAPUNAPUNA ST, HONOLULU, HI 96819		HI SPILLS
HONOLULU COUNTY	S128132589	FUGITIVE AIR EMISSION COMPLAINT	2460 KOA AVE. HONOLULU		HI SPILLS

Count: 515 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU COUNTY	S127331188	HONOLULU HARBOR HYDRAULIC OIL RELEASE	USCG STATION HONOLULU		HI SPILLS
HONOLULU COUNTY	S128132716	POTENTIAL DIESEL RELEASE VESSEL GROUNDING KEEHI SMALL BOAT HARBOR	KEEHI SMALL BOAT HARBOR HONOLULU, HAWAII		HI SPILLS
HONOLULU COUNTY	S128132642	JET A SPILL GATE C3 DANIEL K. INOUYE INTERNATIONAL AIRPORT	DANIEL K. INOUYE INTERNATIONAL AIRPORT 300 RODGERS BLVD, HONOLULU, HI 96819		HI SPILLS
HONOLULU COUNTY	S128132789	UNKNOWN ODOR COMPLAINT	1432 LIHOLIHO ST. HONOLULU		HI SPILLS
HONOLULU COUNTY	S128679684	JET FUEL SPILL ON TANKER DECK	IESCBM TERMINAL HONOLULU HI OFFSHORE FACILITY, OFF OF BARBERS POINT		HI SPILLS
HONOLULU COUNTY	S127331348	UNKNOWN SHEEN BY PIER 53 IN HONOLULU HARBOR	HONOLULU HARBOR BY PIER 53		HI SPILLS
HONOLULU COUNTY	S127331372	USCG VESSEL OIL DISCHARGE	400 SAND ISLAND PARKWAY , HONOLULU HAWAII 96819		HI SPILLS
HONOLULU COUNTY	S127331387	WATER SEALANT SPRAYING CAUSING NOXIOUS ODORS	2064 MAUNA PLACE, HONOLULU HI, 96822		HI SPILLS
HONOLULU COUNTY	S128679686	LUBE OIL RELEASE USS MIDGETT	HONOLULU HARBOR		HI SPILLS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: N/A
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 01/09/2023
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 3
Telephone 215-814-5418

EPA Region 4
Telephone 404-562-8033

EPA Region 5
Telephone 312-886-6686

EPA Region 10
Telephone 206-553-8665

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6774

EPA Region 9
Telephone: 415-947-4246

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: N/A
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 01/09/2023
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Lists of Federal Delisted NPL sites

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: N/A
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 01/09/2023
Data Release Frequency: Quarterly

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 08/25/2022
Date Data Arrived at EDR: 09/06/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 90

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 09/06/2022
Next Scheduled EDR Contact: 01/10/2023
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 01/23/2023
Data Release Frequency: Quarterly

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 01/23/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA TSD facilities

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA generators

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 08/16/2022
Date Data Arrived at EDR: 08/22/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 63

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 11/01/2022
Next Scheduled EDR Contact: 02/20/2023
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 08/15/2022
Date Data Arrived at EDR: 08/17/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 68

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 08/15/2022
Date Data Arrived at EDR: 08/17/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 68

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 06/14/2022
Date Data Arrived at EDR: 06/15/2022
Date Made Active in Reports: 06/21/2022
Number of Days to Update: 6

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 09/20/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

Lists of state- and tribal hazardous waste facilities

SHWS: Sites List

Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 02/22/2022
Date Data Arrived at EDR: 03/09/2022
Date Made Active in Reports: 04/06/2022
Number of Days to Update: 28

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/02/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Semi-Annually

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF: Permitted Landfills in the State of Hawaii

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 09/14/2022
Date Data Arrived at EDR: 09/28/2022
Date Made Active in Reports: 10/12/2022
Number of Days to Update: 14

Source: Department of Health
Telephone: 808-586-4245
Last EDR Contact: 09/27/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Varies

Lists of state and tribal leaking storage tanks

LUST: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/02/2022
Date Data Arrived at EDR: 08/24/2022
Date Made Active in Reports: 11/14/2022
Number of Days to Update: 82

Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 11/22/2023
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/11/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/14/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/28/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 06/02/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/31/2022
Number of Days to Update: 79
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/28/2021
Date Data Arrived at EDR: 06/11/2021
Date Made Active in Reports: 09/07/2021
Number of Days to Update: 88
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/08/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

Lists of state and tribal registered storage tanks

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 10/14/2021
Date Data Arrived at EDR: 11/05/2021
Date Made Active in Reports: 02/01/2022
Number of Days to Update: 88
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 09/27/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/02/2022
Date Data Arrived at EDR: 08/24/2022
Date Made Active in Reports: 11/14/2022
Number of Days to Update: 82
Source: Department of Health
Telephone: 808-586-4228
Last EDR Contact: 11/22/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 06/02/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/31/2022
Number of Days to Update: 79
Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/08/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/14/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/07/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/11/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/28/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

ENG CONTROLS: Engineering Control Sites

A listing of sites with engineering controls in place.

Date of Government Version: 04/17/2019
Date Data Arrived at EDR: 05/21/2019
Date Made Active in Reports: 05/30/2019
Number of Days to Update: 9

Source: Department of Health
Telephone: 404-586-4249
Last EDR Contact: 12/02/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Varies

INST CONTROL: Sites with Institutional Controls

Voluntary Remediation Program and Brownfields sites with institutional controls in place.

Date of Government Version: 04/17/2019
Date Data Arrived at EDR: 05/21/2019
Date Made Active in Reports: 05/30/2019
Number of Days to Update: 9

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/02/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Varies

Lists of state and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27
Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 07/08/2021
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 09/13/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Varies

VCP: Voluntary Response Program Sites
Sites participating in the Voluntary Response Program. The purpose of the VRP is to streamline the cleanup process in a way that will encourage prospective developers, lenders, and purchasers to voluntarily cleanup properties.

Date of Government Version: 02/22/2022
Date Data Arrived at EDR: 03/09/2022
Date Made Active in Reports: 04/06/2022
Number of Days to Update: 28
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/02/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Varies

Lists of state and tribal brownfield sites

BROWNFIELDS: Brownfields Sites
With certain legal exclusions and additions, the term ‘brownfield site’ means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Date of Government Version: 02/22/2022
Date Data Arrived at EDR: 03/09/2022
Date Made Active in Reports: 04/06/2022
Number of Days to Update: 28
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/02/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 03/10/2022
Date Made Active in Reports: 03/10/2022
Number of Days to Update: 0
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/09/2022
Next Scheduled EDR Contact: 12/26/2022
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Landfill / Solid Waste Disposal Sites

SWRCY: SWRCY
A listing of recycling and drop-off facilities located in Hawaii.

Date of Government Version: 09/14/2022
Date Data Arrived at EDR: 09/28/2022
Date Made Active in Reports: 10/05/2022
Number of Days to Update: 7

Source: Department of Health
Telephone: 808-586-4226
Last EDR Contact: 09/27/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 10/20/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 10/11/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 07/29/2022
Date Data Arrived at EDR: 08/18/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 67

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Lab Listing
A listing of clandestine drug lab site locations.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/10/2010
Date Made Active in Reports: 10/22/2010
Number of Days to Update: 42
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/02/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 07/29/2022
Date Data Arrived at EDR: 08/18/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 67
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14
Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 01/09/2023
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 09/19/2022
Date Data Arrived at EDR: 09/19/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 11
Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 09/19/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

SPILLS: Release Notifications
Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

Date of Government Version: 05/24/2022
Date Data Arrived at EDR: 05/25/2022
Date Made Active in Reports: 08/11/2022
Number of Days to Update: 78
Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 11/08/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Varies

SPILLS 90: SPILLS90 data from FirstSearch
Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 03/10/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/11/2013
Number of Days to Update: 39

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 08/11/2022
Date Data Arrived at EDR: 08/11/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 50

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 11/10/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 06/07/2021
Date Data Arrived at EDR: 07/13/2021
Date Made Active in Reports: 03/09/2022
Number of Days to Update: 239

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 10/13/2022
Next Scheduled EDR Contact: 01/23/2023
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/03/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/03/2022
Next Scheduled EDR Contact: 02/20/2023
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 06/20/2022
Date Data Arrived at EDR: 06/21/2022
Date Made Active in Reports: 08/31/2022
Number of Days to Update: 71

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 09/20/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/16/2023
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/16/2023
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/17/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 85

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 09/12/2022
Next Scheduled EDR Contact: 12/26/2022
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 08/14/2020
Date Made Active in Reports: 11/04/2020
Number of Days to Update: 82

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 11/01/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 07/18/2022
Date Data Arrived at EDR: 07/18/2022
Date Made Active in Reports: 07/29/2022
Number of Days to Update: 11

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 10/18/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/04/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 10/27/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 02/16/2023
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2022
Date Data Arrived at EDR: 01/20/2022
Date Made Active in Reports: 03/25/2022
Number of Days to Update: 64

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 09/27/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/26/2022
Date Data Arrived at EDR: 11/22/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 13

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 10/11/2022
Next Scheduled EDR Contact: 01/30/2023
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 11/30/2021
Date Made Active in Reports: 02/22/2022
Number of Days to Update: 84
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 11/29/2022
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 11/23/2022
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 11/03/2022
Next Scheduled EDR Contact: 02/13/2023
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 09/21/2022
Next Scheduled EDR Contact: 01/10/2023
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/28/2020
Date Made Active in Reports: 04/17/2020
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 10/24/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 06/30/2022
Date Data Arrived at EDR: 07/21/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 71

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 09/27/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 03/02/2022
Date Made Active in Reports: 03/25/2022
Number of Days to Update: 23

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 01/02/2023
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 07/26/2021
Date Data Arrived at EDR: 07/27/2021
Date Made Active in Reports: 10/22/2021
Number of Days to Update: 87

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 10/27/2022
Next Scheduled EDR Contact: 02/16/2023
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 11/09/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 01/09/2023
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

MINES VIOLATIONS: MSHA Violation Assessment Data

Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 08/01/2022
Date Data Arrived at EDR: 08/02/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 59

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 11/28/2022
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Quarterly

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/03/2022
Date Data Arrived at EDR: 08/17/2022
Date Made Active in Reports: 08/31/2022
Number of Days to Update: 14

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 11/17/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 05/27/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 78

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 09/13/2022
Date Data Arrived at EDR: 09/14/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 82

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 11/30/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 08/03/2022
Date Data Arrived at EDR: 08/25/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 60

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 11/29/2022
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 01/11/2022
Date Made Active in Reports: 02/14/2022
Number of Days to Update: 34

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 10/05/2022
Next Scheduled EDR Contact: 01/23/2023
Data Release Frequency: Varies

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/06/2021
Date Data Arrived at EDR: 05/21/2021
Date Made Active in Reports: 08/11/2021
Number of Days to Update: 82

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 11/15/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 06/25/2022
Date Data Arrived at EDR: 07/01/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 91

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 09/30/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Quarterly

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 08/11/2022
Date Data Arrived at EDR: 08/11/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 50

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 11/10/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Quarterly

PFAS NPL: Superfund Sites with PFAS Detections Information

EPA's Office of Land and Emergency Management and EPA Regional Offices maintain data describing what is known about site investigations, contamination, and remedial actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) where PFAS is present in the environment.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 07/08/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 123

Source: Environmental Protection Agency
Telephone: 703-603-8895
Last EDR Contact: 10/04/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS FEDERAL SITES: Federal Sites PFAS Information

Several federal entities, such as the federal Superfund program, Department of Defense, National Aeronautics and Space Administration, Department of Transportation, and Department of Energy provided information for sites with known or suspected detections at federal facilities.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS TSCA: PFAS Manufacture and Imports Information

EPA issued the Chemical Data Reporting (CDR) Rule under the Toxic Substances Control Act (TSCA) and requires chemical manufacturers and facilities that manufacture or import chemical substances to report data to EPA. EPA publishes non-confidential business information (non-CBI) and includes descriptive information about each site, corporate parent, production volume, other manufacturing information, and processing and use information.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/04/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS RCRA MANIFEST: PFAS Transfers Identified In the RCRA Database Listing

To work around the lack of PFAS waste codes in the RCRA database, EPA developed the PFAS Transfers dataset by mining e-Manifest records containing at least one of these common PFAS keywords: PFAS, PFOA, PFOS, PERFL, AFFF, GENX, GEN-X (plus the VT waste codes). These keywords were searched for in the following text fields: Manifest handling instructions (MANIFEST_HANDLING_INSTR), Non-hazardous waste description (NON_HAZ_WASTE_DESCRIPTION), DOT printed information (DOT_PRINTED_INFORMATION), Waste line handling instructions (WASTE_LINE_HANDLING_INSTR), Waste residue comments (WASTE_RESIDUE_COMMENTS).

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS ATSDR: PFAS Contamination Site Location Listing

PFAS contamination site locations from the Department of Health & Human Services, Center for Disease Control & Prevention. ATSDR is involved at a number of PFAS-related sites, either directly or through assisting state and federal partners. As of now, most sites are related to drinking water contamination connected with PFAS production facilities or fire training areas where aqueous film-forming firefighting foam (AFFF) was regularly used.

Date of Government Version: 06/24/2020
Date Data Arrived at EDR: 03/17/2021
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 601

Source: Department of Health & Human Services
Telephone: 202-741-5770
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Varies

PFAS WQP: Ambient Environmental Sampling for PFAS

The Water Quality Portal (WQP) is a part of a modernized repository storing ambient sampling data for all environmental media and tissue samples. A wide range of federal, state, tribal and local governments, academic and non-governmental organizations and individuals submit project details and sampling results to this public repository. The information is commonly used for research and assessments of environmental quality.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS NPDES: Clean Water Act Discharge Monitoring Information

Any discharger of pollutants to waters of the United States from a point source must have a National Pollutant Discharge Elimination System (NPDES) permit. The process for obtaining limits involves the regulated entity (permittee) disclosing releases in a NPDES permit application and the permitting authority (typically the state but sometimes EPA) deciding whether to require monitoring or monitoring with limits.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS ECHO: Facilities in Industries that May Be Handling PFAS Listing

Regulators and the public have expressed interest in knowing which regulated entities may be using PFAS. EPA has developed a dataset from various sources that show which industries may be handling PFAS. Approximately 120,000 facilities subject to federal environmental programs have operated or currently operate in industry sectors with processes that may involve handling and/or release of PFAS.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS ECHO FIRE TRAINING: Facilities in Industries that May Be Handling PFAS Listing

A list of fire training sites was added to the Industry Sectors dataset using a keyword search on the permitted facilitys name to identify sites where fire-fighting foam may have been used in training exercises. Additionally, you may view an example spreadsheet of the subset of fire training facility data, as well as the keywords used in selecting or deselecting a facility for the subset. as well as the keywords used in selecting or deselecting a facility for the subset. These keywords were tested to maximize accuracy in selecting facilities that may use fire-fighting foam in training exercises, however, due to the lack of a required reporting field in the data systems for designating fire training sites, this methodology may not identify all fire training sites or may potentially misidentify them.

Date of Government Version: 08/22/2018
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS PART 139 AIRPORT: All Certified Part 139 Airports PFAS Information Listing

Since July 1, 2006, all certified part 139 airports are required to have fire-fighting foam onsite that meet military specifications (MIL-F-24385) (14 CFR 139.317). To date, these military specification fire-fighting foams are fluorinated and have been historically used for training and extinguishing. The 2018 FAA Reauthorization Act has a provision stating that no later than October 2021, FAA shall not require the use of fluorinated AFFF. This provision does not prohibit the use of fluorinated AFFF at Part 139 civilian airports; it only prohibits FAA from mandating its use. The Federal Aviation Administration?s document AC 150/5210-6D - Aircraft Fire Extinguishing Agents provides guidance on Aircraft Fire Extinguishing Agents, which includes Aqueous Film Forming Foam (AFFF).

Date of Government Version: 08/22/2018
Date Data Arrived at EDR: 10/26/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/26/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

AQUEOUS FOAM NRC: Aqueous Foam Related Incidents Listing

The National Response Center (NRC) serves as an emergency call center that fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. The spreadsheets posted to the NRC website contain initial incident data that has not been validated or investigated by a federal/state response agency. Response center calls from 1990 to the most recent complete calendar year where there was indication of Aqueous Film Forming Foam (AFFF) usage are included in this dataset. NRC calls may reference AFFF usage in the ?Material Involved? or ?Incident Description? fields.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 10/06/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PFAS: PFAS Contamination Site Listing

A listing of sites where "Potential PFAS" were found. The listing includes sites with "PFAs" and "fluoro", and site names that include "firefight", fire fight", "fire train".

Date of Government Version: 02/25/2022
Date Data Arrived at EDR: 02/28/2022
Date Made Active in Reports: 03/10/2022
Number of Days to Update: 10

Source: Department of Health
Telephone: 808-586-4249
Last EDR Contact: 12/06/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Varies

AIRS: List of Permitted Facilities

A listing of permitted facilities in the state.

Date of Government Version: 06/28/2022
Date Data Arrived at EDR: 06/30/2022
Date Made Active in Reports: 09/14/2022
Number of Days to Update: 76

Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 09/21/2022
Next Scheduled EDR Contact: 01/10/2023
Data Release Frequency: Varies

DRYCLEANERS: Permitted Drycleaner Facility Listing
A listing of permitted drycleaner facilities in the state.

Date of Government Version: 06/28/2022
Date Data Arrived at EDR: 06/30/2022
Date Made Active in Reports: 10/04/2022
Number of Days to Update: 96
Source: Department of Health
Telephone: 808-586-4200
Last EDR Contact: 09/21/2022
Next Scheduled EDR Contact: 01/10/2023
Data Release Frequency: Varies

Financial Assurance: Financial Assurance Information Listing
A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 08/31/2022
Date Data Arrived at EDR: 09/08/2022
Date Made Active in Reports: 11/28/2022
Number of Days to Update: 81
Source: Department of Health
Telephone: 808-586-4226
Last EDR Contact: 11/30/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Varies

LEAD: Lead Inspection Listing
Lead inspections

Date of Government Version: 09/15/2022
Date Data Arrived at EDR: 09/16/2022
Date Made Active in Reports: 12/06/2022
Number of Days to Update: 81
Source: Department of Health
Telephone: 808-586-5800
Last EDR Contact: 11/30/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Varies

UIC: Underground Injection Wells Listing
A listing of underground injection well locations.

Date of Government Version: 02/07/2013
Date Data Arrived at EDR: 02/12/2013
Date Made Active in Reports: 04/09/2013
Number of Days to Update: 56
Source: Department of Health
Telephone: 808-586-4258
Last EDR Contact: 11/15/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

PCS ENF: Enforcement data
No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29
Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 09/28/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Varies

PCS INACTIVE: Listing of Inactive PCS Permits
An inactive permit is a facility that has shut down or is no longer discharging.

Date of Government Version: 11/05/2014
Date Data Arrived at EDR: 01/06/2015
Date Made Active in Reports: 05/06/2015
Number of Days to Update: 120
Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/28/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Semi-Annually

PCS: Permit Compliance System
PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 07/14/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 55

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 09/28/2022
Next Scheduled EDR Contact: 01/16/2023
Data Release Frequency: Semi-Annually

MINES MRDS: Mineral Resources Data System
Mineral Resources Data System

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 10/21/2019
Date Made Active in Reports: 10/24/2019
Number of Days to Update: 3

Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 11/22/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners
EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/08/2014
Number of Days to Update: 191

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/17/2014
Number of Days to Update: 200

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Health in Hawaii.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/03/2014
Number of Days to Update: 186

Source: Department of Health
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines

Source: Endeavor Business Media

Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data

Source: Endeavor Business Media

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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetlands Inventory
Source: Office of Planning
Telephone: 808-587-2895

STREET AND ADDRESS INFORMATION

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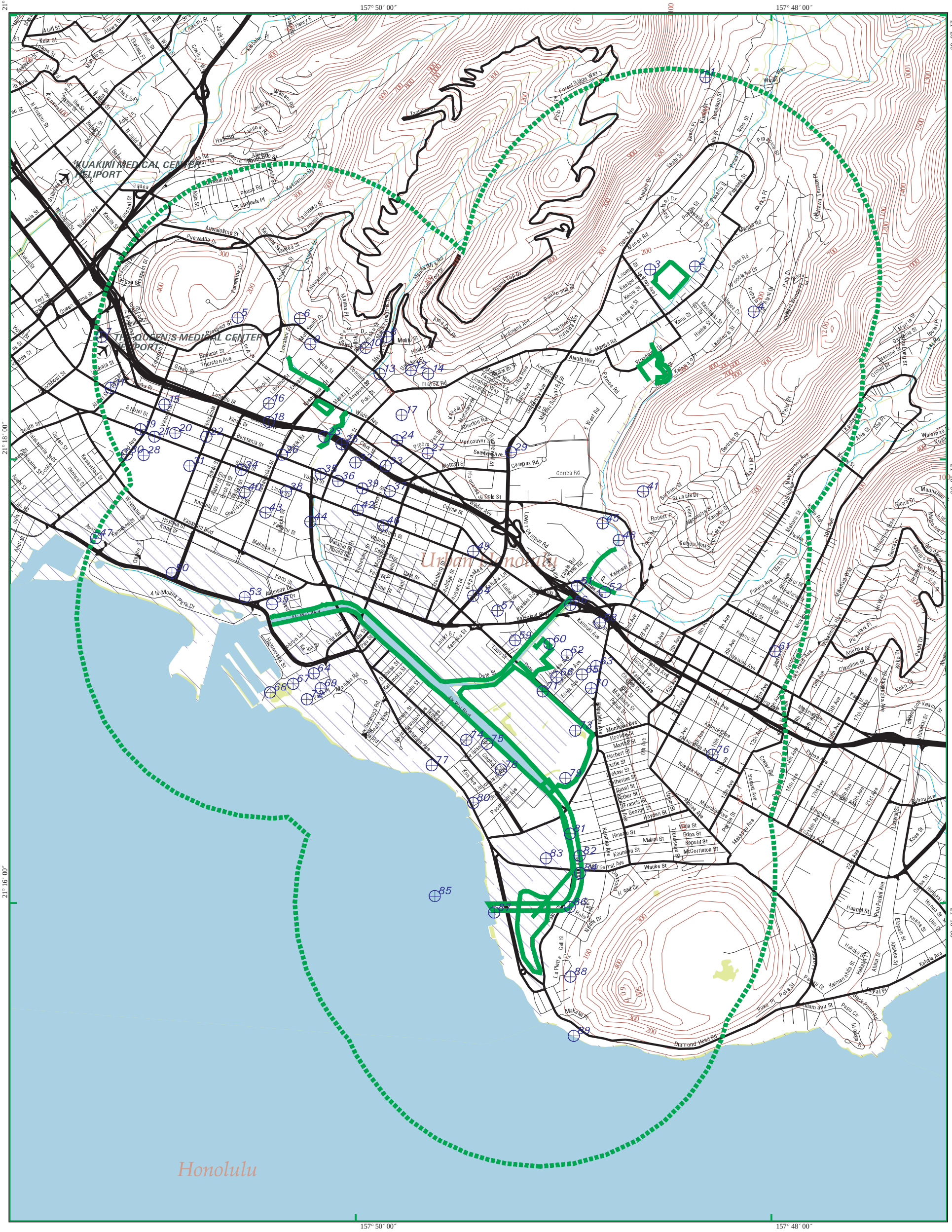
157° 50´ 00˝
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21° 18´ 00˝
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KUAKINI MEDICAL CENTER HELIPORT
THE QUEEN'S MEDICAL CENTER HELIPORT
Urban Honolulu
Honolulu
Ala Wai Canal
Forest Ridge Way
Round Top Dr
Puu Ualakaa Park Dr
Manoa Rd
Lowe Campus Rd
Correa Rd
Dole St
Wilder Ave
Date St
Kapiolani Blvd
Ala Wai Blvd
Ala Moana Park Dr
Diamond Head Rd
Makapuu Pl
Kalakaua Ave
Kuhio Ave
Ala Moana Blvd
Beretania St
S Hotel St
Nimitz Hwy
Waialae Ave
Kapahulu Ave
Monsarrat Ave
Paki Ave
Kaimuki Ave
Wilhelmina Rise
Waialae Rd
Kahala Ave
Kilauea Ave
Pahoa Ave
Kaau Crater Rd
Kaau Crater Trail
Kaau Crater Rd
Kaau Crater Trail
Kaau Crater Rd
Kaau Crater Trail

US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix K - Environmental and Regulatory Compliance

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

This document contains CONTROLLED UNCLASSIFED INFORMATION (CUI). It contains information that may be exempt from public release under the Freedom of Information Act (5 USC 552). It is to be controlled, stored, handled, transmitted, distributed, and disposed of in accordance with USACE policy relating to CUI information and it is not to be released to the public or other personnel who do not have a valid “need to know” without prior written approval of an authorized USACE official.

Report Status: Draft, November 2023

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1. Introduction

The purpose of this appendix is to document the environmental coordination that has been undertaken for the feasibility of providing flood risk management measures in the Ala Wai Canal Flood project, Honolulu, Hawaii. The Corps is obligated to address the following authorities, consultations, and permits:

- Section 7(a)(2) Consultation, Endangered Species Act with the U.S. Fish and Wildlife Service and National Marine Fisheries Service
- Essential Fish Habitat, Magnuson-Stevens Fishery Conservation and Management Act with the National Marine Fisheries Service
- Fish and Wildlife Coordination Act with the U.S. Fish and Wildlife Service and National Marine Fisheries Service
- Coastal Zone Management Consistency Determination, State of Hawaii
- Department of Health, Water Quality Certification, State of Hawaii

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

October 5, 2021

MEMORANDUM FOR RECORD

SUBJECT: Ala Wai Canal General Reevaluation Report, Initial Resource Agency Meeting

LOCATION: Virtual

DATE OF MEETING: October 5, 2021

ATTENDEES:

Steve Kolinski, NMFS PRD
Dan Polhemus, USFWS
Jiny Kim, USFWS
Nadiera McCarthy, USFWS
Anthony Montgomery, USFWS
Elliott Porter, USACE-LRP
Cindy Acpal, USACE-POH
Debby Scerno, USACE-HQ
Sue Davis, USACE-LRC
Alex Hoxsie, USACE-LRC
Shawna Herleth-King, USACE-LRC

REPORT: Attendees discussed the following items.

Elliott Porter presented a powerpoint presentation providing an initial overview of the General Reevaluation Report (GRR) being prepared for the Ala Wai Canal Flood Risk Management Project.

Management Measures – The U.S. Army Corps of Engineers (USACE) requested input on additional management measures that should be considered during the GRR effort (any additional ones beyond those presented in the powerpoint presentation). Recommendations included looking at underground retention in the upper reaches of the Ala Wai watershed due to limited real estate; looking at setbacks for the Woodlawn Bridge area; looking at available detention capacity under existing roadways or paved areas; looking at underground cisterns or other underground storage areas as offshoots to existing channels; and looking at artificial wetlands around the Ala Wai Golf Course.

Section 7(a) consultation (USFWS) – The U.S. Fish and Wildlife Service (USFWS) noted that there are multiple listed species in the upper valley of Manoa (i.e., damselfly) and would want the project to avoid impacts to these species. Elepaio and blackline damselfly are primarily in the upper Ala Wai watershed; Hawaiian hoary bats are located everywhere in the watershed; threatened and endangered birds in the action area can be attracted by nighttime lighting; stilts will use any standing water that might be created by the project; and gallinule are potentially not an issue. It was noted that for the past Ala Wai Canal FRM efforts a Section 7 concurrence letter had been provided to USACE.

Section 7(a) consultation (NMFS) – The National Marine Fisheries Service (NMFS) noted that previous coordination that occurred was on inland waters as the 2017 and 2020 proposed project features were all located upstream (there wasn't a big marine component in previous documents). Some subsequent features have been discussed downstream that could potentially be within marine areas. In general, sea turtles and monk seals would be a NMFS consideration, although there is not nesting in the project action area.

Fish and Wildlife Coordination Act – USFWS noted that an extensive Fish and Wildlife Coordination Act Report (FWCAR) on upstream detention basin structures was provided to

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

USACE for the 2017 effort. A supplemental FWCAR was in development for the 2020 effort which included downstream detention basin structures, etc. For the GRR, USACE would need to reinitiate FWCAR coordination for downstream measures not included in the 2017 FWCAR. In general, the habitat most likely to be impacted by the current effort is the Ala Wai Canal, but it is far from pristine. For the current effort, USACE needs to send letter to USFWS requesting a Scope of Work for the FWCAR.

Essential Fish Habitat Analysis – In general, NMFS noted that they prefer upper water retention so as not to increase flow through the Ala Wai Canal which could potentially increase the amount of sediment reaching the nearshore marine habitat. For the 2017 effort there was no EFH analysis as there were no marine considerations since all measures were in the upper watershed. NMFS would need a description of the alternatives being considered under the GRR to determine involvement for the current effort.

GENERAL DISCUSSION –

Climate Change Considerations: USACE designs projects with a 50-year project life and that is how they are assessed. USACE looks at 100-year period for sea-level rise. Anticipate Hawaii to be similar or drier, however, frequency of heavy rainfall events is expected to increase. At the time of the meeting, no documented 100-year event in the Ala Wai watershed.

Contaminated Sediment Considerations: If holding back water also going to be holding back sediment. There are a lot of legacy contaminated sediments in the Ala Wai watershed and proper disposal of these sediments is important. USACE will have to consider disposal of contaminated sediment as part of the total project cost.

Operations and Maintenance Considerations: The non-federal sponsor takes over operation and maintenance responsibilities once construction of the project is complete; however, the costs and activities are incorporated into the feasibility study. Therefore, as an example, the operation and maintenance of potential pump stations is factored into the decision when selecting an alternative to recommend. USACE doesn't want to push high maintenance and operation costs onto the NFS. Therefore, USACE is actively seeking opportunities with green infrastructure that may capture some sediments before they enter the stream or a detention basin.

Structural Modification Considerations: USACE not considering any type of structural modifications in the upper basin. There is limited ability to affect the surface water in the upper basin and there is a greater potential of environmental impacts.

CONCLUSION AND FOLLOW UP ITEMS:

Follow-up Items:
-Send cooperating agency request letters to USFWS and NMFS
-Begin Scope of Work for FWCAR in the February/March 2022 timeframe
-Section 2020 USFWS coordination information to NMFS
-Set up recurring resource agency meeting for every 2 months initially

Shawna Herleth-King
RTS, Environmental Compliance
Chicago District
Army Corps of Engineers

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

3. Section 7(a)(2) Consultation with the U.S. Fish and Wildlife Service

Section 7(a)(2) Consultation with the U.S. Fish and Wildlife Service will be completed for Hawaiian Seabirds, Hawaiian waterbirds, and the Hawaiian hoary bat. The Corps has determined that the flood risk management project may affect, but is not likely to adversely affect the federally listed species. Consultation letters and communications with the Service are contained in this section (attached).

- Corps' Consultation Initiation Letter and Biological Assessment

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Herleth-King, Shawna S CIV USARMY CELRC (USA)

From: Herleth-King, Shawna S CIV USARMY CELRC (USA)
Sent: Thursday, November 10, 2022 10:48 AM
To: Kim, Jiny
Subject: Reinitiation of Section 7 Consultation for the Ala Wai Canal GRR
Attachments: Final Array Visuals.pptx

Importance: High

Hi Ms. Kim,

The Corps would like to reinitiate informal Section 7 consultation for the Ala Wai Canal GRR study. As discussed during our coordination calls on the subject project, the GRR that the Corps is preparing is a reevaluation of the previous 2017 study and will ultimately result in a recommendation from the Corps that will either update and confirm the 2017 authorized project or make a new recommendation. Currently the Corps is evaluating six alternatives that make up the final array (please see the attached powerpoint for the final array visuals). Further analysis of these alternatives/measures may still result in further screening. Please note that since our last discussion the Corps has screened the Kapiolani Park Detention Basin measure from Alternative 1 – Storage Cornerstone. The remaining measures/alternatives are still being further evaluated, and it is still likely that additional measures/alternatives could be screened out of the final array (including Alternative 2C – Conveyance Cornerstone). However, the only measure that has been for sure screened from the attached final array of alternatives is the Kapiolani Park Detention Basin.

This email is a request for an updated official species list for the study area. It appears from previous consultation on the subject project that the official list from USFWS included the following species as recent as 2020: Hawaiian blackline damselfly (*Megalagrion nigrohamatum nigrolineatum*), Hawaiian hoary bat (*Lasiurus cinereus semotus*), O'ahu 'elepaio (*Chasiempis ibidis*), Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), Hawaiian common gallinule (*Gallinula galeata sandvicensis*), Hawaiian duck (*Ana wyvilliana*), Hawaiian damselfly (*Megalagrion leptodemas*), oceanic Hawaiian damselfly (*Megalagrion oceanicum*), orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*), O'ahu tree snails (*Achatinella sp.*), hāhā (*Cyanea acuminata*), hāhā (*Cyanea crispa*), hāhā (*Cyanea koolauensis*), *Diella erecta*, nānū (*Gardenia mannii*), *Gouania meyenii*, wāwai 'iole (*Huperzia nutans*), *Lobelia oahuensis*, 'ihi'ihi (*Marsilea villosa*), *Pteris lidgatei*, *Schieda nuttallii*, and *Spermolepis hawaiiensis*.

If you could please provide an updated species list or confirm the above species should still be considered in our analysis we would appreciate it.

Thank you,
Shawna

Shawna Herleth-King (she/her)
LRD Regional Technical Specialist
US Army Corps of Engineers
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Chicago, Illinois 60604
(312) 846-5407 Office
(312) 353-2169 FAX
(312) 806-8207 Mobile

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FACEBOOK: http://www.facebook.com/usacechicago

Draft
General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii

Biological Assessment
Under the Endangered Species Act of 1972, as Amended

Prepared for:
U.S. Fish and Wildlife Service
Pacific Islands Region
Honolulu, Hawai'i

Prepared by:
U.S. Army Corps of Engineers, Pittsburgh District

November 2023

(Revised: MONTH YEAR)

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1. Introduction

At the request of the City and County of Honolulu (CCH), the U.S. Army Corps of Engineers, Pittsburgh District (USACE) is conducting a feasibility study for the Ala Wai Canal Project (hereafter referred to as "the project"). The purpose of the project is to reduce flood hazards within the watershed, which is comprised of approximately 19 square miles (12,064 acres) on the southeastern side of the island of Oahu in the State of Hawaii (Figure 1).

In accordance with Section 7 of the Endangered Species Act (ESA) (Title 16, United States Code [USC], Section 1536[c]) and in consultation with the United States Fish and Wildlife (USFWS) and the National Marine Fisheries Service (NMFS), this Biological Assessment (BA) defines and evaluates the potential effects of the proposed project on ESA-listed species and their designated critical habitats.

1. 1 Project Authority

The project is authorized under Section 209 of the Flood Control Act of 1962. Section 209 is a general authority that authorizes surveys in harbors and rivers in Hawaii "with a view to determining the advisability of improvements in the interest of navigation, flood control, hydroelectric power development, water supply, and other beneficial water uses, and related land resources."

1.2 Project Purpose and Need

The purpose of the proposed action is to reduce the on-going flood risks throughout the Ala Wai watershed.

The need for the project is due to the high level of flood risk that exists within the Ala Wai Watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) and aging and undersized infrastructure result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Manoa, and Palolo valleys. The population density within the Ala Wai watershed is approximately 200,000 residents. The watershed also contains the University of Hawai'i and the Waikiki District – a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state.

It is estimated that the Ala Wai Canal has the capacity to contain about a 20% annual exceedance probability (AEP) flood event. Overtopping of the Canal has previously flooded Waikiki multiple times, including November 1965 and December 1967 storms and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by several recent events, including the October 2004 storm that flooded the Manoa Valley and the March 2006 storm that flooded Makiki. The October 2004 event was estimated to have a 4% AEP that caused more than $85 million in damages.

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Figure 1: Regional Location of the Action Area.

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1.3 Project History

In response to a request from DLNR, the reconnaissance phase of the Ala Wai Canal Project was initiated in April 1999. At that time, Federal, State, and local agencies sought a comprehensive management and restoration plan to restore aquatic habitat and biological diversity in the Canal and upstream tributaries. The reconnaissance report was submitted in August 1999 and recommended that the USACE assist the State with restoration of the Canal. Approval by USACE for continuation into the feasibility phase was granted in September 1999.

Independently, the Ala Wai Flood Study was initiated in September 1998 under the Planning Assistance to States (PAS) Program (Section 22 of the Water Resources Development Act [WRDA] of 1974) to determine the potential flood risk to the Waikiki area, in response to a request by the DLNR Land Division. The study was completed in October 2001 and documented a high flood hazard associated with potential overtopping of the Ala Wai Canal. This study identified several mitigative measures and conceptual alternatives that could potentially minimize flood damages to Waikiki and surrounding areas. The results of this technical study were used to establish that the USACE could be involved in the investigation of flood risk management in the Canal. As a result, a flood risk management objective was added to the Ala Wai Canal Project, thus expanding the project focus to both ecosystem restoration and flood risk management in the Canal area.

The FCSA was executed between USACE and the non-Federal sponsor, DLNR Engineering Division, in 2001. The feasibility phase of the project was initiated in July 2002, and an EIS scoping meeting was held in June 2004. Subsequently, in October 2004, heavy rains caused Manoa Stream to overtop its banks, resulting in significant damages. In response, the USACE temporarily ceased work on the feasibility study, such that the project could be expanded to include the upstream portions of the Ala Wai Watershed. While the cost-share agreement was being amended to address a more comprehensive scope, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) received Federal funds to identify specific actions to address flooding in Manoa Valley. The Manoa Watershed Project was initiated in 2006 and resulted in detailed topographic mapping, hydrologic and hydraulic modeling, and identification of potential measures to address specific flood problems. However, because of insufficient Federal funding to complete the project, the Manoa Watershed Project was terminated before implementation.

Information developed through the Manoa Watershed Project by NRCS was subsequently incorporated into the Ala Wai Canal Project, which was restarted in 2007. A second EIS scoping meeting was held in October 2008. Project-related efforts were primarily focused on bringing the technical information for the entire watershed up to the same level of detail as produced for Manoa under the Manoa Watershed Project.

In October 2012, a charette was held to re-scope the study as part of the USACE Civil Works Planning Modernization process. The purpose of the charette was to bring together the USACE project delivery team (PDT), Pacific Ocean Division, and Headquarters staff with the non-Federal sponsor and other cooperating agencies, in order to determine the path forward for completing the feasibility study in compliance with current USACE planning requirements. Key outcomes of the charette included consensus on the problems and opportunities, objectives and constraints, screening and decision criteria, the initial array of alternatives, and a framework for identification of the recommended plan. Based on the project review at the charette, ecosystem restoration was eliminated as a study objective, as it was determined that the biological

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resources within the watershed did not have enough national significance to adequately justify ecosystem restoration as an objective.

The feasibility study was completed in 2017 and resulted in a recommendation that was subsequently authorized for construction under Section 1401 of the Water Resources Development Act of 2018. The 2017 recommended plan consisted of six in-stream debris and detention basins of varying height in the upper reaches of the watershed, one standalone debris catchment structure, three multi-purpose detention basins, floodwalls along the Ala Wai Canal averaging four feet in height and an earthen levee at the perimeter of an adjacent golf course averaging seven feet in height, two pump stations to reduce the threat of interior flooding, and a flood warning system. The record of decision (ROD) was signed on September 18, 2018, initiating the next phase of the study, Preconstruction Engineering and Design (PED). In 2020, an Engineering Documentation Report (EDR) provided the technical basis for modifications necessary to the Authorized Project. Subsequent analysis found that the modifications in the 2020 EDR were not cost effective and lacked the economic justification necessary for continued federal involvement.

In 2021, acknowledging the need to reduce the risk to life, safety, and economic damages from flooding throughout the Ala Wai Watershed in Oahu, Hawaii, the USACE began reevaluating the previously completed Ala Wai Canal Flood Risk Management Study in a General Reevaluation Report (GRR) using current planning criteria and policies. The GRR that is being developed will redefine the flood problems and risks in the Ala Wai Watershed by updating hydrology, physical, biological, and socioeconomic conditions; reevaluate alternatives for reducing flood damages in the area; and reaffirm the Federal interest by recommending a plan that is economically feasible.

1.4 Consultation History

The USACE previously consulted the USFWS in preparation of an Environmental Impact Statement (EIS) (2017) based on the scope of the Ala Wai Flood Risk Management Study at that time (reference number: 01EPIF00-2016-F-0157). A biological opinion analyzed the 2017 proposed project specifically in the Waihi and Waiakeakua Streams and its effects on the Hawaiian blackline damselfly (*Megalagrion nigrohamatum nigrolineatum*). An informal consultation for the proposed project and its effects on listed species was also conducted. Species included in the informal consultation for the 2017 proposed project included the federally endangered Hawaiian hoary bat *(Lasiurus cinereus semotus*), Oahu elepaio (*Chasiempis ibidis*), Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), Hawaiian common gallinule (*Galinula chloropus sandvicensis*), and the Hawaiian duck (*Anas wyvilliana*). The USACE made a no-effect determination for project impacts to the federally endangered crimson Hawaiian damselfly (*Megalagrion leptodemas*), oceanic Hawaiian damselfly (*Megalagrion oceanicum*), orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*), Oahu tree snails (*Achatinella sp.*), haha (*Cyanea acuminata*), haha (*Cyanea crispa*), haha (*Cyanea koolauensis*), *Diellia erecta*, nanu (*Gardenia mannii*), *Gouania meyenii*, wawae iole (*Huperzia nutans*), *Lobelia oahuensis*, ihi ihi (*Marsilea villosa*), *Pteris lidgatei*, *Schieda nuttalii*, and *Spermolepis hawaiiensis*.

In 2020, the scope of the 2017 authorized project was reduced in scale and eliminated the construction of several debris catchments and detention basins in the upper watershed. The USFWS via letter dated September 17, 2020, provided a species list and avoidance and minimization measures to the USACE for the reduced scope project (reference number: 01EPIF00-2020-SL-0470). On October 28, 2020, the USACE provided a biological evaluation to

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the USFWS and reinitiated consultation with the USFWS. In the 2020 BE, USACE requested USFWS's concurrence with the determination that the proposed project may affect, but would not likely adversely affect the endangered Hawaiian petrel (*Pterodroma sandwichensis*), Newell's shearwater (*Puffinus auricularis newelli*), Hawaiian stilt (*Himantopus mexicanus knudseni*), Hawaiian gallinule (*Gallinula galeata sandvicensis*), Hawaiian coot (*Fulica alai*), and Hawaiian hoary bat (*Lasiurus cinereus semotus*). In addition, USACE requested concurrence with the determination that the proposed project would have no effect on the Hawaii distinct population segment of band-rumped storm-petrel (*Oceanodroma castro*). In a letter dated December 24, 2020 (reference number: 01EPIF00-2021-I-0030), USFWS stated that based on the project description that was provided in the 2020 BE along with the proposed avoidance and minimization measures that would be implemented, effects from the actions were discountable. The USFWS concurred with USACE's determination that the proposed action may affect, but is not likely to adversely affect Hawaiian seabirds, Hawaiian waterbirds, and Hawaiian hoary bats.

In compliance with ESA consultation requirements, USACE requested reinitiation of informal consultation for the current effort, and an updated species list via email on November 10, 2022. A list of federally listed species and designated critical habitat that could occur with the action area was ultimately obtained from the USFWS's IPaC website. An initial kick-off meeting with USFWS regarding the General Reevaluation Report on the Ala Wai Canal Flood Risk Management Study was held on October 5, 2021. Follow-up meetings were held with agency staff on February 8, 2022; April 5, 2022; June 9, 2022; August 2, 2022; August 23, 2022; September 27, 2022; October 18, 2022; October 25, 2022; November 15, 2022; December 20, 2022; January 24, 2023; February 28, 2023; March 23, 2023; April 25, 2023; May 2, 2023; June 27, 2023; and July 25, 2023.

Reinitiation of informal consultation was also initiated with NMFS via emailed request from USACE as well as a request for an updated species list on November 10, 2022. A list of federally listed species under NMFS jurisdiction was provided via email on November 10, 2022. An initial kick-off meeting with NMFS regarding the General Reevaluation Report on the Ala Wai Canal Flood Risk Management Study was held on October 5, 2021. Follow-up meetings were held with agency staff on February 8, 2022; April 5, 2022; June 9, 2022; August 2, 2022; August 23, 2022; September 27, 2022; October 25, 2022; October 27, 2022; November 15, 2022; December 20, 2022; January 24, 2023; February 28, 2023; March 23, 2023; April 25, 2023; May 2, 2023; June 27, 2023; July 25, 2023, September 26, 2023, and October 24, 2023.

1.5 Purpose and Need of the Proposed Action

The purpose of the proposed project is to reduce the on-going flood risks throughout the Ala Wai watershed.

The need for the project is due to the high level of flood risk that exists within the Ala Wai Watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) and aging and undersized infrastructure result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Manoa, and Palolo valleys. The population density within the Ala Wai watershed is approximately 200,000 residents. The watershed also contains the University of Hawai'i and the Waikiki District—a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state.

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It is estimated that the Ala Wai Canal has the capacity to contain about a 20% annual exceedance probability (AEP) flood event. Overtopping of the Canal has previously flooded Waikiki multiple times, including November 1965 and December 1967 storms and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by several recent events, including the October 2004 storm that flooded the Manoa Valley and the March 2006 storm that flooded Makiki. The October 2004 event was estimated to have a 4% AEP that caused more than $85 million in damages.

1.6 Threatened, Endangered, Proposed Threatened or Proposed Endangered Species, Designated Critical Habitat

An official species list for the action area (Project Codes: 2023-0048348; 2023-0048319; 2023-0048409; 2023-0048352; 2023-0048400) was obtained from the U.S. Fish and Wildlife Service's Information for Planning and Consultation (IPaC) website (Attachment A). Table 1 contains the federally-listed and proposed species and designated and proposed critical habitat that may be present in the Action Area (defined in Section 1.6). This table includes species that are part of the USACE's informal consultation request for the Proposed Action under Section 7 of the Endangered Species Act (ESA), as well as species for which the USACE has made a no effect determination. Supporting analyses are provided in Chapters 2 and 3 of this document.

Table 1: Federally Endangered, Threatened, Proposed Endangered or Proposed Threatened Species, Designated or Proposed Critical Habitat in the Action Area.

Common Name	Scientific Name	Status
Flowering Plants		
'Aiea	*Nothocestrum latifolium*	Endangered
'Akoko	*Euphorbia celastroides var. kaenana*	Endangered
'ena'ena	*Pseudognaphalium sandwicensium var. molokaiense*	Endangered
Carter's Panicgrass	*Panicum fauriei var. carteri*	Endangered
Ewa Plains 'akoko	*Euphorbia skottsbergii var. skottsbergii*	
Ihi	*Portulaca villosa*	Endangered
Kamanomano	*Cenchrus agrimonioides*	Endangered
No Common Name	*Lobelia monostachya*	Endangered
No Common Name	*Polyscias lydgatei*	Endangered
Popolo	*Solanum nelsonii*	Endangered
Pu'uka'a		Endangered
Ohai	*Sesbania tomentosa*	Endangered
No Common Name	*Vigna o-wahuensis*	Endangered
Ferns and Allies		
Ihi'ihi	*Marsilea villosa*	Endangered
No Common Name	*Microlepia strigose var. mauiensis*	Endangered
Birds		
Band-rumped Storm petrel	*Oceanodroma castro*	Endangered
Hawaii Akepa	*Loxops coccineus*	Endangered
Hawaiian Duck	*Anas wyvilliana*	Endangered
Hawaiian Common Gallinule	*Gallinula galeata sandvicensis*	Endangered
Hawaiian Coot	*Fulica americana alai*	Endangered
Hawaiian Petrel	*Pterodroma sanwichensis*	Endangered
Hawaiian Stilt	*Himantopus mexicanus knudseni*	Endangered

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Common Name	Scientific Name	Status
Newell's Townsend's Shearwater	*Puffinus auricularis newelli*	Threatened
Short-tailed Albatross	*Phoebastria albatrus*	Endangered
Mammals		
Hawaiian Hoary Bat	*Lasiurus cinereus semotus*	Endangered
Hawaiian Monk Seal	*Neomonachus schauinslandi*	Endangered
Hawaiian Monk Seal Critical Habitat	-	-
Reptiles		
Green Sea Turtle, Central North Pacific Distinct Population	*Chelonia mydas*	Threatened
Green Sea Turtle Critical Habitat	-	-
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered

(-) Not applicable

Critical habitat has been designated within the action area for the Hawaiian monk seal. In addition, critical habitat has been proposed within the action area for the green sea turtle.

2. Description of Proposed Action and Action Area

2.1 Detailed Description of Proposed Action

The Proposed Action includes the following major elements:

Woodlawn Drive Floodwall
An approximately 1,270 feet long, six feet tall, and 12 feet wide at the base concrete floodwall with lava rock fascia would be installed along the right descending bank of Manoa Stream from approximately 270 feet upstream of Woodlawn Drive Bridge to approximately 1,120 feet downstream of Woodlawn Drive Bridge (Figure 2). The concrete floodwall would be an L-wall on macropiles (i.e., an ultra-high-capacity micropile typically drilled in place) (Figure 3). In general, macropiles are installed by methods that cause minimal disturbance to adjacent structures, soil, and the environment. They can be installed in access-restrictive environments and in all soil types and ground conditions. The installation procedure for macropiles causes minimal vibration and noise and can be used in conditions of low headroom. For construction, clearing and grubbing would occur along the right-descending bank of Manoa Stream for the length of the proposed L-wall and approximately 72 feet in width to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the stream. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the L-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the six-foot vertical portion of the L-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock

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fascia would be placed on both sides of the vertical portion of the L-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the L-wall would occur.

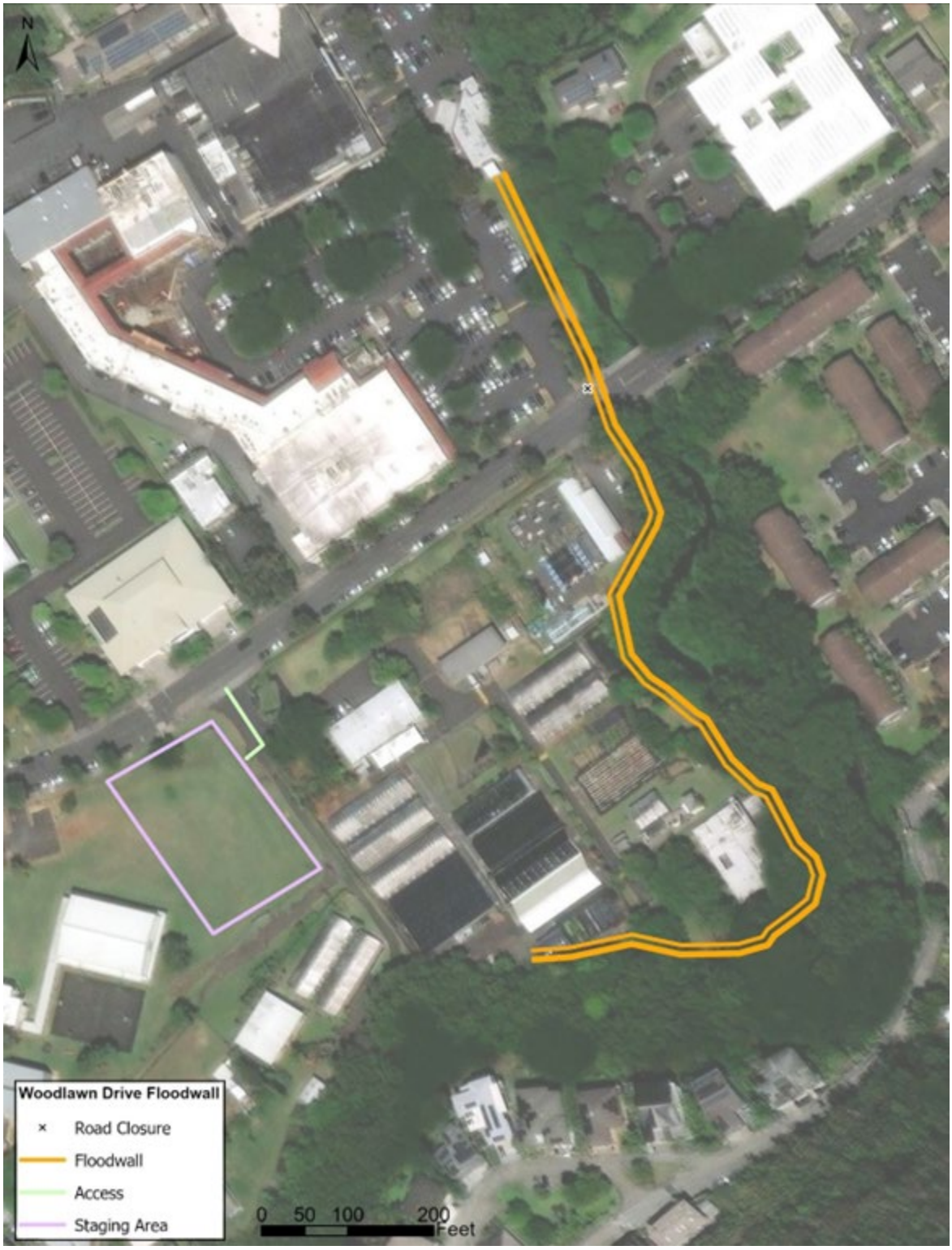

Figure 2: Woodlawn Drive Floodwall Proposed Project Footprint.

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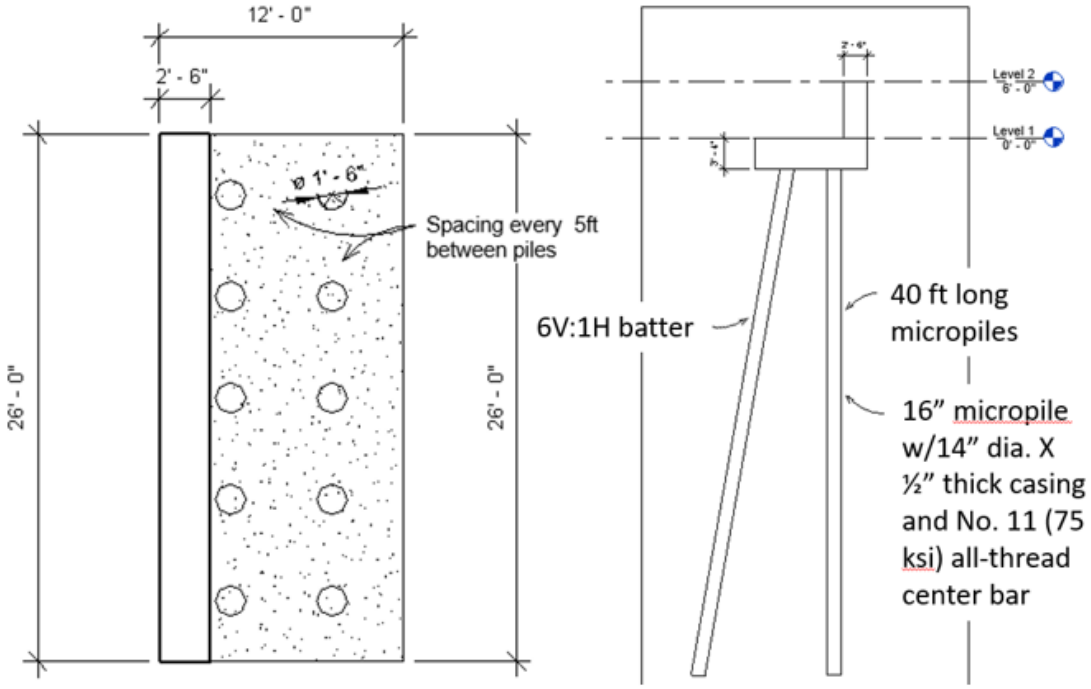

Figure 3: Preliminary L-wall on Macropiles Layout

The Woodlawn Drive Floodwall does not include any new or modification of existing drainage structures. One road closure structure would be constructed across Woodlawn Drive. The road closure structure is assumed to be a swing gate (Figure 4). A swing gate would require hinges to be attached to the floodwall and potentially a removable center post attached to the middle of the roadway if a double gate leaf is necessary (Figure 5). The road closure structure would require minor modifications as described above to the floodwalls for prefab gates. No in-water work is anticipated for the construction of the Woodlawn Drive Floodwall or road closure structure.

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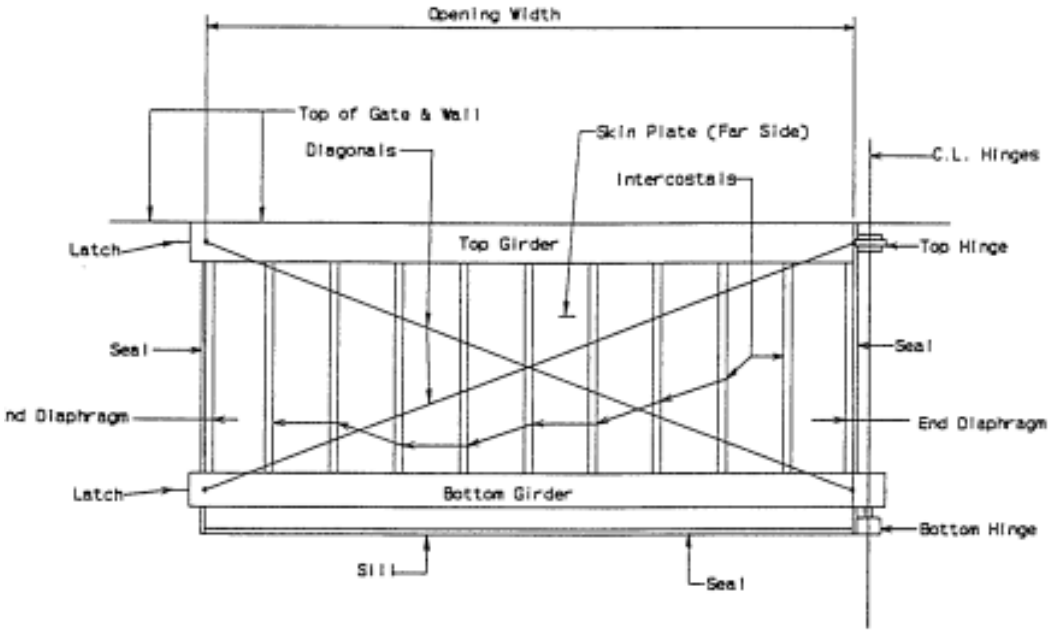

Figure 4: Example of a Single Swing Gate.

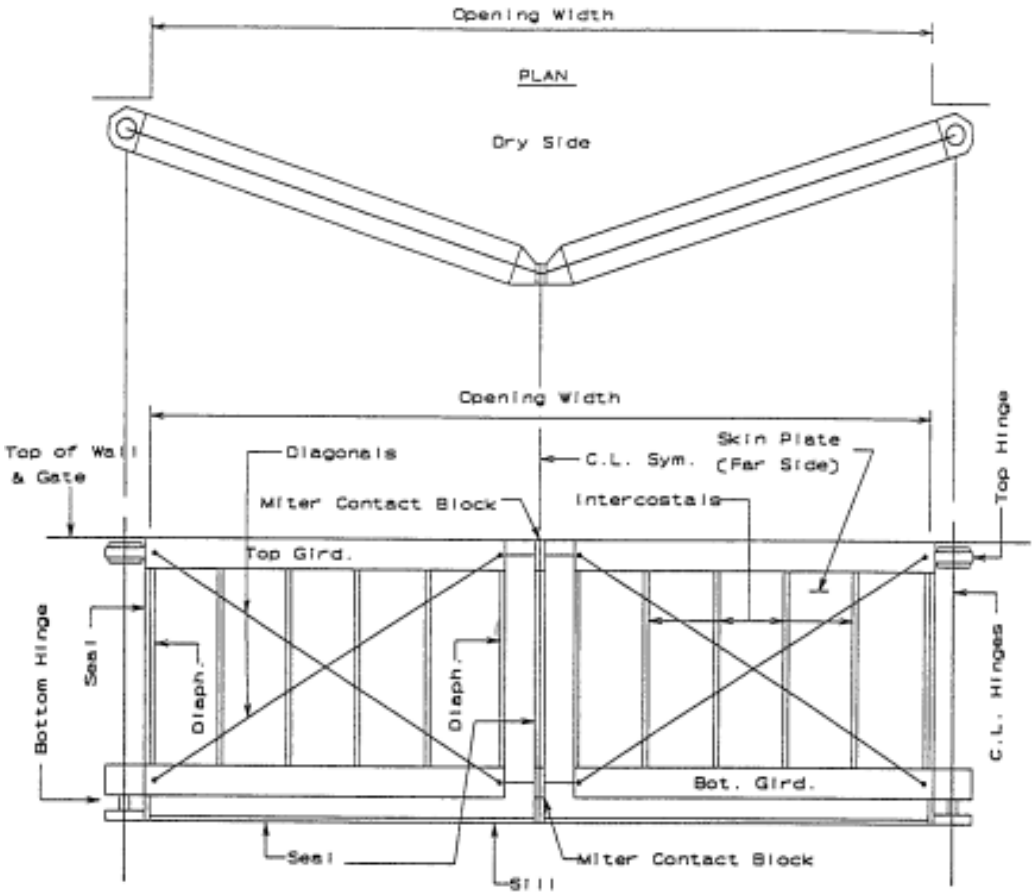

Figure 5: Example of a Double Swing Gate.

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Koali Road Floodwall

An approximately 2,510 feet long, six feet tall, and 12 feet wide at the base concrete floodwall with lava rock fascia would be installed along the left descending bank of Manoa Stream from approximately 1,430 feet upstream of Waialae Avenue downstream to the confluence of Manoa Stream with Palolo Stream. The floodwall would then continue along the right descending bank of Palolo Stream from the confluence of Manoa Stream with Palolo Stream upstream to the St. Louis Drive Bridge (Figure 6). The concrete floodwall would be an L-wall on macropiles as described above for the Woodlawn Drive Floodwall (Figure 3). For construction, clearing and grubbing would occur along the left-descending bank of Manoa Stream for the length of the proposed L-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Similarly, clearing and grubbing would occur along the right-descending bank of Palolo Stream for the length of the proposed L-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the streams. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the L-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the six-foot vertical portion of the L-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the L-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the L-wall would occur.

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Figure 6: Koali Road Floodwall Proposed Project Footprint.

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For the Koali Road Floodwall, two concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. The two concrete drainage structures would be approximately two feet tall by two feet wide by 50 feet long. Each drainage structure is anticipated to impact potentially 50 linear feet of stream. In addition, each drainage structure would require the excavation of approximately 38 cubic yards (CY) of material and the placement of approximately 19 CY of fill material once the concrete structures are put in place. Therefore, these two drainage structures could result in the placement of approximately 38 CY of fill material into waters of the U.S. For visual purposes, concrete drainage structures could be similar in design to that shown in Figure 7. As seen in the figure, in-water work is restricted to where the concrete pipe outlets into the adjacent stream and where the concrete apron (if necessary) extends into the stream. Erosion protection such as the concrete apron and/or riprap may also be placed around the structure where it outlets into the stream channel.

Figure 7: Example of Concrete Drainage Structure.

The Koali Road Floodwall also includes retrofitting two existing smaller stormwater culverts with flap gates. For visual purposes, the flap gates could be like those shown in Figure 8, but would be scaled in size to the existing drainage structure opening. As seen in the figure, the retrofitting of a flap gate requires attachment of the flap gate to an existing drainage structure. No excavation or placement of fill, other than the flap gate, would occur within waters of the U.S.

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Figure 8: Example of Flap Gates.

Lastly, the Koali Road Floodwall includes two road closure structures, one across Koali Road and one across a pedestrian bridge that crosses Palolo Stream. The road closure structures are assumed to be swing gates (Figure 4). Swing gates require hinges to be attached to the floodwall and potentially a removable center post attached to the middle of the roadway if a double gate leaf is necessary (Figure 5). The road closure structures would require minor modifications as described above to the floodwalls for prefab gates. No in-water work is anticipated for the construction of the Koali Road Floodwall or the road closure structures.

Ala Wai Golf Course Detention Basin

An approximately 8,315 feet long, nine feet tall, and 66 feet wide at the base (12 feet wide at the crown) earthen berm (i.e., levee) would be constructed around the Ala Wai Golf Course to create a detention basin. The earthen berm would be adjacent to the left descending bank of the Manoa-Palolo Canal and the right descending bank of the Ala Wai Canal (Figure 9). For construction, clearing and grubbing would occur along the entire proposed length of the earthen berm and at a width of up to 126 feet, where space allows, to accommodate construction equipment. Following clearing and grubbing, fill material would be brought via dump trucks and equipment such as bulldozers, skid steers, rollers, and backhoes would be used to place the fill material and form it into an earthen levee. On the left-descending bank of the Manoa-Palolo Canal, there would be an overtopping spillway section approximately 100-feet in length that would be reinforced with erosion protection such as riprap. The erosion protection would be placed on the upland side as the Manoa-Palolo Canal in this area is already lined with erosion protection on the canal side. Once construction of the earthen berm is complete, the earthen berm as well as adjacent upland areas that were temporarily disturbed during construction would be revegetated with a native grass seed mix and/or grass seed mix appropriate for the maintenance of the golf course area. In addition to the overtopping spillway an existing drainage ditch that runs along the north side of the golf course, parallel to Date Street would be used as an inlet for storm waters from the Manoa-Palolo Canal to overflow into the detention basin. The modification of this existing drainage structure would potentially require the excavation of approximately 170 CY of material and the placement of approximately 83 CY of riprap fill material. Approximately 50 linear feet of stream is expected to be temporarily disturbed during construction while approximately 39 linear feet of stream would be within the permanent project footprint. A second small inlet channel would be excavated and lined with erosion control material to further improve storm water flow into the detention basin. This inlet channel would

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connect to the existing drainage ditch that runs along the north side of the golf course and outlet in the detention basin. The creation of this small inlet channel would require the excavation of approximately 3 CY of material and the placement of approximately 2 CY of riprap material. Approximately 50 linear feet of the existing drainage ditch would be temporarily disturbed by the construction of this inlet channel, with approximately 10 linear feet of the existing drainage ditch remaining within the permanent project footprint.

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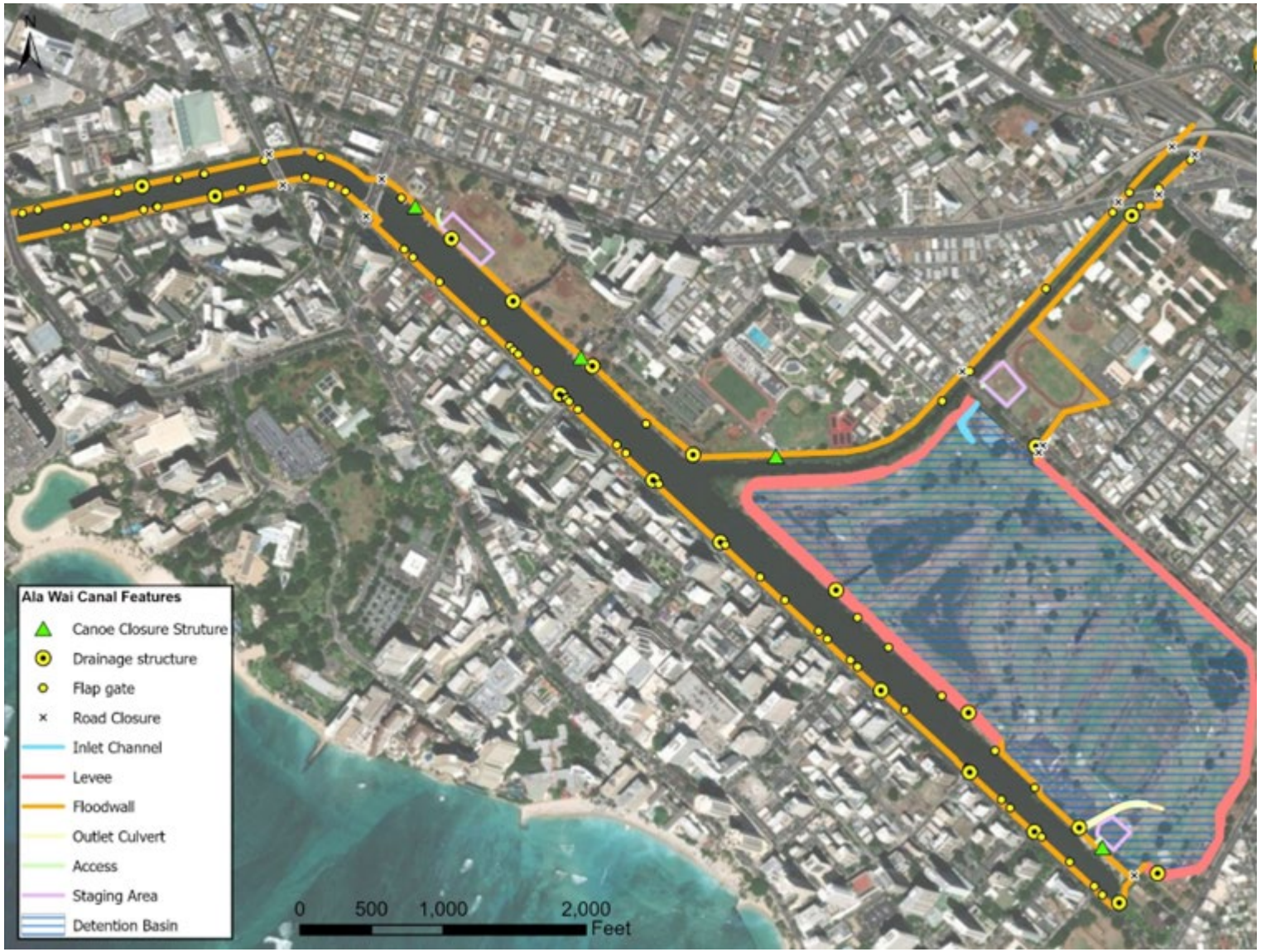

Figure 9: Ala Wai Canal Floodwall and Ala Wai Golf Course Detention Basin Proposed Project Footprint.

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The Ala Wai Golf Course Detention Basin also includes an approximately 2,409 feet long, nine feet tall, and 12 feet wide at the base L-wall floodwall. The L-wall floodwall would primarily be located along the front of the Ala Wai Golf Course Clubhouse and would tie into the earthen berm described above (Figure 9). The concrete floodwall would be an L-wall on macropiles as described above for both the Woodlawn Drive and Koali Road Floodwalls (Figure 3). For construction, clearing and grubbing would occur along the right-descending bank of the Ala Wai Canal for the length of the proposed L-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the canal. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the L-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the nine-foot vertical portion of the L-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the L-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the L-wall would occur.

For the golf course detention basin, five existing drainage structures/ditches would be modified. Four of the drainage structures would be concrete weirs with flap gates constructed along the levee alignment to allow collected storm water within the detention basin and from local runoff to slowly drain into the Ala Wai Canal. These four drainage structures combined would potentially impact approximately 200 linear feet of canal with approximately 69 linear feet of canal remaining within the permanent project footprint. In addition, the placement of these four drainage structures would require the excavation of approximately 180 CY of material and the placement of approximately 89 CY of fill into waters of the U.S. after the placement of the concrete drainage structures. For visualization purposes of the concrete drainage structures refer to Figure 7 and Figure 8. The fifth drainage structure would modify the existing drainage outlet near the Golf Course Clubhouse by enclosing this outlet in a concrete box culvert (instead of daylighted as it currently is) and installing flap gates at the downstream end of the concrete box culvert. The modification of this existing drainage structure would require the excavation of approximately 1,179 CY of material and the placement of approximately 571 CY of material around the concrete box culvert once placed. Approximately 505 linear feet of the existing drainage ditch would be temporarily disturbed as well as be within in the permanent project footprint.

Lastly, the Ala Wai Golf Course Detention Basin includes one road closure structure across the Maintenance Driveway for the Ala Wai Golf Course and one outrigger canoe launch access structure. Both of these structures are assumed to be swing gates (Figure 4). A swing gate requires hinges to be attached to the floodwall and potentially a removable center post attached to the middle of the roadway/launch pad if a double gate leaf is necessary (Figure 5). The structure would require minor modifications as described above to the floodwall for prefab gates. No in-water work is anticipated for the construction of the Ala Wai Golf Course earthen berm/L-wall or the road closure/outrigger canoe launch access structures.

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Ala Wai Canal Floodwall

An approximately 22,852 feet long, six feet tall, and six to 12 feet wide at the base floodwall would be constructed around the Ala Wai Canal (including Manoa-Palolo Canal). Essentially the floodwall would extend along both banks of the Manoa-Palolo Canal from Lunalilo Freeway downstream to the confluence of the Manoa-Palolo Canal with the Ala Wai Canal (except the area where the earthen berm for the Ala Wai Golf Course Detention Basin would be located along the left-descending bank of the Manoa-Palolo Canal) (Figure 9). The floodwall would then extend along both banks of the Ala Wai Canal from where it begins near the Ala Wai Golf Course (near Kapahulu Avenue) downstream to the Ala Moana Boulevard Bridge (except the area where the earthen berm/L-wall for the Ala Wai Golf Course Detention Basin would be located along the right descending bank of the Ala Wai Canal) (Figure 9). The Ala Wai Canal Floodwall would be comprised of three different types of walls: J-wall on macropiles (17,125 feet), L-wall on macropiles (4,069 feet), and tieback I-wall (1,658 feet).

The L-wall on macropiles is primarily located along both banks of the Manoa-Palolo Canal and a small portion of the Ala Wai Canal near Kapahulu Avenue (Figure 10). The concrete L-wall on macropiles would be the same as that described above for the Woodlawn Drive, Koali Road, and Ala Wai Golf Course floodwalls (Figure 3). For construction, clearing and grubbing would occur along both banks of the Manoa-Palolo Canal and the small section of wall near Kapahulu Avenue for the length of the proposed L-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the canals. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the L-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the six-foot vertical portion of the L-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the L-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the L-wall would occur.

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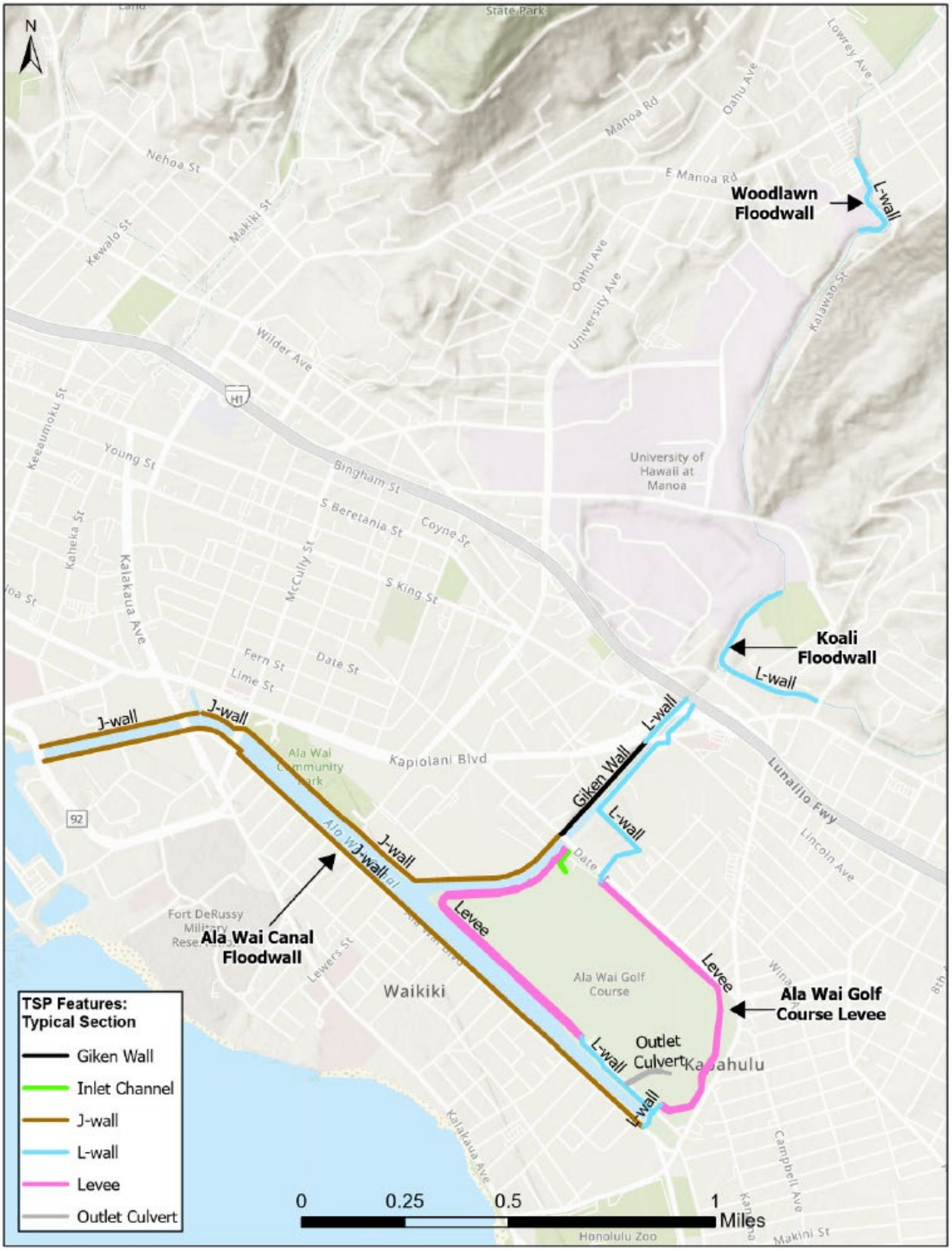

Figure 10: Floodwall Types for Each Measure.

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The tieback I-wall is located along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard downstream to Date Street (Figure 10). For construction, clearing and grubbing would occur along the right-descending bank of the Manoa-Palolo Canal for the length of the proposed tieback I-wall and up to 66 feet in width, where space allows, to accommodate construction equipment. Due to the space constrictions in this area, a 15-feet-wide rock bench would be placed in-stream running parallel to the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard downstream to Date Street (Figure 11). The 15-feet-wide rock bench would provide a work platform for construction equipment. The rock bench would include the placement of temporary fill into waters of the U.S., but this fill would be removed once construction of the tieback I-wall is complete. Following clearing and grubbing and the placement of the temporary rock bench, steel sheetpile would be installed using the press-in method of installation, such as that used by Giken Ltd. Equipment required for the press-in method would be a crane to hold the steel sheetpile and a generator to run the press-in equipment. The steel sheetpile would not be driven into the ground using an impact hammer nor would it be vibrated into the ground using a vibratory hammer. Once the steel sheetpile is in place, tieback soil anchors for stabilization of the wall would be placed six feet below grade. After the tieback I-wall installation is complete, the steel sheetpile wall extending above grade would be encased in concrete and then covered with a lava rock fascia. Lastly, revegetation of disturbed upland areas, minus the area occupied by the tieback I-wall would occur.

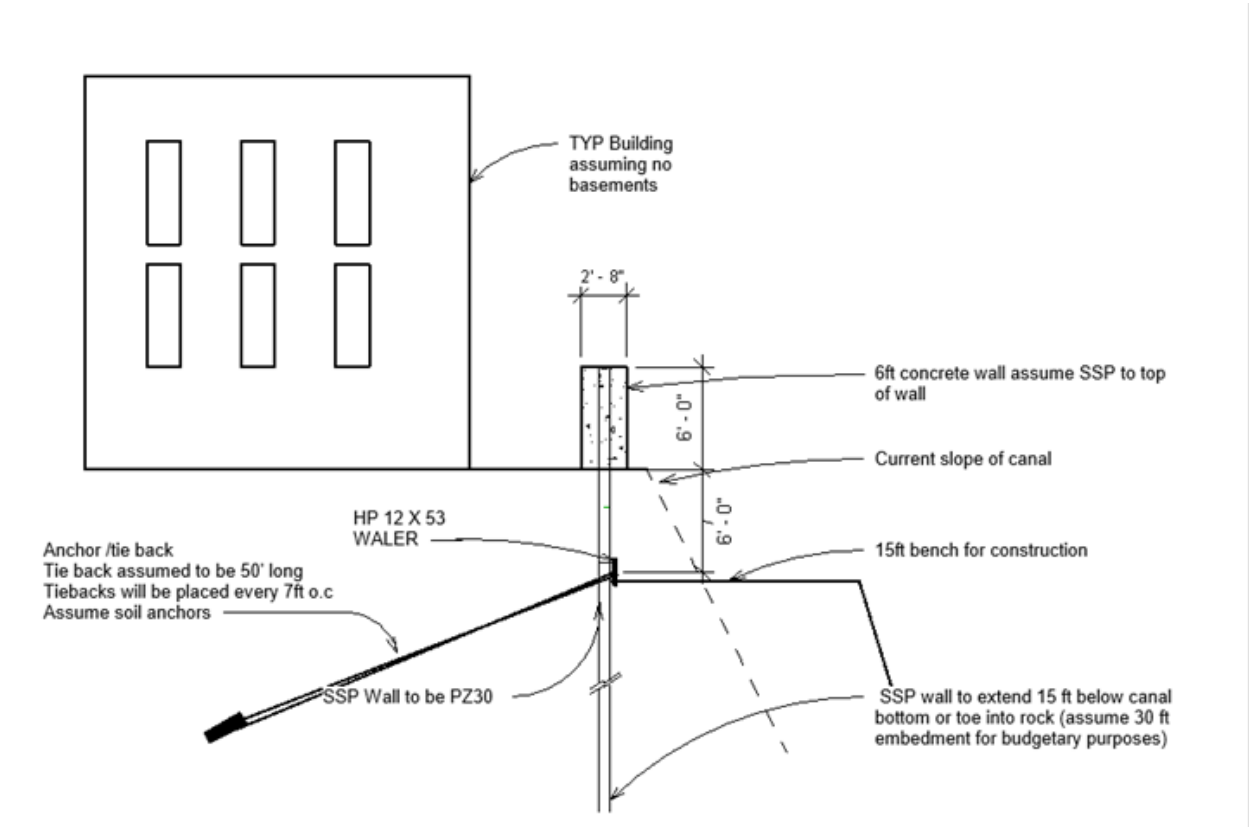

Figure 11: Design Layout of a Tieback I-Wall.

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The J-wall (Figure 12) is located along the right-descending bank of the Manoa-Palolo Canal downstream of Date Street and essentially along both banks of the Ala Wai Canal, except the section next to the Ala Wai Golf Course Detention Basin (Figure 10). For construction, clearing and grubbing would occur along the right-descending bank of the Manoa-Palolo Canal and along both banks of the Ala Wai Canal for the length of the proposed J-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the canals. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the J-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the six-foot vertical portion of the J-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the J-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the J-wall would occur.

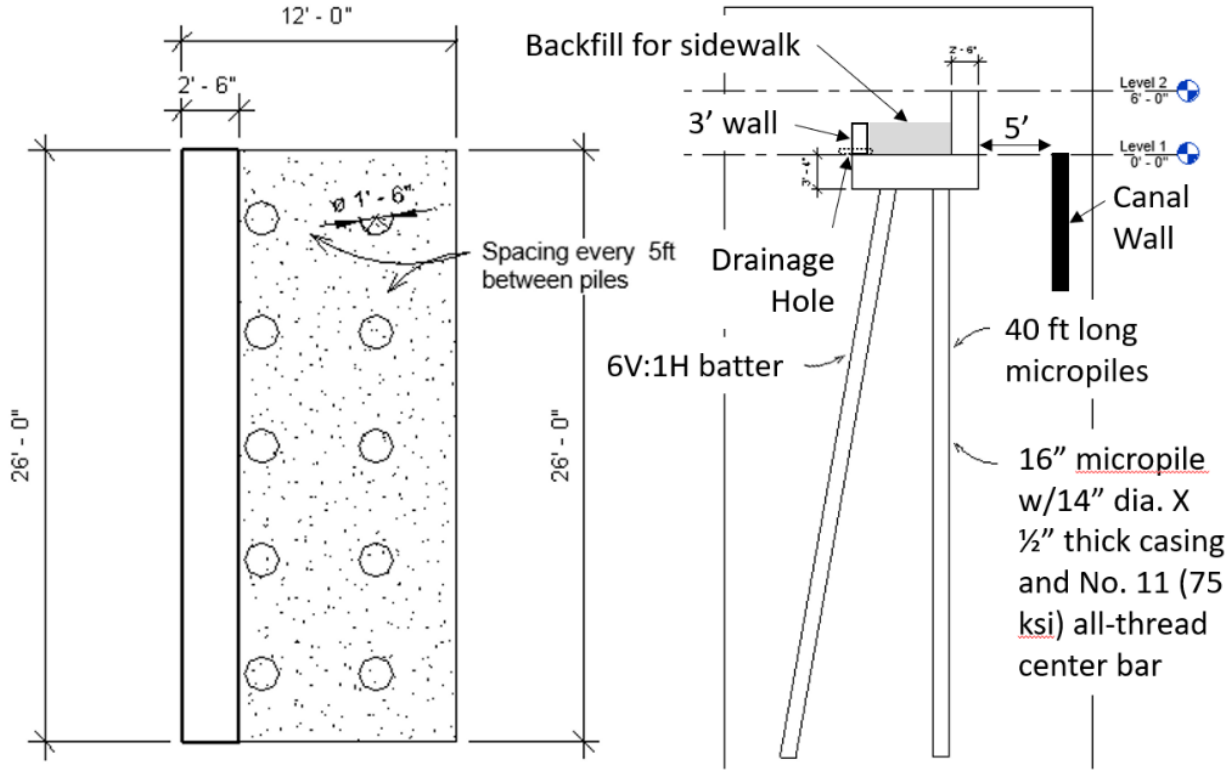

Figure 12: J-wall Typical Cross Section and Layout.

For the Ala Wai Canal Floodwall, 14 concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the areas behind the Ala Wai Canal floodwall. The concrete drainage structures would vary in size. Overall, the 14 drainage structures are expected to potentially impact 700 linear feet of canal during construction with approximately 130 linear feet of canal remaining in the project's permanent footprint. Approximately 76 CY to material would be excavated total for placement of the 14 drainage structures with

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approximately 46 CY of fill material being placed in waters of the U.S. to fill in around the concrete drainage structures once placed. For visual purposes, concrete drainage structures could be similar in design to that shown in Figure 7. As seen in the figure, in-water work is restricted to where the concrete pipe outlets into the adjacent canal and where the concrete apron (if necessary) extends into the canal. Erosion protection such as the concrete apron and/or riprap may also be placed around the structure where it outlets into the canal.

The Ala Wai Canal Floodwall also includes retrofitting 59 existing smaller stormwater culverts with flap gates. For visual purposes, the flap gates could be like those shown in Figure 8, but would be scaled in size to the existing drainage structure opening. As seen in the figure, the retrofitting of a flap gate requires attachment of the flap gate to an existing drainage structure. No excavation or placement of fill, other than the flap gate, would occur within waters of the U.S.

Lastly, the Ala Wai Canal Floodwall includes 11 road closure structures and 3 outrigger canoe launch access structures. All of these structures are assumed to be swing gates (Figure 4). A swing gate requires hinges to be attached to the floodwall and potentially a removable center post attached to the middle of the roadway/launch pad if a double gate leaf is necessary (Figure 5). The structure would require minor modifications as described above to the floodwall for prefab gates. No in-water work is anticipated for the construction of the Ala Wai Canal Floodwall or the road closure/outrigger canoe launch access structures.

Mitigation Measures

Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cubic feet per second (cfs). At the time of compiling this Draft Report, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed. Although likely not to be implemented due to cost, if a pump station were found to be necessary during the Preconstruction Engineering and Design (PED) phase of the project, it would likely be located along Makiki Stream to reduce induced flooding. In general, the pump station would be constructed upland and adjacent to Makiki Stream, but not located within the stream. A permanent pump station would likely consist of a wet well installed in a low-lying area where water naturally flows. The wet well would consist of a concrete inlet box with mesh screens for debris and wildlife protection, hinged lid for pump removal for maintenance, etc. The outlet from the wet well would be routed to the Ala Wai Canal floodwall and would either pass over the wall or through it with a check valve to prevent inflow from the river side. The wet well would connect to a pump house. The pump house would be elevated and would hold the electrical infrastructure and other operating equipment, and a backup generator to minimize pump failure in the event of power disruption. The pump station would only be triggered to begin operating in the event of a storm event; therefore, much of the time the pump station would not be in operation.

Nonstructural measures that are under consideration as potential mitigation measures for induced flooding include floodproofing, elevation, and potentially acquisition. Dry floodproofing involves sealing flood prone structures from water with door and window barriers, small scale rapid deployable floodwalls, or sealants. Dry floodproofing is generally feasible and effective up to a maximum height of three feet above ground level. Floodproofing is only recommended for non-residential structures such as commercial buildings and critical infrastructure that cannot be elevated due to their large size. Elevation of structures is limited to residential structures, largely single-family homes. Whether a structure may be elevated depends on several factors including the foundation type, size of the structure, condition, etc. Elevating a home so that the finished

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floor is at a height where it is less likely that the structure and/or contents will be damaged by flooding. Due to structural constraints and wind loading concerns, a maximum height for residential structure elevation was established at 12 feet above ground level.

Staging Areas

The staging area for the Woodlawn Drive floodwall is proposed to be at Noelani Elementary School and would be approximately 0.7 acre (Figure 2).

The staging area for the Koali Road floodwall is proposed to be at Kanewai Community Park located at the north end of the project footprint. This staging area would be approximately 0.6 acre (Figure 3).

The Ala Wai Canal Floodwall and the Ala Wai Golf Course Detention Basin three potential staging areas (Figure 9). The staging area for the Ala Wai Canal right bank floodwall is proposed to be at Ala Wai Community Park and would be approximately 1 acre. The staging area for the Ala Wai Canal left bank floodwall is proposed to be at Ala Wai Golf Course and would be approximately 0.7 acre. The staging area on the Ala Wai Golf Course would also be used as the staging area for the Ala Wai Golf Course Detention Basin. The Ala Wai Canal left bank floodwall may also stage construction equipment and materials at the Ala Wai Community Park as described for the Ala Wai Canal right bank floodwall above. Lastly, the staging area for the Manoa-Palolo right bank and left bank floodwalls as well as the Kaimuki High School floodwall is at Kaimuki High School and would be approximately 1 acre. Overall, there are five potential staging areas for the entire Proposed Action equaling a total of 4 acres.

Site Access and Haul Routes

For disposal, the haul route would begin within the action area at a project footprint and end at the commercial landfill for Oahu, Waimanalo Gulch Sanitary Landfill, located approximately 28 miles west of the action (Figure 2); note distance varies depending on project feature location. Construction equipment and haul trucks would utilize temporary construction haul roads and existing roadways (e.g., Interstate H-1).

Organic materials, trees, shrubs, as well as inorganic materials, would be disposed of by hauling to the Waimanalo Gulch Sanitary Landfill (Figure 2). Disposal of these materials by burning or burying at the project footprint would not be permitted. Although it is not anticipated that hazardous substances would be present in the material removed, prior to disposal, the collected material would undergo testing (by the contractor) to determine appropriate disposal techniques.

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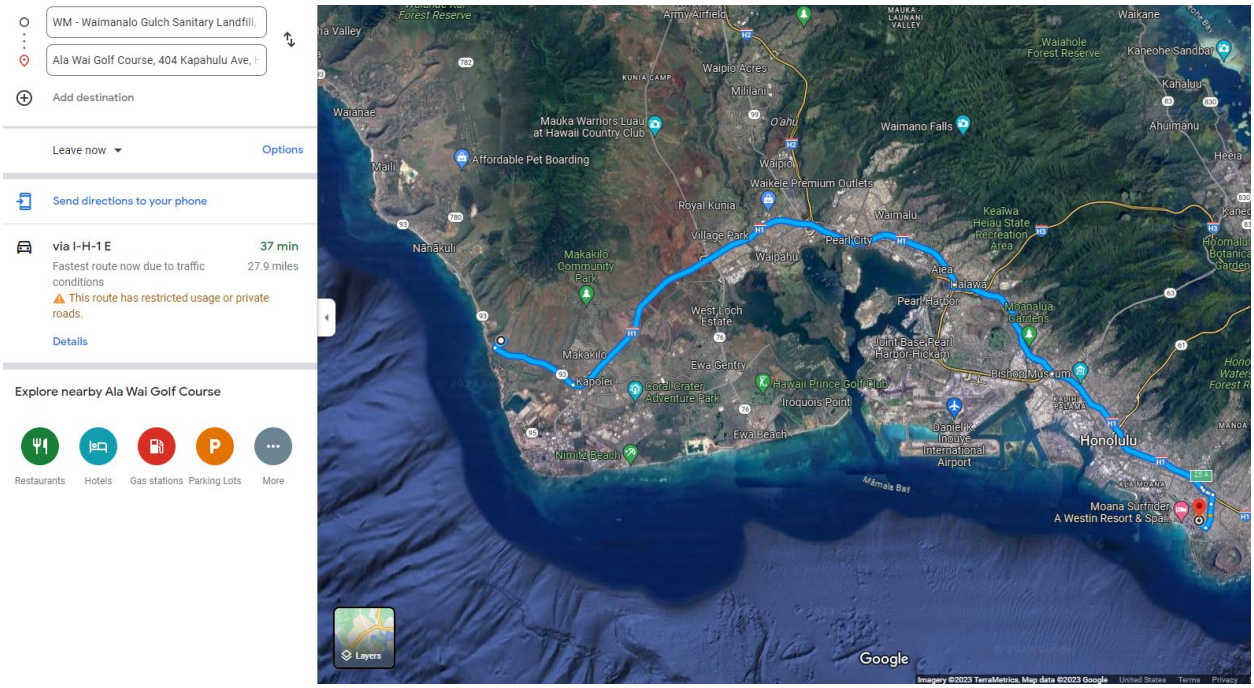

Figure 13: General Haul Route from the Proposed Project Action Area to Nearest Sanitary Landfill.

Construction Equipment

Construction equipment would likely include a combination of water trucks, waste trucks, haul trucks, crawler and front-end loaders, pile driver, dozers, skid-steers, excavators, loaders, and pickup trucks.

Construction Schedule

Construction could begin as early as 2027 and is expected to take approximately four years. It is possible that the Proposed Action would be constructed in stages, with multiple start dates and construction periods for various features depending on funding, environmental windows, and weather delays. Construction phasing may result in an extension of the overall project duration beyond four years.

Proposed construction hours would be 7:00 a.m. to 7:00 p.m., Monday through Friday, and 8:00 a.m. to 7:00 p.m. on Saturday. Occasional overtime work may be required to maintain the construction schedule, but timing would comply with local noise ordinances. Any construction lighting that may be required during dawn and dusk hours to illuminate a work area would use low mounting height, wattage, and lumens. Construction lighting would also be shielded to help direct the light down to the work area where it is needed. Lastly, lights with longer wavelengths (560 nanometers or longer) would be used when feasible.

Future Operation, Maintenance, Repair, Replacement, and Rehabilitation

Maintenance, including routine inspections and minor repairs of the project and its associated features, would be required after construction is completed. The following activities may occur:

- Routine and special inspection with pickup trucks and sport utility vehicles, as needed, and up to daily during flood events.

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- Vegetation management where floodwalls and earthen berms are located. Vegetation management in the areas with floodwalls would be in accordance with Corps of Engineers Engineering Pamphlet 1110-2-18; at a minimum 15-feet down slope of the floodwall would need to be a vegetation free zone (VFZ). The VFZ applies to all vegetation except for grasses for the purpose of erosion control.
- Periodic clearing of debris around inlet/outlet structures.
- Periodic clearing of accumulated sediment and debris from detention basin.
- Periodic vegetation management such as weeding, herbicide application, and re-seeding.
- Periodic graffiti removal and vandalization repair.

Rarely, following large and erosive flood flows, larger-scale maintenance and repairs may be required, which could require access and use of heavy equipment within the floodplain adjacent to the project feature. A temporary work area may need to be established around a repair site. The local sponsor would be required to obtain emergency or standard permits from regulatory agencies, including Corps Regulatory, who would coordinate and consult, if needed, with the USFWS and NMFS. These permits would likely require active habitat restoration of temporary construction and access roads. It is likely that a storm event large enough to damage the detention basins and/or floodwalls would also have removed vegetation in the immediate area, but specific impacts cannot be evaluated until or unless damage occurs, and repair work is defined.

2.2 Action Area and Project Footprint

The action area is defined in 50 CFR § 502.22 as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” Therefore, the action area includes the project footprint as well as a 400-foot buffer around the project footprint. The 400-foot buffer was chosen as the extent of potential indirect impacts based on 400 feet being the distance at which the noise level from the loudest piece of construction equipment (i.e., pile driver) would attenuate to equal or below 60 dBA. The action area was determined by accounting for direct impacts of the Proposed Action and indirect impacts from the Proposed Action such as noise and vibrations that extend beyond the project footprint. The project footprint is being defined in this BA as the area where direct effects of the Proposed Action could occur. The project footprint includes the areas where construction of project features will occur, as well as staging areas, access areas, and haul routes (Figure 2, Figure 6, and Figure 9).

2.3 Measures Intended to Avoid, Minimize, or Offset Effects of the Proposed Action

Standard Avoidance and Minimization Measures

The U.S. Fish and Wildlife Service and the National Marine Fisheries Service recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources, and ESA-listed marine resources:

- Authorized filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project footprint.
- Turbidity and siltation from project-related work should be minimized and contained within the project footprint by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. Best management practices (BMPs) should be

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maintained for the life of the construction period until turbidity and siltation within the project footprint is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

- All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fwl.html) can help to prevent attraction and introduction of non-native species.
- Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.
- Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.
- All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric, or native or non-invasive vegetation matting, hydro-seeding, etc.

Hawaiian Seabird Avoidance and Minimization Measures

The following measures are designed to avoid and minimize potential project impacts to Hawaiian seabirds:

- To the maximum extent practicable, limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat areas.
- If construction activity time restrictions are not possible, use down shielding or directional lighting to avoid light trespass into bird habitat (i.e., use a ‘Cobra’ style light rather than an omnidirectional light system to direct light down to the roadbed). To the maximum extent practicable, while allowing for public safety, low intensity energy saving lighting (e.g., low pressure sodium lamps) will be used.
- Minimize illumination of lighting on associated construction or operation structures by using motion sensors or heat sensors.
- Bright white light, such as metal halide, halogen, fluorescent, mercury vapor, and incandescent lamps should not be used.
- Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledgling period, September 15 through December 15.

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Hawaiian Waterbird Avoidance and Minimization Measures

The following measures are designed to avoid and minimize potential project impacts to Hawaiian Waterbirds:

- In areas where waterbirds are known to be present, reduced speed limit signs will be posted to inform project personnel and contractors about the presence of endangered species on-site; and reduced speed limits will be implemented.
- Applicable USFWS BMPs regarding work in aquatic environments will be incorporated and implemented into the project design if water resources are located within or adjacent to the project footprint in order to contain stream sediments to the operational area.
- A biological monitor that is familiar with Hawaiian waterbirds' biology will conduct nest surveys where appropriate habitat occurs within the vicinity of the proposed project footprint prior to project initiation. Surveys will be repeated within three days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest). If a nest or active brood is found:
    - The USFWS will be contacted within 48 hours for further guidance.
    - A 100-foot buffer will be established and maintained around all active nests and or broods until the chicks have fledged. Potentially disruptive activities will not be conducted, and habitat alteration will not occur within this buffer.
    - A biological monitor that is familiar with the species' biology will be present on the project footprint during all construction or earth moving activities until the chicks fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

Hawaiian Hoary Bat Avoidance and Minimization Measures

The following measures are designed to avoid and minimize potential project impacts to Hawaiian Hoary Bat:

- Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15).
- Do not use barbed wire for fencing.

Green Sea Turtle / Hawksbill Sea Turtle / Hawaiian Monk Seal Avoidance and Minimization Measures

The following measures are designed to avoid and minimize potential project impacts to the green sea turtle, hawksbill sea turtle, and Hawaiian monk seal:

- Constant vigilance shall be kept for the presence of ESA-listed marine species during all aspects of the proposed action, particularly in-water activities.
- The USACE shall designate an appropriate number of competent trained observers to survey the areas adjacent to the proposed action for ESA-listed marine species.
- Surveys shall be made prior to the start of work each day, and prior to resumption of work following any break of more than one-half hour. Periodic additional surveys throughout the workday are strongly recommended.
    - Special attention will be given to verify that no ESA-listed species are in the area where equipment or material is expected to enter the water where there is a risk of contact with the species.

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    - Certain activities may require additional surveys as advised by NMFS on an *ad hoc* basis as identified during the consultation.
- All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area.
    - If ESA-listed motile marine species are noticed within 164 feet (50 meters) after work has already begun, that work may continue only if the activity will not adversely affect the animal(s). For example, divers performing underwater work such as monitoring or surveys would likely be permissible, whereas operation of heavy equipment is likely not.
- All objects will be lowered to the bottom (or installed) in a controlled manner to avoid contact with ESA-listed species. This can include the use of buoyancy controls such as lift bags, or the use of cranes, winches, or other equipment that affect positive control over the rate of descent.
- Do not attempt to feed, touch, ride, or otherwise intentionally interact with any ESA-listed marine species.
- Report any monk seal sightings:
    - Email NMFS at pifsc.monksealsighting@noaa.gov or
    - Call the Marine Animal Stranding, Entanglement, and Reporting Hotline at: 888-256-9840.
- No contamination of the marine environment shall result from project-related activities.
- A contingency plan to control toxic materials is required.
- Appropriate materials to contain and clean potential spills shall be stored at the work site, and be readily available.
- Heavy equipment in and near water bodies shall consider the use of biofuels and non-petroleum-based hydraulic fluids.
- All project-related materials and equipment placed in the water shall be free of pollutants.
- The contractor and heavy equipment operators shall perform daily pre-work equipment inspections for cleanliness and leaks. All heavy equipment operations shall be postponed or halted should a leak be detected and shall not proceed until the leak is repaired and equipment cleaned.
- Fueling of land-based vehicles and equipment shall take place at least 164 feet (50 meters) away from the water, preferably over an impervious surface.
- Turbidity and siltation from project-related work shall be minimized and contained through the appropriate use of erosion control practices, effective silt containment devices, and the curtailment of work during adverse weather and tidal/flow conditions.
- A plan shall be developed to prevent debris and other wastes from entering or remaining in the marine environment during the project.
- All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area.
- Minimize direct contact to corals, seagrass, or other sessile ESA-listed resources.
- All work shall be postponed or halted when motile ESA-listed marine species are within 164 feet (50 meters) of the proposed work and shall only begin/resume after the animals have voluntarily departed the area.
- Unauthorized Take – If a listed marine mammal is determined by the PSO to have been disturbed, harassed, harmed, injured, or killed (e.g., a listed marine mammal(s) is injured or killed or is observed entering a shutdown zone before operations can be shut down),

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it will be reported to NMFS within one business day to Ron.Dean@noaa.gov. These PSO records, submitted in digital and quervable format to NMFS, will include:

  - Information to be provided in the final report;
  - Number and species of listed animals affected;
  - The date, time, and location of each event (provide geographic coordinates);
  - Description of the event;
  - The time the animal(s) was first observed or entered the shutdown zone, and, if known, the time the animal was last seen or exited the zone, and the fate of the animal;
  - Mitigation measures implemented prior to and after the animal was taken;
  - If a vessel struck a marine mammal, the contact information for the PSO on duty, or the contact information for the individual piloting the vessel if there was no PSO on duty;
  - Photographs or video footage of the animal(s) (if available).

- Stranded, Injured, Sick, or Dead Marine Mammal (not associated with the project);
  - If PSOs observe an injured, sick, or dead marine mammal (i.e., stranded marine mammal), they will notify the Pacific Islands Marine Mammal Stranding Hotline at 888-256-9840. The PSOs will submit photos and data that will aid NMFS in determining how to respond to the stranded animal. Data submitted to NMFS in response to stranded marine mammals will include date/time, location of stranded marine mammal, species and number of stranded marine mammals, description of the stranded marine mammal's condition, event type (e.g., entanglement, dead, floating), and behavior of live-stranded marine mammals.
- All areas of temporary waterway or wetland fill will be restored to their original contour and character upon completion of the project. Temporary fill includes both fill that received authorization and fill that inadvertently enters a water of the U.S. (i.e., from slope failures, accidental broken sandbag cofferdams, etc.). All temporary fills and structures in waters of the U.S. will be removed in their entirety upon completion of use. This AMM will ensure restoration of flow to waterbodies for fish migration and avoids creation of potential sources of sedimentation and erosion that may elevate turbidity and adversely impair water quality conditions of downstream waters where federally listed marine species may occur.
- All in-water excavation will be conducted within a cofferdam or other sediment containment device extending from the water surface to the substrate intended to isolate and contain in the work area. All in-water sediment containment devices will be placed to isolate the minimum area necessary to complete the work and will be removed upon completion of in-water work only after the water quality in the enclosed area has returned to ambient and would not release a turbidity plume. This AMM isolates and contains sediments to the in-water work area and reduces potential for adverse impairment of water quality conditions with the risk of degrading water quality conditions of downstream waters where federally listed marine species may occur. Additionally, in navigable waters where federally listed marine species may approach the in-water work area (i.e., Ala Wai Canal), the sediment containment device will create a physical barrier preventing interaction and potential physical impact to federally listed marine species.
- All upland areas of disturbed soil will be mulched and seeded with an approved native or noninvasive herbaceous seed mix following construction and/or planted with native or noninvasive woody vegetation and trees appropriate during the first available planting season. In areas where there is little to no slope and erosion and invasive species establishment is unlikely, the native woody vegetation on the site will be allowed to regenerate naturally. This AMM avoids creation of potential sources of sedimentation

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and erosion that may elevate turbidity and adversely impact water quality conditions of downstream waters where federally listed marine species may occur.

- Temporary access roads placed in the riparian area will be constructed in a manner that they do not allow erosion into waters of the U.S. during construction. This AMM avoids creation of potential sources of sedimentation and erosion that may elevate turbidity and adversely impair water quality conditions of downstream waters where federally listed marine species may occur.
- All off-road equipment and vehicles operating from existing open and maintained roads must be cleaned prior to entering the construction site to remove all soil, seeds, vegetation, or other debris that could contain seeds or reproductive portions of plants. All equipment will be inspected prior to off-loading to ensure that they are clean. This AMM minimizes the spread of invasive plants that may degrade riparian habitats and erode sediments, resulting in reduced water quality conditions that may negatively affect green and hawksbill sea turtles and the Hawaiian monk seal.
- During construction, any disturbed soils will be temporarily stabilized with materials such as hay, mulch, plastic sheeting, erosion control mix, or other appropriate measures. This AMM reduces the risk of erosion and exposure to reduced water quality conditions that may otherwise negatively affect green and hawksbill sea turtles and the Hawaiian monk seal.
- Cofferdam materials will be fully removed from the stream immediately following completion of in-water work, minimizing delays due to high stream flows following heavy precipitation. All areas of temporary bottom disturbance will be restored to their original contour and character upon completion of the project. This AMM removes obstacles and barriers to fish passage and returns benthic habitat to its original composition, limiting sediment disturbance and the temporary effects of degraded water quality conditions to green and hawksbill sea turtles and the Hawaiian monk seal.
- All cofferdams will be removed using techniques to minimize turbidity releases. This includes allowing for the slow reintroduction of water into the work area and utilizing dirty water treatment systems for turbid water. This AMM avoids degrading water quality conditions that may negatively affect green and hawksbill sea turtles and the Hawaiian monk seal.
- No equipment, materials, or machinery will be stored, cleaned, fueled, or repaired within any water of the U.S. All vehicle and equipment refueling activities will occur more than 100 feet from any water course and if not, all refueling areas will require fuel spill containment structures. A spill prevent and response plan will be prepared and implemented by the construction contractor. This AMM avoids creation of a pollutant source that may degrade downstream water quality conditions where federally listed marine species may occur.
- All pumps and generators will have appropriate spill containment structures and/or spill remediation materials available, such as absorbent pads. This AMM reduces the risk of green and hawksbill sea turtle and Hawaiian monk seal exposure to petroleum products and other contaminants.
- All equipment used for in-stream work will be cleaned of external oil, grease, dirt, and mud such that turbid water does not enter any water of the U.S. Any leaks or accumulations of these materials will be correlated before entering streams of areas that drain directly to streams or wetlands. All releases into surface waters or wetlands will be reported immediately to the appropriate regulatory body. This AMM reduces the risk of green and hawksbill sea turtles and the Hawaiian monk seal exposure to petroleum products and other contaminants.

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3. Environmental Baseline and Special Status Species

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the Action Area, without the consequences to the listed species or designated critical habitat caused by the Proposed Action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have undergone Section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify (like flood risk management operations) are part of the environmental baseline (50 CFR § 402.02).

The project action area has been previously surveyed by the USFWS and AECOS in October 2015, and January 2016, respectively. In addition, USFWS conducted a survey specific to the current effort in January 2023 to document the presence and locations of biological resources and sensitive species. The section summarizes the results of these surveys to provide an up to date and thorough description of the environmental baseline.

3.1 Habitat Conditions in the Action Area

Habitat conditions within the action area are a direct result of previous projects within the area as well as modifications of the Ala Wai watershed as a whole. The Ala Wai watershed encompasses 19 square miles and extends from the ridge of the Koolau Mountains to the near-shore waters of Mamala Bay. It includes the Makiki, Manoa, and Palolo streams as well as the Ala Wai Canal.

Makiki Stream is a relatively small stream originating near 1,850 feet on the southwestern flank of Mt. Tantalus in the Koolau Mountains and flows southwestwards for approximately 3.5 miles to its terminus in the Ala Wai Canal (USFWS, 2016). The stream has three major branches, these being from west to east the Kanaha, Kanealoloe, and Moleka streams, the latter two of which join prior to their confluence with the Kanaha. The upper half of the Makiki catchment lies in steep, forested terrain on the slopes of Mt. Tantalus and Round Top, an area that receives up to 134 inches of rain annually. The stream in this section flows in natural, unmodified channels, heavily shaded by a forest of introduced tree species, and is fed by two major springs, the Makiki Spring on the Kanealoloe branch, and the Herring Spring on the Moleka branch. At approximately 150 feet elevation, just downstream from Makiki Street, the stream channel is artificially confined within a concrete box culvert, which runs under the streets and neighborhoods of Honolulu before re-emerging at sea level near the intersection of Philip Street and Kalakaua Avenue. From this point the stream runs in an open concrete channel for another 0.4 miles to the Ala Wai Canal. There are no historic or active ditch diversions in the Makiki Stream catchment. Makiki Stream has an active USGS gauge located at 21° 17'48" N, 157° 50'12" W, at an elevation of 10 feet, and has 69 years of record. Based on this time series, the stream at the gauge has a median discharge of 0.56 cfs (USFWS, 2016).

Manoa Stream is a large stream in a bowl-like catchment, originating near 2,800 feet on the southwestern flank of Konahuanui peak and adjacent ridgelines in the Koolau Mountains, and flows southwestwards for approximately 5.75 miles to its terminus in the Ala Wai Canal (USFWS, 2016). The stream has two major branches, these being the Waihi on the west side of the basin, and the Waiakeakua on the east. The upper half of the Manoa catchment lies in steep, forested terrain on the slopes of the Koolau Mountains, in a very wet area that receives

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up to 151 inches, or 12.6 feet, of rain annually at the headwaters of the Waihi branch, and 140 inches, or 11.6 feet, annually at the headwaters of the Waiakeakua branch. The stream in its upper reaches flows in natural unmodified channels for approximately 2.25 miles, being heavily shaded by a forest of introduced tree species, with some native vegetation on the upper slopes. Below Paradise Park, the stream passes through suburban neighborhoods in a partially modified channel for about 1 mile. At the Manoa District Park, near 160 feet elevation the stream becomes confined within an artificial concrete channel, which continues downstream to the East Manoa Road bridge. Downstream from this bridge the stream flows in a re-aligned but partially natural channel, mostly following the base of the steep eastern wall of Manoa Valley. Downstream from Kanewai Park, at approximately 30 feet elevation, the stream channel has been straightened, but not concrete-lined, and continues in this fashion for 1.4 miles, passing below the H-1 freeway and then continuing to its confluence with the Ala Wai Canal (USFWS, 2016).

Both the Waihi and Waiakeakua branches of Manoa Stream also have active USGS stream gauges (USFWS, 2016). The Waihi gauge is located at 21° 19’42” N, 157° 48’03”, at an elevation of 290 feet, and has 69 years of record. Based on this time series, the stream at the gauge has a median discharge of two cfs. The Waiakeakua gauge is located at 21° 19’41” N, 157° 47’59” W, at an elevation of 294 feet, and has 97 years of record. Based on this time series, the stream at the gauge has a mean discharge of 3.6 cfs. The median of the combined flows of the two branches is therefore on the order of 5.6 cfs (approximately 10 times the discharge volume of Makiki Stream), which is reflective of the current conditions (USFWS, 2016).

Palolo Stream is another large stream in a somewhat more tightly confined catchment than adjacent Manoa Stream and originates near 2,665 feet on the southwestern flank of Mt. Olympus and adjacent ridgelines in the Koolau Mountains and flows southwestwards for approximately 4.4 miles before joining with Manoa Stream just upslope of the H-1 freeway (USFWS, 2016). The stream has two major branches, these being the Pukele on the west side of the basin, and the Waiomao on the east. The upper third of the Palolo catchment lies in steep, forested terrain on the slopes of the Koolau Mountains, in a wet area that receives up to 120 inches, or 10 feet, of rain annually at the headwaters of the Pukele branch, and 104 inches annually at the headwaters of the Waiomao branch. The stream headwaters in these upper reaches traverse unmodified channels for approximately 2 miles, being shaded by a forest of introduced tree species, with some native vegetation on the upper slopes. At approximately 530 feet elevation both stream branches begin to traverse the suburban neighborhoods of Palolo Valley, with their channels becoming progressively more straightened and modified. Pukele Stream appears to be intermittent in its upper reaches but receives significant spring inflow just upstream of the 10th Avenue bridge. No far downstream of this bridge, at 250 feet elevation, the stream becomes confined within a concrete channel, and retains this artificial character for the remaining 0.30 miles of its length, until its confluence with Waiomao Stream at 225 feet elevation. The Waiomao Stream exhibits higher volume in its headwaters, receiving perennial inflow from the outlet of a perched wetland in Kaau Crater. This branch also retains a more natural character to its channel until just before its confluence with the Pukele Stream, at which point it is confined within an artificial concrete channel, which then continues for the remaining 2-mile length of stream until its confluence with Manoa Stream just downslope of Kanewai Park (USFWS, 2016).

The Pukele branch of Palolo Stream has an active USGS gauge located at 21° 18’24” N, 157° 47’18” W, at an elevation of 345 feet, and has 65 years of record. Based on this time series, the

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stream at the gauge has a median discharge of 0.60 cfs (USFWS, 2016) The Waiomao branch of Palolo Stream has an existing gauge structure located at 21° 18'24" N, 157° 46'50" W, at an elevation of 400 feet, which formerly operated from 1911 to 2014; this gauge is no longer actively maintained. Based on historical records, it appears that the median discharge from the Waiomao branch is approximately 0.80 cfs, giving Palolo Stream below the confluence a combined median discharge volume of 1.40 cfs (USFWS, 2016).

Woodlawn Ditch is an intermittent, artificial ditch; the Pukele Stream is considered to represent a naturally interrupted stream midreach; and all other stream reaches described above are considered to represent continuously perennial stream midreach ecosystems possessing riffle and pool habitat (USFWS, 2016).

The Ala Wai Canal is a man-made waterway, approximately 2 miles in length that was created for land reclamation purposes between 1920 and 1924. The depth of the canal ranges from about 10 to 25 feet deep (USFWS, 2016). The Ala Wai Harbor was originally constructed during the early 1900s by the United States military. The entire watershed drains through the Ala Wai Canal into Mamala Bay. Mamala Bay encompasses the ocean area offshore of southern Oahu from Diamond Head Crater to Barbers Point (Kalaeloa) Deep Draft Harbor. Complex coral reef communities have been described throughout Mamala Bay (USFWS, 2016).

3.2 Water Quality

The State of Hawaii, Division of Aquatic Resources (DAR), in their Oahu volume of the Atlas of Hawaiian Watersheds series (Parham et al., 2008) assigned the Ala Wai catchment an overall ranking of 8 on a scale of 1 to 10, with larger numbers equating to higher watershed quality based on land cover classes, size, wetness, reach diversity, and biological resources (USFWS, 2016). This is a relatively high statewide ranking for a drainage system on Oahu and is reflective of the relatively natural conditions prevailing in the upper catchment, despite the urbanization in the lower catchment (USFWS, 2016).

Although the Ala Wai catchment has been assigned an overall ranking of 8, certain reaches within the watershed have been placed on the State's 303(d) List of Water Quality Limited Segments. Figure 14 and Table 2 show the pollutants for which Makiki, Palolo, Manoa, Ala Wai Canal, and Ala Wai Boat Harbor have been placed on the 303(d) List. In general, Manoa Stream (State Waterbody ID: HI3-3-07.01) is listed as impaired for aquatic life and other due to murky water, nitrogen and/or phosphorus, and pesticides (USEPA, 2022b). Makiki Stream (State Waterbody ID: HIALWS06) is listed as impaired for aquatic life due to nitrogen and/or phosphorus. Palolo Stream (State Waterbody ID: HI3-3-07.01.1) is listed as impaired for aquatic life due to trash. Ala Wai Canal and Harbor (Palolo Stream Fork) (State Waterbody ID: HIW00034) is listed as impaired for aquatic life, swimming and boating, and other due to bacteria and other microbes, murky water, and nitrogen and/or phosphorus. Ala Wai Canal and Boat Harbor (State Waterbody ID: HIW00050) is listed as impaired for aquatic life, swimming and boating, and other due to bacteria and other microbes, metals, murky water, nitrogen and/or phosphorus, pesticides, and other unknown causes. The following three Total Maximum Daily Loads (TMDLs) have been developed to protect and restore water quality within the Ala Wai Canal: Ala Wai Canal Phosphorus (January 1, 2002 – addresses algal growth and nutrient impairments), Ala Wai Canal Suspended Solids (February 21, 1986 – addresses suspended solids impairments), and Ala Wai Canal Toxic Pollutants (February 21, 1986 – addresses unlisted impairments). It's important to note that nearby beaches are also listed as impaired on the 303(d)(List). Kahanamoku Lagoon (State Waterbody ID: HIW00003) is listed as impaired for swimming and boating due to bacteria and other microbes. Kahanamoku Beach (State

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Waterbody ID: HI366432) is listed as impaired for aquatic life due to algae and murky water. Royal-Moana Beach (State Waterbody ID: HI898947) is listed as impaired for aquatic life due to algae, ammonia, murky water, and nitrogen and/or phosphorus. Lastly, Waikiki Beach Center (State Waterbody ID: HI244505) is listed as impaired for aquatic life due to murky water (USEPA, 2022b).

Figure 14: Location of 303(d) Listed Water Quality Limited Segments within the Ala Wai Canal Watershed.

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Table 2: Ala Wai Canal Watershed 303(d) Listed Pollutants for Water Quality Limited Segments.

Area (miles[a] or square miles[a])	Impairment	Total Maximum Daily Load (TMDL) Developed	Probable Sources Contributing to Impairment from 2020
Manoa Stream (11.3 miles)	Chlordane	No	Unknown
Manoa Stream (11.3 miles)	Dieldrin	No	Unknown
Manoa Stream (11.3 miles)	Nitrate/Nitrite	No	Unknown
Manoa Stream (11.3 miles)	Total Nitrogen	No	Unknown
Manoa Stream (11.3 miles)	Total Phosphorus	No	Unknown
Manoa Stream (11.3 miles)	Turbidity	No	Unknown
Makiki (7.4 miles)	Total Nitrogen	No	Unknown
Makiki (7.4 miles)	Total Phosphorus	No	Unknown
Palolo Stream (8.7 miles)	Trash	No	Unknown
Ala Wai Canal and Harbor (Palolo Stream Fork) (0.003 square miles)	Turbidity	No	Unknown
Ala Wai Canal and Harbor (Palolo Stream Fork) (0.003 square miles)	Total Nitrogen	No	Unknown
Ala Wai Canal and Harbor (Palolo Stream Fork) (0.003 square miles)	Fecal Coliform	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Cause Unknown	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Lead	Yes	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Nitrate/Nitrite	No	Unknown

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Ala Wai Canal and Boat Harbor (0 square miles)	Total Nitrogen	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Nutrients	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Total Phosphorus	Yes	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Total Suspended Solids	Yes	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Turbidity	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Pesticides	No	Unknown
Ala Wai Canal and Boat Harbor (0 square miles)	Enterococcus	No	Unknown
Kahanamoku Lagoon (0.25 square miles)	Enterococcus	No	Unknown
Kahanamoku Beach (0.3 miles)	Chlorophyll a	No	Unknown
Kahanamoku Beach (0.3 miles)	Turbidity	No	Unknown
Royal-Moana Beach (0.4 miles)	Ammonia-Nitrogen	No	Unknown
Royal-Moana Beach (0.4 miles)	Chlorophyll a	No	Unknown
Royal-Moana Beach (0.4 miles)	Nitrate/Nitrite	No	Unknown
Royal-Moana Beach (0.4 miles)	Turbidity	No	Unknown
Waikiki Beach Center (0.05 miles)	Turbidity	No	Unknown

[a] refers to the miles or square miles assessed

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Regarding Manoa Stream specifically, the USGS has described a variety of contaminants found within stream sediments (USFWS, 2016). Elevated levels of nutrients (e.g., nitrates, phosphates), organochlorine pesticides (e.g., aldrin, chlordane, dieldrin, DDT, and heptachlor) and semivolatile organic compounds, herbicides, and polyaromatic hydrocarbons (PAHs) have all been detected in stream sediments of the Manoa Watershed (USFWS, 2016). As shown in Figure 14, most of the reaches within Manoa Stream are currently listed on the 303(d) List of Water Quality Limited Segments due to the presence of elevated nutrient levels, organochlorine pesticides, and semivolatile organic compounds. Organochlorine pesticides became distributed within Manoa Stream sediments and adjacent upland habitats due to their wide and heavy use in agriculture and to control termites and mosquitoes from the mid-1940s to the mid-1980s (Brasher and Anthony, 2000). For the United States, most organochlorine pesticide use was discontinued in the 1970s for agriculture and in the 1980s for termite control. These types of organochlorine pesticides were replaced by more acutely toxic but less persistent in the environment organophosphate compounds such as chlorpyrifos and carbamate pesticides. Organochlorine pesticides are transported from agricultural and urban sources primarily through soil erosion and surface runoff, and to a lesser extent, through groundwater and atmospherically. Transported organochlorine pesticides are then able to accumulate in stream bed sediments and in tissues of aquatic invertebrates and fish. These organochlorine pesticides continue to persist in Manoa Stream even though most are no longer used. Although not specific to Manoa Stream, a 1998 study collected sediments from various streams on Oahu and analyzed these samples for the presence of organochlorine pesticides. The study then compared the level of organochlorine pesticides within the sediments of Oahu streams and compared them to levels of the same pesticides found in other states where these types of pesticides were heavily used in the past. The study found that in general, concentrations of most organochlorine compounds in stream bed sediments and fish tissues across Oahu and the contiguous states declined following the ban on their agricultural use in the early 1970s and then appeared to level off during the 1980s. However, even though concentrations of organochlorine compounds in fish and sediment from Oahu streams have decreased since the 1970s, some concentrations remain high compared to other regions of the country. Results from sediment samples and fish tissue collected between 1992 and 1994 across the United States indicated Oahu had levels of DDT in sediment and fish tissue comparable to other places, with concentrations measured at agricultural sites lower than at agricultural areas in other parts of the country. Conversely, levels of dieldrin and chlordane at urban Oahu sites were found to be much higher than those measured at other urban sites in other parts of the country (Brasher and Anthony 2000). Therefore, despite use restrictions, these compounds continue to be detected in sediment samples within Manoa Stream currently.

Overall, water quality in the lower Ala Wai watershed is likely impacted by urban stormwater input. Urban stormwater, including runoff from residential, industrial, and construction sites, is documented to be a source of organic matter, nitrogen, phosphorus, metals, bacteria, and other pollutants (National Research Council, 2008). It is likely that the 303(d) list impairments detailed above are related to the urban nature of the study area. The proposed project will not influence the existing stormwater quality nor the stream and canal water quality. The proposed project does not limit existing stormwater runoff inputs to the streams and canal and will not treat existing conditions. To the extent that temporary water storage at the Ala Wai Golf Course detention basin allows for settlement, there may be a slight reduction in suspended solids discharged with the stormwater, however, any impacts are expected to be minor.

3.3 Vegetation

Vegetation communities in the upper watershed include shrubland, wet forest, and mesic forest

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habitats, which generally occur along a decreasing precipitation gradient, ranging from the highest elevations in the watershed down to the interface with the urban areas. The steeper slopes at and below the Koolau ridgeline to roughly about the 1500-foot contour are relatively undisturbed and mostly dominated by native vegetation; these windswept ridge areas support what has been classified as “Montane Wet Shrubland” (Gagne and Cuddihy, 1990), or specifically on Oahu as “Mixed Fern Shrubland.” Below the shrubland is a wet forest, which grades into a mesic forest at lower elevations just above the urban zone. Introduced species dominate these habitats, particularly trees and shrubs such as albizia (*Falcateria moluccana*), eucalyptus (*Eucalyptus globulus* and *E. robusta*), Chinese banyan (*Ficus microcarpa*), octopus tree (*Schefflera actinophylla*), guava, java plum (*Syzgium cumini*), Christmas berry (*Schinus terebinthefolius*), mango (*Mangifera indica*), and shoebutton ardisia (*Ardisia elliptica*).

Riparian vegetation is present along all of the upper stream reaches, and is generally dominated by non-native species (many of which are considered invasive), including large trees such as Chinese banyan, kukui (*Aleurites moluccana*), mango, octopus tree, hau (*Hibiscus tiliaceus*), fiddlewood (*Citharexylum spinosum*), mountain apply (*Syzygium malaccense*), gunpowder tree (*Trema orientalis*), and gum (*Eucalyptus sp.*), as well as smaller herbaceous species such as exotic ginger (*Hedychium sp.*) and Job’s tears (*Coix lachrymal-jobi*) (Kido, 2006; Kido, 2007; Kido, 2008a, Oceanit, 2004). Within the urbanized portion of the watershed, riparian vegetation is generally limited to unchannelized stream reaches, such as long portions of Manoa stream (for example, near the Dole Street Bridge). A majority of Palolo and Makiki streams are channelized and lack a riparian zone (Oeanit, 2004; Englund and Arakaki, 2004; Kido, 2008a). Mangrove trees (*Rhizophora mangle*) are present in some areas in the lower estuarine reaches of the Manoa-Palolo Drainage Canal and the Ala Wai Canal, although most of these reaches are comprised of concrete and riprap.

As further described in Section 4, the occurrence of federally listed plant species is generally restricted to the higher elevations of the upper watershed. These areas, as well as the slopes of Diamond Head, have been designated as critical habitat for the conservation of these species. However, not all of the listed species are presently known to occupy the designated critical habitat; some have not been recorded from the watershed since early in the last century and some are possibly extinct (Federal Register, 2012). No federally listed plant species (or designated critical habitat) are known to occur in the action area.

A summary of the existing vegetation at each feature location is provided in Table 3.

3.4 Terrestrial Wildlife

A variety of terrestrial wildlife species occur throughout the watershed, including mammals, birds, invertebrates, and insects (Mitchell et al., 2005). Many of these species are non-native, many of which are considered invasive and pose a significant management concern (e.g., feral pig [*Sus scrofa*], mongoose [*Herpestes aruopunctatus*], and various bird species). However, there are several federally listed species that could potentially occur within the watershed.

The forested areas of the watershed provide habitat for native bird populations, including the federally listed Oahu ‘elepaio (*Chasiempis sandwichensis ibidis*); the upper-most portion of the watershed is designated as critical habitat for this species, although it is not believed to be currently occupied. Other federally listed species that are known from the upper watershed include endemic tree snails (*Achatinella sp.*) and the blackline Hawaiian damselfly species (*Megalagrion nigrohamatum nigrolineatum*). In addition, the Hawaiian hoary bat (*Lasiurus*

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cinereus semotus), the only land mammal native to Hawaii, could potentially occur in the watershed.

In the lower portions of the watershed, federally listed waterbird species could potentially occur; these include the Hawaiian coot, Hawaiian stilt, Hawaiian duck (*Ana wyvilliana*), and Hawaiian moorhen. Although unlikely given their known distribution, these species could possibly use estuarine areas within the watershed as resting habitat.

Federally listed species, including those described above, are further discussed in Section 4.

3.5 Aquatic Resources

Native freshwater fish in Hawaii are limited to five gobiid species, including one indigenous (*Awaous guamensis*) and three endemic (*Lentipes concolor*, *Sicyopterus stimpsoni*, and *Stenogobius hawaiiensis*) gobies, and one endemic eleotrid (*Eleotris sandwicensis*) (Kinzie, 1990). The native stream macrofaunca assemblage also includes several shrimp species (*Atyoida bisulcata* and *Macrobrachium grandimanus*), and mollusk species (*Neritina vespertina* and *Neritina granosa*). As part of their lifecycle, the adults of each of these species live and breed in freshwater streams; newly hatched larvae drift to the ocean, remaining there for several months before migrating back to freshwater habitat, cued by freshets (Yamamoto and Tagawa, 2000). None of the native stream species are federally listed under the Endangered Species Act.

All of these native species have been recently documented in the Ala Wai watershed, with the exception of o'opu alamo'o and hihiwai (Parnham et al., 2008; Kido, 2008a). The presence of native species of stream macrofauna can often be used as an indicator of stream ecosystem health (Kido, 2008b). In this context, portions of the watershed display signs of good stream habitat. However, the overall watershed lacks healthy populations of native fishes and aquatic invertebrates, likely because of degradation and fragmentation of usable habitat in the urban zone (Oceanit, 2004). Recent observations of native species are typically limited to only a few individuals in the higher reaches of the upper watershed and in the estuarine environment. With these notable exceptions, the extant aquatic macrofauna is dominated by non-native species (Englund and Arakaki, 2004; Kido, 2008a).

Table 3: Existing Conditions at Flood Risk Management Measure Locations

Measure	General Location	Existing Environmental Conditions
Woodlawn Drive Floodwall	Manoa Stream downstream of Woodlawn Bridge	Land in the surrounding area is developed, but the stream is within a forested riparian zone. Some of the common species encountered during a 2016 survey (AECOS, 2016) include wedelia (*Sphagneticola trilobata*), laua'e (*Phymatosorus grossus*), Java plum (*Syzigium cumini*), Guinea grass (*Megathyrsus maximus*).
Koali Road Floodwall	Manoa Stream along Koali Road and Palolo Stream from confluence with Manoa upstream to pedestrian bridge.	Land in the surrounding area is developed. Manoa Stream right descending bank has a forested riparian zone. Manoa Stream left descending bank has a very narrow forested riparian zone and/or no riparian zone. Palolo Stream on both banks has no forested riparian area. Trees

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		sporadically occur on both sides with most trees found in residential back yards.
Ala Wai Golf Course Detention Basin	Ala Wai Canal	Landscaped vegetation for golf course greens and fairways; site also includes two shallow basins and a ditch that are identified as seasonally flooded wetland features on the National Wetlands Inventory (USFWS, 2023a).
Ala Wai Canal Floodwall	Ala Wai Canal	Vegetation along the Canal is generally limited to landscaping, with a single row of trees lining most of both sides of Canal, including niu (*Cocos nucifera*), with some mile (*Thespesia populnea*) and monkeypod.
Makiki Stream Pump Station (Potential Mitigation Measure for Induced Flooding)	Makiki Stream from Fern Street downstream to Ala Wai Canal confluence	Land in the surrounding area is developed, and the stream has no forested riparian area. Trees sporadically occur on both sides of the concrete lined channel.
Nonstructural Measures such as dry/wet floodproofing, elevation, and acquisition (Potential Mitigation Measure for Induced Flooding)	Various Locations (Undefined currently)	The area for these potential mitigation measures is generally known but precise locations are unknown currently. However, the general vegetation would be landscaped and minimal since nonstructural measures would occur on existing structures.

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4. Potentially Affected Listed Species and Critical Habitat

In order to identify whether any of the listed species potentially occurring in the watershed could be affected by the project, the species habitat requirements and known distribution was assessed relative to the action area. In addition, the location of designated critical habitat was mapped to identify any potential overlap with the action area. Following is a summary of the potentially affected species within the watershed, and the effects analysis for each. Due to the action area being generally comprised of either low density vegetated non-native riparian/forest habitat (such as that associated with the floodwalls along the middle watershed), turf grass (such as that associated with the detention basins), or developed areas (such as that associated with the floodwalls along the lower watershed), federally endangered or threatened plant species that have the potential to occur in the area are not expected to occur due to the lack of suitable habitat. Because of the lack of suitable habitat present for these species within the action area, the proposed project is expected to have no effect on these species, or their designated critical habitat and they are not discussed further.

4.1 Band-rumped Storm Petrel (*Oceanodroma castro*)

The Hawaii DPS of band-rumped storm-petrel is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status

Historically, band-rumped storm-petrels were abundant and occurred throughout the main Hawaiian Islands (USFWS, 2021h). There is thought to be one single population that breeds within the Hawaiian Islands across several colonies. Currently, band-rumped storm-petrels are confirmed or likely breeding on Lehua Islet, Kauai, Lanai, and the island of Hawaii. The species may potentially breed on Maui, but no nesting sites have been confirmed. Population estimates for Hawaii DPS of band-rumped storm-petrel are unknown, but a study estimated between 171 and 221 nesting pairs on Kauai in 2002 (USFWS, 2021h).

Biology and Ecology of Species – Reproduction and Forage Requirements

Band-rumped storm-petrels are ground nesting seabirds, which predominantly nest in cliffs or rocky lava fields (USFWS, 2021h). Eggs are laid in May through June and chicks fledge around October. Band-rumped storm-petrels typically do not begin to breed until between ages three to seven years old. The species can live up to 20 years old. Band-rumped storm-petrels feed while sitting on the water or by dipping prey while flapping just above the surface of the ocean. It is suspected that their diet consists of small fish, squid, and perhaps some crustaceans.

Factors Affecting Species Activity and Survival

Threats to band-rumped storm-petrels include introduced predators such as pigs, rats, feral cats, and mongoose, goats, and sheep degrade nesting habitat (USFWS, 2021h). Artificial lighting may cause fall-out, causing collisions and injuries to individuals that make them vulnerable to predators. Also vulnerable to collisions with towers and utility lines while in flight (USFWS, 2021h).

Potential to Occur in the Action Area

Nesting habitat for the band-rumped storm-petrel is not present within the proposed action footprint, nor is the species known to breed on Oahu. The species could be present foraging or flying over the island as fallout of band-rumped storm-petrels has been recorded on Oahu (USFWS, 2021h).

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Potential Effects of the Proposed Action

No direct effects due to implementation of the proposed action are expected to band-rumped storm-petrel since the species is not known to nest on Oahu. Therefore, there would be no direct impacts to band-rumped storm-petrel nesting habitat. During construction of the project, artificial lighting could be used during pre-dawn and pre-dusk hours within staging areas. Band-rumped storm-petrels, like several other seabirds in the order Procellariiformes, show a strong attraction to light sources, including artificial lights. Artificial lights can act as an attractant causing disorientation, confusion, and eventual grounding. The effects of artificial lights lead to a condition known as fallout, where fledgling young and adults are grounded and unable to regain flight, making them vulnerable to depredation or dehydration. Though uncommon, fallout of band-rumped storm-petrels on Oahu has been recorded (USFWS, 2021h). Avoidance and minimization measures regarding artificial lighting would be implemented to reduce potential indirect impacts to band-rumped storm-petrels that may be flying over the action area.

Effects Determination

Given the above, coupled with the nature of activities proposed in these areas, impacts to band-rumped storm-petrels are expected to be insignificant, such that the proposed action **may affect, but is not likely to adversely affect** the species.

4.2 Hawaii Akepa (*Loxops coccineus*)

Hawaii akepa is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status

The historical range of the Hawaii akepa once included much of the island of Hawaii (USFWS, 2010b). At the most recent 5-year review of the species, Hawaii akepa occurred as five disjunct populations in the north and central windward Hawaii, Kau, Kona, and Hualalai regions on Hawaii (USFWS, 2020b). In 1977, the total population of Hawaii akepa was estimated to be 13,892 birds. In 2016, the total population was estimated to be 16,248 birds. Hawaii akepa is known for distributional anomalies across apparently suitable habitat particularly between open canopy montane woodland and old-growth closed-canopy *Metrosideros polymorpha* (ohia) forest, likely due to differences in nest-site and food availability. Overall, recent surveys and population estimates suggest that the Hawaii akepa population is stable and possibly increasing especially in Hakalau Forest National Wildlife Refuge (USFWS, 2020).

Biology and Ecology of Species – Reproduction and Forage Requirements

The Hawaii akepa is a small, sexually dichromatic Hawaiian honeycreeper endemic to Hawaii island (USFWS, 2010b). Hawaii akepas form monogamous pairs during July and August and bonds last several years. The breeding period of akepas begins in March and ends by September. Females typically lay one to two eggs which are incubated for 14 to 16 days. Females brood the hatchlings for up to 8 days. Juveniles develop plumage by day 12 and young akepas leave the nest around 16 to 20 days after hatching. They remain dependent on their parents for up to 10 weeks post hatching (USFWS, 2010b).

Hawaii akepa are birds of old growth ohia or ohia/koa forest (USFWS, 2010b). Their density depends in part on the density of large trees because only large trees provide the cavities required for nesting. The average size of trees used for nesting is three feet in diameter at breast height. Large ohia trees provide cavities for nest-sites and the preferred foraging substrate for Hawaii akepa. Large koa trees provide mainly cavities for nest sites but not

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preferred foraging substrate. Hawaii akepa are not typically found below 4,300 feet elevation (USFWS, 2010b).

Hawaii akepa feed on insects and spiders, though their main diet consists of caterpillars. They have been observed feeding on nectar to a lesser extent (USFWS, 2010b).

Factors Affecting Species Activity and Survival
Threats to the survival of this species primarily include modification and loss of habitat and avian disease (USFWS, 2010b). Predation by introduced mammals may also play a role in this species survival. The species is especially sensitive to the loss of old growth forest due to their dependence on large trees with cavities for nesting (USFWS, 2010b).

Potential to Occur in the Action Area
The action area is generally comprised of either low density vegetated non-native riparian/forest habitat (such as that associated with the floodwalls along the middle watershed), turf grass (such as that associated with the detention basins) or developed areas (such as that associated with the floodwalls along the lower watershed). No portion of the action area supports old growth ohia or ohia/koa forest. As such, suitable habitat is not present, and this species is expected to not have the potential to occur within the action area.

Potential Effects of the Proposed Action
The proposed action is not expected to directly or indirectly affect Hawaii akepa.

Effects Determination
The proposed action is expected to have **no effect** on Hawaii Akepa.

4.3 Hawaiian Duck (*Anas wyvilliana*)

Hawaiian duck is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status
The Hawaiian duck historically occurred throughout the main Hawaiian Islands except the island of Lanai and Kahoolawe (USFWS, 2021i). Today, these birds are only found on Kauai and Niihau and were reintroduced on Oahu, Hawaii, and Maui. During the most recent 5-year review of the species, genomic research indicated that duck populations on the islands of Oahu, Maui, Molokai, and Hawaii are Hawaiian duck-mallard hybrids due to genetic intermixing with feral mallards. However, ducks sampled on Kauai appear to be pure or nearly pure. There are believed to be fewer than 2,000 pure Hawaiian duck remaining statewide, with most of these occurring on Kauai (USFWS, 2021i).

Biology and Ecology of Species – Reproduction and Forage Requirements
Hawaiian duck are found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, sewage treatment ponds, montane streams, and marshlands (USFWS, 2011d). This species is visible from sea level up to 10,827 feet (3,300 meters) of elevation (USFWS, 2021i). The Hawaiian duck was found to occupy wetlands greater than 1,969 feet (600 meters) more likely from a house in areas of low building densities and are more likely to occupy medium to large wetlands (greater than 10,764 square feet [1,000 square meters]) in areas of high wetland densities (USFWS, 2009).

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Hawaiian ducks are serially monogamous (USFWS, 2021i). Some pairs nest year-round, but the main breeding season takes place from December to May. The female lays 2 to 10 eggs and incubation lasts about 4 weeks. Ducklings are precocial and can take to the water soon after hatching but cannot fly until about 9 weeks of age. They become reproductively mature enough to reproduce after a year of age (USFWS, 2021i).

Hawaiian ducks are omnivorous birds (USFWS, 2021i). Their diet consists of freshwater vegetation, mollusks, insects, and other aquatic invertebrates (USFWS, 2021i).

Factors Affecting Species Activity and Survival

Major threats affecting the survival of this species include hybridization with feral mallards (*Anas platyrhynchos*); loss and degradation of wetland habitat including alteration of hydrology, and invasion of habitat by nonnative plants; predation and avian disease; and environmental contaminants (USFWS, 2009).

Potential to Occur in the Action Area

The only suitable habitat that could support this species within the action area are very small pockets of wetland habitat; these are limited to isolated features within the Ala Wai golf course, and possibly Hausten Ditch and the upper reaches of the Ala Wai Canal. However, these areas are in high building densities and are small, and therefore are expected to provide very minimal habitat value in comparison to other nearby wetland areas (e.g., Pearl Harbor National Wildlife Refuge). Overall, these areas are not expected to provide suitable nesting habitat but could be used for resting habitat by Hawaiian ducks. As such, it is possible (though unlikely), that Hawaiian ducks could occur in the action area.

Potential Effects of the Proposed Action

As described above, the extent and quality of potentially suitable habitat within the action area is very limited and is likely to only be used as resting habitat (if at all). In the unlikely event that Hawaiian ducks are present within the action area, it is expected that they would readily disperse to nearby areas with higher quality habitat (e.g., Pearl Harbor National Wildlife Refuge) in response to disturbance; as such, the potential effects of the proposed action are expected to be limited to temporary construction-related disturbance (e.g., noise). Injury or mortality of Hawaiian ducks (or their nests) is not expected.

Areas of potentially suitable wetland habitat may be temporarily unavailable during construction (due to increased levels of disturbance), but sufficient habitat is expected to be available in nearby areas (e.g., Pearl Harbor National Wildlife Refuge). Following construction, the extent and quality of habitat is expected to be the same as the existing condition. During large-scale flood events, the detention basins would be inundated for short periods of time (i.e., about 1 day for Manoa Valley and Makiki Park District detention basins and about 2 days for the Ala Wai Golf Course detention basin), which could temporarily increase the extent of potential habitat. Although increased habitat may be viewed as a benefit, in heavily urbanized areas (such as the Ala Wai watershed), it can also create an attractive nuisance for waterbird species. Specifically, areas of increased habitat may attract waterbirds, which are then vulnerable to predator species that are prevalent in an urban environment (e.g., feral cats, mongoose). However, given the low probability of species occurrence and the infrequent recurrence and short-term duration of flooding, these conditions are not expected to significantly affect Hawaiian ducks.

Effects Determination

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Based on the minimal extent and quality of suitable habitat, there is a low probability of species occurrence in the action area. Given the above, coupled with the nature of activities proposed in these areas, impacts to the Hawaiian duck are expected to be insignificant, such that the proposed action **may affect, but is not likely to adversely affect** the species.

4.4 Hawaiian Common Gallinule (*Gallinula galeata sandvicensis*)

Hawaiian common gallinule is a listed federally endangered species. Critical habitat has not been designated for this species.

Current Species Status

Hawaiian gallinule (Alae ula) occurs in wetland habitats below 410 feet elevation on the islands of Kauai and Oahu, although there have been reports from Keanae Peninsula on Maui and from the island of Hawaii (USFWS, 2010c). On Oahu, the species is widely distributed with most birds found between Haleiwa and Waimanalo; small numbers occur at Pearl Harbor and the leeward coast at Lualualei Valley. Island-wide population, based on semi-annual waterbird counts conducted by DOFAW, suggests that the population is increasing, but count numbers are variable, about 300 individuals. Currently, the Hawaiian gallinule occurs only on the islands of Kauai and Oahu having been extirpated from Molokai sometime after the 1940s, from Maui after the late 1940s, and from the island of Hawaii in 1887 (USFWS, 2021j). As of the most recent 5-year review for the species, it was estimated that the minimum population is approximately 927 individuals (USFWS, 2021j).

Biology and Ecology of Species – Reproduction and Forage Requirements

Hawaiian gallinules are found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, and sewage treatment ponds (USFWS, 2011d).

Nesting occurs year-round, but most activity occurs between March and August (USFWS, 2010c). Platform nests are constructed in dense vegetation over water. Five to six eggs are laid and hatch after 22 days. Chicks can swim shortly after hatching and are dependent on their parents for several weeks (USFWS, 2010c).

Hawaiian gallinules are thought to be opportunistic feeders, so their diet may vary with the habitat (USFWS, 2010c). They generally forage in dense emergent vegetation and along the edges of habitat (USFWS, 2010c).

Factors Affecting Species Activity and Survival

Threats to survival for this species include loss and degradation of wetland habitat; predation by introduced animals; modification of hydrology; alteration of habitat structure and vegetation composition by invasive nonnative plants; loss of riparian vegetation; and water quality degradation due to grazing, disease, and possibly environmental contaminants (USFWS, 2011d).

Potential to Occur in the Action Area

The only suitable habitat that could support this species within the action area are very small pockets of wetland habitat; these are limited to isolated features within the Ala Wai golf course, and possibly Hausten Ditch and the upper reaches of the Ala Wai Canal. However, these areas lack some of the key habitat features, and therefore are expected to provide very minimal habitat value in comparison to other nearby areas (e.g., Pearl Harbor National Wildlife Refuge); these areas are not expected to provide suitable nesting habitat but could be used for resting

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habitat. As such, it is possible (though unlikely), that Hawaiian gallinule could occur in the action area.

Potential Effects of the Proposed Action
As described above, the extent and quality of potentially suitable habitat within the action area is very limited and is likely to only be used as resting habitat (if at all). In the unlikely event that Hawaiian gallinule are present within the action area, it is expected that they would readily disperse to nearby areas with higher quality habitat (e.g., Pearl Harbor National Wildlife Refuge) in response to disturbance; as such, the potential effects of the proposed action are expected to be limited to temporary construction-related disturbance (e.g., noise). Injury or mortality of Hawaiian gallinule (or their nests) is not expected.

Areas of potentially suitable wetland habitat may be temporarily unavailable during construction (due to increased levels of disturbance), but sufficient habitat is expected to be available in nearby areas (e.g., Pearl Harbor National Wildlife Refuge). Following construction, the extent and quality of habitat is expected to be the same as the existing condition. During large-scale flood events, the detention basins would be inundated for short periods of time (i.e., about 1 day for Manoa Valley and Makiki Park District detention basins and about 2 days for the Ala Wai Golf Course detention basin), which could temporarily increase the extent of potential habitat. Although increased habitat may be viewed as a benefit, in heavily urbanized areas (such as the Ala Wai watershed), it can also create an attractive nuisance for waterbird species. Specifically, areas of increased habitat may attract waterbirds, which are then vulnerable to predator species that are prevalent in an urban environment (e.g., feral cats, mongoose). However, given the low probability of species occurrence and the infrequent recurrence and short-term duration of flooding, these conditions are not expected to significantly affect Hawaiian gallinule.

Effects Determination
Based on the minimal extent and quality of suitable habitat, there is a low probability of species occurrence in the action area. Given the above, coupled with the nature of activities proposed in these areas, impacts to the Hawaiian gallinule are expected to be insignificant, such that the proposed action **may affect, but is not likely to adversely affect** the species.

4.5 Hawaiian Coot (Fulica americana alai)

Hawaiian coot is a listed federally endangered species. Critical habitat has not been designated for this species.

Current Species Status
Hawaiian coot (ala keokeo) occurs statewide, although Kauai, Oahu, and Maui collectively support 80 percent of birds detected during the annual waterbird surveys (USFWS, 2021k). On Oahu, coots are observed at Lake Wilson and Nuuanu Reservoir, Kahuku Point and along the windward shore. The most recent minimum population estimate of Hawaiian coot is 1,815 individuals (USFWS, 2021k).

Biology and Ecology of Species – Reproduction and Forage Requirements
Hawaiian coot are found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, and sewage treatment ponds (USFWS, 2011d). Hawaiian coot are omnivores, feeding on seeds and leaves, snails, crustaceans, insects, tadpoles, and small fish. The species will travel long distances, including between islands, when local food sources are depleted. Nesting habitat includes freshwater and brackish ponds, irrigation ditches, and taro

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fields. Floating nests are constructed of aquatic vegetation and found in open water or anchored to emergent vegetation. Open water nests are usually composed of mats of water hyssop and Hilo grass. Nests in emergent vegetation are typically platforms constructed from buoyant stems of species such as bulrush. Nesting occurs year-round, but most activity occurs between March and September. Clutch size ranges from three to ten eggs, and chicks may hatch after a 25-day incubation period (USFWS, 2011d).

Factors Affecting Species Activity and Survival

Threats to survival for this species include loss and degradation of wetland habitat; predation by introduced animals; modification of hydrology; alteration of habitat structure and vegetation composition by invasive nonnative plants; loss of riparian vegetation; and water quality degradation due to grazing, disease, and possibly environmental contaminants (USFWS, 2011d).

Potential to Occur in the Action Area

The only suitable habitat that could support this species within the action area are very small pockets of wetland habitat; these are limited to isolated features within the Ala Wai golf course and possibly along the upper edges of the Ala Wai Canal. However, these areas are very small and provide very minimal habitat value in comparison to other nearby areas (e.g., Pearl Harbor National Wildlife Refuge); they are not expected to provide suitable nesting habitat but could be used for resting habitat. As such, it is possible (though unlikely), that Hawaiian coots could occur in the action area.

Potential Effects of the Proposed Action

As described above, the extent and quality of potentially suitable habitat within the action area is very limited and is likely to only be used as resting habitat (if at all). In the unlikely event that coots are present within the action area, it is expected that they would readily disperse to nearby areas with higher quality habitat (e.g., Pearl Harbor National Wildlife Refuge) in response to disturbance; as such, the potential effects of the proposed action are expected to be limited to temporary construction-related disturbance (e.g., noise). Injury or mortality of coots (or their nests) is not expected.

Area of potentially suitable wetland habitat may be temporarily unavailable during construction (due to increased levels of disturbance), but sufficient habitat is expected to be available in nearby areas (e.g., Pearl Harbor National Wildlife Refuge). Following construction, the extent and quality of habitat is expected to be the same as the existing condition. During large-scale flood events, the detention basins would be inundated for short periods of time (i.e., about 1 day for Manoa Valley and Makiki Park District detention basins and about 2 days for the Ala Wai Golf Course detention basin), which could temporarily increase the extent of potential habitat. Although increased habitat may be viewed as a benefit, in heavily urbanized areas (such as the Ala Wai watershed), it can also create an attractive nuisance for waterbird species. Specifically, areas of increased habitat may attract waterbirds, which are then vulnerable to predator species that are prevalent in an urban environment (e.g., feral cats, mongoose, etc.). However, given the low probability of species occurrence and the infrequent recurrence and short-term duration of the flooding, these conditions are not expected to significantly affect coots.

Effects Determination

Based on the minimal extent and quality of suitable habitat, there is low probability of species occurrence in the action area. Given the above, coupled with the nature of activities proposed in

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the action area, impacts to the Hawaiian coot are expected to be insignificant, such that the proposed action **may affect, but is not likely to adversely affect** the species.

4.6 Hawaiian Petrel (Pterodroma sandwichensis)

Hawaiian petrel is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status

Historically, the Hawaiian petrel was believed to have had well established breeding populations on all the major Hawaiian Islands (USFWS, 1983). Currently, the Hawaiian petrel (Uau) breeds on several main Hawaiian Islands, including Maui, Hawaii Island, and Kauai and possibly on Molokai, Lanai, the sea stacks off Kahoolawe and Lehua Island (USFWS, 2011e). However, approximately 85 percent of the known population of Hawaiian petrel nests on Maui (USFWS, 2011e). Since the last 5-year review in 2017, Pacific Rim Conservation continues to conduct surveys and burrow searching in the northern Koolau Mountains and near the summit of Mount Kaala on Oahu (USFWS, 2022). No burrows have been located yet, but Hawaiian petrel calls continue to be detected on acoustic monitors at both sites (USFWS, 2022). An analysis of at-sea surveys conducted between 1998 and 2011 estimated the Hawaiian petrel population to be 52,186 individuals including juveniles and subadults (USFWS, 2022).

Biology and Ecology of Species – Reproduction and Forage Requirements

Hawaiian petrels currently are known to nest only at elevations above 7,200 feet (USFWS, 1983). Vegetation in nesting areas is often sparse and consists predominantly of grass and bracken fern. Adults form nests by excavating burrows or crevices that are generally three to six feet deep and reaching a length up to 15 feet or more. Nesting burrows are commonly located among large rock outcrops, talus slopes, or along edges of lava flows with suitable underlying soil for the excavation of tunnels. Hawaiian petrels form long-term pair bonds and return to the same nest site each year during breeding season. Eggs are laid in May through June and chicks generally fledge by December. Both parents incubate, brood, and feed a single chick. Hawaiian petrels begin breeding at about age 5 or 6 (USFWS, 1983).

Hawaiian petrels may feed hundreds of miles (thousands of kilometers) from their colonies, preying upon marine organisms, such as squid, goatfish, lantern fish and in some cases, crustaceans. Petrels feed by capturing prey with their beaks while sitting on the water or flapping just above the surface.

Factors Affecting Species Activity and Survival

Threats to the survival of Hawaiian petrels include historic hunting and introduced predators, such as dogs, pigs, rats, feral cats, and mongoose (USFWS, 1983).

Potential to Occur in the Action Area

Nesting habitat for the Hawaiian petrel is not present within the proposed action footprint. Therefore, no direct impacts to Hawaiian petrel or their nesting/foraging habitat is expected to occur. The species could be present foraging or flying over the action area.

Potential Effects of the Proposed Action

No direct effects due to implementation of the proposed action are expected to Hawaiian petrel since the action area does not provide suitable nesting habitat for this species. During construction of the project, artificial lighting could be used during pre-dawn and pre-dusk hours within staging areas. Hawaiian petrel show a strong attraction to light sources, including artificial

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lights. Artificial lights can act as an attractant causing disorientation, confusion, and eventual grounding. Nesting adults and fledglings may traverse the action area while flying between their nesting grounds and the ocean. Although the amount of time spent by the birds in the action area would be limited, there is the potential for construction lighting to attract fledglings and cause fallout. Avoidance and minimization measures regarding artificial lighting would be implemented to reduce potential indirect impacts to Hawaiian petrel that may be flying over the action area.

Effects Determination
Given the above, coupled with the nature of activities proposed in these areas, impacts to Hawaiian petrel are expected to be insignificant, such that the proposed action **may affect, but is not likely to adversely affect** the species.

4.7 Hawaiian Stilt (Himantopus mexicanus knudseni)

Hawaiian stilt is a listed federally endangered species. Critical habitat has not been designated for this species.

Current Species Status
Hawaiian stilts were historically known from all of the major islands except Lanai and Kahoolawe (USFWS, 2011d). Currently, Hawaiian stilts are found on all the main Hawaiian Islands except Kahoolawe. Regarding Oahu, large concentrations of Hawaiian stilts can be found at the James Campbell National Wildlife Refuge, the Kahuku aquiculture ponds, the Honouliuli and Waiawa units of the Pearl Harbor National Wildlife Refuge, and on Nuupia Ponds in Kaneohe. Populations also exist at the Chevron Refinery, the fishponds at Kualoa Beach Park, at Salt Lake District Park, and at scattered locations along the northern and eastern coasts. From 2006 to 2011, Oahu accounted for 35 to 50 percent of the State's Hawaiian stilt population (USFWS, 2011d). The most recent winter and summer surveys for Hawaiian stilt show a fluctuating population, which generally increased from 1985 to 2004 and since then has been roughly stable at 1,500 to 2,000 individuals (USFWS, 2020c).

Biology and Ecology of Species – Reproduction and Forage Requirements
Hawaiian stilts are found in a variety of wetland habitats including freshwater marshes and ponds, coastal estuaries and ponds, artificial reservoirs, kalo or taro (*Colocasia esculenta*) lo'i or patches, irrigation ditches, and sewage treatment ponds (USFWS, 2011d). Foraging habitat consists of ephemeral fresh, brackish, or saltwater habitats. Hawaiian stilts prefer sites with a water depth of less than nine inches, limited and low growing vegetation, or exposed tidal flats and opportunistically prey upon polychaete worms, small crabs, insects, and small fish. Hawaiian stilts frequently move among wetland habitats in search of food (USFWS, 2011d).

Breeding habitat differs from foraging habitat and individuals move between the two habitats daily (USFWS, 2011d). Nesting occurs on freshly exposed mudflats and some low growing vegetation, also will nest on islands in fresh and brackish ponds or artificial floating nest structures. Nesting occurs between March and August and peaks in May and June. Three to four eggs are typically laid, and chicks hatch approximately 24 days later. Both parents incubate eggs and brood young, and fledglings remain with their parents for several months (USFWS, 2011d).

Factors Affecting Species Activity and Survival
Threats to survival for this species include loss and degradation of wetland habitat; predation by introduced animals; modification of hydrology; alteration of habitat structure and vegetation

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composition by invasive nonnative plants; loss of riparian vegetation; and water quality degradation due to grazing, disease, and possibly environmental contaminants (USFWS, 2011d).

Potential to Occur in the Action Area
A small amount of potentially suitable habitat occurs within the action area; these areas include the aquatic features within the Ala Wai golf course, Hausten Ditch, and possibly the upper reaches of the Ala Wai Canal. However, these areas are limited in size and provide very minimal habitat value in comparison to other nearby areas (e.g., Pearly Harbor National Wildlife Refuge); they are not expected to provide suitable nesting habitat but could be used for resting habitat. As such, it is possible (though relatively unlikely), that Hawaiian stilts could occur in the action area.

Potential Effects of the Proposed Action
As described above, the extent and quality of potentially suitable habitat within the action area is very limited and is likely to only be used as resting habitat (if at all). In the unlikely event that stilts are present within the action area, it is expected that they would readily disperse to nearby areas with higher quality habitat (e.g., Pearl Harbor National Wildlife Refuge) in response to disturbance; as such, the potential effects of the proposed action are expected to be limited to temporary construction-related disturbance (e.g., noise). Injury or mortality of stilts (or their nests) is not expected.

Areas of potentially suitable wetland habitat may be temporarily unavailable during construction (due to increased levels of disturbance), but sufficient habitat is expected to be available in nearby areas (e.g., Pearl Harbor National Wildlife Refuge). Following construction, the extent and quality of habitat is expected to be the same as the existing condition. During large-scale flood events, the detention basins would be inundated for short periods of time (i.e., about 1 day for Manoa Valley and Makiki Park District detention basins and about 2 days for the Ala Wai Golf Course detention basin), which could temporarily increase the extent of potential habitat. Although increased habitat may be viewed as a benefit, in heavily urbanized areas (such as the Ala Wai watershed), it can also create an attractive nuisance for waterbird species. Specifically, areas of increased habitat may attract a larger number of waterbirds, which are then vulnerable to predator species that are prevalent in an urban environment (e.g., feral cats, mongoose). However, given the low probability of species occurrent and the infrequent recurrence and short-term duration of flooding, these conditions are not expected to significant affect stilts.

Effects Determination
Based on the minimal extent and quality of suitable habitat, there is a low probability that Hawaiian stilts would occur in the action area. Given this fact, coupled with the nature of the proposed activities, impacts to the Hawaiian stilt are expected to be insignificant, such that the proposed action **may affect, but is not likely to adversely affect** the species.

4.8 Newell's Townsend's Shearwater (*Puffinis auricularis newelli*)

The Newell's shearwater is a listed federally threatened species.

Current Species Status
Newell's shearwater's historical range is thought to include Hawaii, Maui, Molokai, Oahu, and Kauai. Young et al., (2019) have identified sites on the leeward slopes of Mount Kaala in the Waianae Mountains and at Poamoho, Koolau Mountains, that may serve as breeding sites on Oahu. Since the publication of the 5-year review in 2011, results from analysis of at-sea surveys

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conducted between 1998 and 2011 estimated the Newell's shearwater population to be about 27,011 (95 percent confidence interval [CI] 18,254 – 37,125) individuals, including juveniles and subadults. The previous at-sea population estimate from surveys conducted between 1980 and 1994 estimated 84,000 (95 percent confidence interval: 57,000 – 115,000) birds, including subadults and juveniles.

Biology and Ecology of Species – Reproduction and Forage Requirements

Newell's shearwaters are colonial and nesting habitat is typically within steep mountainous terrain between 500 and 2,300 feet in elevation (USFWS, 1983). The species appears to have an affinity for dense fern habitat with moderate to light tree cover. To take flight, the species requires an open downhill flight path through which it can become airborne; therefore, the species favors ridge crests or embankments for its nesting burrows. Females typically lay a single egg in cavities and burrows, often located at the base of a tree. Breeding is highly synchronous, and eggs are laid in early June, and most young fledge by November. Both parents incubate the egg, and brood and feed the nestling. Parents forage tens of miles (hundreds of kilometers) offshore and return to the colony at night to feed their chick. No post-fledging care is provided by the parents. Newell's shearwater first breed typically between six and seven years old (USFWS, 1983).

Newell's shearwater often forages in large, mixed species flocks associated with schools of large, predatory fishes, which drive prey to the surface (USFWS, 1983). The species feeds mainly by pursuit-plunging; individuals dive into water and swim using their partly folded wings for propulsion. Diet may consist of fish and squid (USFWS, 1983).

Factors Affecting Species Activity and Survival

Threats to Newell's shearwater include historical hunting, introduced predators such as dogs, pigs, rats, barn owls, feral cats, and mongoose. Habitat loss and degradation has resulted in the loss of 75 percent of forest habitat over the last 150 years, with much of the remaining forest degraded by invasive plants. Artificial lighting disorients fledglings, causing "fallout" and collision with vertical structures. When grounded, fledglings become susceptible to predators. Overfishing and catastrophes, such as hurricanes, may result in injury and mortality to individuals.

Potential to Occur in the Action Area

Nesting habitat for Newell's shearwater is not present within the proposed action area. Therefore, no direct impacts to Newell's shearwater or their nesting/foraging habitat is expected to occur. The species could be present foraging or flying over the action area.

Potential Effects of the Proposed Action

No direct effects due to implementation of the proposed action are expected to Newell's shearwater since the action area does not provide suitable nesting habitat for this species. During construction of the project, artificial lighting could be used during pre-dawn and pre-dusk hours within staging areas. Artificial lighting has resulted in substantial problems for fledgling Newell's shearwaters during their first flight to the ocean from their nesting grounds. Fledgling shearwaters have a normal attraction towards light and when attracted to man-made lighting, fledglings may become confused and suffer temporary night blindness (USFWS, 1983). This often causes the fledglings to fly into obstructions such as utility wires, poles, trees, and buildings where they then fall to the ground. Most fallen shearwaters are only stunned, but they may be hit by automobiles, killed by dogs or cats, or simply be unable to get to a suitable space to get airborne again. Many perish of broken wings, concussion, paralysis, and other injuries

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received from their fall. A small number of adults may also experience fallout due to artificial lighting (USFWS, 1983). Although the amount of time spent by the birds in the action area would be limited, there is the potential for construction lighting to attract fledglings and cause fallout. Avoidance and minimization measures regarding artificial lighting would be implemented to reduce potential indirect impacts to Newell's shearwater that may be flying over the action area.

Effects Determination
Given the above, coupled with the nature of activities proposed in these areas, impacts to Newell's shearwater are expected to be insignificant, such that the proposed action **may affect, but is not likely to adversely affect** the species.

4.9 Short-tailed Albatross (Phobastria (=Diomedea) albatrus)

The short-tailed albatross is a listed federally endangered species. No critical habitat has been designated for this species.

Current Species Status
Historically, the short-tailed albatross is believed to have once nested on Midway Atoll at the northwestern end of the Hawaiian Archipelago (USFWS, 2008). Since 1938, approximately 50 observations of about 17 different short-tailed albatrosses have been noted in the vicinity of the Northwestern Hawaiian Islands, typically between November and April (USFWS, 2008). During the most recent 5-year review it was noted that in the Northwestern Hawaiian Islands, a short-tailed albatross pair was present on Eastern Island at Midway Atoll from 2008 to 2015 and successfully fledged chicks in 2011, 2012, and 2014 (USFWS, 2020d). During 2016, a new pair formed on Sand Island, Midway Atoll. During the 2018-2019 breeding season, the same pair returned and successfully raised their own chick to fledge. A suspected female-female pair has been attempting to breed at Kure Atoll, Hawaii, since 2010 (USFWS, 2020d). The most recent 5-year review of the species estimated the population at 7,365 birds.

Biology and Ecology of Species – Reproduction and Forage Requirements
Breeding habitat for the species is isolated, windswept, offshore islands, with restricted human access (USFWS, 2008). Nest sites may be flat or slopes, with sparse or full vegetation. The short-tailed albatross is a colonial, annual breeding species; each breeding cycle lasts about eight months. Nests consist of a divot on the ground lined with sand and vegetation. Birds may breed at 5 years of age, but first year of breeding is more commonly six. A single egg is laid in late October to late November with hatching occurring from late December through January. Chicks begin to fledge in late May into June (USFWS, 2008).

Non-breeding habitat is the North Pacific marine environment which is most heavily used by short-tailed albatross (USFWS, 2008). The area is characterized by regions of upwelling and high productivity along the northern edge of the Gulf of Alaska, along the Aleutian Chain, and along the Bering Sea shelfbreak from the Alaska Peninsula out towards St. Matthew Island (USFWS, 2008).

The diet of short-tailed albatross during breeding is not well-known, but observations of food brought to nestlings and of regurgitated material indicate that the diet includes squid, shrimp, fish, flying fish eggs, and other crustaceans (USFWS, 2008).

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Factors Affecting Species Activity and Survival
Major threats to short-tailed albatross include habitat alteration and loss due to catastrophic events; climate change; commercial fishing; contaminants; disease and parasites; predation; natural competition; invasive species; air strikes; and other human activities (USFWS, 2008).

Potential to Occur in the Action Area
The action area is generally comprised of either low density vegetated non-native riparian/forest habitat (such as that associated with the floodwalls along the middle watershed), turf grass (such as that associated with the detention basins) or developed areas (such as that associated with the floodwalls along the lower watershed). No portion of the action area supports suitable breeding habitat for short-tailed albatross. As such, suitable habitat is not present, and this species is expected to not have the potential to occur within the action area.

Potential Effects of the Proposed Action
The proposed action is not expected to affect short-tailed albatross directly or indirectly.

Effects Determination
The proposed action is expected to have **no effect** on short-tailed albatross, or critical habitat designated for this species.

4.10 Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)

The Hawaiian hoary bat is a listed federally endangered species.

Current Species Status
The hoary bat is the most widely distributed bat in North America. In Hawaii, the Hawaiian hoary bat (opeapea) has been reported from all the main Hawaiian Islands, except for Niihau, although the specimen records only exist for Kauai, Oahu, Maui, Molokai, and Hawaii Island. On Oahu, the species is thought to be widely distributed however, the highest concentrations of acoustic detections for Hawaiian hoary bat are from northern Koolau and Waianae Mountain ranges (USFWS, 2021l). Additional acoustic detections for the species have been documented on lands in Waikiki, Ford Island, the north shore of Oahu, and the National Wildlife Refuge complex that includes the James Campbell NWR, the Kalaeloa Unit of the Pearl Harbor NWR, and the Oahu Forest NWR (USFWS, 2021l).

Biology and Ecology of Species – Reproduction and Forage Requirements
Hawaiian hoary bats roost alone or with dependent young in native and nonnative trees, typically more than 15 feet tall (USFWS, 2021l). Hoary bats begin foraging before or after sunset depending on the time of year, feed on a variety of native and non-native night-flying insects, including moths, beetles, crickets, mosquitoes, and termites; and like other insectivorous bats, prey is located using echolocation (USFWS, 1998). Water courses and edges (e.g., coastlines and forest/pasture boundaries) appear to be important foraging areas; the species also is attracted to insects that congregate near lights. Breeding has only been documented on the islands of Hawaii and Kauai. Mating most likely occurs between September and December, and females give birth to twins during May or June. Mother bats likely stay with their pups until they are six to seven weeks old (USFWS, 1998).

Factors Affecting Species Activity and Survival
Threats to hoary bats include habitat loss, pesticides, predation, and roost disturbance. A reduction in tree cover might be the primary reason for the species decline in Hawaii and pesticides may have reduced populations (USFWS, 1998).

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Potential to Occur in the Action Area
Little is known about the species' occurrence across the island of Oahu, including the Ala Wai watershed. However, based on the habitat preferences, it is possible that it could occur within the action area. Specifically, the Manoa Valley Park District detention basin, Woodlawn Drive Bridge floodwall, and Koali Road floodwall include forested habitat with tall trees that may be used for roosting. The Makiki Park District detention basin, Kanaha floodwall, Kaimuki High School floodwall, Ala Wai Golf Course detention basin, and portions of the Ala Wai Canal floodwall (especially in the vicinity of the Manoa-Palolo Canal) may also provide suitable foraging habitat; however, the habitat value of these sites is likely diminished by the extensive urbanization in the surrounding areas.

Potential Effects of the Proposed Action
Should they occur, Hawaiian hoary bats could be directly or indirectly impacted by the proposed action. Direct effects could include mortality or other forms of take (e.g., harm or harassment) to individual bats because of heavy equipment used for clearing and grubbing of the project footprints and construction of the flood risk management structures. The use of heavy equipment would also generate noise, which could disrupt bats that are present within the action area. To avoid and minimize the potential for these impacts, vegetation clearing for the project would be performed during times of the year when Hawaiian hoary bats are not expected to be breeding to avoid potential for harm or disruption of juvenile bats that are unable to fly; specifically trees greater than 15 feet in height would not be cleared between June 1 and September 15. In addition, all construction activities would be scheduled to occur during daytime hours, thus avoiding potential bat foraging activities, which typically occur in the evening hours.

Other effects could include permanent loss or temporary impacts to habitat. However, given the amount of habitat available throughout the upper watershed, tree clearing within the action area is not expected to measurably decrease the amount of forest available to the local population of bats for roosting. In addition, on Oahu roost trees are plentiful and are not expected to be a limiting factor for the species. The forest habitat in the upper portions of the watershed is homogenous and does not vary significantly in composition or structure between adjacent patches. For these reasons, it is expected that any bats displaced by the clearing would readily find alternate roost sites in surrounding undisturbed forest.

Effects Determination
As described above, seasonal restrictions for tree trimming/clearing and enforcement of construction hours will be incorporated to avoid and/or minimize the potential for impacts to the Hawaiian hoary bat, should the species be present in the action area. With implementation of these measures, impacts to the Hawaiian hoary bat are expected to be insignificant, such that the proposed action **may affect, but is not likely to adversely** affect the species.

4.11 Hawaiian Monk Seal (*Monachus schauinslandi*)

The Hawaiian monk seal is a listed federally endangered species. Critical habitat has been designated for Hawaiian monk seal. Specific to Oahu, designated marine critical habitat includes the seafloor and all subsurface waters within 33 feet (10 meters) of the seafloor, out to the 656-foot (200 meter) depth contour line. At specific points around Oahu, critical habitat for Hawaiian monk seal extends inland through the water's edge 16 feet (five meters) into the terrestrial environment from the shoreline. However, no terrestrial critical habitat is designated within the vicinity of the action area.

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Current Species Status

Hawaiian monk seals are found in the Hawaiian archipelago which includes both the main and Northwestern Hawaiian Islands and rarely at Johnston Atoll which lies nearly 1,000 miles southwest of Hawaii (NOAA, 2023a). The monk seals are endemic to these islands, occurring nowhere else in the world. The Hawaiian monk seal population is estimated to be around 1,570 seals—nearly 1,200 seals in the northwestern Hawaiian Islands and 400 seals in the main Hawaiian Islands. In general, the Hawaiian monk seal population has been declining overall for six decades and current numbers, though increasing, are only about one-third of historic population levels (NOAA, 2023a).

Biology and Ecology of Species – Reproduction and Forage Requirements

Hawaiian monk seals are “generalist” feeders, which means they eat a wide variety of foods depending on what’s available (NOAA, 2023a). They eat many types of common fishes, squids, octopuses, eels, and crustaceans (crabs, shrimps, and lobsters). Diet studies indicate that they forage at or near the seafloor and prefer prey that hide in the sand or under rocks. Hawaiian monk seals are mostly solitary and don’t live in colonies like sea lions or other seals. But they do sometimes lie near each other—usually not close enough to make physical contacts—in small groups. They usually sleep on beaches, sometimes for days at a time. They also occasionally sleep in small underwater caves. Monk seals do not migrate seasonally, but some seals have traveled hundreds of miles in the open ocean. Individual seals often frequent the same beaches over and over, but they do not defend territories. When on land, monk seals haul-out to rest, molt, give birth and nurse on sand, coral rubble, and volcanic rock shorelines. They generally prefer sandy, protected beaches surrounded by shallow waters for pupping. When not on land, Hawaiian monk seals use waters surrounding atolls and islands and areas further offshore on reefs and submerged banks; they also use deepwater coral beds as foraging habitat (NOAA, 2023a).

Mating occurs during the spring and summer months at sea (76 FR 32026, June 2, 2011). Most females mate once a year. Females and males typically reach sexual maturity between the ages of 5 to 6 years of age in the main Hawaiian Islands and age 7 to 10 in the Northwestern Hawaiian Islands (NOAA, 2023a). The youngest documented female to give birth was 4 years old. Gestation is about 11 months with most pup births occurring between February and August. Nursing lasts for about 6 weeks and pups and moms stay on shore until a pup is weaned (76 FR 32026, June 2, 2011).

Factors Affecting Species Activity and Survival

Historically, humans and disturbance from government installations in the Northwestern Hawaiian Islands threatened Hawaiian monk seal. Today, Hawaiian monk seal are negatively affected by food limitation, shark predation, marine debris entanglement, male seal aggression, habitat loss, fishery interactions (i.e., commercial longline fishing including hook and nets), disease (e.g., canine distemper, Leptospirosis, and Brucellosis) and contaminants, human-seal interactions, and intentional killing (NOAA, 2023a).

Potential to Occur in the Action Area

The Hawaiian monk seal is unlikely to occur within the action area; however, a Hawaiian monk seal was observed swimming in the Ala Wai Canal on March 6, 2023 (Moore, 2023). It is believed that the presence of the Hawaiian monk seal in the canal is potentially related to recent dredging of canal sediments by the Hawaii DLNR and Genki balls that have been thrown into the canal as part of the Genki Ala Wai Project. In addition, a Hawaiian monk seal known as RK96 (also known as Kaiwi) has pupped on Kaimana beach in Waikiki twice (i.e., 2021 and

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2023) (NOAA, 2023b). Therefore, there is the potential for Hawaiian monk seals to occur within the action area. It is important to note that the proposed action is focused on stream-related flood risk reduction and does not include any direct impacts to marine or coastal habitat. The proposed action does not extend into the marine critical habitat for the Hawaiian monk seal, and no terrestrial critical habitat is designated within the vicinity of the action area. Overall, there is the potential for Hawaiian monk seal to occur within the action area.

Potential Effects of the Proposed Action

Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with Hawaiian monk seal through:

1. Collision with vessels;
2. Direct physical impact;
3. Disturbance from human activity and equipment operation;
4. Exposure to elevated noise levels;
5. Exposure to elevated turbidity;
6. Exposure to wastes and discharges; and
7. Loss of forage habitat.

Collision with vessels:

Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

Direct physical impact:

Physical impact to Hawaiian monk seal is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact Hawaiian monk seal should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Hawaiian monk seal could also be pinned to the bottom and drowned. To minimize potential physical impacts to Hawaiian monk seal during cofferdam material placement, avoidance and minimization measures listed in Section 2.3 would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization measures (refer to Section 2.3 for the complete list) would minimize the potential physical impact to Hawaiian monk seal during the placement and removal of cofferdam material.

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Disturbance from human activity and equipment operation:

Although construction of the floodwalls would occur upland, work would occur near marine habitat where ESA-listed marine species may be directly exposed to project-related activity. Hawaiian monk seal may experience a startle reaction and resulting stress should they encounter site preparation and construction activities. The reaction could range from one extreme where an animal calmly approaches and investigates the activity, to an opposite reaction of panicked flight, where an animal injures itself in an attempt to flee. However, marine mammals such as Hawaiian monk seal typically avoid human activity. Thus, the most likely effect of this interaction will be moderate level stress with a moderate to high energy avoidance behavior leading to the Hawaiian monk seal rapidly leaving the project footprint without injury.

Exposure to elevated noise levels:

Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for Hawaiian monk seal. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, most of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot-wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot-wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise during construction of these types of floodwalls. However, like the pile installation along the reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of

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soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose Hawaiian monk seals to project-related activity. However, Hawaiian monk seals typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed in Section 2.3. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon Hawaiian monk seal.

As described in Section 2.3, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To

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obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the Hawaiian monk seal due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 4. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

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Table 4: Future Without Project and Future with Project Modeled Velocities at the 5%, 2%, and 1% AEP.

Ala Wai Canal Location	Existing Velocities at Different AEPs without Project			Predicted Velocities at Different AEPs with Project			Velocity Difference (+) increase (-) decrease		
	5% AEP	2% AEP	1% AEP	5% AEP	2% AEP	1% AEP	5% AEP	2% AEP	1% AEP
Mouth of Manoa-Palolo Canal	10,215	11,171	11,418	13,268	13,220	15,497	(+) 3,053	(+) 2,029	(+) 4,079
Ala Wai Golf Course Midpoint	1,713	1,732	1,990	1,336	3,045	4,543	(-) 377	(+) 1,313	(+) 2,553
Ala Wai Canal Terminus	465	649	684	557	569	833	(+) 92	(-) 80	(+) 149
Ala Wai Community Park	11,700	13,238	13,833	14,429	16,688	18,922	(+) 2,729	(+) 3,450	(+) 5,089
Mouth of Ala Wai Canal (Ala Moana Boulevard)	2,831	3,177	3,475	15,687	17,387	18,622	(+) 12,856	(+) 14,210	(+) 15,147

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Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 15 shows selected time progressions of this storm's modeled turbidity plume.

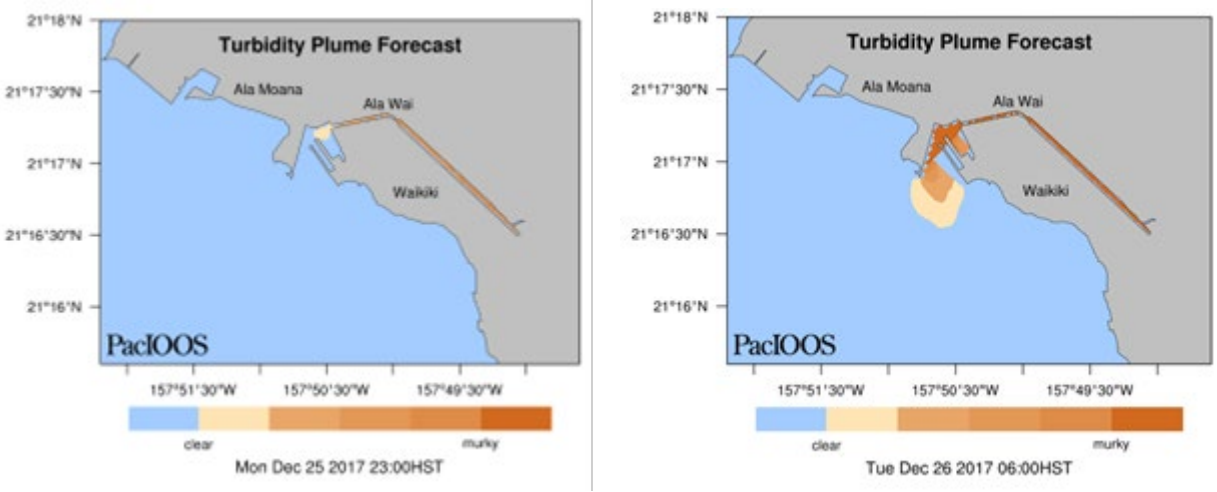

Figure 15: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

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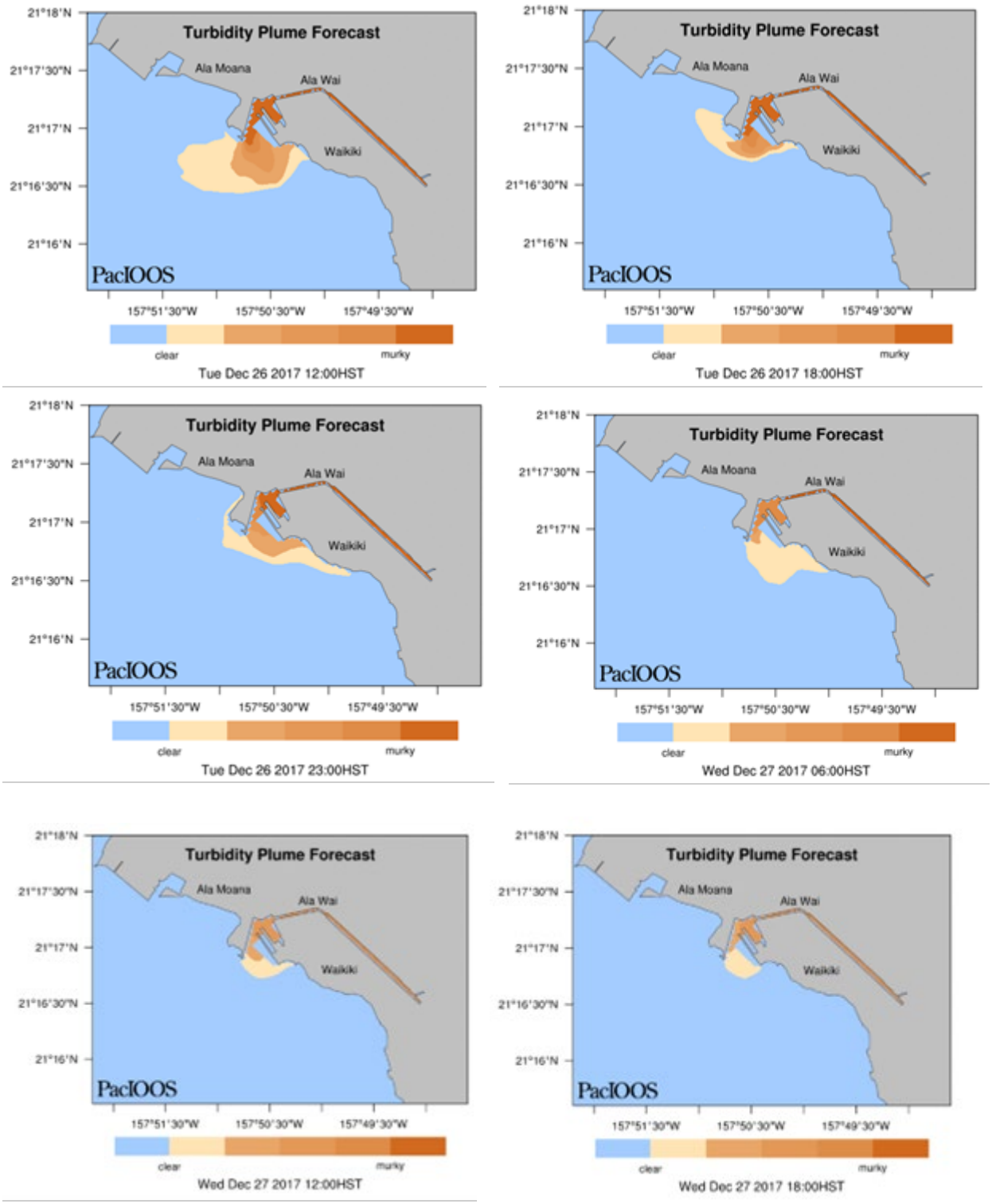

Figure 15, cont'd: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

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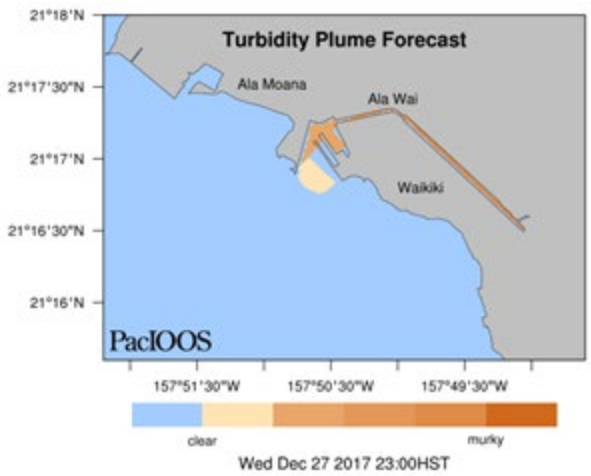

Figure 15, cont'd: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

As seen in the above time progressions, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm

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event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact Hawaiian monk seal. However, given that Hawaiian monk seal breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by Hawaiian monk seal from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

Exposure to wastes and discharges:

Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle Hawaiian monk seal. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose Hawaiian monk seal to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed in Section 2.3 include measures intended to prevent or reduce exposure of Hawaiian monk seal to wastes and discharges in the marine environment.

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Loss of forage habitat:

Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where Hawaiian monk seal may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure is located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.

Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother Hawaiian monk seal foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, Hawaiian monk seal foraging habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to Hawaiian monk seal foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on Hawaiian monk seal foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa

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and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of Hawaiian monk seal foraging habitat.

Critical Habitat

Activities associated with the proposed action that could reasonably be expected to impact designated marine critical habitat for the Hawaiian monk seal include:

1. Exposure to elevated turbidity and sedimentation; and
2. Exposure to wastes and discharges.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area which could include proposed designated critical habitat for the green sea turtle. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed in Section 2.3. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat, green sea turtle proposed designated critical habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon designated critical habitat for the Hawaiian monk seal.

As described in Section 2.3, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The long-term operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to designated critical habitat for the Hawaiian monk seal from potential water quality degradation. Under the proposed project,

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turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced primarily at nearby designated critical habitat for the Hawaiian monk seal sooner than under the without project condition. Turbidity plumes extending into nearby designated critical habitat for the Hawaiian monk seal may also take longer than approximately 24 hours for dissipation to begin. The degraded water quality caused by the turbidity plumes could stimulate and sustain algae growth within the action area. Currently, frondose algae, crustose coralline algae, and turf algae are common but not dominant in the action area. Filamentous algae or cyanobacteria are also present primarily seaward of Waikiki beaches but do not dominate the habitat. While the proposed project is likely to increase nutrient and sediment concentrations reaching the nearshore marine environment during a storm event, the degree of increase in concentrations is not expected to stimulate algae growth in such a way that algae would be expected to become dominant in the action area and smoother corals that provide habitat for Hawaiian monk seal prey. Hawaiian monk seals are “generalist” feeders, meaning they eat a wide variety of foods depending on availability. Hawaiian monk seals eat many species of common fishes, squids, octopuses, eels, and crustaceans (crabs, shrimps, and lobsters). There could be slight increases in algae growth observed due to increased nutrient and sediment concentrations and turbidity taking longer to begin to dissipate, but the increase in algae growth would not be expected to be substantial to cause a loss of foraging habitat for the Hawaiian monk seal in the action area. Overall, the proposed project is not expected to substantially affect foraging habitat for the Hawaiian monk seal; therefore, the proposed project is not expected to destroy or adversely modify designated critical habitat for the Hawaiian monk seal.

Exposure to discharges:

Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, equipment spills and discharges likely consisting of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, could enter the nearshore marine environment and designated critical habitat for the Hawaiian monk seal to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects. Regarding foraging habitat for the Hawaiian monk seal (i.e., designated critical habitat), inadvertent spills and discharges from construction equipment has the potential to quickly kill Hawaiian monk seal prey. Highly motile prey such as fish, squid, octopus, and eels may be able to avoid harm by moving out of the area. Highly motile prey is also expected to be able to recolonize the affected area faster once contamination is contained and/or dissipates. Less motile prey such as crabs, shrimps, and lobsters are likely to be killed. Less motile prey is also expected to take longer to recolonize the affected area once contamination is contained and/or dissipates. Although inadvertent spills and discharges from construction equipment have the potential to kill Hawaiian monk seal prey, motile prey are expected to be able to avoid harm and recolonize the area quickly. Less motile prey species would likely take longer to recolonize the area, but since Hawaiian monk seals eat a wide variety of foods depending on availability, diet for the seals would likely consist of more motile species until less motile species are able to recolonize the area. It is important to note that local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed in Section 2.3 include measures intended to prevent or reduce exposure of the marine environment to wastes and discharges from construction equipment. Based on the above and the implementation of measures in Section 2.3, the proposed project is not expected to substantially affect foraging habitat for the Hawaiian monk seal; therefore, the proposed project is not expected to destroy or adversely modify designated critical habitat for the Hawaiian monk seal.

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Effects Determination
The proposed action involves minor in-water work which could expose Hawaiian monk seal to project-related activity. However, with the implementation of avoidance and minimization measures listed in Section 2.3 potential impacts to Hawaiian monk seal due to project-related activity is expected to be minimized such that the proposed action **may affect, but is not likely to adversely affect** Hawaiian monk seal or designated critical habitat for Hawaiian monk seal.

4.12 Green Sea Turtle (*Chelonia mydas*)

The green sea turtle, Central North Pacific Distinct Population Segment is a listed federally threatened species. The National Marine Fisheries Service has proposed to designate specific areas in the marine environment as critical habitat for six distinct population segments (DPSs) of the green sea turtle, including the Central North Pacific DPS, under the Endangered Species Act of 1973, as amended. Proposed critical habitat includes nearshore areas from the mean high-water line to 66-foot (20 meters) depth located along the coasts of Florida, North Carolina, Texas, Puerto Rico, U.S. Virgin Islands, California (which also includes nearshore areas from the mean high-water line to 6 miles [10 kilometers] offshore), Hawaii, American Samoa, Guam, and the Commonwealth of Northern Marian Islands. It also includes Sargassum habitat, from 33-foot (10 meters) depth to the outer boundary of the U.S. Exclusive Economic Zone, in the Gulf of Mexico and Atlantic Ocean (NOAA-NMFS-2023-0087). The proposed designated critical habitat includes the mouth of the Ala Wai Canal, the Ala Wai Canal Boat Harbor, and the nearshore marine environment within the vicinity of Waikiki which could experience indirect impacts from the proposed action.

Current Species Status
The green sea turtle occurs throughout the Hawaiian Islands and are most conspicuous at French Frigate Shoals (NMFS and USFWS, 1998). Green sea turtles also inhabit the nearshore waters around the main Hawaiian Islands, including Oahu. The Hawaiian green turtle population (i.e., the Central North Pacific DPS) has been increasing at a rate of 5 percent per year over the past two decades (NMFS and USFWS, 1998).

Biology and Ecology of Species – Reproduction and Forage Requirements
Adult green sea turtles reside in nearshore benthic environments and have a nearly exclusive herbivorous diet consisting of macroalgae and sea grasses (NMFS and USFWS, 1998). Green sea turtles are commonly observed to forage for sea grass (*Halophila decipiens*) at Ala Moana Beach Park, Oahu Island. Adult male and female green sea turtles have been observed to haul out and bask on the shoreline at French Frigate shoals. About 90 percent of the nesting occurs on French Frigate Shoals of the Northwestern Hawaiian Islands. Between 200 and 700 females nest at French Frigate Shoals annually with a modest amount of nesting at Laysan Island, Lisianski Atoll, and Peal and Hermes Reef. Green sea turtles in Hawaii may lay up to six clutches of eggs per season and each clutch may consist of about 100 eggs (NMFS and USFWS, 1998).

Factors Affecting Species Activity and Survival
Threats to the survival of GST include the loss of foraging habitat to nearshore development in the main Hawaiian Islands (e.g., marina construction, artificial beach development, siltation from agricultural runoff, contamination of forage areas from toxic spills, resort development, and increased vessel traffic), entanglement and ingestion of marine debris, incidental take during fisheries, poaching, and disease (e.g., fibropapillomas) (NMFS and USFWS, 1998).

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Potential to Occur in the Action Area

The green sea turtle is likely to occur within the action area, specifically the Ala Wai Canal and potentially as far upstream as the Manoa-Palolo Canal. Green sea turtle has been observed as recently as 2021 in the Ala Wai Canal.

Potential Effects of the Proposed Action

Species

Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with green sea turtle through:

1. Collision with vessels;
2. Direct physical impact;
3. Disturbance from human activity and equipment operation;
4. Exposure to elevated noise levels;
5. Exposure to elevated turbidity;
6. Exposure to wastes and discharges; and
7. Loss of forage habitat.

Collision with vessels:

Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

Direct physical impact:

Activities associated with the proposed action do not include the use of vessels in nearshore Physical impact to green sea turtle is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact green sea turtle should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Green sea turtle could also be pinned to the bottom and drowned. To minimize potential physical impacts to green sea turtle during cofferdam material placement, avoidance and minimization measures listed in Section 2.3 would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization measures (refer to Section 2.3 for the complete list) would minimize the potential physical impact to green sea turtle during the placement and removal of cofferdam material.

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Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. Construction of the Ala Wai Canal floodwall, however, includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose green sea turtles to project-related activity. However, sea turtles typically avoid human activity, so exposure to the project-related activity detailed above would be infrequent and non-injurious. In addition, avoidance and minimization measures would be implemented during construction such that in insignificant effects on the green sea turtle are anticipated.

Exposure to elevated noise levels:

Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for green sea turtle. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, most of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot-wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot-wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise

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during construction of these types of floodwalls. However, like the pile installation along the reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose green sea turtle to project-related activity. However, green sea turtles typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed in Section 2.3. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon green sea turtle.

As described in Section 2.3, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water

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construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the green sea turtle due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 4. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 15 shows selected time progressions of this storm's modeled turbidity plume.

As seen in Figure 15, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of

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the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact green sea turtle. However, given that green sea turtles breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by green sea turtle from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff

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reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

Exposure to wastes and discharges:

Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle green sea turtle. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose green sea turtles to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed in Section 2.3 include measures intended to prevent or reduce exposure of green sea turtles to wastes and discharges in the marine environment.

Loss of forage habitat:

Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where green sea turtles may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure is located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.
Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from

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storm waters. Increased sedimentation in nearshore marine waters could smother green sea turtle foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, green sea turtle foraging habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to green sea turtle foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on green sea turtle foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of green sea turtle foraging habitat.

Critical Habitat

Activities associated with the proposed action that could reasonably be expected to impact proposed designated habitat for the green sea turtle include:

1. Exposure to elevated turbidity and sedimentation; and
2. Exposure to wastes and discharges.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area which could include proposed designated critical habitat for the green sea turtle. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed in Section 2.3. The Ala Wai Canal is generally subjected to low

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flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat, green sea turtle proposed designated critical habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon proposed designated critical habitat for the green sea turtle.

As described in Section 2.3, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The long-term operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to proposed designated critical habitat for the green sea turtle from potential water quality degradation. Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced primarily at nearby proposed designated critical habitat for the green sea turtle sooner than under the without project condition. Turbidity plumes extending into nearby proposed designated critical habitat for the green sea turtle may also take longer than approximately 24 hours for dissipation to begin. The degraded water quality caused by the turbidity plumes could stimulate and sustain algae growth within the action area. Currently, frondose algae, crustose coralline algae, and turf algae are common but not dominant in the action area (USFWS, 2023b). Filamentous algae or cyanobacteria are also present primarily seaward of Waikiki beaches but do not dominate the habitat (USFWS, 2023b). While the proposed project is likely to increase nutrient and sediment concentrations reaching the nearshore marine environment during a storm event, the degree of increase in concentrations is not expected to stimulate algae growth in such a way that algae would be expected to become dominant in the action area. Green sea turtles are herbivores and eat mostly seagrasses and algae. Although the project is not expected to significantly stimulate algae growth, the project is also not expected to substantially decrease algae growth beyond that which currently occurs in the action area. Overall, the proposed project is not expected to substantially affect foraging habitat for the green sea turtle; therefore, the proposed project is not expected to destroy or adversely modify proposed designated critical habitat for the green sea turtle.

Exposure to discharges:

Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, equipment spills and discharges likely consisting of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, could enter the nearshore marine environment and proposed designated critical habitat for the green sea turtle to toxic chemicals. Depending on

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the chemicals and their concentration, exposure could result in a range of effects. Regarding foraging habitat for the green sea turtle (i.e., proposed designated critical habitat), inadvertent spills and discharges from construction equipment has the potential to quickly kill algae filaments; however, populations may recover rapidly by growth and vegetative reproduction of any unharmed fragments or spores (O'Brien and Dixon, 1976). Although inadvertent spills and discharges from construction equipment have the potential to kill algae, hydrocarbon-based chemicals generally have a greater adverse impact on algal grazers than algae (O'Brien and Dixon, 1976). Therefore, inadvertent spills and discharges would likely kill algal grazers and result in a temporary increase in algae until algal grazers are able to recolonize the impacted area (O'Brien and Dixon, 1976). It is important to note that local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed in Section 2.3 include measures intended to prevent or reduce exposure of the marine environment to wastes and discharges from construction equipment. Based on the above and the implementation of measures in Section 2.3, the proposed project is not expected to substantially affect foraging habitat for the green sea turtle; therefore, the proposed project is not expected to destroy or adversely modify proposed designated critical habitat for the green sea turtle.

Effects Determination

The proposed action involves minor in-water work which could expose green sea turtle to project-related activity. However, with the implementation of avoidance and minimization measures listed in Section 2.3 potential impacts to green sea turtle due to project-related activity is expected to be minimized such that the proposed action **may affect, but is not likely to adversely affect** green sea turtle or proposed designated critical habitat for green sea turtle.

4.13 Hawksbill Sea Turtle (*Eretmochelys imbricata*)

The hawksbill sea turtle is a listed federally endangered species. Critical habitat has been designated in the waters surrounding Mona and Monito Islands, Puerto Rico. No critical habitat is present within the action area.

Current Species Status

Hawksbill sea turtles may occur throughout the main Hawaiian Islands but are considered rare except for common observations of individuals around West Maui. Approximately 60 female adults have been documented within Hawaiian waters with no estimate of population size.

Biology and Ecology of Species – Reproduction and Forage Requirements

Adult hawksbill sea turtles forage on sponges and certain species of algae. They are observed in shallow reefs and bays. Nesting has been documented along Halawa River Valley of east Molokai Island, Kamehameha Beach, Hawaii Island, and various beaches around Maui Island. Hawksbill turtles display slow growth rates with an average annual growth rate of approximately 0.79 to 1.97 inches (two to five centimeters) per year for juveniles that slows to almost no somatic growth in adults.

Factors Affecting Species Activity and Survival

Threats to hawksbill sea turtle include the loss of nesting beaches due to construction and human presence, beach erosion, artificial lighting, nest predation, exotic vegetation, marine debris, incidental take during from fisheries, poaching, and disease (e.g., fibropapillomas).

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Potential to Occur in the Action Area

The hawksbill sea turtle is less likely to occur within the action area when compared to the green sea turtle; however, the possibility exists that the species could be present in the Ala Wai Canal and potentially as far upstream as the Manoa-Palolo Canal.

Potential Effects of the Proposed Action

Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with hawksbill sea turtle through:

1. Collision with vessels;
2. Direct physical impact;
3. Disturbance from human activity and equipment operation;
4. Exposure to elevated noise levels;
5. Exposure to elevated turbidity;
6. Exposure to wastes and discharges; and
7. Loss of forage habitat.

Collision with vessels:

Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

Direct physical impact:

Activities associated with the proposed action do not include the use of vessels in nearshore Physical impact to hawksbill sea turtle is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact hawksbill sea turtles should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Hawksbill sea turtle could also be pinned to the bottom and drowned. To minimize potential physical impacts to hawksbill sea turtle during cofferdam material placement, avoidance and minimization measures listed in Section 2.3 would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization measures (refer to Section 2.3 for the complete list) would minimize the potential physical impact to hawksbill sea turtle during the placement and removal of cofferdam material.

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Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. Construction of the Ala Wai Canal floodwall, however, includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose hawksbill sea turtles to project-related activity. However, sea turtles typically avoid human activity, so exposure to the project-related activity detailed above would be infrequent and non-injurious. In addition, avoidance and minimization measures would be implemented during construction such that in insignificant effects on the hawksbill sea turtle are anticipated.

Exposure to elevated noise levels:

Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for hawksbill sea turtle. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, most of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot-wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot-wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise

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during construction of these types of floodwalls. However, like the pile installation along the reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose hawksbill sea turtle to project-related activity. However, Hawaiian monk seals typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting hawksbill sea turtle from potential noise-related impacts.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed in Section 2.3. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon hawksbill sea turtle.

As described in Section 2.3, USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water

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construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the hawksbill sea turtle due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 4. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 15 shows selected time progressions of this storm's modeled turbidity plume.

As seen in Figure 15, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of

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the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact hawksbill sea turtles. However, given that hawksbill sea turtles breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by hawksbill sea turtle from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff

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reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

Exposure to wastes and discharges:

Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle hawksbill sea turtle. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose hawksbill sea turtle to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed in Section 2.3 include measures intended to prevent or reduce exposure of hawksbill sea turtle to wastes and discharges in the marine environment.

Loss of forage habitat:

Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where hawksbill sea turtle may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure were located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.

Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998),

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sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother hawksbill sea turtle foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, hawksbill sea turtle foraging habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to hawksbill sea turtle foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on hawksbill sea turtle foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of hawksbill sea turtle foraging habitat.

Effects Determination

The proposed action involves minor in-water work which could expose hawksbill sea turtle to project-related activity. However, with the implementation of avoidance and minimization measures listed in Section 2.3 potential impacts to hawksbill sea turtle due to project-related activity is expected to be minimized such that the proposed action **may affect, but is not likely to adversely affect** hawksbill sea turtle.

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5. Effects Determination

Based on the information presented in Section 4, the effects determination for the species addressed in this BA are summarized in Table 5. As no critical habitat occurs within the action area, there will be no effect on any critical habitat.

Table 5: Summary of Effects Determination

Common Name	Scientific Name	Potential to Occur in Action Area	Potential Effects	Effects Determination
ʻAiea	*Nothocestrum latifolium*	No; no suitable habitat	None	No Effect
ʻAkoko	*Euphorbia celastroides var. kaenana*	No; no suitable habitat	None	No Effect
ʻena'ena	*Pseudognaphalium sandwicensium var. molokaiense*	No; no suitable habitat	None	No Effect
Carter's Panicgrass	*Panicum fauriei var. carteri*	No; no suitable habitat	None	No Effect
Ewa Plains ʻakoko	*Euphorbia skottsbergii var. skottsbergii*	No; no suitable habitat	None	No Effect
Ihi	*Portulaca villosa*	No; no suitable habitat	None	No Effect
Kamanomano	*Cenchrus agrimonioides*	No; no suitable habitat	None	No Effect
No Common Name	*Lobelia monostachya*	No; no suitable habitat	None	No Effect
No Common Name	*Polyscias lydgatei*	No; no suitable habitat	None	No Effect
Popolo	*Solanum nelsonii*	No; no suitable habitat	None	No Effect
Pu'uka'a	*Cyperus trachysanthos*	No; no suitable habitat	None	No Effect
Ohai	*Sesbania tomentosa*	No; no suitable habitat	None	No Effect
No Common Name	*Vigna o-wahuensis*	No; no suitable habitat	None	No Effect
Ihi'ihi	*Marsilea villosa*	No; no suitable habitat	None	No Effect
No Common Name	*Microlepia strigose var. mauiensis*	No; no suitable habitat	None	No Effect

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Common Name	Scientific Name	Potential to Occur in Action Area	Potential Effects	Effects Determination
Band-rumped Storm petrel	*Oceanodroma castro*	Unlikely given the minimal extent/quality of habitat and current species distribution	Temporary attractive nuisance from artificial lighting during construction	May Affect, Not Likely to Adversely Affect
Hawaii Akepa	*Loxops coccineus*	No; no suitable habitat	None	No Effect
Hawaiian Duck	*Anas wyvilliana*	Unlikely given the minimal extent/quality of habitat and current species distribution	Temporary disturbance during construction; short-term habitat increase (and attractive nuisance) during flood events	May Affect, Not Likely to Adversely Affect
Hawaiian Common Gallinule	*Gallinula galeata sandvicensis*	Unlikely given the minimal extent/quality of habitat and current species distribution	Temporary disturbance during construction; short-term habitat increase (and attractive nuisance) during flood events	May Affect, Not Likely to Adversely Affect
Hawaiian Coot	*Fulica americana alai*	Unlikely given the minimal extent/quality of habitat and current species distribution	Temporary disturbance during construction; short-term habitat increase (and attractive nuisance) during flood events	May Affect, Not Likely to Adversely Affect
Hawaiian Petrel	*Pterodroma sanwichensis*	Unlikely given the minimal extent/quality of habitat and current species distribution	Temporary attractive nuisance from artificial lighting during construction	May Affect, Not Likely to Adversely Affect

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Common Name	Scientific Name	Potential to Occur in Action Area	Potential Effects	Effects Determination
Hawaiian Stilt	*Himantopus mexicanus knudseni*	Unlikely given the minimal extent/quality of habitat and current species distribution	Temporary attractive nuisance from artificial lighting during construction	May Affect, Not Likely to Adversely Affect
Newell's Townsend's Shearwater	*Puffinus auricularis newelli*	Unlikely given the minimal extent/quality of habitat and current species distribution	Temporary attractive nuisance from artificial lighting during construction	May Affect, Not Likely to Adversely Affect
Short-tailed Albatross	*Phoebastria albatrus*	No; no suitable habitat	None	No Effect
Hawaiian Hoary Bat	*Lasiurus cinereus semotus*	Possibly, though unlikely; bats could roost in the trees within the action area	Harm/harassment as a result of clearing and construction, but potential impacts to be minimized with seasonal restrictions on tree clearing	May Affect, Not Likely to Adversely Affect
Hawaiian Monk Seal	*Neomonachus schauinslandi*	Possibly, though unlikely, given the minimal extent/quality of habitat within the action area	Temporary disturbance during in-water construction and project operation	May Affect, Not Likely to Adversely Affect
Hawaiian Monk Seal Critical Habitat	-	Yes; foraging habitat located at mouth of Ala Wai Canal and Ala Wai Boat Harbor	Temporary disturbance during construction and project operation	May Affect, Not Likely to Destroy or Adversely Modify Designated Critical Habitat
Green Sea Turtle, Central North Pacific Distinct Population	*Chelonia mydas*	Possibly, though unlikely, given the minimal extent/quality of habitat	Temporary disturbance during in-water construction	May Affect, Not Likely to Adversely Affect

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Common Name	Scientific Name	Potential to Occur in Action Area	Potential Effects	Effects Determination
		within the action area		
Green Sea Turtle, Proposed Critical Habitat	-	Yes; foraging habitat located at mouth of Ala Wai Canal and Ala Wai Boat Harbor	Temporary disturbance during in-water construction and project operation	May Affect, Not Likely to Destroy or Adversely Modify Proposed Designated Critical Habitat
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Possibly, though unlikely, given the minimal extent/quality of habitat within the action area	Temporary disturbance during in-water construction	May Affect, Not Likely to Adversely Affect

(-) Not Applicable.

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USFWS. 2007b. *Chamaeysce skottsbergii* var. *kalaeloana* (Akoko) 5-Year Review Summary and Evaluation. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, HI. 12 pp. Accessed at: https://ecos.fws.gov/docs/tess/species_nonpublish/1093.pdf

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: November 15, 2023
Project Code: 2023-0048348
Project Name: Ala Wai Canal Flood Risk Management Project General Reevaluation Report

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service’s wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
- http://www.towerkill.com
- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2023-0048348
Project Name: Ala Wai Canal Flood Risk Management Project General Reevaluation Report
Project Type: Flooding
Project Description: Evaluation of flood risk management measures for the Ala Wai Watershed in Oahu, Hawaii.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@21.30655265,-157.80839329399933,14z

Counties: Honolulu County, Hawaii

ENDANGERED SPECIES ACT SPECIES

There is a total of 17 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Hawaiian Hoary Bat *Lasiurus cinereus semotus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/770 General project design guidelines: https://ipac.ecosphere.fws.gov/project/UYJUOQCQBFHUNA7V7S5U3YBY2I/documents/generated/6477.pdf	Endangered

BIRDS

NAME	STATUS

Band-rumped Storm-petrel *Hydrobates castro* — Endangered
- Population: USA (HI)
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/1226
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/UYJUOQCQBFHUNA7V7S5U3YBY2I/documents/generated/6939.pdf

Hawaiian Common Gallinule *Gallinula galeata sandvicensis* — Endangered
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/6612
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/UYJUOQCQBFHUNA7V7S5U3YBY2I/documents/generated/6934.pdf

Hawaiian Coot (alae Ke`oke`o) *Fulica alai* — Endangered
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/7233
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/UYJUOQCQBFHUNA7V7S5U3YBY2I/documents/generated/6934.pdf

Hawaiian Duck *Anas wyvilliana* — Endangered
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/7712
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/UYJUOQCQBFHUNA7V7S5U3YBY2I/documents/generated/6934.pdf

Hawaiian Petrel *Pterodroma sandwichensis* — Endangered
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/6746
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/UYJUOQCQBFHUNA7V7S5U3YBY2I/documents/generated/6939.pdf

Hawaiian Stilt *Himantopus mexicanus knudseni* — Endangered
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/2082
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/UYJUOQCQBFHUNA7V7S5U3YBY2I/documents/generated/6934.pdf

Newell"s Shearwater *Puffinus newelli* — Threatened
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/2048
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/UYJUOQCQBFHUNA7V7S5U3YBY2I/documents/generated/6939.pdf

REPTILES

NAME	STATUS
Hawksbill Sea Turtle *Eretmochelys imbricata*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3656

FLOWERING PLANTS

NAME	STATUS
`aiea *Nothocestrum latifolium*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/1061

`akoko *Euphorbia celastroides var. kaenana*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3842

`ena`ena *Pseudognaphalium sandwicensium var. molokaiense*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/5993

Kamanomano *Cenchrus agrimonioides*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2928

Lobelia monostachya	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/4334

Polyscias lydgatei	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2751

Vigna o-wahuensis	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8445

FERNS AND ALLIES

NAME	STATUS
Microlepia strigosa var. mauiensis	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4737

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Apapane *Himatione sanguinea* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9659	Breeds Dec 1 to Jul 31
Black Noddy *Anous minutus melanogenys* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10559	Breeds Apr 1 to Nov 30
Bristle-thighed Curlew *Numenius tahitiensis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/3913	Breeds elsewhere
Bulwer's Petrel *Bulweria bulwerii* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10579	Breeds May 1 to Sep 30
Christmas Shearwater *Puffinus nativitatis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9636	Breeds Apr 1 to Oct 31
Laysan Albatross *Phoebastria immutabilis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9669	Breeds Nov 15 to Jun 15
Oahu 'amakihi *Hemignathus flavus* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9592	Breeds Apr 1 to Jul 1
Red-tailed Tropicbird *Phaethon rubricauda melanorhynchos* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10563	Breeds Dec 15 to Oct 15

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

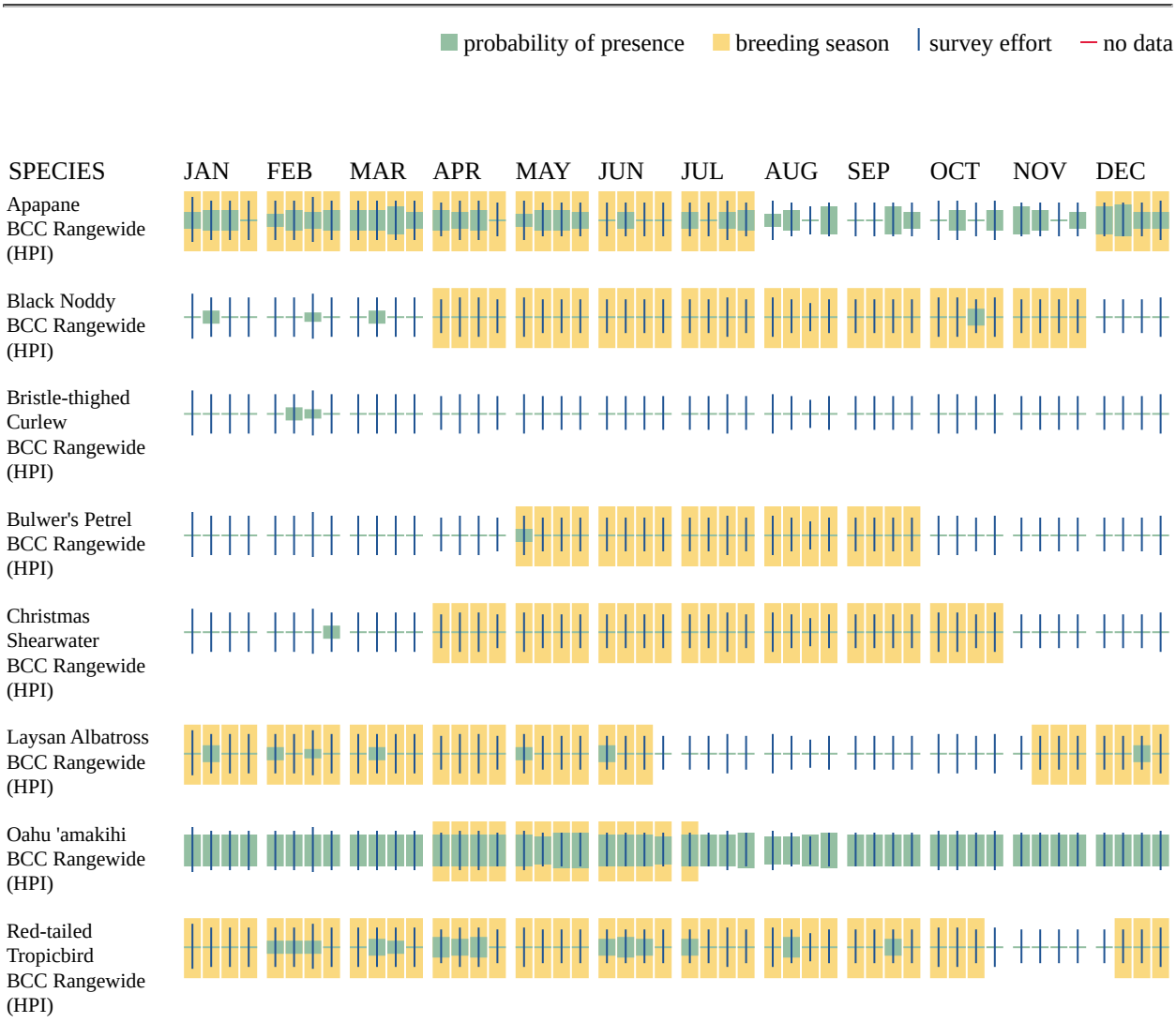
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management

- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PFO3C

IPAC USER CONTACT INFORMATION

Agency: Army Corps of Engineers
Name: Shawna Herleth-King
Address: 231 S. LaSalle St., Suite 1500
City: Chicago
State: IL
Zip: 60604
Email herleth.king@gmail.com
Phone: 3128465407

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: November 15, 2023
Project Code: 2023-0048352
Project Name: Ala Wai Canal Flood Risk Management Project General Reevaluation Report

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

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A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

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If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service’s wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
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- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

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This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2023-0048352
Project Name: Ala Wai Canal Flood Risk Management Project General Reevaluation Report
Project Type: Flooding
Project Description: Evaluation of flood risk management measures to be implemented in the Ala Wai Watershed.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@21.291413650000003,-157.81449396340298,14z

Counties: Honolulu County, Hawaii

ENDANGERED SPECIES ACT SPECIES

There is a total of 17 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

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---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Hawaiian Hoary Bat *Lasiurus cinereus semotus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/770
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/F6MRZRCZBZE6ZN2B4X5FT43EYI/documents/generated/6477.pdf

BIRDS

NAME — STATUS

Band-rumped Storm-petrel *Hydrobates castro* — Endangered
- Population: USA (HI)
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/1226
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Hawaiian Duck *Anas wyvilliana* — Endangered
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- General project design guidelines: https://ipac.ecosphere.fws.gov/project/F6MRZRCZBZE6ZN2B4X5FT43EYI/documents/generated/6934.pdf

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- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/6746
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/F6MRZRCZBZE6ZN2B4X5FT43EYI/documents/generated/6939.pdf

Hawaiian Stilt *Himantopus mexicanus knudseni* — Endangered
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/2082
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/F6MRZRCZBZE6ZN2B4X5FT43EYI/documents/generated/6934.pdf

Newell"s Shearwater *Puffinus newelli* — Threatened
- No critical habitat has been designated for this species.
- Species profile: https://ecos.fws.gov/ecp/species/2048
- General project design guidelines: https://ipac.ecosphere.fws.gov/project/F6MRZRCZBZE6ZN2B4X5FT43EYI/documents/generated/6939.pdf

REPTILES

NAME STATUS

Hawksbill Sea Turtle *Eretmochelys imbricata* Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3656

FLOWERING PLANTS

NAME STATUS

`akoko *Euphorbia celastroides var. kaenana* Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3842

`ena`ena *Pseudognaphalium sandwicensium var. molokaiense* Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/5993

Carter's Panicgrass *Panicum fauriei var. carteri* Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/5578

Ihi *Portulaca villosa* Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/4886

Ohai *Sesbania tomentosa* Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8453
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/F6MRZRCZBZE6ZN2B4X5FT43EYI/documents/generated/7050.pdf

Pu`uka`a *Cyperus trachysanthos* Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/7749

Vigna o-wahuensis Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8445

FERNS AND ALLIES

NAME STATUS

Ihi`ihi *Marsilea villosa* Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/2169

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE

SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Apapane *Himatione sanguinea* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9659	Breeds Dec 1 to Jul 31
Black Noddy *Anous minutus melanogenys* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10559	Breeds Apr 1 to Nov 30
Bristle-thighed Curlew *Numenius tahitiensis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/3913	Breeds elsewhere
Bulwer's Petrel *Bulweria bulwerii* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10579	Breeds May 1 to Sep 30
Christmas Shearwater *Puffinus nativitatis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9636	Breeds Apr 1 to Oct 31
Laysan Albatross *Phoebastria immutabilis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9669	Breeds Nov 15 to Jun 15
Oahu 'amakihi *Hemignathus flavus* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9592	Breeds Apr 1 to Jul 1
Red-tailed Tropicbird *Phaethon rubricauda melanorhynchos* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10563	Breeds Dec 15 to Oct 15

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- R3UBHx
- R2UBHx

FRESHWATER FORESTED/SHRUB WETLAND

- PFO3C

IPAC USER CONTACT INFORMATION

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
Phone: (808) 792-9400 Fax: (808) 792-9580

In Reply Refer To: November 15, 2023
Project Code: 2023-0048400
Project Name: Ala Wai Canal Flood Risk Management Project General Reevaluation Report

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened and endangered species, as well as designated critical habitat that may occur within the boundary of your proposed project and that may be affected by project related actions. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Please contact the Service's Pacific Islands Fish and Wildlife Office (PIFWO) at 808-792-9400 if you have any questions regarding your IPaC species list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may adversely affect threatened and endangered species and/or designated critical habitat.

Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological

Evaluation, similar to a Biological Assessment, be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment or Biological Evaluation are described at 50 CFR 402.12.

Due to the significant number of listed species found on each island within PIFWO's regulatory jurisdiction, and the difficulty in accurately mapping ranges for species that we have limited information about, your species list may include more species than if you obtained the list directly from a Service biologist. We recommend you use the species links in IPaC to view the life history, habitat descriptions, and recommended avoidance and minimization measures to assist with your initial determination of whether the species or its habitat may occur within your project area. If appropriate habitat is present for a listed species, we recommend surveys be conducted to determine whether the species is also present. If no surveys are conducted, we err on the side of the species, by regulation, and assume the habitat is occupied. Updated avoidance and minimization measures for plants and animals, best management practices for work in or near aquatic environments, and invasive species biosecurity protocols can be found on the PIFWO website at: https://www.fws.gov/office/pacific-islands-fish-and-wildlife/library.

If a Federal agency determines, based on the Biological Assessment or Biological Evaluation, that a listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/index.

Non-federal entities can also use the IPaC generated species list to develop Habitat Conservation Plans (HCP) in accordance with section 10(a)(1)(B) of the Act. We recommend HCP applicants coordinate with the Service early during the HCP development process. For additional information on HCPs, the Habitat Conservation Planning handbook can be found at https://www.fws.gov/sites/default/files/documents/habitat-conservation-planning-handbook-entire.pdf.

Please be aware that wind energy projects should follow the Service’s wind energy guidelines (http://www.fws.gov/windenergy) for minimizing impacts to migratory birds. Listed birds and the Hawaiian hoary bat may also be affected by wind energy development and we recommend development of a Habitat Conservation Plan for those species, as described above. Guidance for minimizing impacts to migratory birds for projects including communications towers can be found at:

- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers
- http://www.towerkill.com
- http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation actions that benefit threatened and endangered species into their project planning to further the purposes of the Act in accordance with section 7(a)(1). Please include the Consultation Tracking Number associated with your IPaC species list in any

request for consultation or correspondence about your project that you submit to our office. Please feel free to contact us at PIFWO_admin@fws.gov or 808-792-9400 if you need more current information or assistance regarding the potential impacts to federally listed species and federally designated critical habitat.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Pacific Islands Fish And Wildlife Office
300 Ala Moana Boulevard, Box 50088
Honolulu, HI 96850-5000
(808) 792-9400

PROJECT SUMMARY

Project Code: 2023-0048400
Project Name: Ala Wai Canal Flood Risk Management Project General Reevaluation Report
Project Type: Flooding
Project Description: Evaluation of flood risk management measures for implementation within the Ala Wai watershed.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@21.2815565,-157.82130335332727,14z

Counties: Honolulu County, Hawaii

ENDANGERED SPECIES ACT SPECIES

There is a total of 20 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Hawaiian Hoary Bat *Lasiurus cinereus semotus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/770
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6477.pdf

BIRDS

NAME STATUS

Band-rumped Storm-petrel *Hydrobates castro* Endangered
Population: USA (HI)
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/1226
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6939.pdf

Hawaiian Common Gallinule *Gallinula galeata sandvicensis* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6612
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6934.pdf

Hawaiian Coot (alae Ke`oke`o) *Fulica alai* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/7233
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6934.pdf

Hawaiian Duck *Anas wyvilliana* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/7712
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6934.pdf

Hawaiian Petrel *Pterodroma sandwichensis* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/6746
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6939.pdf

Hawaiian Stilt *Himantopus mexicanus knudseni* Endangered
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2082
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6934.pdf

Newell"s Shearwater *Puffinus newelli* Threatened
No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2048
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6939.pdf

NAME	STATUS
Short-tailed Albatross *Phoebastria (=Diomedea) albatrus*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/433

REPTILES

NAME	STATUS
Green Sea Turtle *Chelonia mydas*	Threatened

Population: Central North Pacific DPS
There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/6199
General project design guidelines:
https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/6929.pdf

Hawksbill Sea Turtle *Eretmochelys imbricata*	Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/3656

FLOWERING PLANTS

NAME	STATUS
`akoko *Euphorbia celastroides var. kaenana*	Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3842	
`akoko *Euphorbia skottsbergii var. skottsbergii*	Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6793	
`ena`ena *Pseudognaphalium sandwicensium var. molokaiense*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5993	
Carter's Panicgrass *Panicum fauriei var. carteri*	Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5578	
Ihi *Portulaca villosa*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4886	
Ohai *Sesbania tomentosa*	Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8453 General project design guidelines: https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/7050.pdf	
Popolo *Solanum nelsonii*	Endangered
No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2281 General project design guidelines: https://ipac.ecosphere.fws.gov/project/XFANLQQKVNEAVJX4SNBXOA3FBE/documents/generated/7050.pdf	
Pu`uka`a *Cyperus trachysanthos*	Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7749	

FERNS AND ALLIES

NAME	STATUS
Ihi`ihi *Marsilea villosa*	Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2169	

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

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---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE

SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Apapane *Himatione sanguinea* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9659	Breeds Dec 1 to Jul 31
Black Noddy *Anous minutus melanogenys* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10559	Breeds Apr 1 to Nov 30
Bristle-thighed Curlew *Numenius tahitiensis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/3913	Breeds elsewhere
Bulwer's Petrel *Bulweria bulwerii* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10579	Breeds May 1 to Sep 30
Christmas Shearwater *Puffinus nativitatis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9636	Breeds Apr 1 to Oct 31
Laysan Albatross *Phoebastria immutabilis* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9669	Breeds Nov 15 to Jun 15
Oahu 'amakihi *Hemignathus flavus* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/9592	Breeds Apr 1 to Jul 1
Red-tailed Tropicbird *Phaethon rubricauda melanorhynchos* This is a Bird of Conservation Concern (BCC) throughout its range in Hawaii and the Pacific Islands. https://ecos.fws.gov/ecp/species/10563	Breeds Dec 15 to Oct 15

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

ESTUARINE AND MARINE DEEPWATER

- M1UBLx

FRESHWATER FORESTED/SHRUB WETLAND

- PFO3C
- PFO3Cx
- PSS3C

RIVERINE

- R2UBH
- R2UBHx

FRESHWATER POND

- PUBHx

IPAC USER CONTACT INFORMATION

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4. Section 7(a)(2) Consultation with the National Marine Fisheries Service

The Corps has determined that the planned flood risk management project may affect, but is not likely to adversely affect federally listed species under the authority of the National Marine Fisheries Service. Consultation letters and communications with the Service are contained in this section (attached).

- Corps' Consultation Initiation Letter (refer to Section 3 for the Biological Assessment)

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Corps Request to Reinitiate Informal Section 7 Consultation and Official Species List

Herleth-King, Shawna S CIV USARMY CELRC (USA)

From: Herleth-King, Shawna S CIV USARMY CELRC (USA)
Sent: Thursday, November 10, 2022 10:54 AM
To: Ron Dean - NOAA Federal; joel.moribe@noaa.gov
Subject: Reinitiation of Section 7 Consultation for the Ala Wai Canal GRR
Attachments: Final Array Visuals.pptx

Importance: High

Hi Mr. Dean and Mr. Moribe,

The Corps would like to reinitiate informal Section 7 consultation for the Ala Wai Canal GRR study. As discussed during our coordination calls on the subject project, the GRR that the Corps is preparing is a reevaluation of the previous 2017 study and will ultimately result in a recommendation from the Corps that will either update and confirm the 2017 authorized project or make a new recommendation. Currently the Corps is evaluating six alternatives that make up the final array (please see the attached powerpoint for the final array visuals). Further analysis of these alternatives/measures may still result in further screening. Please note that since our last discussion the Corps has screened the Kapiolani Park Detention Basin measure from Alternative 1 – Storage Cornerstone. The remaining measures/alternatives are still being further evaluated, and it is still likely that additional measures/alternatives could be screened out of the final array (including Alternative 2C – Conveyance Cornerstone). However, the only measure that has been for sure screened from the attached final array of alternatives is the Kapiolani Park Detention Basin.

This email is a request for an updated official species list for the study area. It appears from previous consultation on the subject project that the official list from USFWS included the following species as recent as 2020: green sea turtle, Central North Pacific Distinct Population Segment (*Chelonia mydas*); Hawksbill sea turtle (*Eretmochelys imbricata*), and Hawaiian monk seal (*Monachus schauinslandi*).

If you could please provide an updated species list or confirm the above species should still be considered in our analysis we would appreciate it.

Thank you,
Shawna

Shawna Herleth-King (she/her)
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US Army Corps of Engineers
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NMFS Official Species List

Herleth-King, Shawna S CIV USARMY CELRC (USA)

From: Joel Moribe - NOAA Federal <joel.moribe@noaa.gov>
Sent: Thursday, November 10, 2022 11:39 AM
To: Herleth-King, Shawna S CIV USARMY CELRC (USA)
Cc: Ron Dean - NOAA Federal
Subject: [URL Verdict: Neutral][Non-DoD Source] Re: Reinitiation of Section 7 Consultation for the Ala Wai Canal GRR

Follow Up Flag: Follow up
Flag Status: Flagged

Shawna,

The species you and your agency will be working with are Central North Pacific green sea turtle, hawksbill sea turtle, and Hawaiian monk seal (now *Neomonachus schauinslandi*). The project may also affect Hawaiian monk seal critical habitat.

Joel Moribe
Endangered Species Biologist, NMFS/Pacific Islands Regional Office/PRD
NOAA Fisheries | U.S. Department of Commerce
Office: (808) 725-5142
www.fisheries.noaa.gov

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5. Essential Fish Habitat Consultation with the National Marine Fisheries Service

The Corps has prepared a draft EFH assessment.

- Corps' Consultation Initiation Letter and Essential Fish Habitat Assessment

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Draft
General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii

Essential Fish Habitat Assessment
Under the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as Amended

Prepared for:
NOAA, National Marine Fisheries Service
Habitat Conservation Division
Pacific Islands Region
Honolulu, Hawaii

Prepared by:
U.S. Army Corps of Engineers, Pittsburgh District

November 2023

(Revised: MONTH YEAR)

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1. Introduction

1.1 Preface

Many aquatic habitats are critical to the productivity and sustainability of marine fisheries. Essential Fish Habitat (EFH) is defined as “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1802(10)). “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate. “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities.

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as amended by the Sustainable Fisheries Act (SFA) of 1996 (Public Law 104-267), set forth a mandate for the National Marine Fisheries Service (NMFS), regional Fishery Management Councils (FMCs), and other Federal agencies to identify, conserve, and enhance EFH for those species regulated under a federal fisheries management plan (FMP). Federal agencies that fund, permit, or undertake activities that may adversely affect EFH are required to consult with NMFS regarding the potential effects of their actions on EFH and respond in writing to NMFS recommendations.

1.2 Project Authority

The Ala Wai Canal Flood Risk Management Study (Proposed Project) is authorized under Section 209 of the Flood Control Act of 1962. Section 209 is a general authority that authorizes surveys in harbors and rivers in Hawaii “with a view to determining the advisability of improvements in the interest of navigation, flood control, hydroelectric power development, water supply, and other beneficial water uses, and related land resources.”

1.3 Project History

In response to a request from the State of Hawaii Department of Land and Natural Resources (DLNR), the reconnaissance phase of the Ala Wai Canal Project was initiated in April 1999. At that time, Federal, State, and local agencies sought a comprehensive management and restoration plan to restore aquatic habitat and biological diversity in the canal and upstream tributaries. The reconnaissance report was submitted in August 1999 and recommended that the U.S. Army Corps of Engineers (USACE) assist the State with restoration of the canal. Approval by USACE for continuation into the feasibility phase was granted in September 1999.

Independently, the Ala Wai Flood Study was initiated in September 1998 under the Planning Assistance to States (PAS) Program (Section 22 of the Water Resources Development Act [WRDA] of 1974) to determine the potential flood risk to the Waikiki area, in response to a request by the DLNR Land Division. The study was completed in October 2001 and documented a high flood hazard associated with potential overtopping of the Ala Wai Canal. This study identified several mitigative measures and conceptual alternatives that could potentially minimize flood damages to Waikiki and surrounding areas. The results of this technical study were used to establish that the USACE could be involved in the investigation of flood risk management in the canal. As a result, a flood risk management objective was added to the Ala Wai Canal Project, thus expanding the project focus to both ecosystem restoration and flood risk management in the canal area.

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The Feasibility Cost Sharing Agreement (FCSA) was executed between USACE and the non-Federal sponsor, DLNR Engineering Division, in 2001. The feasibility phase of the project was initiated in July 2002, and an EIS scoping meeting was held in June 2004. Subsequently, in October 2004, heavy rains caused Manoa Stream to overtop its banks, resulting in significant damages. In response, the USACE temporarily ceased work on the feasibility study, such that the project could be expanded to include the upstream portions of the Ala Wai watershed. While the cost-share agreement was being amended to address a more comprehensive scope, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) received Federal funds to identify specific actions to address flooding in Manoa Valley. The Manoa Watershed Project was initiated in 2006 and resulted in detailed topographic mapping, hydrologic and hydraulic modeling, and identification of potential measures to address specific flood problems. However, because of insufficient Federal funding to complete the project, the Manoa Watershed Project was terminated before implementation.

Information developed through the Manoa Watershed Project by NRCS was subsequently incorporated into the Ala Wai Canal Project, which was restarted in 2007. A second EIS scoping meeting was held in October 2008. Project-related efforts were primarily focused on bringing the technical information for the entire watershed up to the same level of detail as produced for Manoa under the Manoa Watershed Project.

In October 2012, a charette was held to re-scope the study as part of the USACE Civil Works Planning Modernization process. The purpose of the charette was to bring together the USACE project delivery team (PDT), Pacific Ocean Division, and Headquarters staff with the non-Federal sponsor and other cooperating agencies, to determine the path forward for completing the feasibility study in compliance with current USACE planning requirements. Key outcomes of the charette included consensus on the problems and opportunities, objectives and constraints, screening and decision criteria, the initial array of alternatives, and a framework for identification of the recommended plan. Based on the project review at the charette, ecosystem restoration was eliminated as a study objective, as it was determined that the biological resources within the watershed did not have enough national significance to adequately justify ecosystem restoration as an objective.

The feasibility study was completed in 2017 and resulted in a recommendation that was subsequently authorized for construction under Section 1401 of the Water Resources Development Act of 2018. The 2017 recommended plan consisted of six in-stream debris and detention basins of varying height in the upper reaches of the watershed, one standalone debris catchment structure, three multi-purpose detention basins, floodwalls along the Ala Wai Canal averaging four feet in height and an earthen levee at the perimeter of an adjacent golf course averaging seven feet in height, two pump stations to reduce the threat of interior flooding, and a flood warning system. The record of decision (ROD) was signed on September 18, 2018, initiating the next phase of the study, Preconstruction Engineering and Design (PED). In 2020, an Engineering Documentation Report (EDR) provided the technical basis for modifications necessary to the Authorized Project. Subsequent analysis found that the modifications in the 2020 EDR were not cost effective and lacked the economic justification necessary for continued federal involvement.

In 2021, acknowledging the need to reduce the risk to life, safety, and economic damages from flooding throughout the Ala Wai Watershed in Oahu, Hawaii, the USACE began reevaluating the previously completed Ala Wai Canal Flood Risk Management Study in a General Reevaluation Report (GRR) using current planning criteria and policies. The GRR that is being developed will

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redefine the flood problems and risks in the Ala Wai watershed by updating hydrology, physical, biological, and socioeconomic conditions; reevaluate alternatives for reducing flood damages in the area; and reaffirm the Federal interest by recommending a plan that is economically feasible.

1.4 Consultation History

An initial kick-off meeting with the National Marine Fisheries Service (NMFS) regarding the General Reevaluation Report on the Ala Wai Canal Flood Risk Management Study was held on October 5, 2021. Follow-up meetings were held with agency staff on February 8, 2022; April 5, 2022; June 9, 2022; August 2, 2022; August 23, 2022; September 27, 2022; October 25, 2022; October 27, 2022; November 15, 2022; December 20, 2022; January 24, 2023; February 28, 2023; March 23, 2023; April 25, 2023; May 2, 2023; June 27, 2023; July 25, 2023, and September 26, 2023.

1.5 Project Purpose and Need

The purpose of the proposed project is to reduce the on-going flood risks throughout the Ala Wai watershed.

The need for the project is due to the high level of flood risk that exists within the Ala Wai Watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) and aging and undersized infrastructure result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Manoa, and Palolo valleys. The population density within the Ala Wai watershed is approximately 200,000 residents. The watershed also contains the University of Hawai'i and the Waikiki District—a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state.

It is estimated that the Ala Wai Canal has the capacity to contain about a 20% annual exceedance probability (AEP) flood event. Overtopping of the Canal has previously flooded Waikiki multiple times, including November 1965 and December 1967 storms and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by several recent events, including the October 2004 storm that flooded the Manoa Valley and the March 2006 storm that flooded Makiki. The October 2004 event was estimated to have a 4% AEP that caused more than $85 million in damages.

1.6 Project Action Area Description

The Ala Wai watershed is located on the southeastern side of the island of Oahu. The watershed encompasses 19 square miles (12,064 acres) and extends roughly 5 miles from the ridge of the Ko'olau Mountains to the near-shore waters of Mamala Bay. It includes the drainage of Makiki, Mano, and Palolo streams, which flow to the Ala Wai Canal, a 2-mile long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands. This construction and subsequent draining allowed the development of the Waikiki District. The study area is shown in Figure 1.

The Ala Wai watershed contains approximately 200,000 residents and is the most densely populated watershed in Hawaii. The upper portion (approximately 7.5 square miles, or 40 percent of the watershed) is zoned as Conservation District, which is intended to protect natural

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and cultural resources, including the island's aquifer. The remaining approximately 11 square miles of the middle and lower watershed is heavily urbanized, supporting a high density of single-family residences, condominiums, hotels, businesses, and schools.

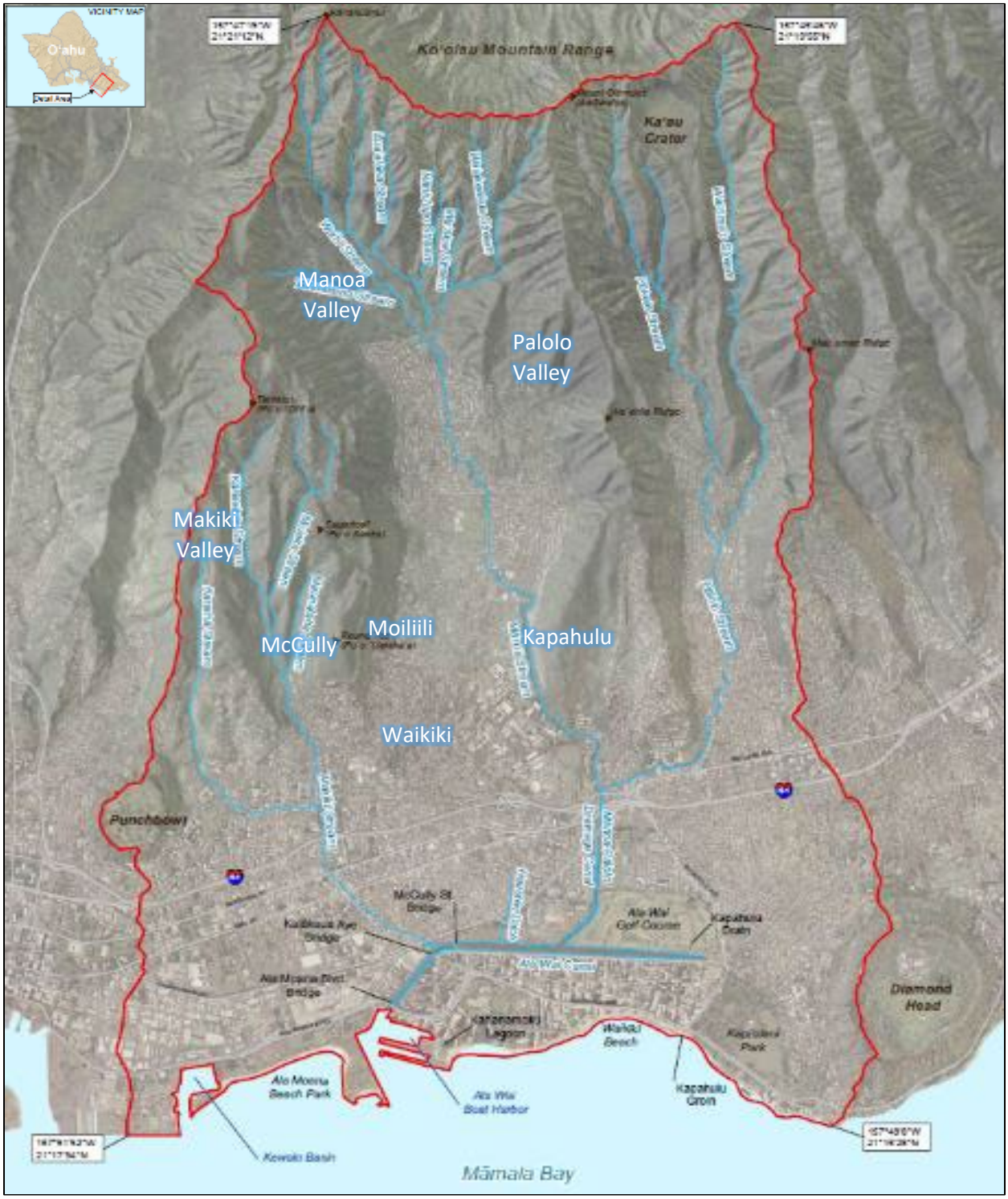

Figure 1: Regional Location of the Project Action Area.

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2. Description of Proposed Action and "Project Action Area"

The Ala Wai Canal Flood Risk Management Study ("The Project") purpose is to reduce riverine flood risks in the Ala Wai Watershed. Flooding associated with a 1-percent AEP rainfall event would affect approximately 3,111 structures with an estimated $905,327,000 in structural damages alone (2023 price levels). In response to identified flood-related problems and opportunities, a series of flood risk management measures were identified and formulated into five alternatives including the No Action alternative. The alternatives were evaluated through an iterative screening and reformulation process, resulting in the tentative selection of a plan for implementation. The tentatively selected plan would reduce flood risks by constructing one detention basin and concrete floodwalls averaging six feet high along Woodlawn Drive, Koali Road, and Kaimuki High School. In addition, concrete floodwalls averaging six feet high would be constructed on both sides of the Manoa-Palolo and Ala Wai canals. The proposed activities associated with the Project and that constitute the Federal action are described below in Section 2.2 Proposed Action, and construction details are provided in Section 2.3.

2.1 "Project Action Area" Defined

The scope of USACE's "Project Action Area" for the purposes of EFH consultation under Section 305(b)(2) of the MSA consists of the marine aquatic habitat in the Ala Wai Small Boat Harbor as well as the marine aquatic habitat within 1,640 feet (500 meters) of the mouth of the Ala Wai Small Boat Harbor. The total area of EFH waters and substrate (waters of the U.S.) within the defined project action area boundary is 171 acres. It is important to note that there is no proposed in-water work areas within the defined project action area for the purposes of EFH consultation. Potential in-water work areas would be located within Ala Wai Canal, Manoa-Palolo Canal, Makiki Stream, Manoa Stream, and Palolo Stream, all of which do not contain designated EFH.

2.2 Proposed Action

The Project includes constructing four floodwalls located along Woodlawn Drive, Koali Road, Kaimuki High School, and the Ala Wai Canal (including Manoa-Palolo Canal); constructing a detention basin at the Ala Wai Golf Course; and construction of potential mitigation measures to offset impacts due to induced flooding.

Approximately 1,505 linear feet of waters of the U.S. would be disturbed during project construction/modification of drainage structures; approximately 720 linear feet of waters of the U.S. would remain within the permanent project footprint. Approximately 744 cubic yards (CY) of fill material would be placed within the 1,505 linear feet of waters of the U.S. to be disturbed during construction. It is important to note, however, that the linear feet of waters to be disturbed, to remain in the permanent project footprint, and to include permanent fill are not waters with designated EFH. These waters are located within the Ala Wai Canal, Manoa-Palolo Canal, Manoa Stream, and Palolo Stream which have no designated EFH present. The potential impact to marine waters with EFH would be indirect as EFH designated waters are located immediately adjacent to the project footprint.

2.3 Construction Phases of the Proposed Action

The proposed action is divided into the following five (5) general construction phases:

1. Woodlawn Drive Floodwall
2. Koali Road Floodwall
3. Ala Wai Golf Course Detention Basin

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4. Ala Wai Canal Floodwall
5. Mitigation Measures

Construction is planned to begin in 2027 and would require approximately four (4) years to complete the overlapping construction phases. A summary of the activities in or affecting waters of the U.S., which comprise each construction phase is described in the following subsections. USACE has identified appropriate and necessary Best Management Practices (BMPs) that are considered part of the proposed action. These measures are detailed in Section 2.5 below.

2.3.1 Woodlawn Drive Floodwall

An approximately 1,270 feet long, six feet tall, and 12 feet wide at the base concrete floodwall with lava rock fascia would be installed along the right descending bank of Manoa Stream from approximately 270 feet upstream of Woodlawn Drive Bridge to approximately 1,120 feet downstream of Woodlawn Drive Bridge (Figure 2). The concrete floodwall would be an L-wall on macropiles (i.e., an ultra-high-capacity micropile typically drilled in place) (Figure 3). In general, macropiles are installed by methods that cause minimal disturbance to adjacent structures, soil, and the environment. They can be installed in access-restrictive environments and in all soil types and ground conditions. The installation procedure for macropiles causes minimal vibration and noise and can be used in conditions of low headroom. For construction, clearing and grubbing would occur along the right-descending bank of Manoa Stream for the length of the proposed L-wall and approximately 72 feet in width to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the stream. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the L-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the six-foot vertical portion of the L-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the L-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the L-wall would occur.

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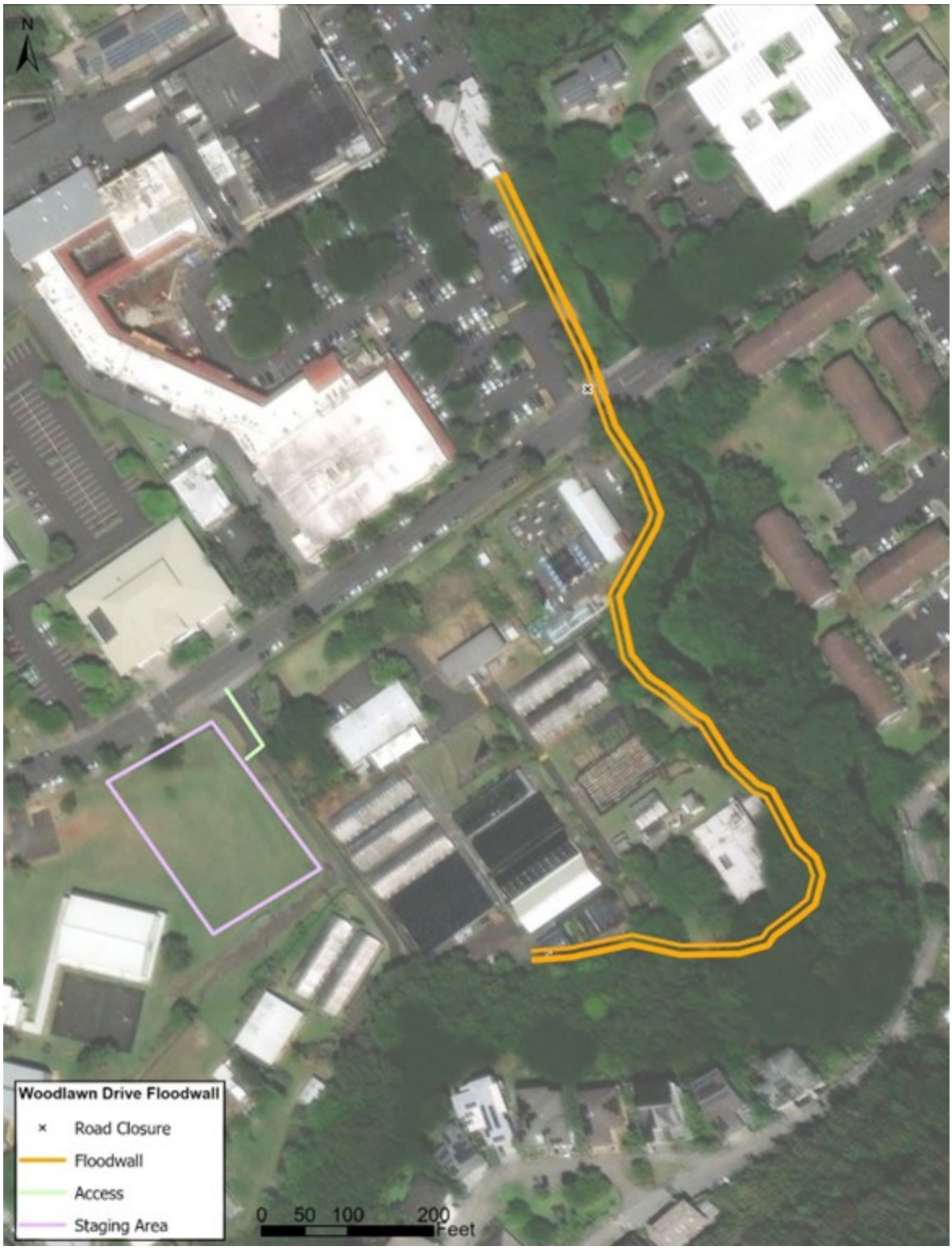

Figure 2: Woodlawn Drive Floodwall Proposed Project Footprint.

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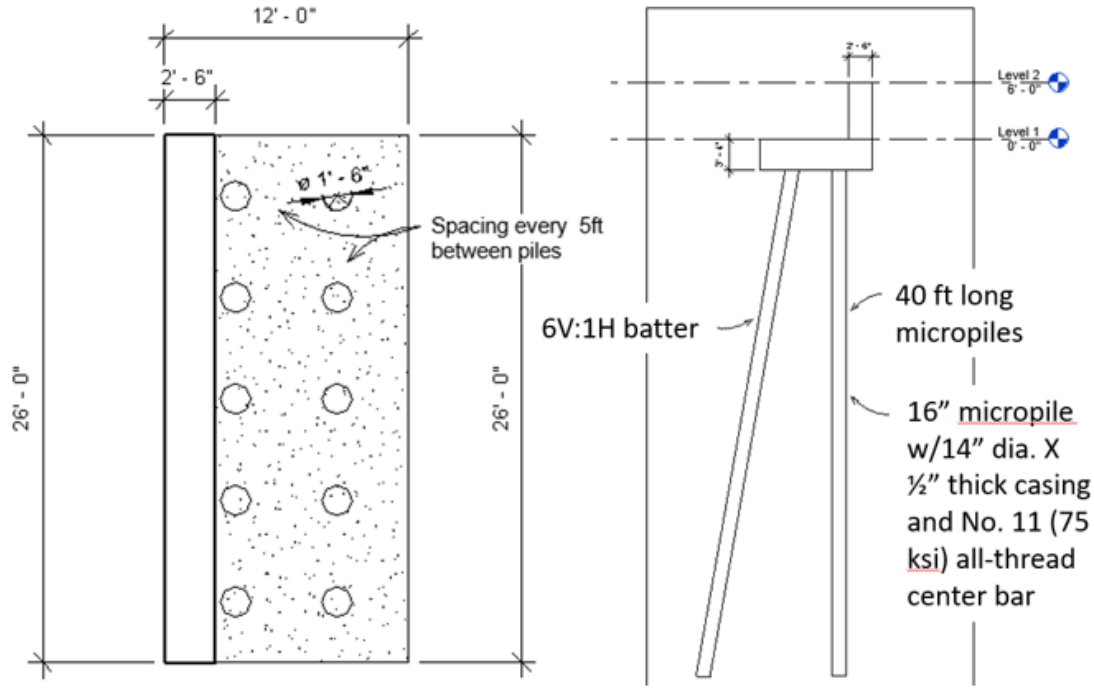

Figure 3: Preliminary L-wall on Macropiles Layout

The Woodlawn Drive Floodwall does not include any new or modification of existing drainage structures. One road closure structure would be constructed across Woodlawn Drive. The road closure structure is assumed to be a swing gate (Figure 4). A swing gate would require hinges to be attached to the floodwall and potentially a removable center post attached to the middle of the roadway if a double gate leaf is necessary (Figure 5). The road closure structure would require minor modifications as described above to the floodwalls for prefab gates. No in-water work is anticipated for the construction of the Woodlawn Drive Floodwall or road closure structure.

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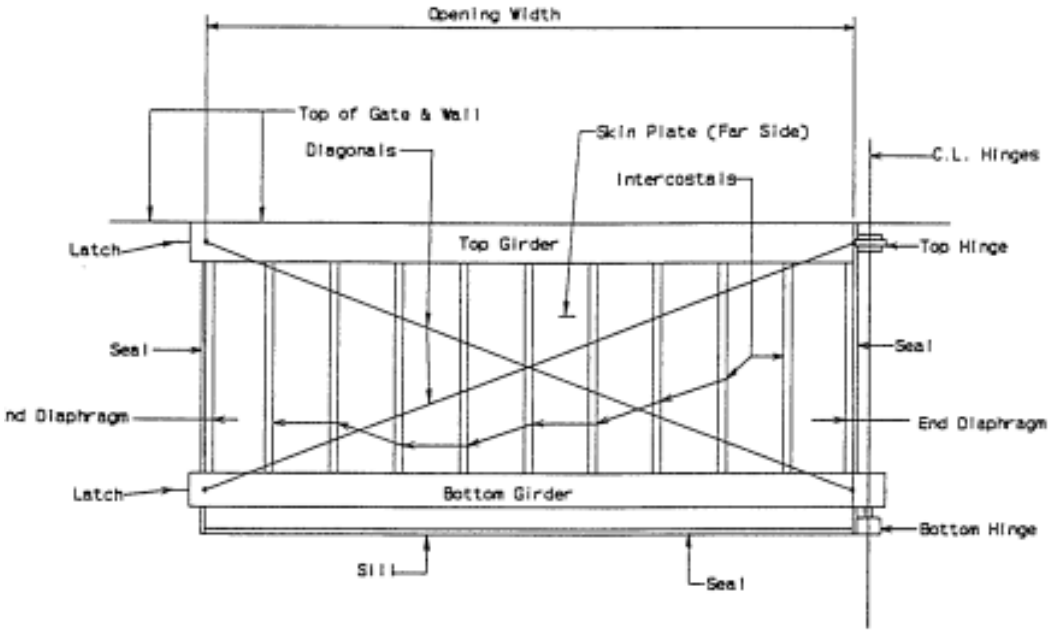

Figure 4: Example of a Single Swing Gate.

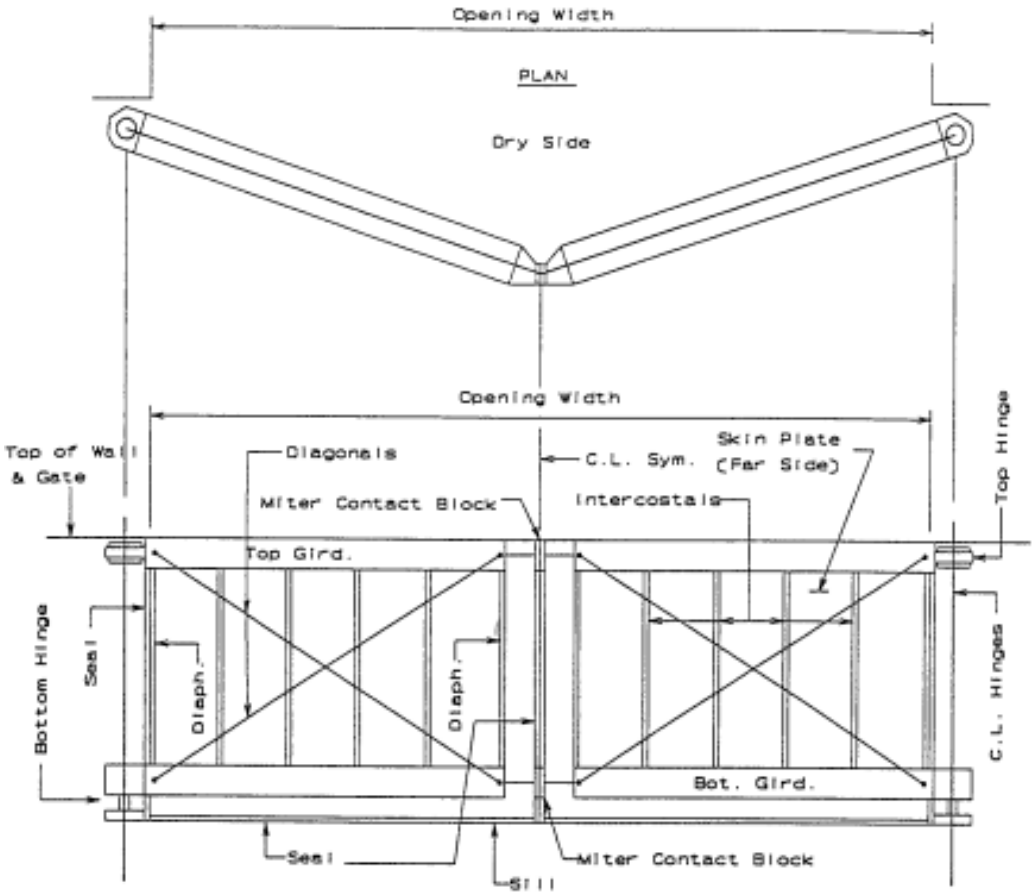

Figure 5: Example of a Double Swing Gate.

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2.3.2 Koali Road Floodwall

An approximately 2,510 feet long, six feet tall, and 12 feet wide at the base concrete floodwall with lava rock fascia would be installed along the left descending bank of Manoa Stream from approximately 1,430 feet upstream of Waialae Avenue downstream to the confluence of Manoa Stream with Palolo Stream. The floodwall would then continue along the right descending bank of Palolo Stream from the confluence of Manoa Stream with Palolo Stream upstream to the St. Louis Drive Bridge (Figure 6). The concrete floodwall would be an L-wall on macropiles as described above for the Woodlawn Drive Floodwall (Figure 3). For construction, clearing and grubbing would occur along the left-descending bank of Manoa Stream for the length of the proposed L-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Similarly, clearing and grubbing would occur along the right-descending bank of Palolo Stream for the length of the proposed L-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the streams. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the L-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the six-foot vertical portion of the L-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the L-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the L-wall would occur.

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Figure 6: Koali Road Floodwall Proposed Project Footprint.

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For the Koali Road Floodwall, two concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. The two concrete drainage structures would be approximately two feet tall by two feet wide by 50 feet long. Each drainage structure is anticipated to impact potentially 50 linear feet of stream. In addition, each drainage structure would require the excavation of approximately 38 CY of material and the placement of approximately 19 CY of fill material once the concrete structures are put in place. Therefore, these two drainage structures could result in the placement of approximately 38 CY of fill material into waters of the U.S. For visual purposes, concrete drainage structures could be similar in design to that shown in Figure 7. As seen in the figure, in-water work is restricted to where the concrete pipe outlets into the adjacent stream and where the concrete apron (if necessary) extends into the stream. Erosion protection such as the concrete apron and/or riprap may also be placed around the structure where it outlets into the stream channel.

Figure 7: Example of Concrete Drainage Structure.

The Koali Road Floodwall also includes retrofitting two existing smaller stormwater culverts with flap gates. For visual purposes, the flap gates could be like those shown in Figure 8, but would be scaled in size to the existing drainage structure opening. As seen in the figure, the retrofitting of a flap gate requires attachment of the flap gate to an existing drainage structure. No excavation or placement of fill, other than the flap gate, would occur within waters of the U.S.

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Figure 8: Example of Flap Gates.

Lastly, the Koali Road Floodwall includes two road closure structures, one across Koali Road and one across a pedestrian bridge that crosses Palolo Stream. The road closure structures are assumed to be swing gates (Figure 4). Swing gates require hinges to be attached to the floodwall and potentially a removable center post attached to the middle of the roadway if a double gate leaf is necessary (Figure 5). The road closure structures would require minor modifications as described above to the floodwalls for prefab gates. No in-water work is anticipated for the construction of the Koali Road Floodwall or the road closure structures.

2.3.3 Ala Wai Golf Course Detention Basin

An approximately 8,315 feet long, nine feet tall, and 66 feet wide at the base (12 feet wide at the crown) earthen berm (i.e., levee) would be constructed around the Ala Wai Golf Course to create a detention basin. The earthen berm would be adjacent to the left descending bank of the Manoa-Palolo Canal and the right descending bank of the Ala Wai Canal (Figure 9). For construction, clearing and grubbing would occur along the entire proposed length of the earthen berm and at a width of up to 126 feet, where space allows, to accommodate construction equipment. Following clearing and grubbing, fill material would be brought via dump trucks and equipment such as bulldozers, skid steers, rollers, and backhoes would be used to place the fill material and form it into an earthen levee. On the left-descending bank of the Manoa-Palolo Canal, there would be an overtopping spillway section approximately 100-feet in length that would be reinforced with erosion protection such as riprap. The erosion protection would be placed on the upland side as the Manoa-Palolo Canal in this area is already lined with erosion protection on the canal side. Once construction of the earthen berm is complete, the earthen berm as well as adjacent upland areas that were temporarily disturbed during construction would be revegetated with a native grass seed mix and/or grass seed mix appropriate for the maintenance of the golf course area. In addition to the overtopping spillway an existing drainage ditch that runs along the north side of the golf course, parallel to Date Street would be used as an inlet for storm waters from the Manoa-Palolo Canal to overflow into the detention basin. The modification of this existing drainage structure would potentially require the excavation of approximately 170 CY of material and the placement of approximately 83 CY of riprap fill material. Approximately 50 linear feet of stream is expected to be temporarily disturbed during construction while approximately 39 linear feet of stream would be within the permanent project footprint. A second small inlet channel would be excavated and lined with erosion control material to further improve storm water flow into the detention basin. This inlet channel would

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connect to the existing drainage ditch that runs along the north side of the golf course and outlet in the detention basin. The creation of this small inlet channel would require the excavation of approximately 3 CY of material and the placement of approximately 2 CY of riprap material. Approximately 50 linear feet of the existing drainage ditch would be temporarily disturbed by the construction of this inlet channel, with approximately 10 linear feet of the existing drainage ditch remaining within the permanent project footprint.

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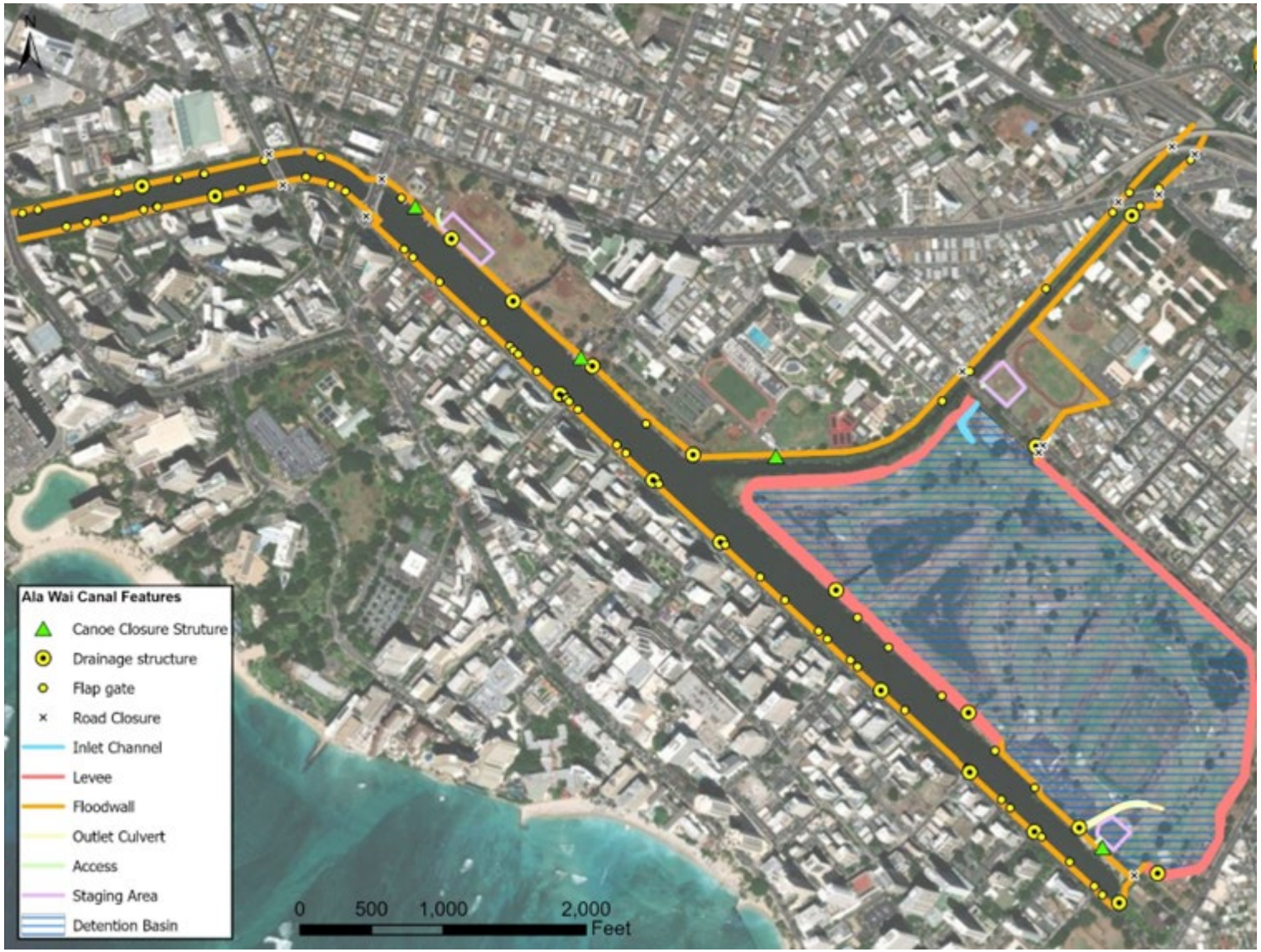

Figure 9: Ala Wai Canal Floodwall and Ala Wai Golf Course Detention Basin Proposed Project Footprint.

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The Ala Wai Golf Course Detention Basin also includes an approximately 2,409 feet long, nine feet tall, and 12 feet wide at the base L-wall floodwall. The L-wall floodwall would primarily be located along the front of the Ala Wai Golf Course Clubhouse and would tie into the earthen berm described above (Figure 9). The concrete floodwall would be an L-wall on macropiles as described above for both the Woodlawn Drive and Koali Road Floodwalls (Figure 3). For construction, clearing and grubbing would occur along the right-descending bank of the Ala Wai Canal for the length of the proposed L-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the canal. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the L-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the nine-foot vertical portion of the L-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the L-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the L-wall would occur.

For the golf course detention basin, five existing drainage structures/ditches would be modified. Four of the drainage structures would be concrete weirs with flap gates constructed along the levee alignment to allow collected storm water within the detention basin and from local runoff to slowly drain into the Ala Wai Canal. These four drainage structures combined would potentially impact approximately 200 linear feet of canal with approximately 69 linear feet of canal remaining within the permanent project footprint. In addition, the placement of these four drainage structures would require the excavation of approximately 180 CY of material and the placement of approximately 89 CY of fill into waters of the U.S. after the placement of the concrete drainage structures. For visualization purposes of the concrete drainage structures refer to Figure 7 and Figure 8. The fifth drainage structure would modify the existing drainage outlet near the Golf Course Clubhouse by enclosing this outlet in a concrete box culvert (instead of daylighted as it currently is) and installing flap gates at the downstream end of the concrete box culvert. The modification of this existing drainage structure would require the excavation of approximately 1,179 CY of material and the placement of approximately 571 CY of material around the concrete box culvert once placed. Approximately 505 linear feet of the existing drainage ditch would be temporarily disturbed as well as be within in the permanent project footprint.

Lastly, the Ala Wai Golf Course Detention Basin includes one road closure structure across the Maintenance Driveway for the Ala Wai Golf Course and one outrigger canoe launch access structure. Both of these structures are assumed to be swing gates (Figure 4). A swing gate requires hinges to be attached to the floodwall and potentially a removable center post attached to the middle of the roadway/launch pad if a double gate leaf is necessary (Figure 5). The structure would require minor modifications as described above to the floodwall for prefab gates. No in-water work is anticipated for the construction of the Ala Wai Golf Course earthen berm/L-wall or the road closure/outrigger canoe launch access structures.

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2.3.5 Ala Wai Canal Floodwall

An approximately 22,852 feet long, six feet tall, and six to 12 feet wide at the base floodwall would be constructed around the Ala Wai Canal (including Manoa-Palolo Canal). Essentially the floodwall would extend along both banks of the Manoa-Palolo Canal from Lunalilo Freeway downstream to the confluence of the Manoa-Palolo Canal with the Ala Wai Canal (except the area where the earthen berm for the Ala Wai Golf Course Detention Basin would be located along the left-descending bank of the Manoa-Palolo Canal) (Figure 9). The floodwall would then extend along both banks of the Ala Wai Canal from where it begins near the Ala Wai Golf Course (near Kapahulu Avenue) downstream to the Ala Moana Boulevard Bridge (except the area where the earthen berm/L-wall for the Ala Wai Golf Course Detention Basin would be located along the right descending bank of the Ala Wai Canal) (Figure 9). The Ala Wai Canal Floodwall would be comprised of three different types of walls: J-wall on macropiles (17,125 feet), L-wall on macropiles (4,069 feet), and tieback I-wall (1,658 feet).

The L-wall on macropiles is primarily located along both banks of the Manoa-Palolo Canal and a small portion of the Ala Wai Canal near Kapahulu Avenue (Figure 10). The concrete L-wall on macropiles would be the same as that described above for the Woodlawn Drive, Koali Road, and Ala Wai Golf Course floodwalls (Figure 3). For construction, clearing and grubbing would occur along both banks of the Manoa-Palolo Canal and the small section of wall near Kapahulu Avenue for the length of the proposed L-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the canals. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the L-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the six-foot vertical portion of the L-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the L-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the L-wall would occur.

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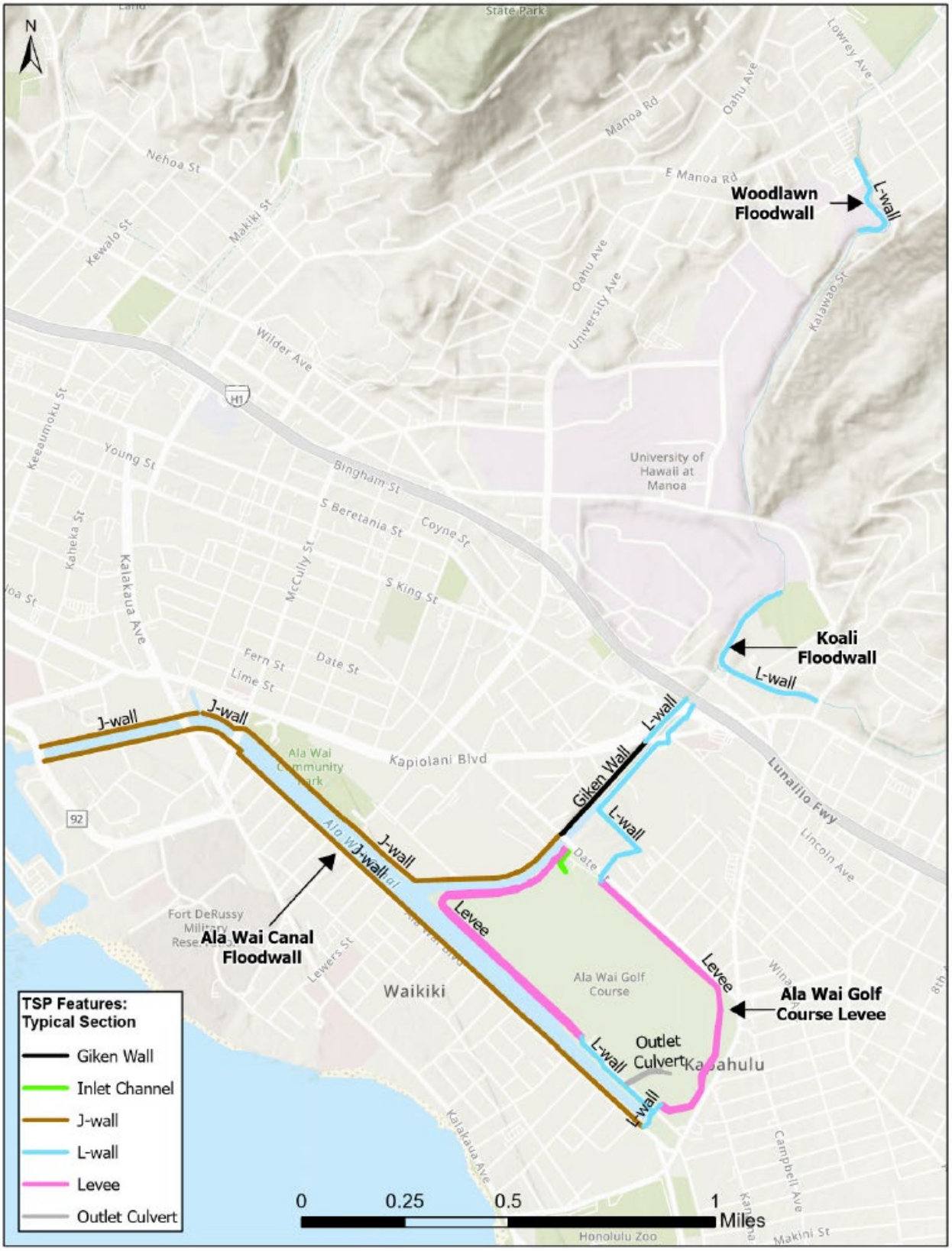

Figure 10: Floodwall Types for Each Measure.

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The tieback I-wall is located along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard downstream to Date Street (Figure 10). For construction, clearing and grubbing would occur along the right-descending bank of the Manoa-Palolo Canal for the length of the proposed tieback I-wall and up to 66 feet in width, where space allows, to accommodate construction equipment. Due to the space constrictions in this area, a 15-feet-wide rock bench would be placed in-stream running parallel to the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard downstream to Date Street (Figure 11). The 15-feet-wide rock bench would provide a work platform for construction equipment. The rock bench would include the placement of temporary fill into waters of the U.S., but this fill would be removed once construction of the tieback I-wall is complete. Following clearing and grubbing and the placement of the temporary rock bench, steel sheetpile would be installed using the press-in method of installation, such as that used by Giken Ltd. Equipment required for the press-in method would be a crane to hold the steel sheetpile and a generator to run the press-in equipment. The steel sheetpile would not be driven into the ground using an impact hammer nor would it be vibrated into the ground using a vibratory hammer. Once the steel sheetpile is in place, tieback soil anchors for stabilization of the wall would be placed six feet below grade. After the tieback I-wall installation is complete, the steel sheetpile wall extending above grade would be encased in concrete and then covered with a lava rock fascia. Lastly, revegetation of disturbed upland areas, minus the area occupied by the tieback I-wall would occur.

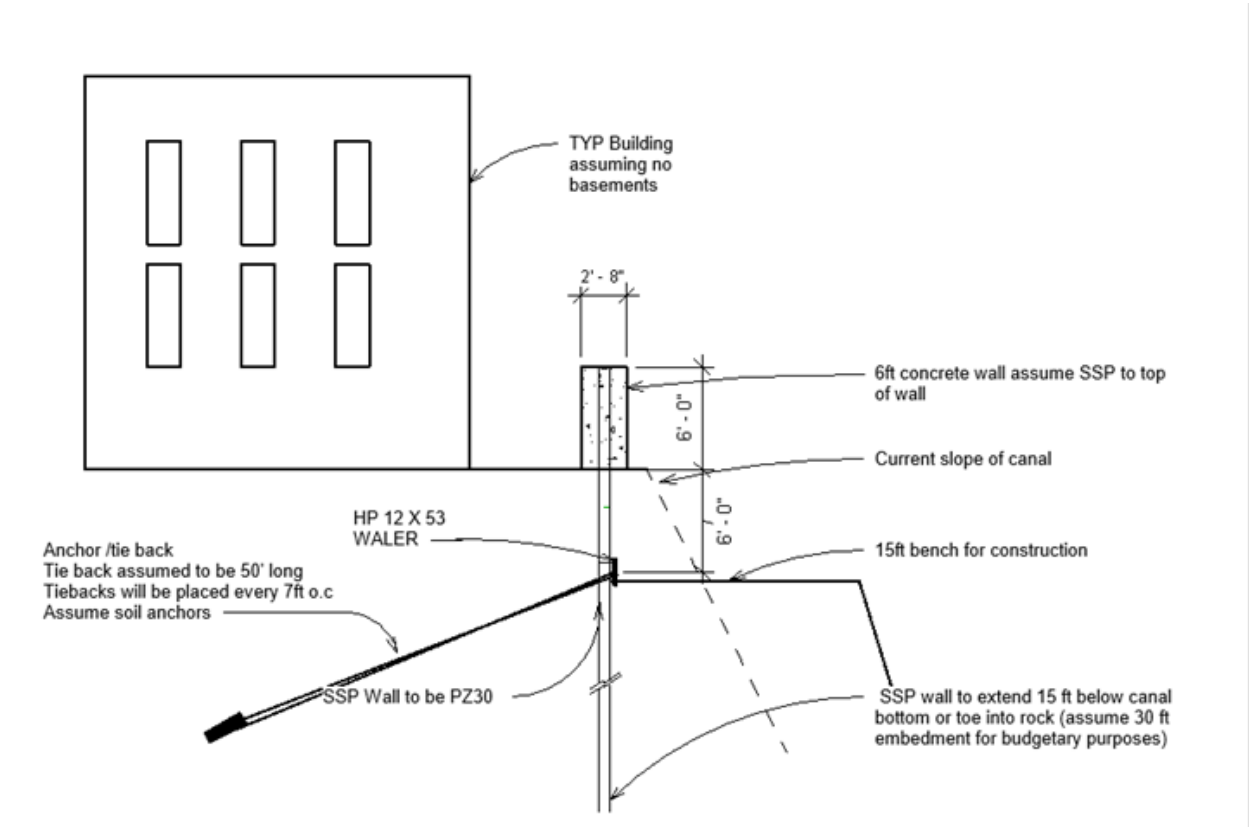

Figure 11: Design Layout of a Tieback I-Wall.

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The J-wall (Figure 12) is located along the right-descending bank of the Manoa-Palolo Canal downstream of Date Street and essentially along both banks of the Ala Wai Canal, except the section next to the Ala Wai Golf Course Detention Basin (Figure 10). For construction, clearing and grubbing would occur along the right-descending bank of the Manoa-Palolo Canal and along both banks of the Ala Wai Canal for the length of the proposed J-wall and up to 72 feet in width, where space allows, to accommodate construction equipment. Following clearing and grubbing, macropiles would be drilled into the upland area adjacent to the canals. A drill rig and associated drilling equipment would be staged upland and used to advance the macropile steel casing to the design depth. Where the drill hole can stay open without steel casing, an open hole can be advanced to design depth, and the casing then installed. Reinforcing the steel in the form of an all-thread bar or concentric pipes is inserted into the steel casing pipe, and high-strength grout is then pumped in by tremie. Form work would then occur to establish the 12-foot base of the J-Wall (i.e., the horizontal footing of the wall). Cement trucks would be used to pump cement into the base form. Once set, form work would occur for the six-foot vertical portion of the J-wall and cement trucks would once again be used to bring in the cement and pump it into the vertical form. Once the concrete is set, lava rock fascia would be placed on both sides of the vertical portion of the J-wall. Lastly, revegetation of disturbed upland areas, minus the area occupied by the J-wall would occur.

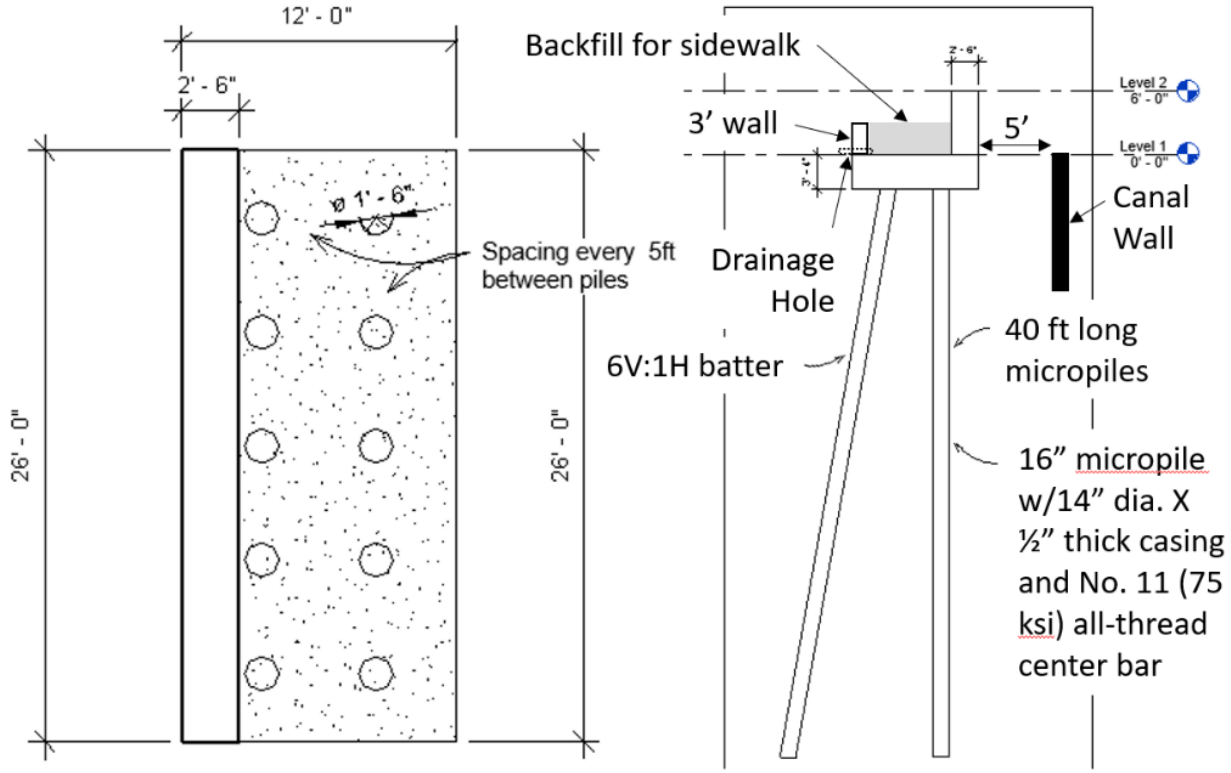

Figure 12: J-wall Typical Cross Section and Layout.

For the Ala Wai Canal Floodwall, 14 concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the areas behind the Ala Wai Canal floodwall. The concrete drainage structures would vary in size. Overall, the 14 drainage structures are expected to potentially impact 700 linear feet of canal during construction with approximately 130 linear feet of canal remaining in the project's permanent footprint. Approximately 76 CY to material would be excavated total for placement of the 14 drainage structures with

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approximately 46 CY of fill material being placed in waters of the U.S. to fill in around the concrete drainage structures once placed. For visual purposes, concrete drainage structures could be similar in design to that shown in Figure 7. As seen in the figure, in-water work is restricted to where the concrete pipe outlets into the adjacent canal and where the concrete apron (if necessary) extends into the canal. Erosion protection such as the concrete apron and/or riprap may also be placed around the structure where it outlets into the canal.

The Ala Wai Canal Floodwall also includes retrofitting 59 existing smaller stormwater culverts with flap gates. For visual purposes, the flap gates could be like those shown in Figure 8, but would be scaled in size to the existing drainage structure opening. As seen in the figure, the retrofitting of a flap gate requires attachment of the flap gate to an existing drainage structure. No excavation or placement of fill, other than the flap gate, would occur within waters of the U.S.

Lastly, the Ala Wai Canal Floodwall includes 11 road closure structures and 3 outrigger canoe launch access structures. All of these structures are assumed to be swing gates (Figure 4). A swing gate requires hinges to be attached to the floodwall and potentially a removable center post attached to the middle of the roadway/launch pad if a double gate leaf is necessary (Figure 5). The structure would require minor modifications as described above to the floodwall for prefab gates. No in-water work is anticipated for the construction of the Ala Wai Canal Floodwall or the road closure/outrigger canoe launch access structures.

2.3.6 Mitigation Measures

Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cubic feet per second (cfs). At the time of compiling this Draft Report, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed. Although likely not to be implemented due to cost, if a pump station were found to be necessary during the Preconstruction Engineering and Design (PED) phase of the project, it would likely be located along Makiki Stream to reduce induced flooding. In general, the pump station would be constructed upland and adjacent to Makiki Stream, but not located within the stream. A permanent pump station would likely consist of a wet well installed in a low-lying area where water naturally flows. The wet well would consist of a concrete inlet box with mesh screens for debris and wildlife protection, hinged lid for pump removal for maintenance, etc. The outlet from the wet well would be routed to the Ala Wai Canal floodwall and would either pass over the wall or through it with a check valve to prevent inflow from the river side. The wet well would connect to a pump house. The pump house would be elevated and would hold the electrical infrastructure and other operating equipment, and a backup generator to minimize pump failure in the event of power disruption. The pump station would only be triggered to begin operating in the event of a storm event; therefore, much of the time the pump station would not be in operation.

Nonstructural measures that are under consideration as potential mitigation measures for induced flooding include floodproofing, elevation, and potentially acquisition. Dry floodproofing involves sealing flood prone structures from water with door and window barriers, small scale rapid deployable floodwalls, or sealants. Dry floodproofing is generally feasible and effective up to a maximum height of three feet above ground level. Floodproofing is only recommended for non-residential structures such as commercial buildings and critical infrastructure that cannot be elevated due to their large size. Elevation of structures is limited to residential structures, largely single-family homes. Whether a structure may be elevated depends on several factors including the foundation type, size of the structure, condition, etc. Elevating a home so that the finished

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floor is at a height where it is less likely that the structure and/or contents will be damaged by flooding. Due to structural constraints and wind loading concerns, a maximum height for residential structure elevation was established at 12 feet above ground level.

2.3.7 Staging Areas

The staging area for the Woodlawn Drive floodwall is proposed to be at Noelani Elementary School and would be approximately 0.7 acre (Figure 2).

The staging area for the Koali Road floodwall is proposed to be at Kanewai Community Park located at the north end of the project footprint. This staging area would be approximately 0.6 acre (Figure 3).

The Ala Wai Canal Floodwall and the Ala Wai Golf Course Detention Basin three potential staging areas (Figure 9). The staging area for the Ala Wai Canal right bank floodwall is proposed to be at Ala Wai Community Park and would be approximately 1 acre. The staging area for the Ala Wai Canal left bank floodwall is proposed to be at Ala Wai Golf Course and would be approximately 0.7 acre. The staging area on the Ala Wai Golf Course would also be used as the staging area for the Ala Wai Golf Course Detention Basin. The Ala Wai Canal left bank floodwall may also stage construction equipment and materials at the Ala Wai Community Park as described for the Ala Wai Canal right bank floodwall above. Lastly, the staging area for the Manoa-Palolo right bank and left bank floodwalls as well as the Kaimuki High School floodwall is at Kaimuki High School and would be approximately 1 acre. Overall, there are five potential staging areas for the entire Proposed Action equaling a total of 4 acres.

2.3.8 Site Access and Haul Routes

For disposal, the haul route would begin at the project footprint and end at the commercial landfill for Oahu, Waimanalo Gulch Sanitary Landfill, located approximately 28 miles west of the project action area (Figure 13); note distance varies depending on project feature location. Construction equipment and haul trucks would utilize temporary construction haul roads and existing roadways (e.g., Interstate H-1).

Organic materials, trees, shrubs, as well as inorganic materials, would be disposed of by hauling to the Waimanalo Gulch Sanitary Landfill (Figure 13). Disposal of these materials by burning or burying at the project footprint would not be permitted. Although it is not anticipated that hazardous substances would be present in the material removed, prior to disposal, the collected material would undergo testing (by the contractor) to determine appropriate disposal techniques.

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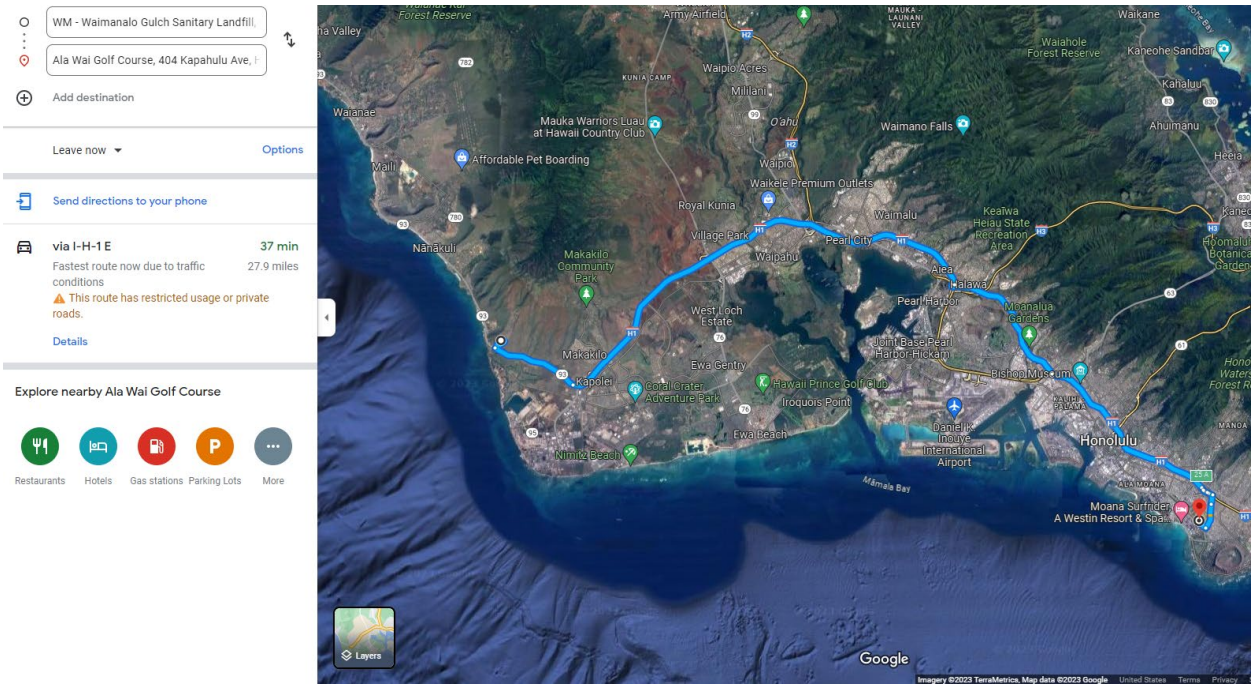

Figure 13: General Haul Route from the Proposed Project Action Area to Nearest Sanitary Landfill.

2.3.9 Construction Equipment

Construction equipment would likely include a combination of water trucks, waste trucks, haul trucks, crawler and front-end loaders, pile driver, dozers, skid-steers, excavators, loaders, and pickup trucks.

2.3.10 Construction Schedule

Construction could begin as early as 2027 and is expected to take approximately four years. It is possible that the Proposed Action would be constructed in stages, with multiple start dates and construction periods for various features depending on funding, environmental windows, and weather delays. Construction phasing may result in an extension of the overall project duration beyond four years.

Proposed construction hours would be 7:00 a.m. to 7:00 p.m., Monday through Friday, and 8:00 a.m. to 7:00 p.m. on Saturday. Occasional overtime work may be required to maintain the construction schedule, but timing would comply with local noise ordinances. Any construction lighting that may be required during dawn and dusk hours to illuminate a work area would use low mounting height, wattage, and lumens. Construction lighting would also be shielded to help direct the light down to the work area where it is needed. Lastly, lights with longer wavelengths (560 nanometers or longer) would be used when feasible.

2.4 Future Operation, Maintenance, Repair, Replacement, and Rehabilitation

Maintenance, including routine inspections and minor repairs of the project and its associated features, would be required after construction is completed. The following activities may occur:

- Routine and special inspection with pickup trucks and sport utility vehicles, as needed, and up to daily during flood events.

- Vegetation management where floodwalls and earthen berms are located. Vegetation management in the areas with floodwalls would be in accordance with Corps of Engineers Engineering Pamphlet 1110-2-18; at a minimum 15-feet down slope of the floodwall would need to be a vegetation free zone (VFZ). The VFZ applies to all vegetation except for grasses for the purpose of erosion control.
- Periodic clearing of debris around inlet/outlet structures.
- Periodic clearing of accumulated sediment and debris from detention basin.
- Periodic vegetation management such as weeding, herbicide application, and re-seeding.
- Periodic graffiti removal and vandalization repair.

Rarely, following large and erosive flood flows, larger-scale maintenance and repairs may be required, which could require access and use of heavy equipment within the floodplain adjacent to the project feature. A temporary work area may need to be established around a repair site. The local sponsor would be required to obtain emergency or standard permits from regulatory agencies, including Corps Regulatory, who would coordinate and consult, if needed, with the U.S. Fish and Wildlife Service (USFWS) and NMFS. These permits would likely require active habitat restoration of temporary construction and access roads. It is likely that a storm event large enough to damage the detention basins and/or floodwalls would also have removed vegetation in the immediate area, but specific impacts cannot be evaluated until or unless damage occurs, and repair work is defined.

2.5 Proposed Avoidance and Minimization Measures Included as Part of the Proposed Action

USACE has formulated a Site-Specific BMP Plan identifying all measures that would be implemented before, during, and after construction to avoid and/or minimize project-related impacts to the natural and human environment. The following BMP's are considered part of the proposed action and would be implemented, as applicable, to avoid and/or minimize adverse impacts, specifically to EFH. Rationale for implementation of each BMP as it relates to EFH is also provided below.

- Restrict turbidity-generating construction activities and remove sediment containment BMPs overnight during specific coral production timeframes (e.g., two to three days, or five days to be conservative, after the full moon in July and August).
    - *Rationale: The majority of larvae are released at night and elevated turbidity has the potential to adversely affect coral spawning activities. Removal of in-water sediment containment BMPs overnight would avoid disruption or restriction of night coral spawning during reproductive months.*

- The use of full length, full-surround silt curtains shall be installed during any in-water construction activities (i.e., Koali Road Floodwall – discharge structures; Ala Wai Golf Course Detention Basin – inlet and discharge structures; Ala Wai Canal Floodwall – discharge structures, etc.) to isolate and contain construction-generated turbidity, where and when such installation is effective and appropriate.
    - *Rationale: to minimize indirect impacts that have the potential to degrade water quality of surrounding harbor/nearshore marine waters and to prevent settling of suspended sediments atop adjacent habitats for coral, macroinvertebrates, and fish communities. Silt curtains are ineffective when deployed in currents,*

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therefore, any in-water construction activities dependent upon their use would be curtailed during significant storm events when flows from streams entering the harbor/nearshore marine environment generate surface currents.

- Oil absorbent booms shall be readily available during installation of the upland floodwalls/earthen berms.
    - *Rationale: to protect against release of land-based pollutants into the soil at the groundwater interface that could infiltrate harbor/nearshore marine waters.*

- Excavated soils and sediments would be managed to ensure containment of stockpiles and to prevent return flows or run-off from entering waters of the U.S.
    - *Rationale: to avoid degradation of harbor/nearshore water quality resulting from return flow or overflow of excavated spoils.*

- An environmental observer would be on-site daily to monitor all in-water work.
    - *Rationale: this BMP is intended to cover a broad range of potential resource concerns from sea turtle and marine mammal observations to documentation of any turbidity plumes or other construction practices that may result in adverse impacts to the harbor/nearshore marine environment. The observer would play an active role in addressing and resolving environmental concerns and ensuring corrective measures are implemented in a timely matter.*

- Turbidity-generating, in-water construction activities would be halted during periods of heavy precipitation that have the potential to elevate ambient turbidity levels within the harbor.
    - *Rationale: this BMP is intended to avoid compounding construction-generated turbidity levels atop stormwater-related turbidity within the harbor/nearshore marine environment to minimize adverse impacts to EFH.*

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3. Essential Fish Habitat Designations

EFH in the marine waters surrounding the Hawaiian Islands is described in two fishery ecosystem plans (FEPs) prepared by the Western Pacific Regional Fishery Management Council (WPRFMC). The FEP for the Hawaiian Archipelago (2009; Amendment 4, 2016; Amendment 5, 2019) specifically manages demersal resources and habitats associated with the extended Hawaiian Islands. Fisheries may comprise a group or complex of species. These fishery species are collectively referred to as management unit species (MUS).

The project action area (i.e., adjacent marine waters of Ala Wai Small Boat Harbor and the nearshore marine waters of Honolulu (Figure 14) is within the Hawaii Archipelago Fishery Ecosystem Plan (FEP) boundaries and has been identified as Essential Fish Habitat (EFH) by the Western Pacific Regional Fishery Management Council (the Council). Management unit species (MUS) are those “caught in quantities sufficient to warrant management or specific monitoring by NMFS and the Council,” and are listed in Table 1. The EFH for MUS of the Western Pacific Region (Table 2 and Table 3) are bounded by the shoreline and the seaward boundary of the EEZ, unless otherwise indicated.

Figure 14: Essential Fish Habitat (Yellow) within the Vicinity of the Proposed Project Action Area.

Table 1: Hawaii Archipelago Management Unit Species (MUS).

Scientific Name	Common Name	Local Name
Bottomfish		
Aphareus rutilans	silverjaw jobfish	lehi
Aprion virescens	gray jobfish	uku
Hyporthodus quernus	sea bass	hāpu’upu’u
Etelis carbunculus	red snapper	ehu

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Scientific Name	Common Name	Local Name
Etelis coruscans	longtail snapper	onaga or ‘ula’ula’loa’e
Pristipomoides filamentosus	pink snapper	‘ōpakapaka
Pristipomoides sieboldii	Von Siebold’s snapper	Kalekale
Pristipomoides zonatus	snapper	gindai
Seamount Groundfish		
Beryx splendens	alfonsin	NA
Hyperoglyphe japonica	raftfish	NA
Pentaceros wheeleri	armorhead	NA
Crustaceans		
Heterocarpus spp.	deepwater shrimp	NA
Ramina ranina	Kona crab	papa’I kua loa

(NA) = Not Applicable

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Table 2: Bottomfish and Seamount Groundfish EFH Designations for Each Life Stage of Species Assemblages.

Species Assemblage	Essential Fish Habitat Designations				Overlaps with Action Area?
	Eggs	Post-hatch Pelagic	Post-settlement	Sub-adult/adult	
Bottomfish Shallow Stocks	• Water column from 0-787 ft (0-240 m) • Shoreline to EEZ outer boundary				Yes
Bottomfish Intermediate Stocks	• Water column from 0-1,050 ft (0-320 m) • Shoreline to EEZ outer boundary		• Water column from 131-1,050 ft (40-320 m) • Between the 131 and 1,050 ft (40 and 320 m) isobaths		• Yes – Eggs & Post-hatch pelagic • No – Post-settlement & sub-adult/adults
Bottomfish Deep Stocks	• Water column from 0-1,312 ft (0-400 m) • Shoreline to EEZ outer boundary		• Water column from 262-1,312 ft (80-400 m) • Shoreline to 1,312 ft (400 m) isobath		
Seamount Groundfish	• Pelagic waters 0-1,968 ft (0-600 m) • Within EEZ north of 28° N & west of 180° W		• Benthic or benthopelagic waters from 394-1,968 ft (120-600 m) • Within EEZ north of 28° N & west of 180° W	• Benthic or benthopelagic waters from 394-1,968 ft (120-600 m) • Within EEZ north of 28° N & west of 180° W	

Table 3: Pelagic and Crustacean EFH Designations for Each Life Stage of Species Assemblages.

Species Assemblage	Essential Fish Habitat Designations		Overlaps with Project Action Area?
	Eggs & Larvae	Juveniles & Adults	
Crustaceans	**Kona crab:** • Water column down to 492 ft (150 m) • Shoreline out to EEZ boundary	**Kona crab:** • Bottom from shoreline down to 328 ft (100 m)	Yes
	Deepwater shrimp: • Outer reef slopes between 1,804 and 2,297 ft (550 and 700 m)	**Deepwater shrimp:** • Outer reef slopes between 984 and 2,297 ft (300 and 700 m)	No
Pelagic	• Water column down to 656 ft (200 m) • Shoreline to EEZ boundary	• Water column down to 3,281 ft (1,000 m) • Shoreline to EEZ boundary	Yes

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While pelagic MUS can be found within the Hawaii Archipelago FEP boundary, they are managed under a separate Pelagic FEP, which encompasses all areas of pelagic fishing operations in the EEZ or on the high seas, for any domestic vessels that: fish for, possess, or transship Pacific Pelagic MUS (Table 4) within the EEZ waters of the Western Pacific Region or land Pacific Pelagic MUS within the states, territories, commonwealths, or unincorporated U.S. island possessions of the Western Pacific Region.

Table 4: Pacific Pelagic Management Unit Species (PMUS)

Scientific Name	Common Name
Thunnus alalunga	Albacore
Thunnus obesus	Bigeye tuna
Thunnus albacares	Yellowfin tuna
Thunnus thynnus	Northern bluefin tuna
Katsuwonus pelamis	Skipjack tuna
Euthynnus affinis	Kawakawa
Auxis spp.	Other tuna relatives
Scomber spp.	Other tuna relatives
Allothunus spp.	Other tuna relatives
Tetrapturus audax	Striped marlin
Tetrapturus angustirostris	Shortbill spearfish
Xiphias gladius	Swordfish
Istiophorus platypterus	Sailfish
Makaira mazara	Blue marlin
Makaira indica	Black marlin
Alopias pelagicus	Pelagic thresher shark
Alopias superciliousus	Bigeye thresher shark
Alopias vulpinus	Common thresher shark
Carcharhinus falciformis	Silky shark
Carcharhinus longimanus	Oceanic whitetip shark
Prionace glauca	Blue shark
Isurus oxyrinchus	Shortfin mako shark
Isurus paucus	Longfin mako shark
Lamna ditropis	Salmon shark
Coryphaena spp.	Mahimahi (dolphinfish)
Lampris spp.	Moonfish
Acanthocybium solandri	Wahoo
Gempylidae	Oilfish family
Bramidae	Pomfret family
Ommastrephes bartamii	Neon flying squid
Thysanoteuthis rhombus	Diamondback squid
Sthenoteuthis oualaniensis	Purple flying squid

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4. Environmental Baseline Conditions Within the "Project Action Area"

As described in Section 2.1, the "Project Action Area" is defined as the marine aquatic habitat in the Ala Wai Small Boat Harbor as well as the marine aquatic habitat within 500 meters of the mouth of the Ala Wai Small Boat Harbor. The project action area is defined as the marine aquatic habitat in the Ala Wai Small Boat Harbor as well as the marine aquatic habitat within 500 meters of the Ala Wai Boat Harbor. The project action area also includes the Ala Wai Canal and Manoa-Palolo Canal and portions of adjacent uplands along these areas as well as upland areas along Manoa Stream (Woodlawn Drive floodwall) and Manoa/Palolo streams (Koali Road floodwall) that will be impacted to facilitate construction associated with the Ala Wai Canal FRM project.

4.1 Project Action Area Existing Environment

The Ala Wai Watershed has undergone major land-use changes in the past 100 years. Since 1950 the resident population of the island has more than doubled (State of Hawai'i, 2000). Honolulu, the capital city located on the island of Oahu, is now considered the most densely population city in the Nation (Fulton et al., 2001). Urbanization on Oahu has been accompanied by substantial alterations to stream systems, including changes in water quality, instream habitat, riparian habitat, and the introduction of nonnative species. An extensive study conducted in the 1970s, showed that 57 percent of the streams on the island of Oahu had been channelized, 58 percent had water exported from them, and all had roads crossing over them (Timbol and Maciolek, 1978). Modifications of the stream ecosystems have been most severe at the lower elevations where urban growth is greatest (Timbol and Maciolek, 1978). Artificially straightened reaches with concrete-lined flat-bottomed channels and revetted (reinforced) banks are common in the urban areas of the study area. Such modifications are commonly accompanied by removal of riparian vegetative cover, and a reduction in substrate complexity (removal of large boulders).

4.2 Project Action Area Existing Environment

The Ala Wai Small Boat Harbor is located on the south shore of Oahu between Ala Moana Park and Waikiki Beach (DLNR and DOBAR, 2022). It was first constructed from a barge channel in the 1900s and has been periodically enlarged over time to its current state. It is the largest small boat harbor in Hawaii and is managed and administered by the State of Hawaii Department of Land and Natural Resources (DNLR) Division of Boating and Ocean Recreation (DOBOR). Small boat harbors managed by DOBOR are constructed, maintained, and operated for the purposes of: (1) recreational boating activities; (2) landing of fish; and (3) commercial vessel activities. Currently, the Ala Wai Boat Harbor contains 699 berths with docks, 85 moorings, and 22 dry storage spaces and can accommodate vessels up to 85 feet in length. Water depths within the Ala Wai Small Boat Harbor range down to 15 feet (4.6 meters) (DLNR and DOBAR, 2022).

Ala Wai Small Boat Harbor receives surface runoff via sheet flow and drainage outlets and drainage from Ala Wai Canal which have the potential to convey terrigenous sediments into Ala Wai Small Boat Harbor during precipitation events. During storm events, storm runoff can result in temporary increases in nutrients, pollutants, and sediments in the harbor in addition to a decrease in water clarity. Harbor sediments are continually re-suspended into the water column due to recreational vessel activity (i.e., propeller wash within the harbor). Such inputs contribute to the ambient water quality of Ala Wai Harbor.

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Once out of the Ala Wai Small Boat Harbor currents generally push water east/southeast towards Waikiki Beach (Figure 15). Waikiki Beach extends along the shoreline of Mamala Bay on the south shore of Oahu, Hawaii. Waikiki is a predominantly engineered shoreline. Almost the entire length of Waikiki is armored by seawalls that were constructed in the early 1900s. The beaches of Waikiki are primarily man-made and composed almost entirely of sand that has been imported from various terrestrial sources, other beaches, and dredged from offshore deposits. The beaches of Waikiki have tremendous historical, cultural, and recreational value and are the primary amenity that supports the tourism-based economies of Waikiki, the City and County of Honolulu, and the State of Hawaii.

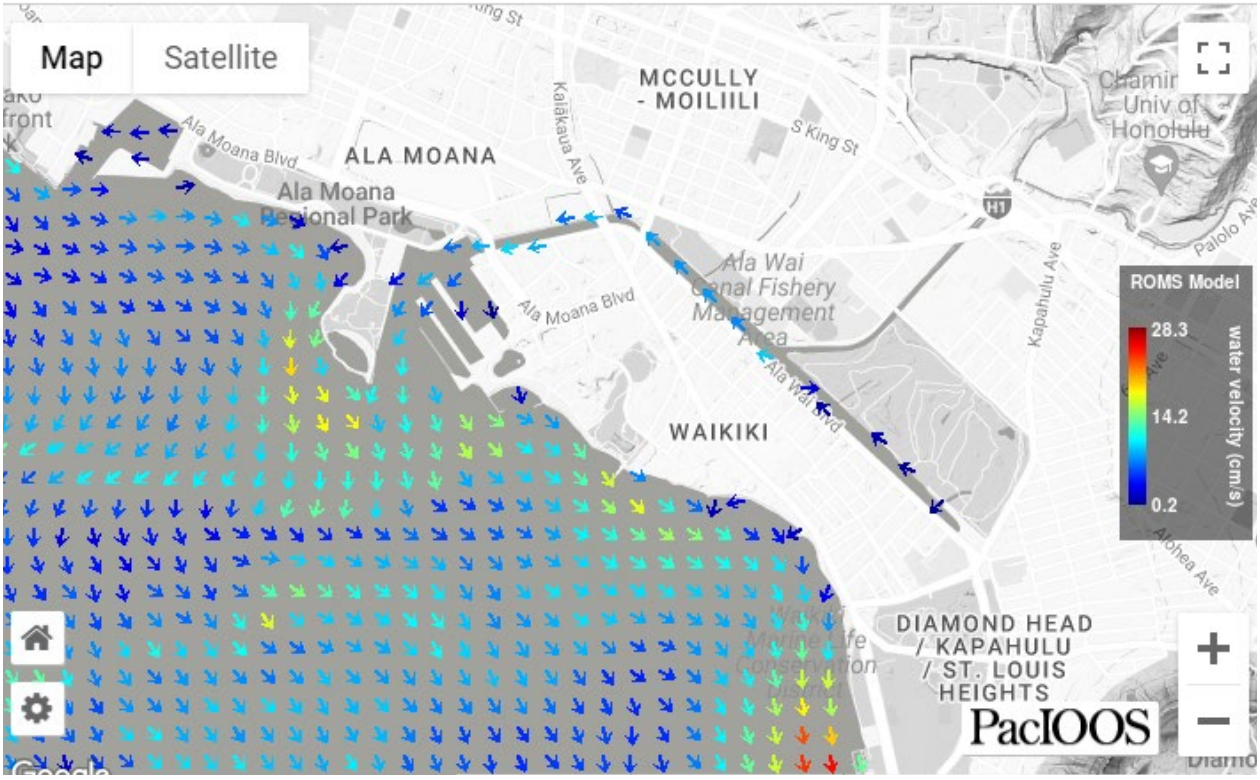

Figure 15: General characterization of current patterns out of Ala Wai Small Boat Harbor (PacIOOS, 2023).

The waters of Ala Wai Small Boat Harbor and nearshore waters from Ala Moana Beach to Waikiki Beach appear on the Hawaii Department of Health (HDOH) 2022 list of impaired waters prepared under Clean Water Act §303(d) (HDOH, 2022). This designation indicates that waters in these areas do not meet certain applicable water quality standards. Nearshore waters from Ala Moana Beach to Waikiki Beach are listed as impaired for turbidity.

The Ala Wai Canal and Ala Wai Small Boat Harbor (State Waterbody ID: HIW00050) are on the 303(d) List of Water Quality Limited Segments. Ala Wai Canal and Boat Harbor (ID: HIW00050) is listed as impaired for aquatic life, swimming and boating, and other due to Enterococci (bacteria), TN, NO_3+NO_2, total phosphorus, turbidity, pathogens, metals, total suspended solids, organochlorine pesticides, and lead. There is also a fish consumption advisory for fish caught within the Ala Wai Canal and Boat Harbor. TMDLs for total nitrogen and total phosphorus were approved in 1996 and revised in 2022 for the Ala Wai Canal and Boat Harbor. Beaches

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southeast of the Ala Wai Small Boat Harbor that are on the 2022 list of impaired waters include Kahanamoku Beach (State Waterbody ID: HI366432), Kuhio Beach (State Waterbody ID: HI681782), Kuhio Beach (Public Bath) (State Waterbody ID: HI851298), and Waikiki Beach Center (State Waterbody ID: HI244505). Kahanamoku Beach is listed as impaired due to turbidity and chlorophyl *a*. Kuhio Beach is listed as impaired due to NO_3+NO_2, NH_4, turbidity, and chlorophyl *a*. Kuhio Beach (Public Bath) is listed as impaired due to NH_4, turbidity, and chlorophyl a. Lastly, Waikiki Beach Center is listed as impaired due to turbidity.

4.3 U.S. Fish and Wildlife Service's Survey of the "Project Action Area"

The U.S. Fish and Wildlife Service, as part of their Draft Coordination Act Report on the Ala Wai Project (USFWS, 2023), surveyed the geomorphological structure and benthic habitat characteristics at Waikiki Beach from the Ala Wai Canal exit (Ala Moana Bowls) to the jetty at the southeastern end of Ft. DeRussy. Surveys covered approximately 78 miles (125 kilometers) of reef as the crow flies, from shore to the forereef or surf zone. Surveys were limited to the reef flats and intertidal zones in some cases where surf conditions made the reef crest and forereef inaccessible (USFWS, 2023).

The target area, as defined for the Ala Wai Canal Project, included the marine aquatic habitat within 1,640 ft (500 m) of the mouth of Ala Wai Harbor (USFWS, 2023). USFWS biologists considered the harbor mouth to be the discharge site for Ala Wai Canal effluent waters, and marine resources within 1,640 ft (500 m) of the discharge site to be the most likely to be impacted by the proposed project. The project action area included the target area and the surveyed area, plus a 328 ft (100 m) buffer around both (Figure 16). While the project action area was intended to cover the likely area of both direct and indirect effects, it may be larger or smaller than actual potential impacts (USFWS, 2023).

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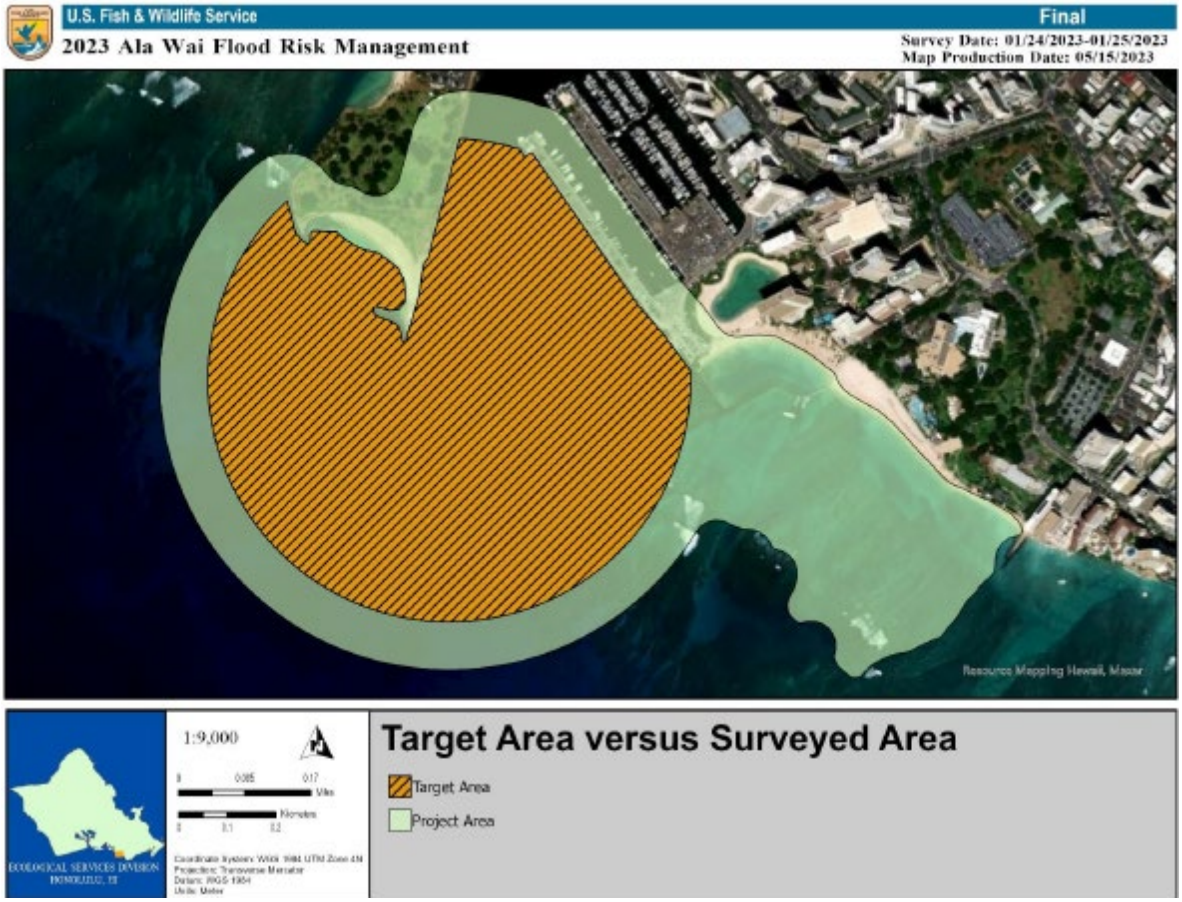

Figure 16: Map of the Target Area (1,640 ft [500-meter] radius from Ala Wai Canal Discharge point) and the Project Action Area (Target and surveyed area plus 100-meter buffer) (USFWS, 2023).

The total area surveyed by USFWS was 7,495,696 ft^2 (696,373 m^2) (USFWS, 2023). The geomorphological habitat structures were made up of Land (0.5 percent), Scattered Coral Rock in Unconsolidated Sediment (15.9 percent), Artificial (0.9 percent) Unconsolidated Sediment (0.1 percent), Pavement (15.0 percent), Pavement with Sand Channels (3.4 percent), Reef Hole (0.2 percent) and Unknown (64.0 percent). Unknown classifications represented areas with insufficient data. The habitat zones included Land (0.5 percent), Harbor (14.9 percent), Reef Flat (19.4 percent), Reef Crest (3.9 percent), Fore Reef (19.7 percent), and Bank/Shelf (41.9 percent). The major geomorphological habitat structures included Land (0.5 percent), Mixed (19.3 percent), Hard Bottom (16.1 percent), and Unconsolidated Sediment (0.1 percent), and Unknown (64 percent). The sediment present was 89.3 percent Sand with Rubble and 10.7 percent sand mixed with Rubble and Cobble (USFWS, 2023).

The surveyed area (Figure 17) primarily included Shoreline Intertidal, Harbor, Reef Flat, and Reef Crest zones seaward of Ala Wai Boat Harbor and Waikiki Beach seaward of Ft. DeRussy (Figure 18) (USFWS, 2023). The observed area included modified intertidal beach and a mix of natural reef flat and reef flat areas that have been modified to provide access to small dug out harbors at Waikiki Beach (USFWS, 2023).

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Figure 17: Map of the Project Action Area directly observed during USFWS Surveys (USFWS, 2023).

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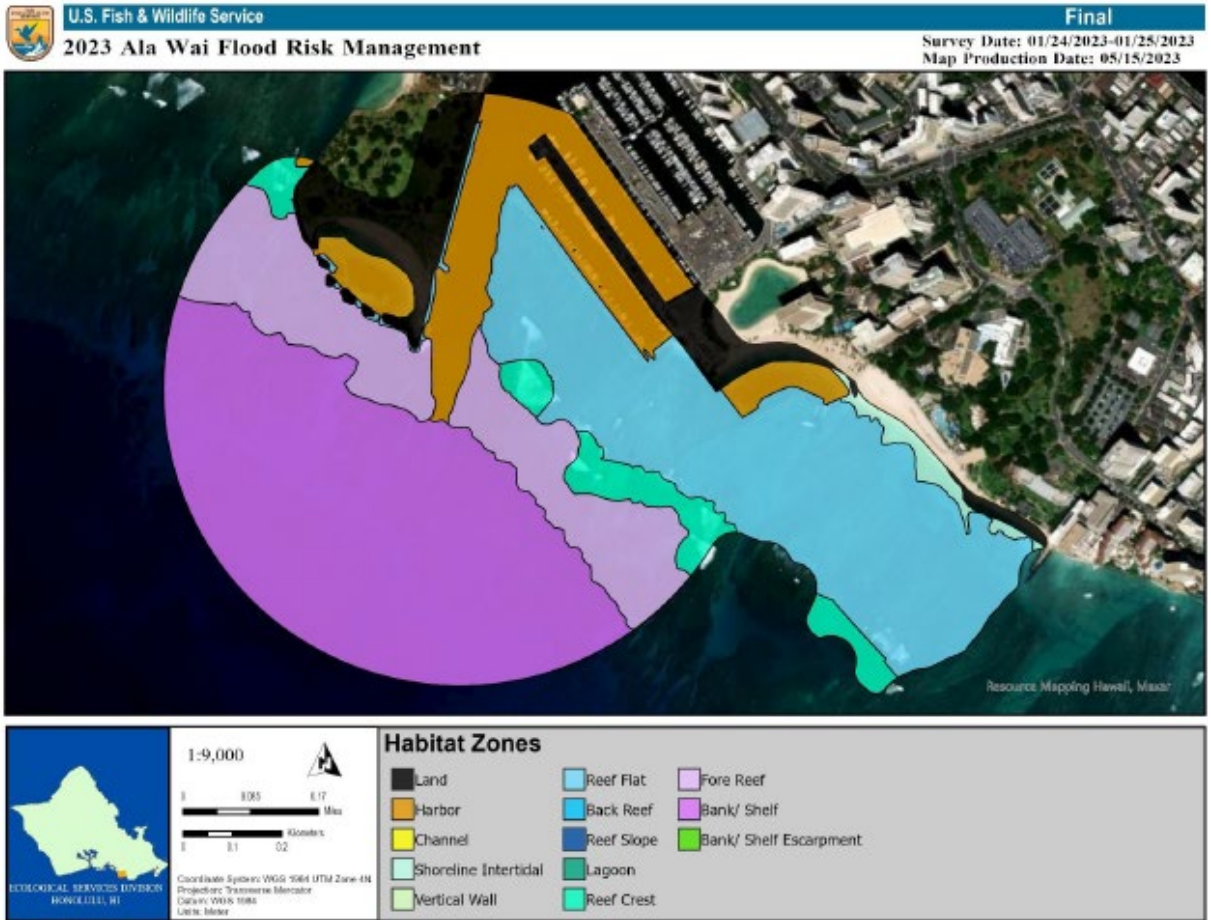

Figure 18: Map of the habitat zones within the Project Action Area (USFWS, 2023).

4.3.1 Benthic Substrate Habitat

The benthic substrate habitat within the project action area is comprised of soft, hard, and mixed substrate habitat (USFWS, 2023). The soft substrate community, found primarily along the Kahanamoku Beach harbor area, makes up approximately 0.1% of the benthos of the marine aquatic area that may be impacted by the project. The project action area was surveyed by USFWS and the soft substrate habitat was found to consist primarily of unconsolidated sediment (Figure 19) made up of sand and rubble (Figure 20) (USFWS, 2023). Soft substrate habitats, in general, support a diverse community likely consisting primarily of polychaetes, crustaceans, mollusks, and burrow-dwelling fish just below the sand surface. Species adapted to this habitat structurally alter the habitat through bioturbation, burrow, and tube building. These activities result in increased water flow and nutrient cycling through the surface layers of sand. Soft bottom habitats can perform ecological functions in marine communities by recycling organic matter up into the food web. Many of the organisms that live in this habitat are adapted to filter feed, increasing the extraction of material from the overlaying water column. Benthic burrowing communities are typically highly resistant to adverse impacts from sedimentation and have a high rate of reproduction and community recovery but would be very susceptible to the wholesale removal of the habitat. Members of this community have the most direct link to managed fishery species. The soft bottom community provides food either directly or in the form of eggs and larvae broadcast into the water column.

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The areas seaward of Ala Wai Harbor and Waikiki beaches were generally separated by the small dug out harbor adjacent to Kahanamoku Beach and the Atlantis Submarines dock, and a channel cut through the reef flat many years ago providing access to that harbor (FWS, 2023). The Kahanamoku Beach harbor area consisted of Unconsolidated Sediment (Figure 19) made up of Sand and Rubble (Figure 20). The channel area was classified as Mixed habitat (Figure 19) including Unconsolidated Sediment and Scattered Coral Rock in Unconsolidated Sediment (Figure 20) (FWS, 2023).

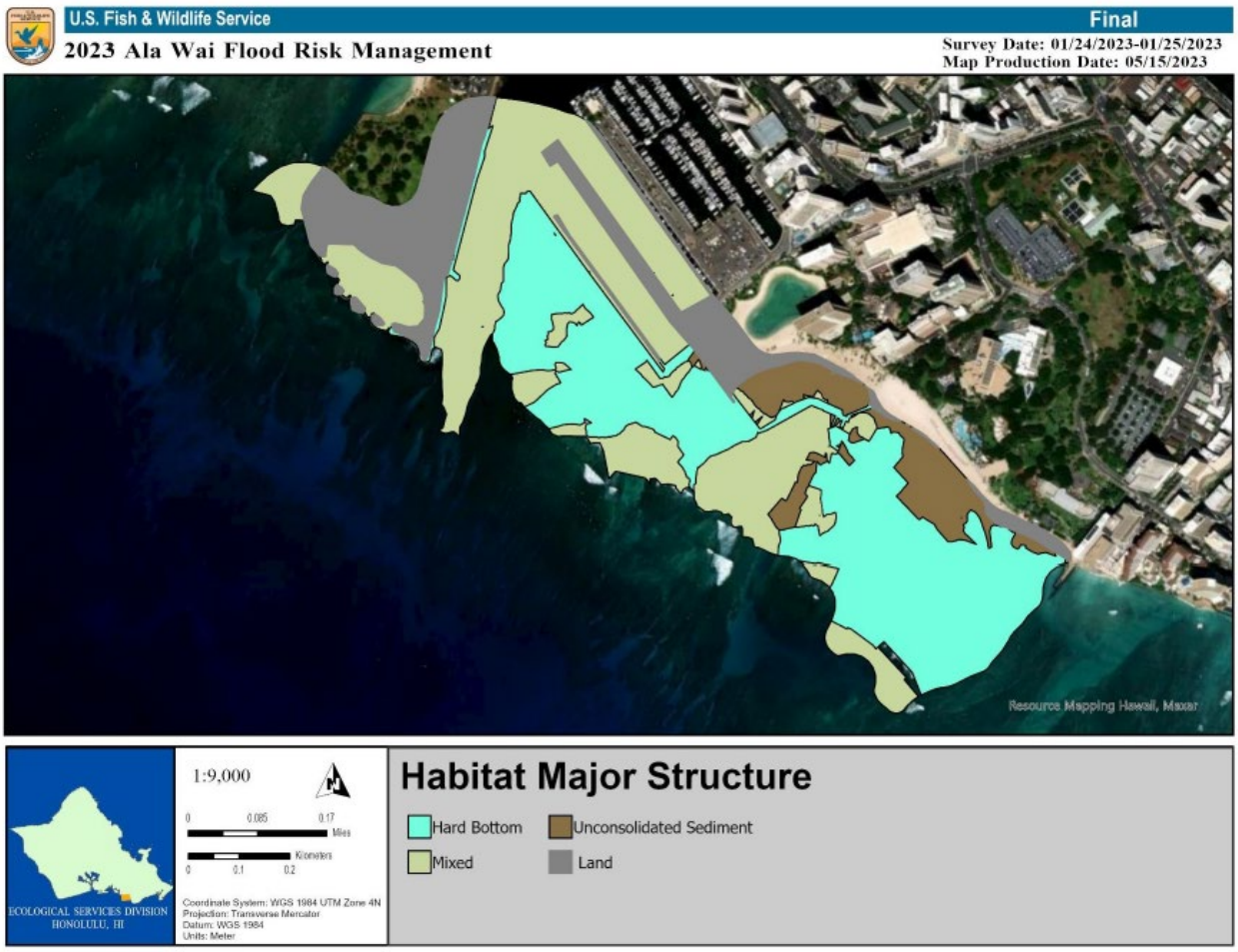

Figure 19: Map of habitat major structure observed within the Project Action Area (USFWS, 2023).

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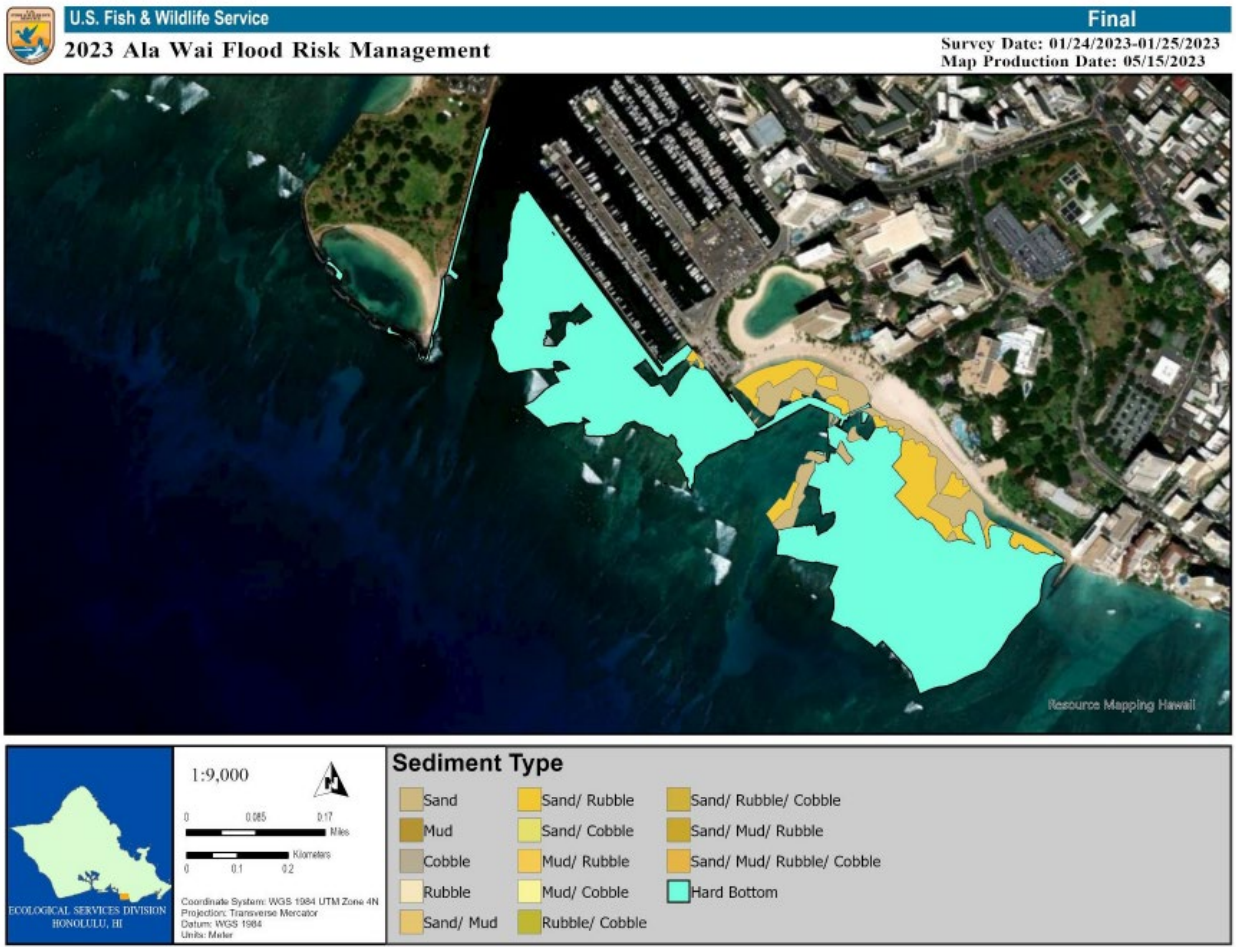

Figure 20: Map of sediment types found within the Project Action Area (USFWS, 2023).

The hard substrate community makes up approximately 16.1% of the benthic aquatic habitat area that may be impacted by the project (USFWS, 2023). The hard substrate community generally extended from the intertidal zone to the surf zone at the reef crest and was characterized as gently sloping reef flat with depths of approximately 0.5 meter to 2 meters. The reef flat substrate in the project action area was characterized by hard bottom pavement with areas of mixed habitat structure including mostly pavement, sand, and rubble with low relief (Figure 20 and Figure 21). The forereef area included steeper spur and grove characteristics (Figure 21), while the area seaward of the fore reef slope appeared to be deeper offshore bank/shelf habitat (Figure 21) (USFWS, 2023).

The hard substrate within the project action area provides habitat that supports certain managed fisheries. In addition to shelter, the habitat provides food for managed fisheries either directly or in the form of eggs and larvae released into the water column.

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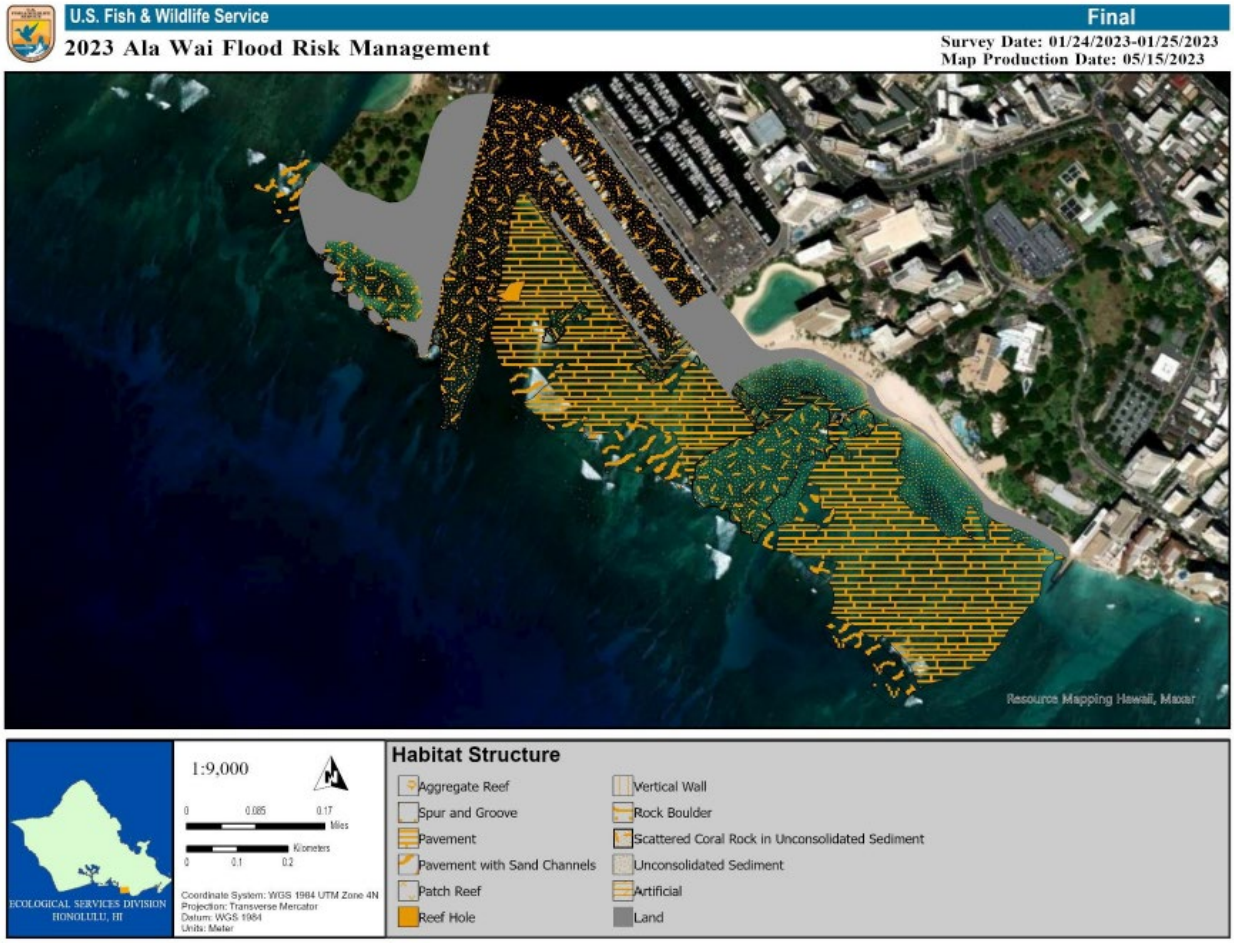

Figure 21: Map of habitat structure observed within the Project Action Area (USFWS, 2023).

Mixed substrate habitat is primarily found in Ala Wai Small Boat Harbor, the channel leading out of the Ala Wai Small Boat Harbor, a small dug out harbor adjacent to Kahanamoku Beach, the Atlantis Submarines dock, and a channel cut through the reef flat many years ago providing access to that harbor. The mixed substrate habitat is primarily composed of scattered coral rock in unconsolidated sediment (Figure 21) (USFWS, 2023). Mixed substrate habitat is a combination of soft and hard substrate habitat. As discussed above, soft substrate habitats in general support a diverse community likely consisting primarily of polychaetes, crustaceans, mollusks, and burrow-dwelling fish just below the sand surface. Members of this community have the most direct link to managed fishery species as the soft bottom community provides food either directly or in the form of eggs and larvae broadcast into the water column. Hard substrate provides habitat that supports certain managed fisheries as well. In addition to shelter, hard substrate habitat provides food for managed fisheries either directly or in the form of eggs and larvae released into the water column.

4.3.2 Water Column Estuary Habitat

The Ala Wai Small Boat Harbor is an artificially deepened, inshore embayment with strong estuary characteristics influenced by inflow from perennial streams, groundwater, and storm drains from the surrounding urban land use area. With an area of 50 acres and an average

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depth of 25 feet, the volume of the estuary exceeds the average daily flow volume of all inflowing water sources. As described in Laws et al. (1993), the tidal input from the marine environment generally exceeds the freshwater input. The Ala Wai behaves like a type B estuary as the tidal prism is 10 to 20 times the volume of freshwater input. This class of estuary typically has little sediment export to the ocean (Montgomery et al., 2009). These characteristics allow the Ala Wai Canal to function as a physical sink for land-based pollutants as well as act as a biological reaction vessel to transform and incorporate a portion of the land-based nutrients into the marine food web through the production of phytoplankton. The stratified water column provides a variety of micro-habitats defined by light, salinity, nutrient availability, and phytoplankton concentrations. Harbor waters are continually impacted by such terrigenous inputs that adversely affect its water quality.

Table 5: Areas of Habitat Types Across the Target Survey Area (USFWS, 2023).

Area Type	Classification	Area (ft^2)	Area (m^2)	Percent of Area
Waters	Waters of the U.S.	7,456,613	692,742	99.48
Structure	Land	39,084	3,631	0.5
	Scattered Coral Rock in Unconsolidated Sediment	1,171,329	108,820	15.9
	Artificial	66,112	6,142	0.9
	Unconsolidated Sediment	5,899	548	0.1
	Pavement	1,110,879	103,204	15.0
	Pavement with Sand Channels	254,739	23,666	3.4
	Reef Hole	14,155	1,315	0.2
	Unknown	4,725,862	439,047	64.0
	Total	**7,388,057**	**686,373**	
Zone	Land	18,955	1,761	0.3
	Harbor	1,101,299	102,314	14.9
	Reef Flat	1,428,565	132,718	19.4
	Reef Crest	287,418	26,702	3.9
	Fore Reef	1,450,986	134,801	19.7
	Bank/Shelf	3,092,191	287,274	41.9
	Total	**7,379,414**	**685,570**	
Major Structure	Land	39,084	3,631	0.5
	Mixed	1,411,428	132,126	19.3
	Hard Bottom	1,191,134	110,660	16.1
	Unconsolidated Sediment	5,899	548	0.1
	Unknown	4,725,862	439,047	64.0
	Total	**7,384,182**	**686,013**	
Sediment	Sand/Rubble	5,264	489	89.3
	Sand/Rubble/Cobble	635	59	10.7
	Total	**5,899**	**548**	

4.3.3 Marine Fauna

4.3.3.1 Coral Species

Coral was present on reef flat although abundance was generally low (< 10% cover) throughout the project action area (Figure 22) (FWS, 2023). Small (< 0.39 inches [< 50 centimeters]) to

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large (0.39 – 78.74 inches [50 – 200 centimeters]) lobate corals (Figure 22) were most common on the reef flats, followed by small medium-branching (Figure 22), encrusting, and microatoll growth forms (Figure 22). The most common coral species observed included *Porites rus*, *P. compressa*, *P. lobata*, and potentially other species of massive *Porites*, branching *Pocillopora spp.*, and encrusting *Montipora spp*. (USFWS, 2023).

Porites lobata
Lobe coral (*Porites lobata*) is the most common and widespread coral in Hawaii (USACE, 2016). The growth form is most commonly massive but can be encrusting in high wave energy environments or plate-forming on steep calm slopes (or concrete pilings). Lobe coral spawns from July to August two to three days after the full moon and has a moderate 0.46 inch (11.4 millimeters) per year growth rate (USACE, 2016). Lobe coral was one of the most prevalent species within the project action area.

Porites compressa
Finger coral (*Porites compressa*) is often the most common coral in low wave energy environments and has a rapid growth rate (1.10 inches [28 millimeters] per year; Minton, 2013) and tends to be very fragile. Finger coral spawns from June through September on the new moon's 1st quarter from 23:00 to 01:30 (USACE, 2016). Finger coral was one of the most prevalent species within the project action area.

Porites rus
Porites rus is a common coral species in Hawaii that may be dominant in a wide range of habitats, although they are typically found in shallow reef environments. *P. rus* spawns from October through April, five days after the full moon, and about two hours after daybreak. Mean linear growth rates for colonies growing in shallow water (3.3-9.8 feet [1-3 meters]) or close to the reef edge in an undisturbed environment range between 0.34 and 0.48 inch (8.64 and 12.26 millimeters) per year (Dullo et al., n.d.).

Pocillopora spp.
Some of the common *Pocillopora spp.* in Hawaii include *Pocillopora meandrina* (cauliflower coral or rose coral) and *P. damicornis* (lace coral). Cauliflower coral typically spawns from April through May, at full moon and/or two to three days after a full moon, and around 07:30. Lace coral can spawn year-around and under all phases of the moon. Lace coral can release larvae throughout the day, but mostly at night. Growth rates for transplanted *Pocillopora spp.* range from 1.7 to 3.9 inches (4.36 to 9.98 centimeters) per year (Garcia-Medrano, et al., 2023; Fabregat-Male et al., 2023)

Montipora spp.
One of the common *Montipora spp.* in Hawaii is *Montipora verrucosa* (Rice coral). Rice coral spawns from June through August, three to five days after a new moon, and between 20:00 and 22:00. The growth rate for Montipora spp. can range up to 0.55 inch (14 millimeters) per year (Baird, 2023).

Zoanthids were sparsely distributed on the reef flats (Figure 23).

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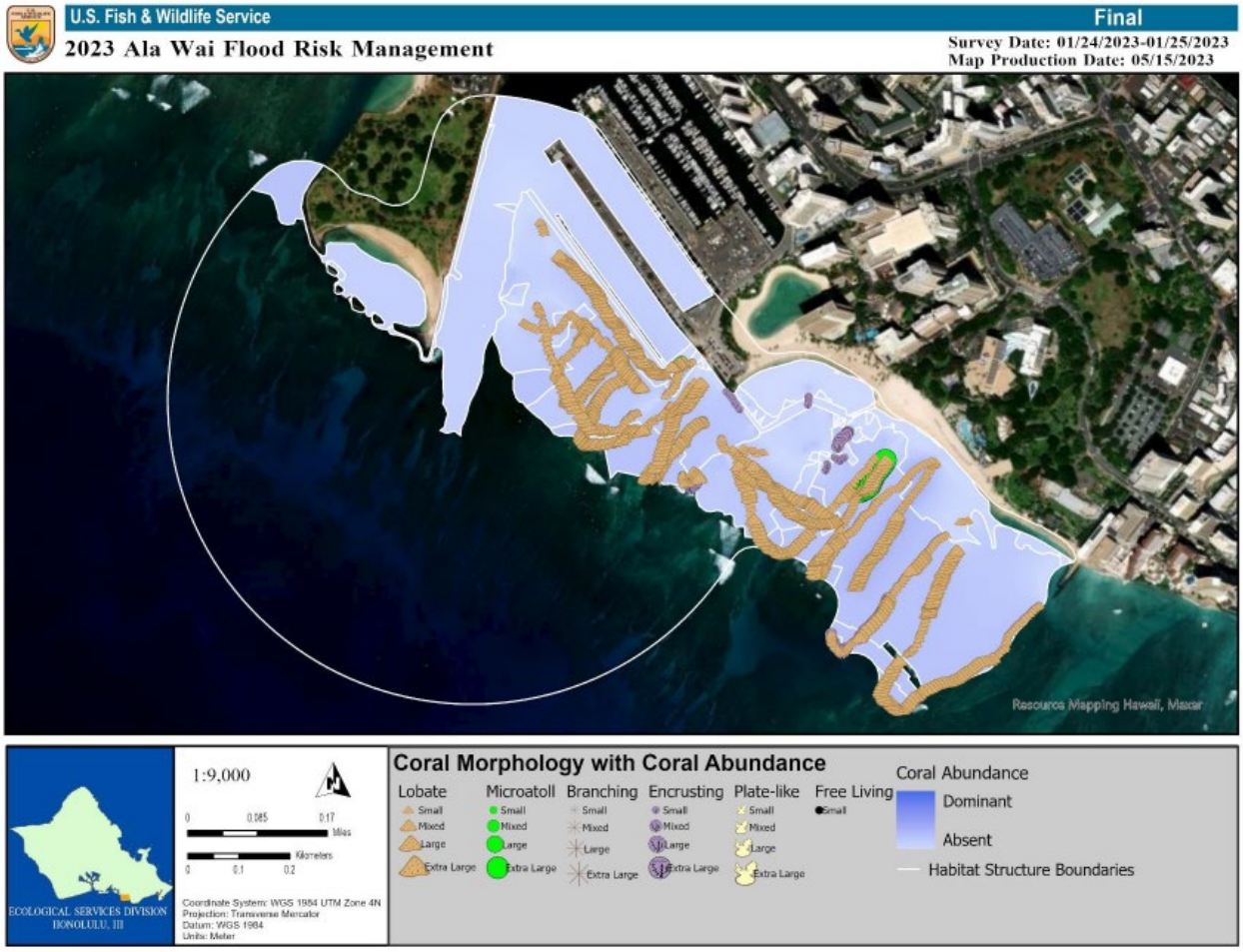

Figure 22: Map of the coral morphology and abundance observed at the Project Action Area (USFWS, 2023).

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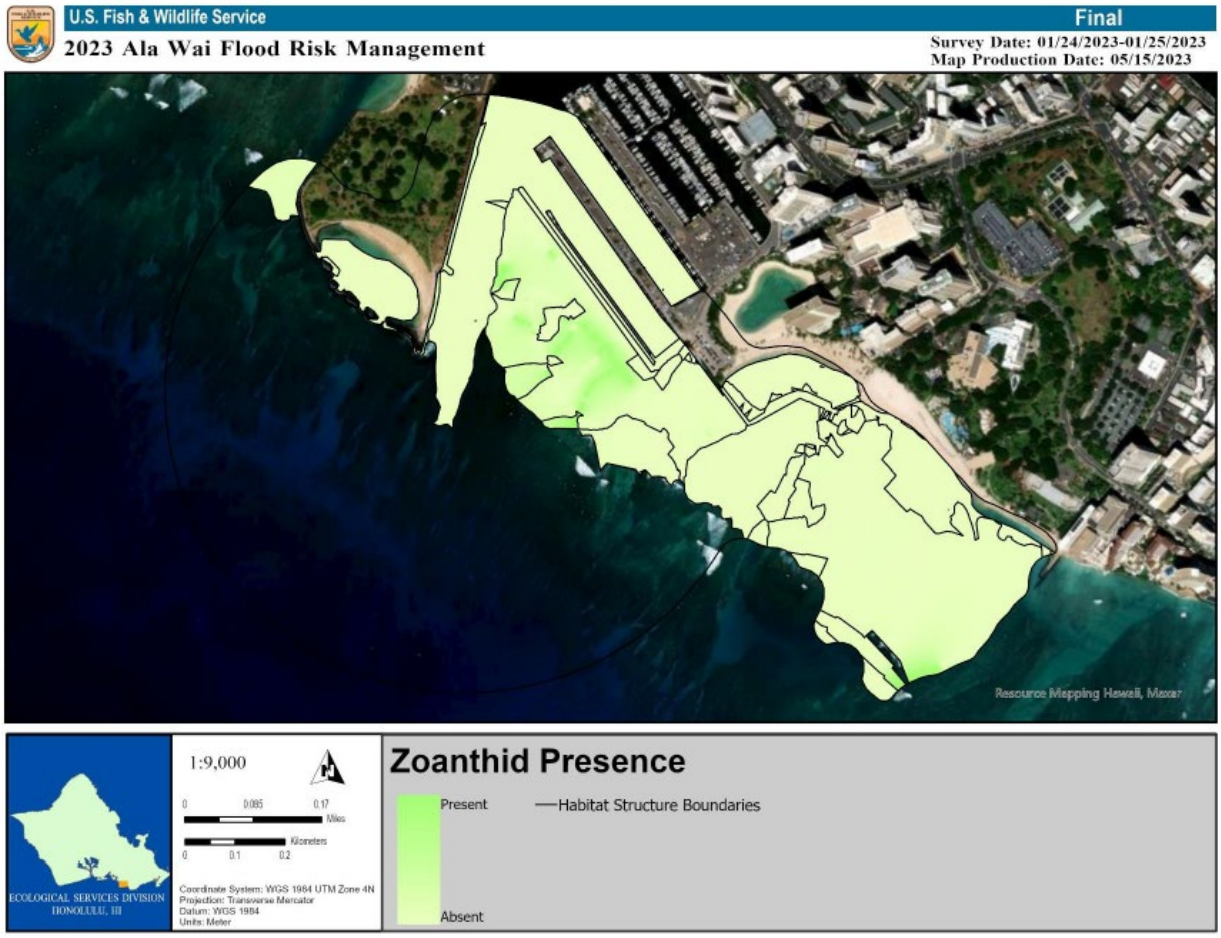

Figure 23: Map of the zoanthid presence observed at the Project Action Area (USFWS, 2023).

4.3.3.2 Macroinvertebrates

Within the area surveyed by USFWS, spiny urchins were common, and rock boring urchins were dominant throughout the surveyed area (USFWS, 2023). Sea cucumbers were observed throughout the area surveyed and occurred in clusters in certain reef flat areas (Figure 24). Mollusks were observed sparsely throughout the surveys. Sponges were observed in clusters, primarily seaward of Ala Wai Harbor. Tunicates were observed primarily in areas directly adjacent to channels and harbor areas (USFWS, 2023).

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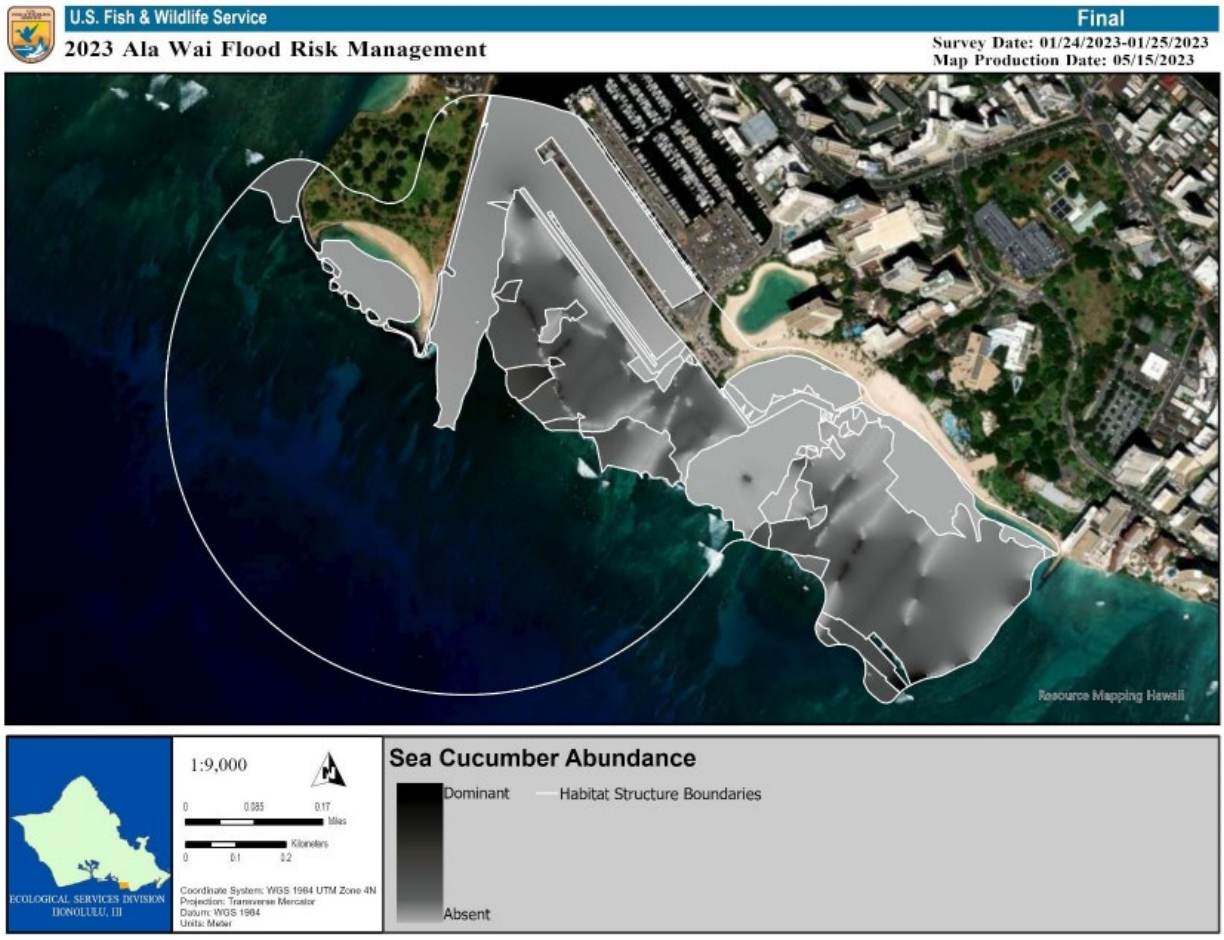

Figure 24: Map of the sea cucumber abundance observed at the Project Action Area (USFWS, 2023).

4.3.3.3 Fish

Although fish species were not specifically surveyed by USFWS, the following species have been caught within the Ala Wai Boat Harbor: Great Barracuda (*Sphyraena barracuda*), Wedge-tail Triggerfish (*Rhinecanthus rectangulus*), Crevalle Jack (*Caranx hippos*), Hawaiian Ladyfish (*Elops hawaiensis*), Doublespotted Queenfish (*Scomberoides lysan*), Skipjack Tuna (*Katsuwonus pelamis*), West Atlantic Bonefish (*Abula vulpes*), Giant Trevally (*Caranx ignobilis*), Southern Puffer (*Sphoeroides nephelus*), Smallmouth Bass, Pacific Barracuda (*Sphryaena argentea*), Bluefin Trevally (*Caranx melampygus*), Eyestripe Surgeonfish (*Acanthurus dussumieri*), Blackchin Tilapia (*Sarotherodon melanotheron*), Stocky Hawkfish (*Cirrhitus pinnulatus*), Manybar Goatfish (*Parupeneus multifasciatus*), Blue Tilapia (*Oreochromis aureus*), Wahoo (*Acanthocybium solandri*), Black Seabass (*Centropristis striata*), Common Dolphinfish (*Coryphaena hippurus*), Orange Goatfish (*Mulloidichthys flavolineatus*), Red Grouper (*Epinephelus morio*), Inshore Lizardfish (*Synodus foetens*), and Leopard Moray Eel (*Enchelycore pardalis*). While the above may not include all the fish species for which EFH has been designated within the project action area, that does not mean that these species and/or their lifestages are not present in the project action area.

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5. Potential Effects of the Action on EFH and MUs

Because of the magnitude and range of activities represented by the project, this section analyzes the potential impacts first by each individual project phase, and second by type of project impact. Each phase varies by construction method and likewise potential vectors for impacts to EFH.

5.1 Effects by Project Phase

The action, anticipated to begin in 2027, would incorporate five construction phases lasting approximately four (4) years, followed by operation of the project. Activities occurring for each project feature are discussed in greater detail below: Woodlawn Drive Floodwall, Koali Road Floodwall, Ala Wai Golf Course Detention Basin, Ala Wai Canal Floodwall, and Mitigation Measures. Impacts from each project feature are discussed in each of the following sections and summarized in Section 5.3.

5.1.1 Woodlawn Drive Floodwall

A floodwall would be constructed along the right descending bank of Manoa Stream downstream of the Woodlawn Drive Bridge. The floodwall would be approximately six feet in height and approximately 1,270 feet in length. The design of the floodwall is an L-wall on macropiles. The macropiles would be drilled in vertically into the ground as a support for the foundation of the L-wall. The vertical part of the L-wall would then extend six feet above the foundation attached to the macropiles. Appropriate BMPs would be implemented at the construction site to prevent storm water runoff and drill effluent from leaving the site. In addition, a single road closure structure would be placed at Woodlawn Drive Bridge. All of the above construction would occur adjacent to Manoa Stream with no in-water work anticipated. Also, Manoa Stream does not contain EFH, so there would be no direct disturbance of EFH due to construction activities. No indirect disturbance of EFH is anticipated either from this single feature. However, there could be a cumulative indirect disturbance to EFH in the project action area once the project is operational. The potential indirect impact to EFH due to project operation will be discussed later. Overall, the activities proposed under this project feature would not reduce the quantity or quality of EFH. Accordingly, the Corps has determined that the Koali Road floodwall would neither adversely affect nor have the potential to cause effect to any MUS or its designated EFH.

5.1.2 Koali Road Floodwall

A floodwall would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream in the vicinity of Koali Road. The total length of the floodwalls would be approximately 2,510 feet and the height of the floodwall would be six feet. Construction would be the same as that detailed above for the Woodlawn Drive floodwall. The Koali Road floodwall also includes two road closure structures and the addition of two concrete drainage structures that would provide interior drainage. Two flap gates would also be retrofitted on smaller stormwater culverts already existing along this feature. The addition of the two concrete drainage structures would disturb adjacent stream habitat where the drainage structures allow inflow into the adjacent stream. To minimize impacts at the drainage structure construction sites appropriate sediment containment BMPs would be implemented throughout construction to isolate turbidity within the work area. The degree of indirect impacts from these pollutants depends on the success of BMPs. Suspended materials that may reach the marine environment can directly or indirectly impacts MUS and EFH including potential impacts such as health detriment to swimming MUS or plankton blooms of unknown potential impact. All of the

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above construction would occur for the most part adjacent to Manoa and Palolo streams with no in-water work anticipated. The only exception to in-water work is connecting the drainage structures to the adjacent streams to allow interior drainage into the streams during a storm event. Since Manoa Stream does not contain EFH, there would be no direct disturbance of EFH due to construction activities. No indirect disturbance of EFH is anticipated either from this single feature. However, there could be a cumulative indirect disturbance to EFH in the project action area once the project is operational. The potential indirect impact to EFH due to project operation will be discussed later. Overall, the activities proposed under this project feature would not reduce the quantity or quality of EFH. Accordingly, the Corps has determined that the Koali Road floodwall would neither adversely affect nor have the potential to cause effect to any MUS or its designated EFH.

5.1.3 Ala Wai Golf Course Detention Basin

At Ala Wai Golf Course, adjacent to the left descending bank of the Manoa-Palolo Canal and the right descending bank of the Ala Wai Canal, an earthen levee approximately six to nine feet in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin. The total length of the earthen levee would be approximately 8,315 feet and the height of the earthen levee would range from six to nine feet. On the left descending bank of the Manoa-Palolo Canal, there would be an overtopping spillway section approximately 100 feet in length, that would be reinforced with erosion protection such as riprap. A portion of the existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be riprapped and used as an inlet location for overflow into the Ala Wai Golf Course Detention Basin. A small inlet channel would be excavated and lined with erosion control material to improve flow onto the golf course. Three concrete drainage structures and three flap gates would be constructed along the levee alignment of the Ala Wai Golf Course to allow collected stormwater within the basin and from local runoff to slowly drain into Ala Wai Canal. To minimize impacts at the drainage structure construction sites appropriate sediment containment BMPs would be implemented throughout construction to isolate turbidity within the work area. The degree of indirect impacts from these pollutants depends on the success of BMPs. Suspended materials that may reach the marine environment can directly or indirectly impacts MUS and EFH including potential impacts such as health detriment to swimming MUS or plankton blooms of unknown potential impact. The detention basin also includes a floodwall along the golf course parking lot near the Ala Wai Canal, which is nine feet in height. The floodwall has one concrete drainage structure and two flap gates that would be installed. To minimize impacts at the drainage structure construction site appropriate sediment containment BMPs would be implemented throughout construction to isolate turbidity within the work area. The degree of indirect impacts from these pollutants depends on the success of BMPs. Suspended materials that may reach the marine environment can directly or indirectly impacts MUS and EFH including potential impacts such as health detriment to swimming MUS or plankton blooms of unknown potential impact. The original outlet will be enclosed by concrete (instead of daylighted) and will need reconstruction of the vehicle and pedestrian access at this location. A small section of floodwall near the Kapahulu Avenue and Ala Wai Boulevard intersection at the Diamond Hear end of the Ala Wai Canal will tie-in to the golf course levee and Ala Wai Canal floodwall. This section is six feet in height and includes one road closure structure and one drainage structure. Finally, there is one canoe access point in this location. One road closure structure would be constructed across the Ala Wai Golf Course Maintenance Facility driveway.

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Construction of the earthen berm around the golf course would require the placement of fill material upland. No macropile drilling or sheetpile driving would be required for the golf course earthen berm. Potential in-water work would be limited to connecting the outlet drainage structures to the adjacent canal, but these connections already exist and would primarily consist of minimal in-water work to allow retrofitting of the concrete drainage structures and flap gates. Placement of erosion protection along the overtopping spillway and existing drainage ditch could involve minor in-water work as placement of these materials would be expected to occur from land and mostly on upland habitat.

Therefore, most construction activities would occur adjacent to the left descending bank of the Manoa-Palolo Canal or adjacent to the right descending bank of the Ala Wai Canal with most of the work occurring from upland (i.e., no in-water work). As mentioned above, adding erosion protection, and retrofitting the existing drainage structures with new concrete drainage structures and flap gates could involve some in-water work, but is anticipated to occur from upland for the most part. Both Manoa-Palolo Canal and the Ala Wai Canal do not contain designated EFH, so there would be no direct disturbance of EFH due to construction activities. No indirect disturbance of EFH is anticipated either from this single feature. However, there could be a cumulative indirect disturbance to EFH in the project action area once the project is operational. The potential indirect impact to EFH due to project operation will be discussed later. Overall, the activities proposed under this project feature would not reduce the quantity or quality of EFH. Accordingly, the Corps has determined that the Ala Wai Golf Course Detention Basin would neither adversely affect nor have the potential to cause effect to any MUS or its designated EFH.

5.1.4 Ala Wai Canal Floodwall

At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending six feet above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 22,852 feet long and would be constructed of a combination of J-wall on macropiles (17,125 ft), L-wall on macropiles (4,069 feet), and I-wall (1,658 feet) with a lava rock fascia. Existing stormwater sewers inletting into the Ala Wai Canal would be modified so that fourteen would be drainage structures and 59 would be retrofitted with flap gates. To minimize impacts at the drainage structure construction sites appropriate sediment containment BMPs would be implemented throughout construction to isolate turbidity within the work area. The degree of indirect impacts from these pollutants depends on the success of BMPs. Suspended materials that may reach the marine environment can directly or indirectly impacts MUS and EFH including potential impacts such as health detriment to swimming MUS or plankton blooms of unknown potential impact. Eleven road closure structures would be constructed: (1) King Street (Manoa-Palolo Canal right descending bank), (2) King Street (Manoa-Palolo Canal left descending bank), (3) Kapiolani Boulevard (Manoa-Palolo Canal right descending bank), (4) Kapiolani Boulevard (Manoa-Palolo Canal left descending bank), (5) Date Street (near the Date Street and Laau Street junction), (6) Date Street (near the vicinity of the Kaimuki High School's discus and shot put throwing area, (7) Ala Wai Golf Course Drive, (8) McCully Street (Ala Wai Canal right descending bank), (9) McCully Street (Ala Wai Canal left descending bank), (10) Kalakaua Avenue (Ala Wai Canal right descending bank), and (11) Kalakaua Avenue (Ala Wai Canal left descending bank). The typical cross section of this feature varies along the alignment, but all are assumed to be 6 ft above ground. The floodwall along the Ala Wai Canal and the lower right descending bank of the Manoa-Palolo Canal will include an elevated walking path. On the left descending bank of the Manoa-Palolo Canal and near Kaimuki High School, there will be a floodwall on macropiles with no walking path. Where space is constricted, along the upper right

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descending bank of the Manoa-Palolo Canal, the tieback I-wall will be constructed, with no walking path. Construction of the tieback I-wall in this location would occur from equipment staged along a 15-foot-wide rock bench placed temporarily in-stream along the right descending bank of the Manoa-Palolo Canal. The rock bench is temporary fill placed into waters of the U.S., but the waters do not contain designated EFH. Construction of the tieback I-wall would use the press in method of installation such as used by Giken Ltd. Construction of the tieback I-wall would not involve the driving of pile into the ground which could cause potential noise and vibration concerns. Construction methods for the J-wall and L-wall would be the same as those discussed for the Woodlawn Drive, Koali Road, and Kaimuki High School floodwalls. Overall, since most of the construction would occur upland (i.e., not in-water) and there is no designated EFH in the Manoa-Palolo Canal or the Ala Wai Canal, there would be no direct disturbance of EFH due to construction activities. No indirect disturbance of EFH is anticipated either from this single feature. However, there could be a cumulative indirect disturbance to EFH in the project action area once the project is operational. The potential indirect impact to EFH due to project operation will be discussed later. Overall, the activities proposed under this project feature would not reduce the quantity or quality of EFH. Accordingly, the Corps has determined that the Ala Wai Canal floodwall would neither adversely affect nor have the potential to cause effect to any MUS or its designated EFH.

5.1.5 Mitigation Measures

Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cfs. At the time of compiling this Draft Report, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed. In addition to considering pumps as potential mitigation for induced flooding within the watershed, nonstructural measures such as dry/wet floodproofing, elevation, and acquisition are also under consideration. Nonstructural measures such as dry/wet floodproofing, elevation, and acquisition involve construction that occurs strictly upland to existing structures and no in-water work. Although unlikely, if found during the Preconstruction Engineering and Design (PED) phase that a permanent pump station may be necessary to minimize induced flooding, construction of the pump station would primarily occur upland and likely adjacent to Makiki Stream. Where the pump station would outlet collected water either over or under the Ala Wai Canal floodwall could potentially require in-water work due to placement of a drainage structure and erosion protection; although this work may be able to be completed from upland with no in-water work.

5.1.6 Operation and Maintenance

5.2 Effects by Type of Impact

In this section, potential adverse impacts upon EFH and MUS by type of impact are discussed. Due to the extensive classification of thousands of managed fishery species collectively considered under several MUS', the following discussions would be generalized to the impact upon each specific fishery type. Project-related impacts to substrate EFH include water quality degradation and habitat quality degradation that could reduce the quality of EFH and EFH production. Impacts to water column EFH include water quality degradation and habitat quality degradation that could reduce the quality of EFH. MUS impacts may include habitat quality degradation that supports MUS' and their prey and that has the potential to reduce the quality of designated EFH.

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5.2.1 Water Quality Degradation

Construction

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing resuspension of sediments into the water column, thereby raising ambient turbidity levels. It is important to note that no in-water work would occur in EFH designated waters which are outside the project footprints that would be directly impacted.

Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of BMPs. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat).

Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon mobile marine species. The biota currently established and utilizing the canal appear to be resilient to turbidity stress, as observed by their survivorship in such an environment.

As described in Section 2.5, USACE has proposed BMPs (e.g., silt curtains) to contain re-suspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters and adjacent EFH designated waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize potential compounding of adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event.

Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

Operation and Maintenance

The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to EFH habitat due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality of the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed

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and are compared against velocities within the canal under existing conditions in Table 6. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

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Table 6: Future Without Project and Future With Project Modeled Velocities at the 5%, 2%, and 1% AEP.

Ala Wai Canal Location	Existing Velocities at Different AEPs without Project			Predicted Velocities at Different AEPs with Project			Velocity Difference (+) increase (-) decrease		
	5% AEP	2% AEP	1% AEP	5% AEP	2% AEP	1% AEP	5% AEP	2% AEP	1% AEP
Mouth of Manoa-Palolo Canal	10,215	11,171	11,418	13,268	13,220	15,497	(+) 3,053	(+) 2,029	(+) 4,079
Ala Wai Golf Course Midpoint	1,713	1,732	1,990	1,336	3,045	4,543	(-) 377	(+) 1,313	(+) 2,553
Ala Wai Canal Terminus	465	649	684	557	569	833	(+) 92	(-) 80	(+) 149
Ala Wai Community Park	11,700	13,238	13,833	14,429	16,688	18,922	(+) 2,729	(+) 3,450	(+) 5,089
Mouth of Ala Wai Canal (Ala Moana Boulevard)	2,831	3,177	3,475	15,687	17,387	18,622	(+) 12,856	(+) 14,210	(+) 15,147

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Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 26 shows selected time progressions of this storm's modeled turbidity plume.

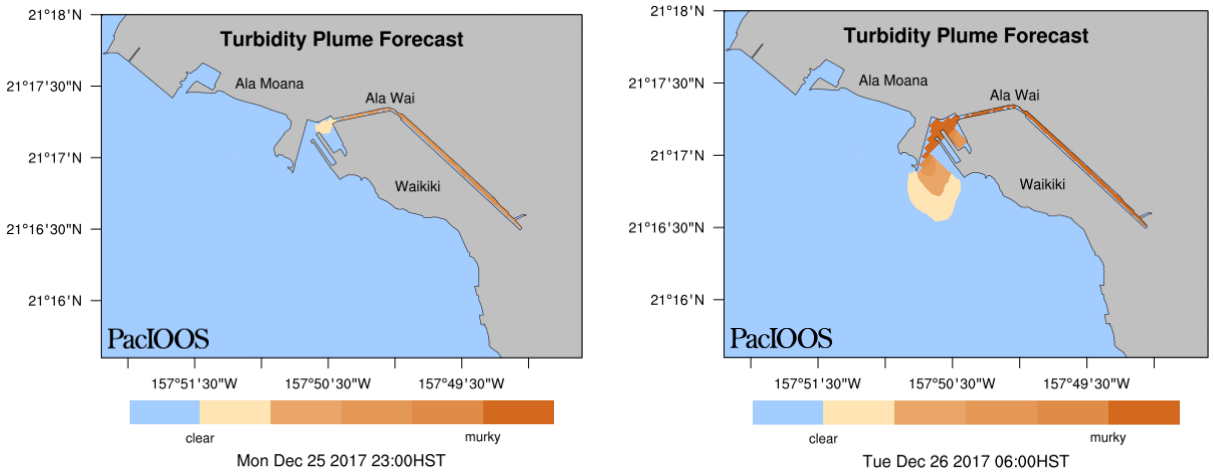

Figure 25: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

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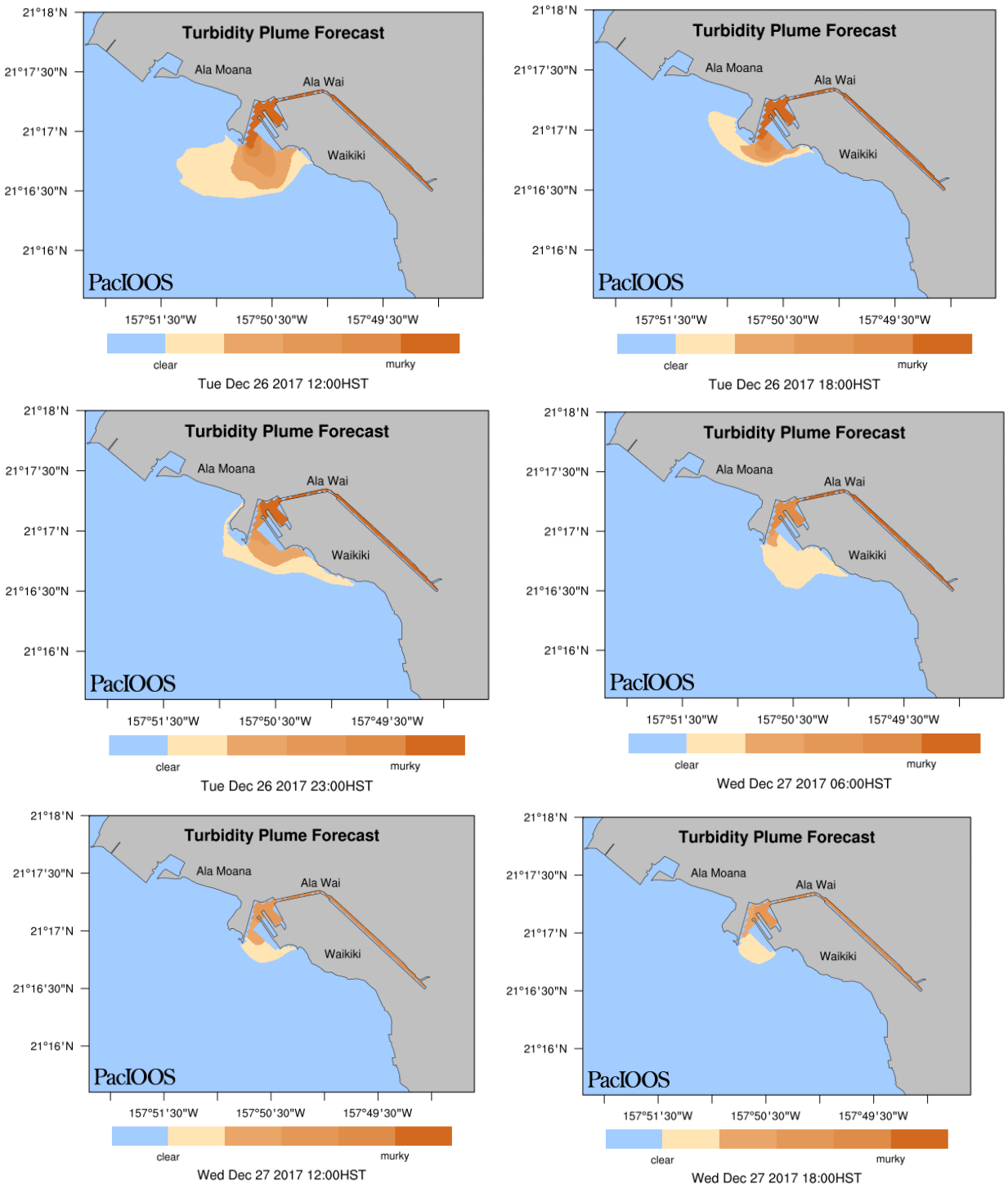

Figure 26, cont'd: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

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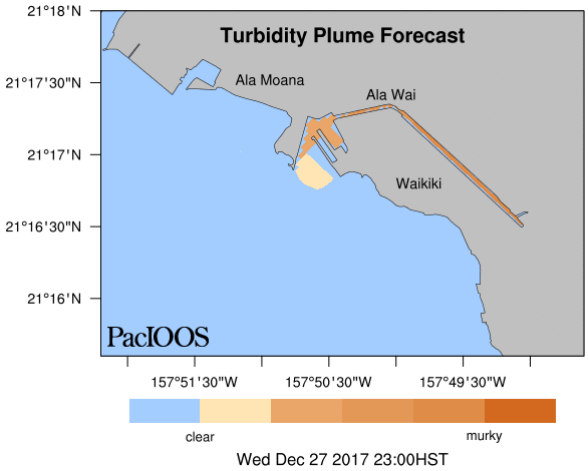

Figure 27, cont'd: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

As seen in the above time progressions, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, EFH habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while EFH habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, EFH present in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between

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approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. The degraded water quality caused by the turbidity plumes could stimulate and sustain algae growth within the project action area. Currently, frondose algae, crustose coralline algae, and turf algae are common but not dominant in the project action area (USFWS, 2023). Filamentous algae or cyanobacteria are also present primarily seaward of Waikiki beaches but do not dominate the habitat (USFWS, 2023). While the proposed project is likely to increase nutrient and sediment concentrations reaching the nearshore marine environment during a storm event, the degree of increase in concentrations is not expected to stimulate algae growth in such a way that algae would be expected to become dominant in the project action area and smother corals that are present. There could be slight increases in algae growth observed due to increased nutrient and sediment concentrations and turbidity taking longer to begin to dissipate, but the increase in algae growth would not be expected to be substantial to cause algae to become dominant in the project action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to EFH and MUS from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

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5.2.2 Habitat Quality Degradation

Construction

As discussed above under Water Quality Degradation, in-water construction activities have the potential to generate turbidity through disturbance of existing in place sediments causing resuspension of these sediments into the water column, thereby raising ambient turbidity levels. Resuspended sediments within the water column would be anticipated to eventually settle out, but this could result in sedimentation of hard substrate habitat resulting in decreased EFH habitat quality.

Suspended sediments because of in-water construction are expected to settle rather quickly upon completion of the construction activity. Adverse impacts to substrate habitat quality are likely to be very limited in both physical and temporal extent due to the lack of currents in the canal and use of BMPs during in-water construction activities. Ala Wai Canal is usually subject to low velocity currents from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat).

Given that Ala Wai Canal is subject to bouts of high turbidity during periods of storm water runoff, it is not likely that temporary increases in turbidity from constructing/modifying existing drainage structures and the resulting deposition of these suspended sediments would have any measurable impact upon minimally mobile marine organisms. The biota currently established and utilizing the canal appear to be resilient to sedimentation stress, as observed by their survivorship in such an environment.

As described in Section 2.5, USACE has proposed BMPs (e.g., silt curtains) to contain re-suspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, sedimentation impacts to surrounding waters. In addition, the contractor would not conduct in-water construction activities that would compound upon adverse sedimentation impacts resulting from periods of heavy rainfall when flow primarily from the Manoa-Palolo Canal would introduce high turbidity levels.

Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and must implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

Operation

An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother living corals in the project action area and prevent recruitment of coral larvae. Currently, coral abundance in the project action area is generally low (< 10% cover) throughout (USFWS, 2023). Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment and EFH habitat,

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the degree of increase is not expected to be substantially different from the existing condition; therefore, coral abundance in the project action area is not expected to substantially decrease from its current abundance within the project action area. The corals found in the project action area are common to Hawaii and are somewhat pollution tolerant since they can survive in an environment that already receives increased sediment loading from the heavily urbanized Ala Wai watershed.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to EFH and MUS from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on habitat quality within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation.

Table 7: Summary of Direct/Indirect Impacts to Essential Fish Habitat Associated with Each Project Phase.

Summary of Potential Adverse Effects on EFH and MUS From Planned Activities Associated with The Ala Wai Canal Flood Risk Management Project Honolulu, Oahu, Hawaii **Adverse Effect**	**Type of Impact**	**Project Phase**					
		Woodlawn Drive Floodwall	Koali Road Floodwall	Ala Wai Golf Course Detention Basin	Ala Wai Canal Floodwall	Mitigation Measures	Operation and Maintenance
Loss of Man-Made Hard Substrate	**Loss of Physical Habitat and MUS**	N/A	N/A	N/A	N/A	N/A	N/A
Loss of Natural Hard Substrate		N/A	N/A	N/A	N/A	N/A	N/A
Loss of Natural Soft Substrate		N/A	N/A	N/A	N/A	N/A	N/A
Loss of Biological Assemblages Colonizing Hard Substrate		N/A	N/A	N/A	N/A	N/A	N/A

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Summary of Potential Adverse Effects on EFH and MUS From Planned Activities Associated with The Ala Wai Canal Flood Risk Management Project Honolulu, Oahu, Hawaii **Adverse Effect**	**Project Phase** **Type of Impact**	Woodlawn Drive Floodwall	Koali Road Floodwall	Ala Wai Golf Course Detention Basin	Ala Wai Canal Floodwall	Mitigation Measures	Operation and Maintenance
Degraded water quality by generation of sediment plumes from in-water construction activities	**Water Quality Degradation**	N/A	N	N	N	N/A	N/A
Decreased water quality from inadvertent construction wastes and discharges		N/A	N	N	N	N/A	N/A
Degraded water quality by generation of sediment plumes from project operation		N/A	N/A	N/A	N/A	N/A	N
Degraded water quality from phytoplankton blooms resulting from sediment plumes		N/A	N/A	N/A	N/A	N/A	N
Decreased habitat quality due to sedimentation from project operation	**Habitat Quality Degradation**	N/A	N/A	N/A	N/A	N/A	N
Decreased habitat quality due to increased freshwater influx from project operation		N/A	N/A	N/A	N/A	N/A	N

N = No effects due to adequate design or BMP implementation
N/A = Not applicable

5.3 Summary of Short-Term and Long-Term / Permanent Effects

Summary of potential adverse impacts of the proposed project on EFH and MUS are discussed in this section.

The extent of temporary impacts to EFH is dependent upon the following factors:

- The intensity of the impact at the specific site being affected.
- The spatial extent of the impact relative to the availability of the habitat type affected.
- The sensitivity/vulnerability of the habitat to the impact.
- The habitat functions that may be altered by the impact (i.e., shelter from predators).
- The timing of the impact relative to when the species or life stage needs the habitat.
- The degree to which the adverse impacts are avoided or minimized through BMP use.

Some impacts would be avoided or controlled through Project design modification, BMP implementation, or regulatory oversight and are considered negligible. Such impacts are described below.

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- Turbidity would be controlled through the use of silt curtains during construction. The low energy environment within the Ala Wai Canal reduces the spread and movement of plumes by current. Water quality monitoring would measure effectiveness of silt curtains (turbidity control) required as part of the State Water Quality Certification, in accordance with Section 401 of the Clean Water Act.

Short-Term Effects on EFH

Short-term effects result from actions that would cause temporary adverse impact to EFH or associated MUS, but are expected to be substantially restored through natural processes within one year.

- Mobile MUS (i.e., fish and crustaceans) trapped within a cofferdam if required for in-water work related to construction / modification of drainage structures would likely be lost during de-watering of the work area. Most fish in the vicinity during placement of cofferdam materials would swim away from the area. Any lost individual MUS would be negligible to the managed fishery and are expected to quickly recover.

Long-Term Effects on EFH

- Most mobile MUS (i.e., fish and crustaceans) would swim away from areas experiencing a turbidity plume during a storm event. Although unlikely, any lost individual MUS would be negligible to the managed fishery and are expected to recover quickly.
- Impacts on water quality from the addition of nutrients or other growth factors would have temporary biological effects. Unlike particulate turbidity which settles out quickly, nutrients that leach from the sediment particles stay in the water column and would quickly be taken up by phytoplankton in the water. An increase in nutrients has the capacity to result in a plankton bloom with possible indirect impacts. Such impacts would restore to equilibrium naturally.

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6. Proposed Minimization and Offset Measures

6.1 Minimization Measures Internal to the Project

It is USACE's intent that potential adverse impacts to EFH would be avoided or minimized through implementation of Project-specific BMPs before, during, and post-construction. In addition, impact minimization measures incorporated into the project design are intended to provide long-term benefit to EFH in the harbor. Such benefits include:

- Construction and operation of the Ala Wai Golf Course Detention Basin which has the potential to improve water quality of detained water prior to releasing the water slowly into the Ala Wai Canal. The Ala Wai Golf Course Detention Basin would capture water discharging from the Manoa-Palolo Canal and hold detained water for approximately two days prior to the slow release of the water back into the Ala Wai Canal. The detainment time would provide an opportunity for sediments suspended in the water column to settle out on the golf course instead of remaining entrained and settling out in the Ala Wai Canal and/or the nearshore marine environment. The settled-out sediments could contain pollutants the removal of which would improve the quality of the water entering the Ala Wai Canal from the detention basin.

6.2 Best Management Practices

A summary of the construction BMPs to be implemented to avoid and/or minimize adverse impacts to EFH are discussed in Section 2.5.

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7. Determination of Effect

The project would involve potential in-water work within freshwater streams and the Ala Wai Canal to construct/modify drainage structures associated with the project's proposed floodwalls and Ala Wai Golf Course detention basin. The operation of the project would be passive but could have an indirect effect on water quality and habitat quality within the Ala Wai Small Boat Harbor and the nearshore marine environment.

The project would not result in the loss of nearshore marine habitat, nor would the project have any unavoidable adverse impacts on the nearshore marine environment. All construction work either occurs upland or within aquatic habitat not designated as containing EFH. Therefore, the project would have no direct adverse effects to EFH.

Indirect adverse effects to the nearshore marine environment could occur because of project operation. The operation of the project could result in increased water velocities within the Ala Wai watershed which could in turn disturb in-place sediments within the Manoa Stream, Palolo Stream, and the Ala Wai Canal. Disturbance of in-place sediments would result in the resuspension of these sediments within the water column and creation of a turbidity plume which would degrade water quality. It is important to note that a turbidity plume is currently created under the future without project condition that causes degraded water quality, however, the proposed project could increase the degree to which water quality is degraded (i.e., could see greater degradation over a longer period). The construction and operation of the Ala Wai Golf Course detention basin could minimize this potential adverse indirect impact by detaining storm flows from the Manoa and Palolo streams and giving time for entrained sediments to settle out in the golf course prior to detained water entering the Ala Wai Canal. This could be a beneficial improvement in the water quality of storm water from the Manoa and Palolo streams entering the Ala Wai Canal and subsequently the nearshore marine environment.

The Corps has determined that these activities and their resulting impacts, as described in the preceding sections, would potentially reduce the quality of EFH, and accordingly would adversely affect EFH for BMUS, CMUS, and PMUS within the Ala Wai Small Boat Harbor and the nearshore marine environment. However, due to the containment of impacts to the Ala Wai Canal, the comparatively low quality of the EFH within the Ala Wai Small Boat Harbor and the nearshore marine environment, the size and scale of the impacts in comparison to the seemingly infinite expanse of EFH throughout the Pacific, the expected beneficial offsets resulting from the project design, and implementation of temporary avoidance and minimization measures built into the project, the Corps has determined that the anticipated adverse effects do not have the potential to cause substantial adverse effects to EFH.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

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CONTROLLED UNCLASSIFIED INFORMATION (CUI)

6. Fish and Wildlife Coordination Act Consultation with the U.S. Fish and Wildlife Service

Attached is the Draft Fish and Wildlife Coordination Act Report prepared by the U.S. Fish and Wildlife Service in coordination with the National Marine Fisheries Service and Hawaii Resource Agencies.

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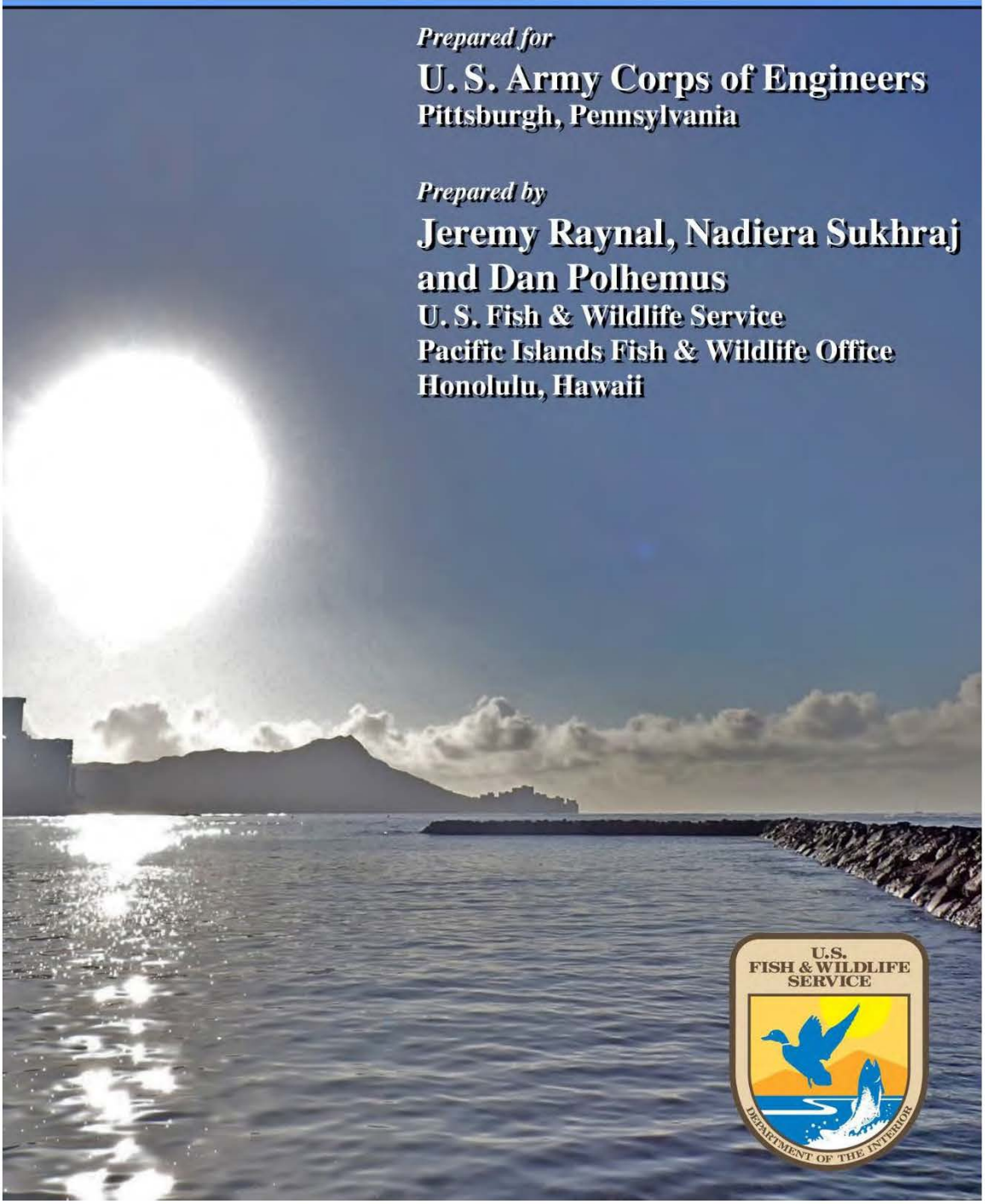
Phase 1 Marine Habitat Characterization
Ala Wai Watershed Flood Risk Management
Oahu, Hawaii

Planning Aid Report - Fish & Wildlife Coordination Act

FINAL REPORT **June 2023**



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FINAL REPORT
FISH AND WILDLIFE COORDINATION ACT REPORT

MARINE HABITAT CHARACTERIZATION
ALA WAI CANAL WATERSHED FLOOD RISK MANAGEMENT

OAHU, HAWAII

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Honolulu, HI

Prepared for

U.S. Army Corps of Engineers
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June 2023

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INTRODUCTION

Authority, Purpose and Scope

The Ala Wai Canal Flood Risk Management Project (Ala Wai Project) is being developed as a cooperative effort between the United States Army Corps of Engineers (USACE) and the City and County of Honolulu. The Ala Wai project is authorized by Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970, as amended. This project will utilize federal funding and requires a Department of the Army Permit, and therefore triggers mandatory consultation under the Fish and Wildlife Coordination Act of 1934 [16 U.S.C. 661 *et seq*.; 48 Stat. 401], as amended (FWCA).

The FWCA provides the basic authority for the Secretary of the Interior, Secretary of Commerce, and the appropriate State fish and game agency to assist and coordinate with Federal, State, and public or private agencies and organizations in the conservation and rehabilitation of aquatic wildlife and habitats. This authority is provided to the Secretary of the Interior and is delegated to the Service, and subsequently to the Ecological Services Program. The authority provided to the Secretary of Commerce is delegated to the National Marine Fisheries Service (NMFS) via Reorganization Plan No. 4. The authority provided to states and territories is delegated to natural resource agencies there (e.g. Department of Land and Natural Resources (DLNR) in Hawaii). The FWCA report acts as one step in informing each of these resource agencies, in addition to the requesting or acting agency, on natural resources present in the proposed project area and potential project impacts to those resources.

The following report is prepared in response to the USACE request that the U.S. Fish and Wildlife Service (Service), Pacific Islands Fish and Wildlife Office (PIFWO) develop a FWCA report to advise Corps on FWCA compliance on the Ala Wai project. This request was received in the document, "Fish and Wildlife Coordination Act Scope of Work: Ala Wai Canal Flood Risk Management Project General Reevaluation Report", dated July 11, 2022 (Appendix A). PIFWO prepared a Scope of Work and subsequently provided the following services: 1) collected and evaluated data; 2) analyzed potential project impacts; 3) provided recommendations for impact avoidance, minimization, and mitigation; 4) maintained coordination with Corps, DLNR, and the NMFS; and 5) drafted the FWCA report to document and present those services. This FWCA report was prepared under the authority of, and in accordance with, provisions of the FWCA; the Clean Water Act of 1977 [33 USC 1251 *et seq*.; 91 Stat. 1566], as amended (CWA); the Endangered Species Act of 1973 [16 U.S.C. 1531 *et seq*.; 87 Stat. 884], as amended (ESA); and other legislation that authorize the Service to provide technical assistance to conserve trust resources.

The Ala Wai Project aims to reduce potential impacts to public and private Honolulu infrastructure in future flood events. The Ala Wai watershed includes a high level of flood risk due to a combination of extensive and outdated urban development, steep topography in the Makiki, Manoa, and Palolo valleys, and a propensity for periodic and sometimes unpredictably severe heavy rain events. The Ala Wai Canal itself has overflowed and flooded Waikiki several times in the past (e.g. storms in November 1965 and December 1967, and Hurricane Iniki in 1992). Upland areas of the watershed have flooded more recently causing extensive damage in

the Manoa valley, impacting residents, businesses, and the University of Hawaii campus facilities (2004; > $85 million in damages), and in Makiki (October 2006).

The scope of the proposed project includes construction of flood mitigation measures throughout the Ala Wai watershed. Primary strategies being considered focus on increasing water storage in new detention basons and enhancing conveyance of floodwaters in streams with newly constructed floodwalls. The proposed measures will likely alter stream flow rates, runoff, and discharge to the Ala Wai Canal and on to the ocean. The scope of aquatic ecosystem impacts could include streams throughout the watershed, the Ala Wai Canal, Ala Wai Harbor, and the nearshore marine environment at Ala Moana and Waikiki.

Description of Project Area and Proposed Action

Oahu, Hawaii is located in the north Pacific Ocean (Figure 1). All proposed project sites are in the Ala Wai watershed on the leeward south shore of Oahu Island (Figures 2 and 3). The Ala Wai watershed is the primary natural drainage unit for the City of Honolulu, Hawaii, and surrounding residential and commercial areas. The Ala Wai watershed includes the southern slopes of the Koolau Range between Punchbowl and Diamond Head craters, the most densely populated and economically important area in the state. The watershed primarily drains to the Ala Wai Canal, where urban Honolulu meets Waikiki, before it flows into the Pacific Ocean via the mouth of the Ala Wai Harbor (Figure 3). Primary streams that feed the Ala Wai Canal originate in the prominent residential neighborhoods of Makiki and the Manoa and Palolo valleys (Figure 3).

Ongoing risk of damaging flooding in Makiki, Manoa, and Palolo, and downstream residential and commercial communities, calls for strategic flood risk mitigation throughout the Ala Wai watershed. The Corps has been planning the Ala Wai Canal Watershed Flood Risk Management project for over a decade and has met many challenges (e.g. social, logistical) in finalizing project plans. At present, the Corps has narrowed approximately 223 initially proposed measures down to three potential active Project Alternatives to reduce flood risk in the Ala Wai watershed, in addition to the possible "No Action Alternative." Current active Alternatives being considered include Alternative 1, primarily focused on increasing storage of floodwaters in detention basins but including some conveyance features; Alternative 2b, primarily focused on floodwall construction to facilitate conveyance of floodwaters but including some detention; and Alternative 5, a hybrid approach including both storage and conveyance strategies.

Each active Alternative includes several potential measures, some of which are still being screened at the time of writing.

Alternative 1

Alternative 1 proposes the Makiki District Park Detention Basin and the Kanaha Floodwall in Makiki, the Manoa Valley District Park Detention Basin and the Woodlawn Drive Floodwall in Manoa Valley, the Koali Road Floodwall near the convergence of Manoa and Palolo streams, the Kaimuki High School Floodwall near the school and adjacent to the Manoa-Palolo Canal, and

the Ala Wai Golf Course Detention Basin (see Figure 4). Schematics of floodwall designs are provided in Figure 5 through 8.

The Makiki District Park Detention Basin would temporarily store stormwater starting at a 20-year flood event and would slowly release water to the Makiki stream to drain by gravity over a period of about 24 hours. Basin capacity would be approximately 22 acre-feet and construction would include excavating down 6-10 ft, building a floodwall around the perimeter of the park (~ 1,200 ft in length), and building a 20 ft high, 4 ft wide, 525 ft long concrete box culvert at the basin inlet along with a 1.75 ft X 1.75 ft X 1.205 ft long concrete culvert at the exit.

The Kanaha Floodwall was designed to work in conjunction with the Makiki District Park Detention Basin to reduce flooding in adjacent and downstream residential communities. The Kanaha Floodwall is expected to be approximately 6 ft high and 2,200 ft long, extending along the right descending bank of Makiki Stream from Mott Smith Drive to Anapuni Street.

The Manoa District Park Detention Basin is designed similarly to the Makiki District Park Detention Basin to reduce flooding in residential areas downstream. The Manoa Park Detention Basin is also designed to store stormwater beginning at the 20-year storm event, would include similar excavation (6-8 ft) and a 6 ft floodwall construction including steel sheetpile and earthen slopes around the perimeter of Manoa District Park (~ 1,580 ft). The Manoa District Park Detention Basin is designed to have storage capacity of 54 acre-feet and would drain naturally over a period of about a day. The entrance concrete culvert box would be 15 ft high X 4.5 ft wide X 445 ft long and a 2 ft deep and 2 ft wide channel would be excavated to allow the basin to drain to Manoa Stream.

The Woodlawn Drive Floodwall would be constructed to reduce potential flooding at the University of Hawaii campus and downstream residential areas due to overflow at the Woodlawn Drive Bridge. This area has flooded severely in the past due to debris collecting at the bridge causing blockage and backup of stormwaters. The proposed structure would be approximately 6 ft high and would extend about 1,625 ft downstream, from a location approximately 320 ft upstream of Woodlawn Drive Bridge, along the right descending bank of Manoa Stream. The Woodlawn Drive Floodwall would be constructed of micropiles and concrete.

The Koali Road Floodwall would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream where the two streams meet to reduce threats of residential flooding near Kanewai Community Park. This measure would be constructed of micropiles and concrete, would be 6 ft tall, and would extend approximately 2,485 ft in total. The structure would be constructed where the two streams meet and would extend upstream to about 990 ft downstream from Dole Street Bridge on Manoa Stream, and 690 ft below the Koali Bridge on the Palolo Stream. Two associated box culverts would also be constructed. One would inlet near Kanewai Street with effluent to the Paolo Stream and the other would have influent flow at Kaluawaa Street and effluent flow to the Palolo Stream.

The Kaimuki High School Floodwall would include a similar floodwall construction to the others, to reduce potential flooding of residential structures east of the school. The Kaimuki Floodwall would extend around the perimeter of Kaimuki High athletic fields (4,400 ft).

Modifications to Ala Wai Golf Corse are planned to create Ala Wai Golf Course Detention Basin to reduce flood risk in Waikiki and other nearby communities. This measure would include construction of an earthen levee around the perimeter of the golf course (~ 10,655 acre-feet) to create a storage capacity of approximately 314 acre-feet. A concrete in-stream diversion weir (33ft wide X 147 ft long X 14.5 ft high) would be constructed along the left downstream bank of the Manoa-Palolo Canal and at the end of a drainage ditch that currently runs parallel to Date Street to divert water to the detention basin beginning in the case of a 20-year storm event. Current natural drainage areas along the southwest side of the golf course would be modified to create three concrete drainage structures with flap gates (3 ft wide X 3 ft high) to allow the Ala Wai Golf Course Detention Basin to drain into the Ala Wai Canal over a period of about 48 hours.

Alternative 2B

Alternative 2B (Figure 9) includes the Makiki District Park Detention Basin, Kanaha Floodwall, Woodlawn Drive Floodwall, and Koali Road Floodwall as described above. Alternative 2B also includes the Ala Wai Canal Floodwall and the Kaimuki High School Floodwall (less extensive than described in Alternative 1). The Ala Wai Canal Floodwall would be constructed of micropile, steel sheetpile, and concrete, would be 6 ft high, and extend approximately 24,745 ft along the right descending bank of Manoa-Palolo Stream from H-1 to the Ala Wai Canal, from Kaimuki Highschool Floodwall down Date Street and along the east side of the golf course, and along both banks of the Ala Wai Canal to Ala Moana Blvd. However, there may not be enough space to allow construction of the preferred "L-wall" design along the right descending bank between Kapiolani Boulevard and Date Street. Other design and construction alternatives remain in discussion (e.g. "I-wall" with tie-backs to keep the wall upright) and will likely be finalized during the Pre-Construction Engineering and Design phase of the project. This structure is intended to prevent flooding in Moiliili, Diamond Head, and Waikiki. Stormwater drainage sewers around the golf course would also be modified to allow free drainage to the Ala Wai Canal without backflow. The Kaimuki High School Floodwall proposed in Alternative 2B differs from that proposed in Alternative 1 in that it would join with the Ala Wai Canal Floodwall instead of extending parallel to Date Street.

Alternative 5

Alternative 5 (Figure 10) includes the Woodlawn Drive Floodwall and Koali Road Floodwall as described under Alternative 1. Alternative 5 also includes the Ala Wai Golf Course Detention basin as described below, and an iteration of the Kaimuki High School Floodwall that would differ from the Alternative 2B measure in how it joins the Ala Wai Canal Floodwall.

Alternative 5 proposes a modified design to create the Ala Wai Golf Course Detention Basin. This measure would be similar to that described in Alternative 1 but the earthen levee would join with the Ala Wai Canal Floodwall on the left descending bank of the Ala Wai Canal near the intersection of Kapahulu Ave. and Ala Wai Blvd. The drainage ditch running along the north side of the golf course at Date St. would be reinforced to act as a stormwater overflow into the golf course (detention basin). Drainage from the basin would occur as previously described.

Alternative 5 also includes the Ala Wai Canal Floodwall to extend along both banks of the Manoa-Palolo stream from H-1 to the Ala Wai Canal and Kaimuki High School Floodwall, connect with the earthen berm on the east side of the golf course, and along both banks of the Ala Wai Canal to Ala Moana Blvd. Area stormwater sewers that drain into the canal would be modified to prevent backflow.

Prior Fish and Wildlife Service Studies and Reports

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US Army Corps of Engineers. 2017. Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii: Feasibility Study with Integrated Environmental Impact Statement. Interim Final Report.

Coordination with Federal and State Resource Agencies

Corps notified Service of new project engineering design and reinitiated ESA Consultation in a letter – 20 August 2020

Corps and Service met to discuss FWCA concerns about aquatic species passage, contaminants, and riparian habitat – 28 August 2020

Service provided ESA species list and recommendation to minimize impacts in a letter – 17 September 2020

Corps notified Service of reduced project scope in a letter – 10 November 2020

Service provided questions on project scope and Corps responded – 28 November 2020

Corps provided letter to Service indicating plans for a General Reevaluation Report – 9 August 2021

Service provided letter to USACE with comments and recommendations regarding the GRR – 2 September
2021

Agency Coordination Meeting with NOAA, USEPA, State of Hawaii Dept of Health (DOH), Coastal Zone Management Program (CZMP), Office of Conservation and Coastal Lands (OCCL), Commission on Water Resource Management (CWRM), and DLNR, and the City and County of Honolulu – 8 February 2022

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 5 April 2022

Corps provided Draft SOW for preparation of the FWCA Report – 18 July 2022

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 2 August 2022

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 23 August 2022

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 27 September 2022

USFWS Breakout Coordination Meeting – 18 October 2022

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 25 October 2022

DOH and CZMP Breakout Coordination Meeting – 26 October 2022

Service provided a first draft FWCA SOW and budget to NMFS for review – 8 November 2022

NMFS responded with Essential Fish Habitat (EFH) and ESA concerns on initial SOW draft – 8/10 November 2022

Service responded to NMFS comments on SOW – 14-15 November 2022

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 15 November 2022

Service provided SOW to Hawaii DLNR – 15 November 2022

Service received comments on SOW from DLNR (Department of Aquatic Resources (DAR) & Commission on Water Resource Management (CWRM)) and responded 15-16 November 2022

Service provided SOW to state and federal resource agencies for final review – 22 November 2022

Service provided SOW draft to Corps for initial review – 28 November 2022

Service provided Final Draft SOW to Corps and resource agencies – 6 December 2022

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 20 December 2022

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 24 January 2023

Agency Coordination Meeting with NOAA, USEPA, DOH, CZMP, OCCL, CWRM, DLNR, and the City and County of Honolulu – 28 February 2023

USFWS provided Preliminary Results to USACE – 28 March 2023

USFWS provided Draft FWCA Report to Federal and State Resource Agencies - 28 March 2023

FISH AND WILDLIFE RESOURCE CONCERNS AND PLANNING OBJECTIVES

U.S. Fish and Wildlife Service Planning Objectives

The mission of the Service consists of working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. In 2016, the Service updated its 1981 mitigation policy to better meet this mission (USFWS, 2016), but has since rescinded the revised 2016 mitigation policy (USFWS, 2018) leaving the 1981 policy in effect. The Service's 1981 Mitigation Policy (USFWS, 1981) outlines internal guidance for evaluating project impacts affecting fish and wildlife resources. The Mitigation Policy complements the Service's participation under NEPA and the FWCA. The Service's

Mitigation Policy was formulated with the intent of protecting and conserving the most important fish and wildlife resources while facilitating balanced development of this nation's natural resources. The policy focuses primarily on habitat values and identifies four resource categories and mitigation guidelines. The resource categories are shown in Table 2.

Table 2: Resource Categories. **Resource categories and mitigation planning goals.**

Resource Category	Designation Criteria	Mitigation Planning Goal
1	High value for evaluation species and unique and irreplaceable.	No loss of existing habitat value.
2	High value for evaluation species and scarce or becoming scarce.	No net loss of in-kind habitat value.
3	High to medium value for evaluation species and abundant.	No net loss of habitat value while minimizing loss of in-kind habitat value.
4	Medium to low value for evaluation species.	Minimize loss of habitat value.

The proposed Ala Wai Project measures could have secondary impacts on areas that are considered coral reefs and meet the description of Resource Category 2. Other areas that could potentially be impacted by the proposed project meet definitions of Resource Category 3. Coral reef and freshwater stream areas should be considered “high” or “high to medium” value due to the aquatic and marine resources documented and sources cited in this report.

Coral reefs are considered scarce based on the local, national, and global decline of coral reefs (Williams et al., 2009; Walsh et al., 2010; Waddell (ed.), 2005; Waddell and Clarke (eds.), 2008; Wilkinson (ed), 1998; Wilkinson (ed), 2000; Wilkinson (ed), 2004; Wilkinson (ed), 2008) and the geographical constraints of coral reefs in the United States. Coral reefs have also been designated as Special Aquatic Sites under the Clean Water Act (CWA). Special Aquatic Sites are defined as “geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values.” They are further described as “significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region” (40 CFR Part 230 §230.44/FR v.45n.249).

Oahu’s freshwater streams provide essential habitat for a variety of endemic and threatened species. While these species may not currently occur in project sites, streams of the lower Ala Wai watershed do provide essential passage for indigenous diadromous species and can therefore be considered medium value.

Designations of Resource Category 2 and Special Aquatic Site require the Service to recommend ways for the action agency to mitigate losses, through measures to avoid or minimize significant adverse impacts. In the event losses are unavoidable, measures to rectify immediately, reduce, or eliminate losses commensurate with project permitting or implementation will be recommended

under the FWCA. Recommendations will focus on compensation for the replacement of in-kind habitat values and ecological functions. An effective and verifiable mitigation program planned and executed by the project proponent is required under NEPA and the CWA.

To this end, it is the policy of the Service to provide federal leadership for the conservation, protection, and enhancement of fish, wildlife, and their habitats by seeking to mitigate their losses with a facilitated, balanced approach to proposed water development actions. The Service's 1981 mitigation planning policies achieve this by the following: 1) State-Federal Partnership, 2) Resource Category Determinations, 3) Impact Assessment Principles, 4) Mitigation Recommendations, 5) Mitigation means and Measures, and 6) Follow-up.

Within these planning policies, the key term *evaluation species* is used to describe the fish and wildlife resources selected for impact analysis. There are two basic approaches to the implementation of evaluation species: 1) selection of species with high public interest, economic value, or both, and 2) selection of species that provide a broad ecological perspective of an area. While some species may be appropriate for both approaches, the Service emphasizes using species that provide a broad ecological perspective.

The evaluation species typically used for tropical Pacific marine ecosystems include stony corals, seagrasses, and certain benthic algal groups (*Halimeda* meadows or unique coralline algal communities). Some situations may dictate the use of additional benthic species and key fish species as important evaluation species, but the Service currently does not consider fish species in our assessments.

These evaluation species are important as they also relate to other federal agency policies. Coral reefs are generally considered high value habitat and have been defined in the CWA Section 404(b)(1) guidelines as "skeletal deposits, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef." Stony corals are a foundation species to the development of coral reefs and hence are often the central focus of mitigation within the Pacific Island region. Coral reefs are further considered to be Special Aquatic Sites under the CWA 404(b)(1) guidelines. Finally, the 404(b)(1) guidelines also consider vegetated shallows to be Special Aquatic Sites. Within the Pacific Islands, the Service considers *Halimeda* meadows and seagrass communities to be vegetated shallows. Such Special Aquatic Sites are areas that possess special ecological characteristics and contribute to the overall benefit of the ecosystem.

Some locations within the potential impact area of the proposed project include coral reef and are classified under Category 2. Other areas within the proposed project fall under Category 3-4. This report includes assessment of data collected by the Service in early 2023, specifically to understand the coral reef resources that could potentially be impacted by the Ala Wai Project. The Service previously collected and assessed data and reported on potential project impacts to freshwater systems within the Ala Wai Canal watershed (see Foster et al. 2016 and Kim 2016). Those previous data and reports are still relevant and should be reviewed as appropriate to ongoing project plans. Though representative surveys were completed at marine and freshwater sites that are most likely to be impacted, it is possible that some valuable resources may have

been missed during field surveys. Precautionary plans for mitigation of any potentially present valuable resources should be considered.

Resource Concerns

The primary concerns associated with the proposed project include the potential impacts to coral reef ecosystems in the Ala Moana and Waikiki beach areas. This project is not likely to impact reefs directly. All construction associated with the Ala Wai Project is planned for sites located inland of the coast. However, the proposed construction and results of the project could have secondary impacts to coral reefs and other coastal habitat due to altered stormwater conveyance to the ocean via the Ala Wai Canal and its tributaries. Honolulu stormwaters typically include sediments and chemical contaminants that can harm corals and other living marine habitats and species. Negative impacts to the marine environment can potentially be minimized or avoided with appropriate planning that allows settling, removal, or filtering of sediment and contaminants, however, it remains difficult to quantify how sediments and chemical contaminants will be delivered to the coastal environment at different potential flood levels in relation to implementation of the proposed Project Alternatives.

The Service's specific planning objective is to collect and provide the Corps and federal and state resource agencies with data on the fish and wildlife resources, particularly aquatic species and habitats, that are most likely to be impacted by the proposed project. The Service also aims to interpretate those data and provide minimization and avoidance comments and recommendations for consideration during additional project planning and ongoing coordination among the Corps and resource agencies.

EVALUATION METHODOLOGY

Field Data Collection Protocol

Geomorphological structure and benthic habitat characteristics were surveyed at Waikiki Beach from the Ala Wai Canal exit (Ala Moana Bowls) to the jetty at the southeastern end of Ft. DeRussy. Surveys covered a distance of approximately 1.25 km of reef as the crow flies, from shore to the forereef or surf zone. Surveys were limited to the reef flats and intertidal zones in some cases where surf conditions made the reef crest and forereef inaccessible. Data was collected to map and assess potential impacts to benthic resources by secondary effects of the Ala Wai Project.

Phase I Habitat Mapping

Phase I survey methodology was used to identify and map habitat types, ground truth any information assumed from previously available benthic data sources, and to generally identify benthic habitat and species types present.

A team of two biologists collected qualitative information on the habitats and biological communities within the survey area using snorkeling equipment. The survey teams used various

available benthic data sources, satellite imagery, daily environmental conditions, and previous local experience to predetermine general areas and specific starting points for the surveys. The total number of transects surveyed was based on the time available and the area to be covered. The survey team was equipped with digital cameras, dive watches, floated GPS units, and datasheets attached to clipboards to record data. The team collected habitat and biological information along swim paths while towing a pair of floated GPS units. The floated GPS units were used to mark starting and ending waypoints and were set to automatically record a track log with 5 to 10-second intervals. GPS units were continuously aligned near the team to minimize spatial error between the biologists and the GPS path. The time on digital cameras was synchronized with the GPS units by photographing the time of the GPS unit before entering the water. Any time difference between dive watches and GPS units was recorded for later synchronization. This allowed scientists' observations to be linked to time and approximate locations (GPS coordinates) where the observations were made.

The survey team included a habitat/coral biologist and an algae/invertebrate biologist. All surveyors recorded data on observed habitat zones, debris observations, and protected species, in addition to their assigned focal taxonomic/geomorphologic/ecological groups. Each biologist recorded the estimated distance they were able to effectively observe, as visual assessment range is potentially limited by water clarity, rugosity of habitat, complexity of habitat, water depth, and other environmental conditions that can limit visible distance. One biologist was assigned as the navigator. The navigator followed a pre-determined compass bearing, depth contour, habitat boundary or other criteria used to define the survey transect path. Each biologist collected photographic documentation of significant species and habitat types observed.

Habitat Terminology and Characterization

Terminology used in this report to describe habitat was modified from Battista et al. (2007). Detailed definitions are available from the Pacific Islands Fish and Wildlife Office upon request. Although the classification of Battista et al. (2007) was not developed specifically for impact assessments, the terminology and characterization framework are generally appropriate for the purposes of characterizing habitats for this Phase I survey. The framework described in Battista et al. (2007) included three data layers of habitat information including classification of geographic zones, geomorphological structures, and biological cover. The Service used the terms for geographic zones, geomorphological structures, and major geomorphological structures with slight modification. The "geographic zones" were referred to as "habitat zones", "geomorphological structures" were called "habitat structures", and "major geomorphological structures" were referred to as "major habitat structures."

Habitat zones were generally determined prior to entering the water and verified by the teams during the survey and upon analysis of the qualitative data collected. To verify habitat zones, the habitat/coral surveyor identified habitat structures as accurately as possible while in the water. The navigator led the survey teams along approximated habitat structure boundaries where possible to assist with further delineation between habitat structures. Biological characterization was focused on one side of any observed boundaries to apply appropriately to each specific habitat structure involved in the assessment. This characterization focus was coordinated by the observers and noted on their datasheets. The boundaries between habitat structures were

evaluated or refined during the data processing phase (see Habitat Map Production methods). The types of unconsolidated sediments observed were scored as present or absent and categorized as sand, mud, rubble, and cobble.

In addition to characterizing the habitat structures, the habitat/coral surveyor also characterized habitat complexity. The categories of habitat complexity used were the same as used by NOAA's Pacific Islands Fishery Science Center (Brainard et al. 2008; Brainard et al. 2012) and included six categories recorded on a 0-5 scale: 0 for low, 1 for medium-low, 2 for medium, 3 for medium-high, 4 for high, and 5 for very high. "As examples, low habitat complexity is often associated with flat sand plains or rubble habitats; medium habitat complexity is often associated with small to moderate spur and groove, coral or boulder habitats; and high or very high habitat complexity are often observed as high or extreme vertical relief associated with steep spur-and-groove canyons, pinnacles, and walls" (Brainard et al. 2008).

Biotic Characterization

The biologists inventoried biological groups/categories and species observed along the survey transect. Information on the biological groups/categories was recorded every 10 to 60 seconds depending on the habitat area/complexity and speed of swimming. Visual assessment range was recorded. The biotic characterization included three main survey categories including habitat/coral, algae/invertebrate, and ESA corals, and each main category included multiple data collection components as described in the following sections.

Habitat/Coral Characterization

The habitat/coral surveyor also collected information on six different components of the coral population within each surveyed area. These components included the relative abundance of stony corals, stony coral growth forms observed, estimated stony coral sizes present, and presence of non-stony corals (see components 1–6 below). Each observation, and the time of observations (hh:mm:ss) was recorded to identify approximate GPS coordinates for each observation. Approximate radius (m) of areas assessed for coral abundance was recorded. The observer also photographed representative habitats, coral communities, coral colonies, and/or any other notable features.

Component 1 – Habitat structure and sediment were classified continually and with the same frequency as other data. Habitat zones were classified at the start of the dive or when a change of zone was found.

Component 2 – Relative coral abundance was recorded utilizing a modified DACOR method. DACOR stands for dominant (5), abundant (4), common (3), occasional (2), or rare (1). Categories were recorded on a 1-5 scale with 1 being Rare and 5 being Dominant. Zero was used for coral absence. Each category was approximated to represent a broad range of percent coral cover such as 1 – <1% (scattered corals), 2 – <10%, 3 – 10–50%, 4 – 50–80%, and 5 – >80%.

Component 3 – Stony coral growth forms included: 1) lobate/massive, 2) conical, 3) small-branching, 4) medium-branching, 5) large-branching, 6) digitate, 7) columnar, 8) table, 9) plate,

10) foliaceous, 11) encrusting, 12) free-living, and 13) mixed. Possible mixed growth forms included forms like plates-and-column and plates-and-branched, but if other combinations existed, they were recorded as well. The distinction between small and medium branching colonies was made by using the approximate diameter of a pencil (< 1 cm), while the distinction between medium and large branching colonies was made by using the approximate diameter of a small wrist (< 5 cm). For data analysis, these growth forms were lumped into fewer categories including: 1) lobate, microatoll, branching, encrusting, plate-like, and free-living.

Component 4 – For each growth form observed, the sizes observed were recorded as broad size categories, including: 1) small (less than 50 cm), 2) large (greater than 50 cm), 3) mixed (including both small and large colonies), and 4) extra-large colonies (greater than 2 m).

Component 5 – Non-stony coral groups were recorded as present or absent. The groups include: 1) soft corals, 2) zoanthids, 3) gorgonians or sea fans, and 4) black or wire corals.

Component 6 – If coral disease or bleaching was observed, it was noted in the comments section of the datasheet and recorded in the Access database. It was recorded as coral stress (present or absent), and then logged as disease, pale bleached, partial bleached, or complete bleached.

Algae/Non-Coral Invertebrate Characterization

The algal/invertebrate observer collected information on up to eight different components. These components included relative abundances for seagrass, turf algae, coralline algae, filamentous algae, macroalgae, and several invertebrate groups. The observer also recorded observations on debris. The details for each component are listed below. Locations of each observation were recorded. The visual assessment range was estimated and representative habitats, representative algal and invertebrate communities, algae and invertebrates for species identification, or any other notable feature of interest were photographed.

Component 1 – Relative abundance for seagrass was recorded on a scale of 0–3. Zero was used for seagrass absence. Category 1 represented seagrass abundance that consisted of isolated patches and did not have continuous coverage within an area. Category 2 represented seagrass that has semi-continuous or continuous coverage, but only a low density of blades. Category 3 represented seagrass with continuous coverage and a high density of blades or a tall canopy height. The species of seagrass were recorded.

Component 2 – Relative abundance for turf algae was recorded on a scale of 0–3. Zero was used for turf algae absence. Category 1 represented turf algae that had sparse or patchy coverage and/or low density. Category 2 represented a moderate, semi-continuous coverage and a low to moderate density of turf algae. Category 3 represented continuous coverage and a high density of turf algae. Turf algae were considered to include sparse to thick multi-specific assemblages of diminutive and juvenile algae less than 2–3 cm in canopy height.

Component 3 – Relative abundance for coralline algae was recorded on a scale of 0–3. Zero was used for coralline algae absence. Category 1 represented a sparse or patchy coverage of coralline algae. Category 2 represented a moderate or semi-continuous coverage of coralline algae.

Category 3 represented a continuous coverage of coralline algae. Coralline algae were identified as readily visible red or pink corallines on the reef surface. The observer did not look in holes or under rocks to assess the coralline algae abundance.

Component 4 – Relative abundance of filamentous algae and cyanobacteria was recorded on a scale of 0–3. Zero was used for absence of filamentous algae or cyanobacteria. Category 1 represented a sparse or patchy coverage of filamentous algae or cyanobacteria. Category 2 represented a moderate or semi-continuous coverage of filamentous algae or cyanobacteria. Category 3 represented a continuous coverage and a high density of filamentous algae or cyanobacteria. Filamentous algae were defined here as hair-like plants that do not form a substantial thallus or a coherent tissue (definition modified from Huisman et al. 2007, page 254). Common filamentous algae that are representative of this group include *Cladophora* spp. or *Bryopsis hypnoides* (not *Bryopsis pennata*). Common cyanobacteria that are representative of this category include *Lyngbya* spp. and *Hormothamnion* sp.

Component 5 – Relative abundance of macroalgae was recorded on a scale of 0–3. Zero was used for macroalgae absence. Category 1 classification represented sparse or patchy (even individual plants) and a low density of macroalgae. Category 2 classification represented moderate, semi-continuous coverage and a low to moderate density of macroalgae. Category 3 represented a continuous coverage with a high density of macroalgae. In addition to recording the relative abundance, four forms of macroalgae were recorded as being present or absent and included short frondose, tall frondose, *Halimeda* algae, or invasive macroalgae. Short frondose macroalgae was defined as having a maximum canopy height of 20 cm and tall frondose macroalgae was defined as having a minimum canopy height of 20 cm.

Component 6 – Relative abundance for all non-coral invertebrates was recorded on a scale of 0–3. Zero was used for invertebrate absence. Category 1 classification represented an observation of 1–2 individuals. Category 2 classification represented the observation of 3–10 individuals. Category 3 represented the observation of more than 10 individuals. If an aggregation of significantly more than 10 individuals was observed, this was recorded in the comments section. The invertebrate groups included grazing sea urchins, rock boring sea urchins, crown-of-thorns starfish, lobsters, *Pinctada margaritifera*, giant clams, anemones, sea cucumbers, molluscs (strombids, top or turbin shells, Triton's Trumpet, helmet shells, etc.), octopus, seastars (*Linckia* sp., *Culcita* sp., or others), and crinoids. In addition, the presence and absence (but not relative abundance of) sponges and tunicates in all forms and shapes were recorded.

Component 7 – The observation of marine debris (deb) or remnant structure underwater was recorded as present or absent. The type of structure or debris was also recorded (UXO, tires, misc., etc.).

Component 8 – The final component was the compilation of an overall species list for all algae and invertebrate species observed. Species were identified to the lowest taxonomic level possible, either *in situ* or by subsequent examination of photographs taken on-site.

Post-Field Work Data Processing

Data Preparation

Digital images and GPS data were downloaded using appropriate software. Images were placed into daily folders and GPS data were downloaded using DNRGPS 6.0© as a tab-delimited text file (.txt). Benthic data were entered into a Microsoft Access© database. After all data are entered into the Access database, the GPS data, dive data, habitat/coral data, and algae/invert data were validated for errors or anomalies. All errors were corrected, and the data were processed for geosyncronization. The final, validated, georeferenced data were stored as a database file (.mdb).

Data Processing

Habitat map data layers were produced with a series of Service custom built scripts (Marine_Mapping_Model1_v4.R and Marine_Mapping_Model2_v4.R) using R software (R Core Team, 2020). These custom built scripts used several packages including RODBC (Ripley and Lapsley 2020), sf (Pebesma et al. 2020a), raster (Hijmans et al. 2020), rgdal (Bivand et al. 2020a), dismo (Hijmans et al. 2017), deldir (Turner 2020), maptools (Bivand et al. 2020b), rgeos (Bivand et al. 2020c), smoothr (Strimas-Mackey 2020), spatialEco (Evans et al. 2020), cleangeo (Blondel 2019), sp (Pebesma et al. 2020b), gstat (Pebesma and Graeler 2020), R.utils (Bengtsson 2020), and rmapshaper (Teucher et al. 2020). The first script (Marine_Mapping_Model1_v4.R) processed the raw survey data exported from the database file. External data can be incorporated into the data processing including various other resources such as NOAA's Benthic Habitat Maps (Battista et al. 2007), land classification layers, existing DEM layers, or habitat classification from Feature Analyst©. All available benthic classification data were incorporated into the classification layer produced from this project's field data to provide a comparative option for the final classification. After the individual datasets were processed, they were incorporated and combined into the draft classification layer. This draft layer was processed based on comparative criteria and manual interpretation of the results to produce a final classification layer in the second script (Marine_Mapping_Model2_v4.R). The second script also finalized the geoprocessing steps and incorporated a series of interpolations for all the biological groups as described previously.

Initial input layers used to begin the data processing included area enclosure and Target Area shapefiles, the raw database output file, and NOAA's Benthic Habitat Maps (Battista et al. 2007). The Target Area shapefile represented the coastal marine area anticipated to experience the most direct impacts from the proposed project and associated runoff in future flood events. A 500 m radius from the coastal discharge location (i.e. the mouth of Ala Wai Harbor) was used to define the Target Area. Marine surveys were focused southwestward from the discharge area because previous observations indicated that prevailing ocean currents are expected to direct effluent waters in that direction. The area enclosure shapefile included the entire Ala Wai watershed and nearshore waters but served to clip the spatial data and ensure it could not extend beyond the area of interest. This prevented inclusion of extraneous data. The Project Area was defined by a 100 m buffer of the Target Area and the area directly surveyed by divers and is intended to represent the area of highest likelihood of secondary impacts.

During the classification stage, set classification criteria and manual interpretation of the layer classifications were used to finalize classification. The set classification criteria and manual

interpretation determined the boundaries of the habitat structures by: 1) direct observation, 2) transects that are swum along habitat structure transition boundaries (e.g. scattered rock in unconsolidated sediment on one side and unconsolidated sediment-sand on the other side), 3) utilizing NOAA's Benthic Habitat Maps where deemed appropriate, or 4) other data sources as described previously (e.g. Feature Analyst outputs based on WorldView-2 imagery) that provided information on habitat structures. These boundaries were assumed to represent a best estimate of actual habitat boundaries based on the available information. After the boundaries were drawn for each habitat character, the edited Theissen polygon was validated to reassure all changes were correct and complete.

The models were also used to generate output tables that included all geodetic area calculations for each major habitat structure, habitat structure, sediment type, and habitat zones.

DESCRIPTION OF FISH AND WILDLIFE RESOURCES AND HABITAT

General

The Target Area, as defined for this project, included the marine aquatic habitat within 500 m of the mouth of Ala Wai Harbor. We considered the harbor mouth to be the discharge site for Ala Wai Canal effluent waters, and marine resources within 500 m of the discharge site to be the most likely to be impacted by the proposed project. The Project Area included the Target Area and the surveyed area, plus a 100 m buffer around both. While the Project Area was intended to cover the likely area of both direct and indirect effects, it may be larger or smaller than actual potential impacts.

Appendix B contains 23 maps depicting the habitats and biological resources within the Project Area (see Figure B1). Details of the maps are discussed below. Table 2 shows the breakdown for the Target Area including the surveyed structures, zones, and sediment types. The total area was 696,373 m^2. The geomorphological habitat structures were made up of Land (0.5 percent), Scattered Coral Rock in Unconsolidated Sediment (15.9 percent), Artificial (0.9 percent), Unconsolidated Sediment (0.1 percent), Pavement (15.0 percent), Pavement with Sand Channels (3.4 percent), Reef Hole (0.2 percent) and Unknown (64.0 percent). Unknown classifications represented areas with insufficient data. The habitat zones included Land (0.5 percent), Harbor (14.9 percent), Reef Flat (19.4 percent), Reef Crest (3.9 percent), Fore Reef (19.7 percent), and Bank/Shelf (41.9 percent). The major geomorphological habitat structures included Land (0.5 percent), Mixed (19.3 percent), Hard Bottom (16.1 percent), and Unconsolidated Sediment (0.1 percent), and Unknown (64 percent). The sediment present was 89.3 percent Sand with Rubble and 10.7 percent sand mixed with Rubble and Cobble.

Habitat Characteristics

The surveyed area (Figure B2 and B3) primarily included Shoreline Intertidal, Harbor, Reef Flat, and Reef Crest zones seaward of Ala Wai Harbor and Waikiki Beach seaward of Ft. DeRussy (Figures 11 and B4). The observed area included modified intertidal beach and a mix of natural reef flat and reef flat areas that have been modified to provide access to small dug out harbors at Waikiki Beach.

The areas seaward of Ala Wai Harbor and Waikiki beaches were generally separated by the small dug out harbor adjacent to Kahanamoku Beach and the Atlantis Submarines dock (Figure 12), and a channel cut through the reef flat many years ago providing access to that harbor. The Kahanamoku Beach harbor area consisted of Unconsolidated Sediment made up of Sand and Rubble (Figures 13) and B5 – B7). The channel area was classified as Mixed habitat including Unconsolidated Sediment and Scattered Coral Rock in Unconsolidated Sediment (Figures B5 – B7).

The intertidal zone adjacent to beaches included a seaward progression from Unconsolidated Sediment, consisting of Sand changing to Sand and Rubble, to reef flat habitat (Figures 5 – 7). Waikiki Beach included a deeper trough at the seaward edge of the intertidal zone near Grays Channel before the reef flat began. Progressing seaward from Ala Wai Harbor, habitat transitioned from artificial structure (Figure 14) directly to areas classified as Reef Flat in most cases (Figures B5 – B8). Reef flats were generally gently sloping, with depths of approximately 0.5 m to 2 m, extending from the intertidal zone to the surf zone at the reef crest. The reef flat was characterized by Hard Bottom Pavement with areas of Mixed Habitat Structure including mostly Pavement, Sand, and Rubble with low relief (Figures B4 – B9). The forereef included steeper spur and grove characteristics (Figures B7 – B9). Area seaward of the fore reef slope appeared to be deeper offshore bank/shelf habitat (Figure B4).

Biological Resources

Visual surveys indicated that the Project Area was relatively typical of historically modified urban beaches, harbors, and coral reef environments. Coral abundance was generally low (< 10 percent cover) throughout (Figure B10). Small (< 50 cm) to large (50cm – 200 cm) lobate corals (Figure 15) were most common on the reef flats, followed by small medium-branching (Figure 16), encrusting, and microatoll growth forms (Figure B11). The most common coral species observed included *Porites rus*, *P. compressa*, *P. lobata,* and potentially other species of massive *Porites*, branching *Pocillopora spp*., and encrusting *Montipora spp*. Zoanthids were sparsely distributed on the reef flats (Figure B12). Frondose algae, CCA, and turf algae were common but not dominant throughout the surveyed area (Figures 17 and B13 – B15). Invasive algal species observed included *Gracilaria salicornia*, *Acanthophera spicifera*, and *Avrainvillea* sp. Filamentous algae or cyanobacteria were present, particularly seaward of Waikiki beaches but did not dominate the habitat (Figures 17 and B16). Spiny urchins were common, and rock boring urchins (Figures 16 and 18) were dominant throughout the surveyed area (Figures 17 – 18). Sea cucumbers were observed throughout the Project Area and occurred in clusters in certain reef flat areas (Figure B19). Molluscs were observed sparsely throughout the surveys (Figure B20). Sponges were observed in clusters, primarily seaward of Ala Wai Harbor (Figure B21). Tunicates were observed primarily in areas directly adjacent to channels and harbor areas (Figure B22). Green sea turtles were observed swimming at 16 locations within the Project Area. No marine mammals were observed (Figure B10).

PROJECT IMPACTS

Direct Impacts

The direct environmental impacts on aquatic species and habitats caused by the Ala Wai project are most likely limited to construction areas that will alter streams and freshwater habitats inland of the marine environment. The Service assessed project impacts on streams and freshwater systems previously in Foster et al. (2016) and Kim (2016). The Service also provided relevant comments in a letter in September 2021 responding to the Corps indication of plans for a General Reevaluation Report for the project. These documents can be reviewed for understanding of direct project impacts to aquatic ecosystems.

Indirect Impacts

Impacts of the Ala Wai project on marine ecosystems will possibly be indirect. Impacts to the marine environment can potentially be minimized with appropriate planning and application of Project Alternatives, however, it remains difficult to quantify the complex array of potential impacts and how they will occur at different flood levels and given implementation of the various potential measures associated the Project Alternatives.

Sources of project impacts on marine ecosystems include altered delivery of freshwater, sediments, and chemical contaminants to the nearshore marine environment. Response of marine species to these factors depends on concentration, frequency, and duration of exposure, and different marine species will be impacted differently. Habitat forming organisms such as corals are of primary concern because a wide range of other species depend on them.

Legacy environmental contaminants, particularly termiticides used in older wood frame houses in neighborhoods like Manoa and Palolo, and other contaminants from urban and industrial runoff, have likely accumulated in locations within the watershed based on current flow regimes. It is unclear how accumulated chemical contaminants and sediments would be redistributed by flow alterations proposed by this project, and how those contaminants will be delivered to the sea. Accumulation of contaminants in the Ala Wai Canal could be extensive at this time and could be increased by this project. Additionally, accumulation of contaminants would likely occur in detention basins that are proposed measures. These contaminants ultimately flush to the marine environment and could do so more readily with altered flow of stormwaters. These factors could lead to increased negative impacts on evaluation species.

Concerns about sediment and chemical contaminants could be reduced if the project incorporates measures to allow contaminants to settle out of flood waters (e.g. multiple detention basins), in addition to maintenance plans to remove contaminants from the watershed (e.g. removal of accumulated sediments from detention basins and Ala Wai Canal).

While the Corps has completed hydrologic and hydraulic (H&H) modeling for the project area (Figure D1; Table D1) that helps to understand flood levels, runoff, and freshwater discharge, the ability to predict discharge of sediment and chemical contaminants remains limited. FWCA requires equal consideration of fish and wildlife resources to other project goals. Flood risk reduction measures that can also reduce contamination of the marine environment should be included in this project.

RECOMMENDATIONS

1) *The Service recommends that the Corps refer to previous FWCA assessments and other correspondences to avoid impacts to streams and freshwater aquatic habitats and species:*

The Service has previously assessed potential impacts of the Ala Wai Canal Flood Risk Management project on streams and freshwater ecosystems within the Ala Wai watershed. Please refer to Kim (2016) and Foster (2016) to avoid impacts to freshwater ecosystems.

2) *The Service recommends further consideration of natural mitigation measures at the Makiki District Park Detention Basin and Manoa Valley District Park Detention Basin measures, in addition to the Ala Wai Golf Course Detention Basin, to trap sediments and chemical contaminants originating up stream of those locations:*

Despite the limits to effectiveness of previously screened natural mitigation measures and Makiki District Park Detention Basin and Manoa Valley District Park Detention Basin in meeting flood control goals, FWCA requires equal consideration of fish and wildlife trust resources to other project goals. This calls for a precautionary approach to mitigating the potential impacts. A precautionary approach to mitigation, in this case, may include revitalizing flood risk management measures that have previously been screened out for other reasons. For example, the initially considered measure including natural enhancement of upland native forest was screened due to being limited in overall reduction of flood risk compared to other measures planned to control flow of upland floodwaters (i.e. Makiki District Park Detention Basin and Manoa Valley District Park Detention Basin). Currently, these two detention basins have also been screened. Detention basins are potentially valuable for mitigating both flood risk to infrastructure and expected discharges of sediment and chemical contaminants to nearshore environment and should be considered further for inclusion. Natural enhancement of native upland forests could add additional water retention benefits, combined with detention basins or in their absence, in consideration of fish and wildlife trust resources throughout the watershed and in the marine environment.

3) *The Service recommends regular scheduled maintenance plans be incorporated into this project to remove sediments (likely to contain chemical contaminants) that are present in the Ala Wai Canal, and also sediments/contaminants that are expected to accumulate in the Ala Wai Canal and the detention basins associated with this project over time.*

4) *The Service recommends that the Corps evaluate organochlorine levels in Manoa and Palolo streams and model their delivery to the marine environment prior to finalizing Project measures to be implemented.*

Monitoring chemical contaminants that enter the marine environment alongside trends in the nearshore ecosystem will enhance understanding of impacts of this project to marine ecosystems and inform future similar projects.

5) *The Service recommends that this project incorporate medium-term to long-term monitoring of marine resources and sediment and contaminants (including chlordane and dieldrin) in marine habitats located in the Project Area:*

Monitoring chemical contaminants that enter the marine environment alongside status and trends indicators in the nearshore ecosystem will enhance understanding of impacts of this project to marine ecosystems and inform future similar projects.

6) *The Service recommends the Best Management Practices provided as Appendix C.*

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FIGURES

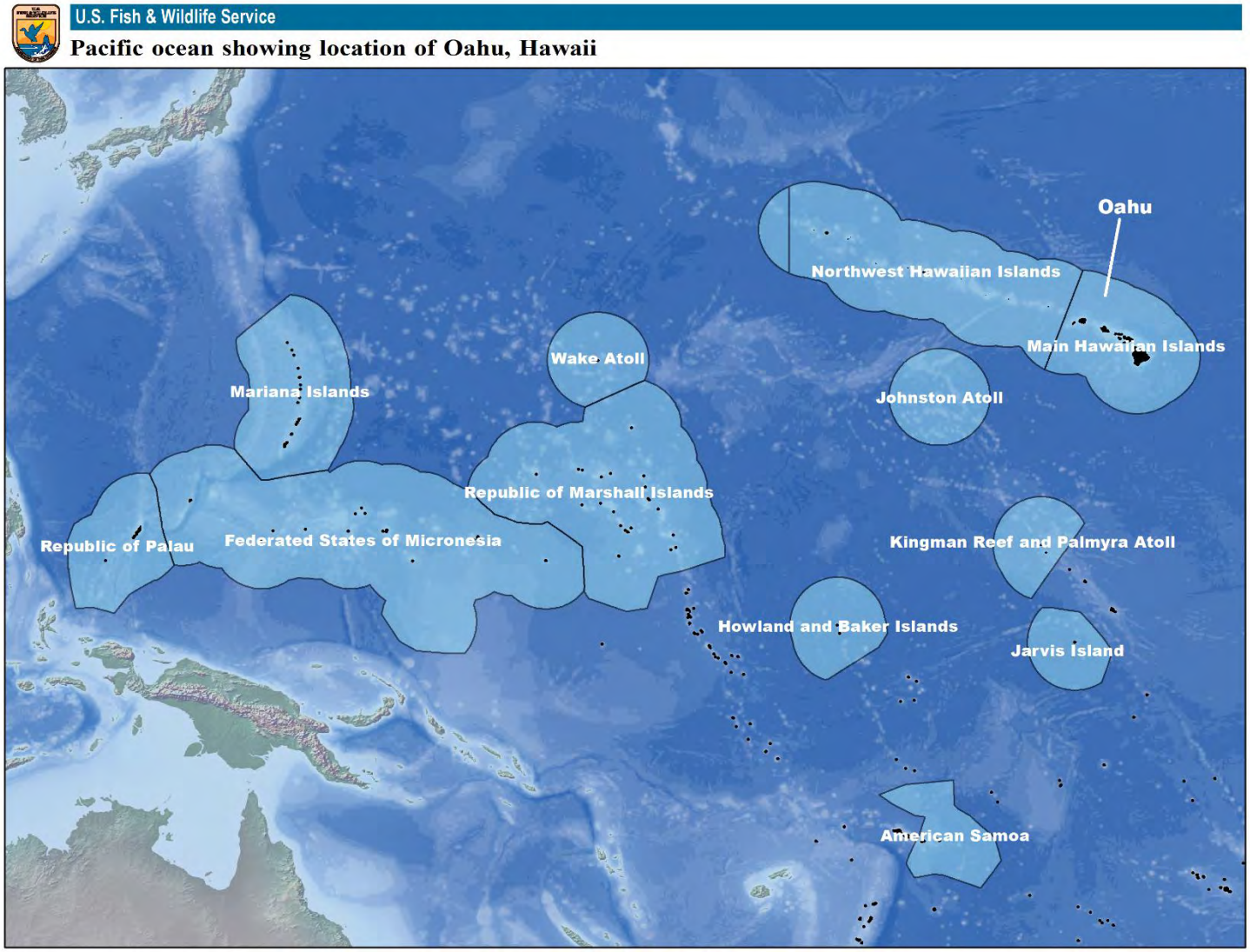

Figure 1: Pacific Ocean. Map of the Pacific Ocean showing the location of Oahu, Hawaii.

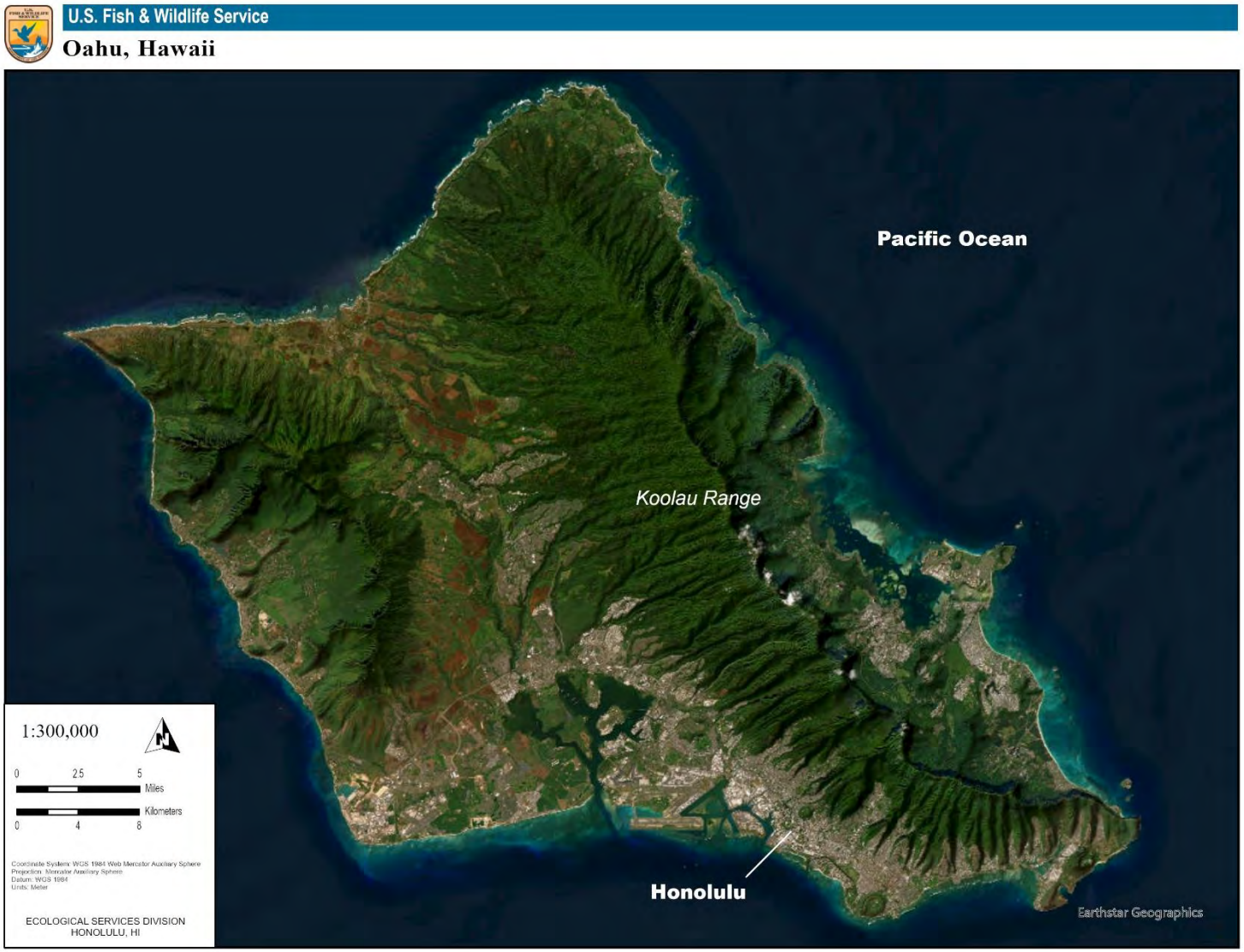

Figure 2: Oahu, Hawaii. Map of Oahu, Hawaii showing the location of Honolulu, leeward of the southern Koolau Range.

Figure 3: Ala Wai Watershed. Map of the Ala Wai watershed including Makiki and the Manoa, and Palolo Valley neighborhoods/drainage areas. The Punchbowl and Diamond Head craters mark the northwest and southeast extremities of the watershed. Waikiki, the Ala Wai Canal, and the Ala Wai Harbor discharge area are additional key features to the project.

Figure 4: Alternative 1. Storage Cornerstone Alternative including each measure proposed in Alternative 1. Figure provided by the Corps (24 March 2023).

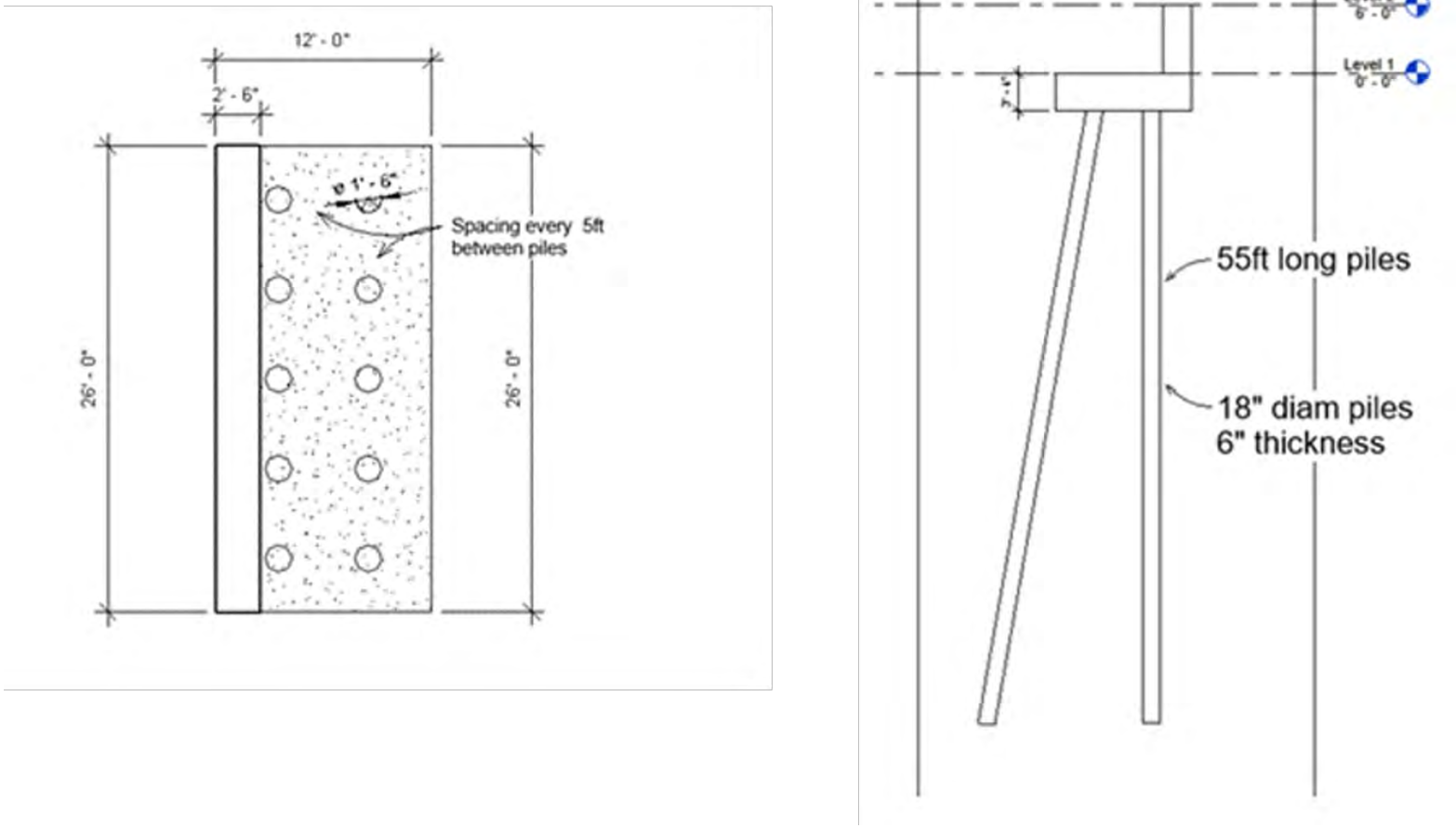

Figure 5: Micropile Floodwall Schematic. Two schematics of micropile floodwall designs proposed for the Ala Wai Project. 55ft long piles in the schematic on the right would likely be reduced to 40ft for this project. Schematic provided by the Corps (24 March 2023).

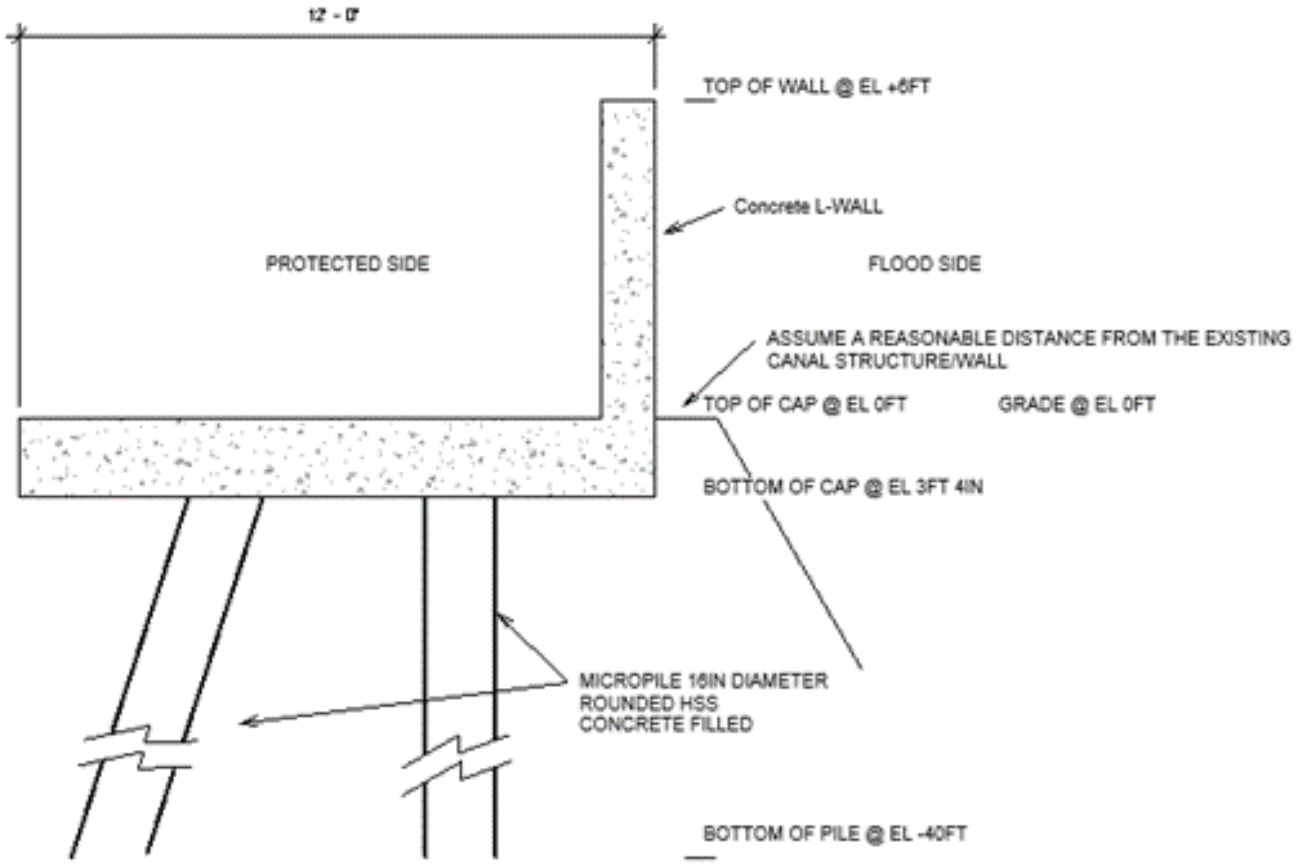

Figure 6: Detailed Micropile Floodwall Schematic. This figure shows additional details of micropile floodwall design planned for this project. Schematic provided by the Corps (24 March 2023).

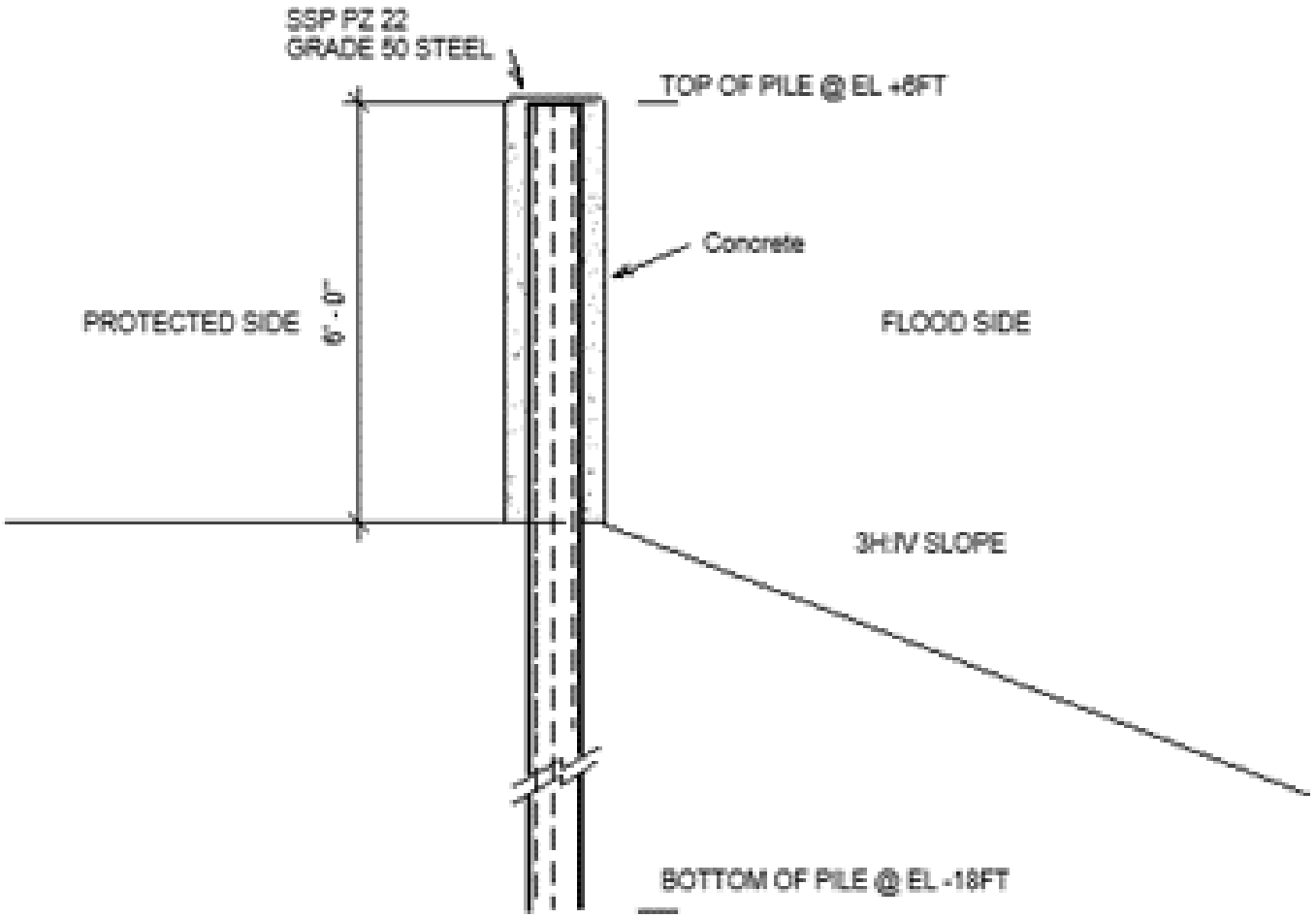

Figure 7: Steel Sheetpile on Slope Schematic. This figure shows design features of steel sheetpile walls with concrete fascia as they would be applied on slopes at Makiki and Manoa Valley District Parks. Schematic provided by the Corps (24 March 2023).

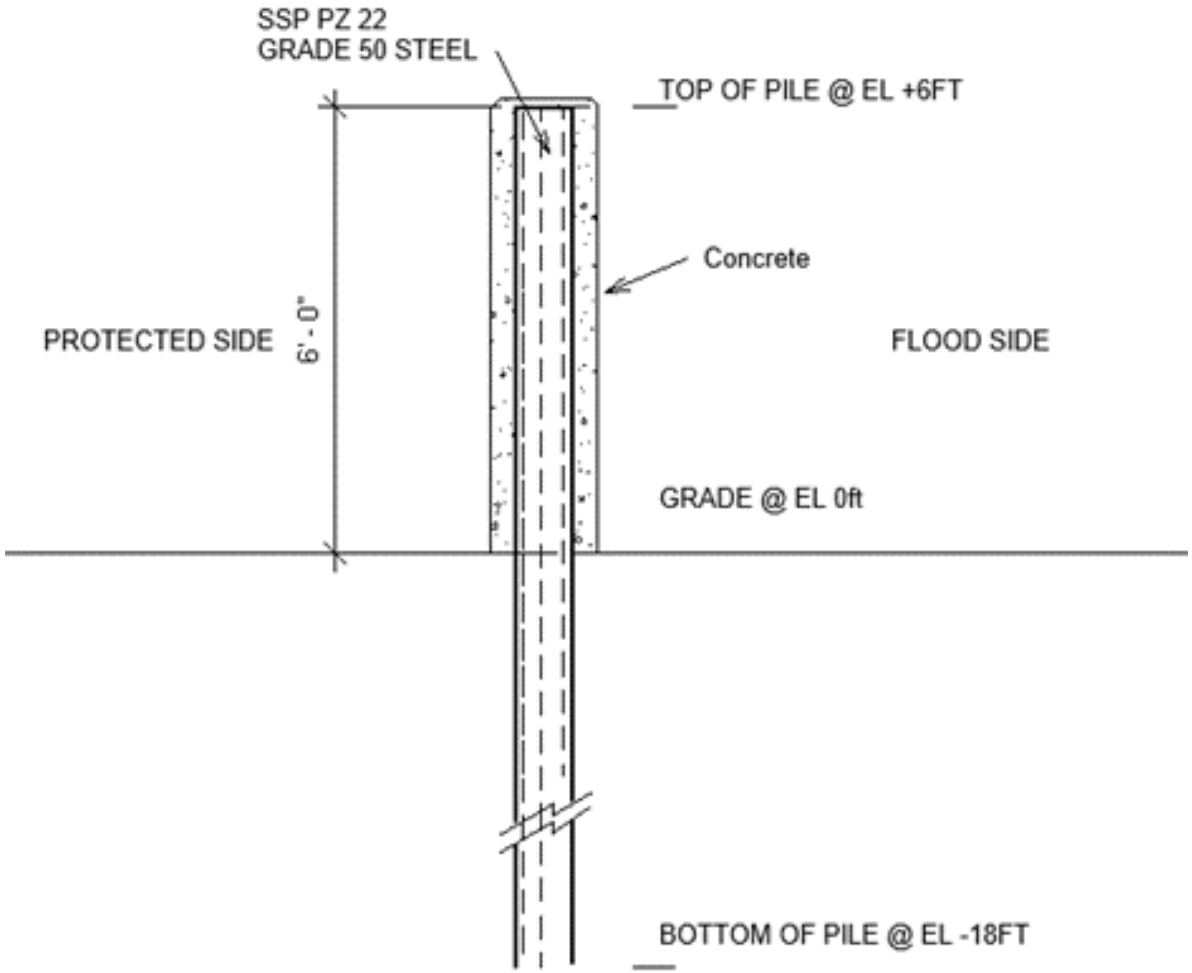

Figure 8: Steel Sheetpile Schematic. This figure shows design features of steel sheetpile walls with concrete fascia as they would be applied on flat land. Schematic provided by the Corps (24 March 2023).

Figure 9: Alternative 2B. Conveyance Cornerstone Alternative including each measure proposed in Alternative 2B. Figure provided by the Corps (24 March 2023).

Figure 10: Alternative 5. Hybrid Alternative including each measure proposed in Alternative 5. Figure provided by the Corps (24 March 2023).

Figure 11: Waikiki Beach. Photograph of Waikiki Beach adjacent to Ft. DeRussy. Photograph by Jeremy Raynal, USFWS (24 January 2023).

Figure 12: Harbor at Kahanamoku Beach. Photograph showing the harbor area at Kahanamoku Beach and the Atlantis submarine dock, facing Diamond Head crater and Waikiki Beach. Photograph by Jeremy Raynal, USFWS (24 January 2023).

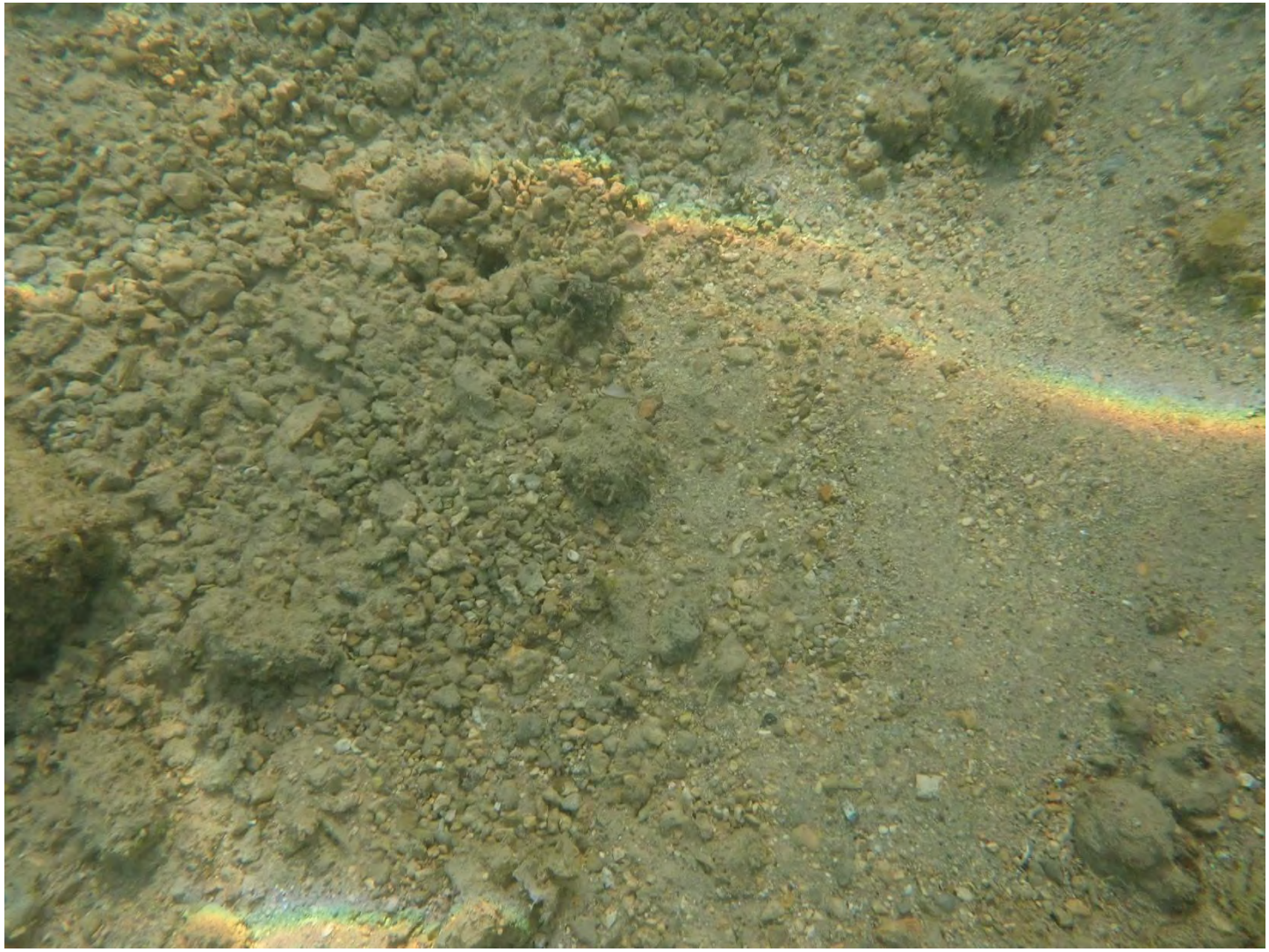

Figure 13: Sand and Rubble. Photograph of typical sand/rubble mix found within the Project Area. Photograph by Nadiera Sukhraj, USFWS (24 January 2023).

Figure 14: Seaward Ala Wai Harbor. Photograph seaward of Ala Wai Harbor showing artificial structures where they transition directly to reef flat habitat. Photograph by Jeremy Raynal, USFWS (24 January 2023).

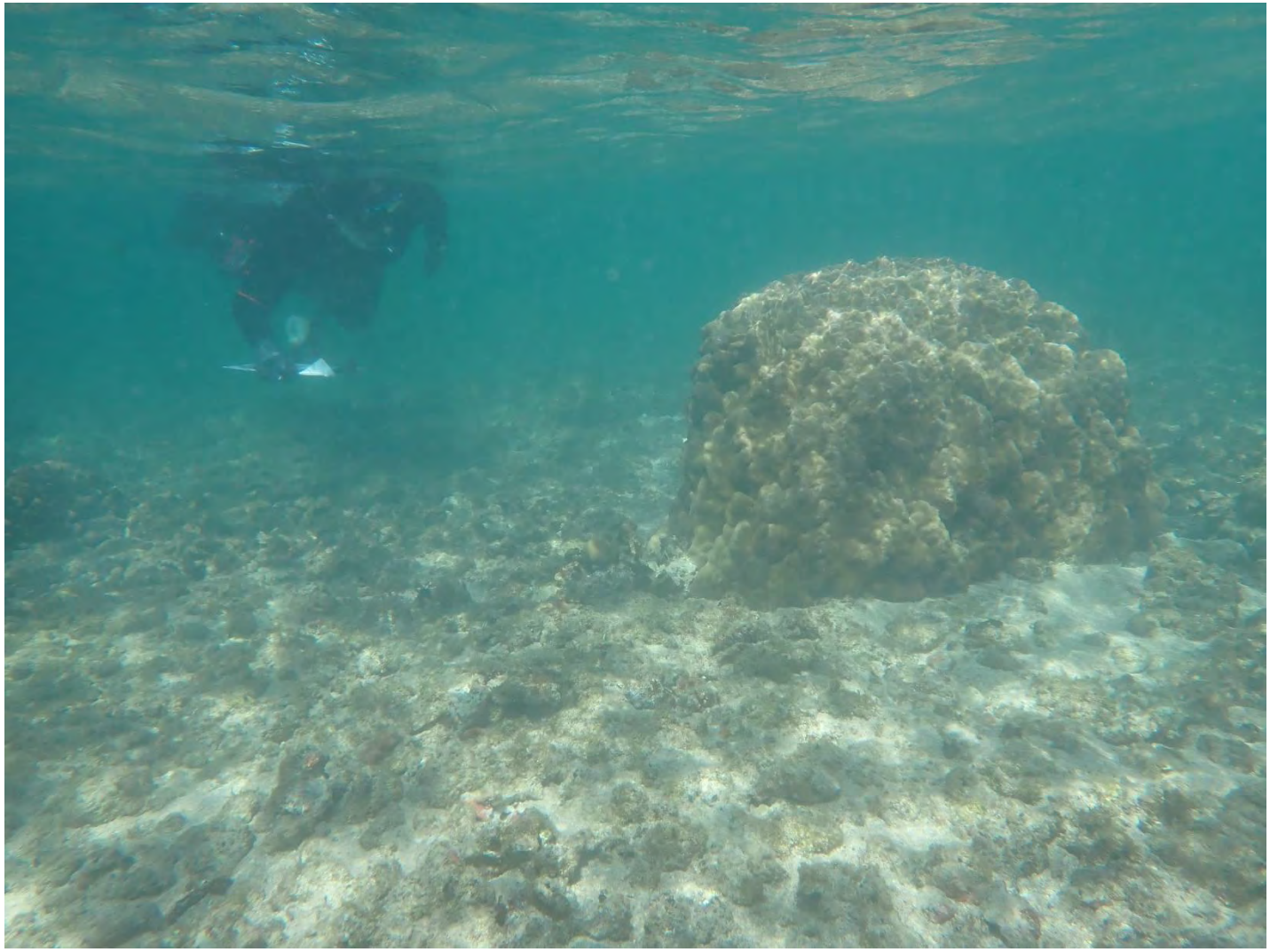

Figure 15: Lobate Coral. Photograph of a large lobate coral colony (*Porites sp*.) within the Project Area. Photograph by Jeremy Raynal, USFWS (24 January 2023).

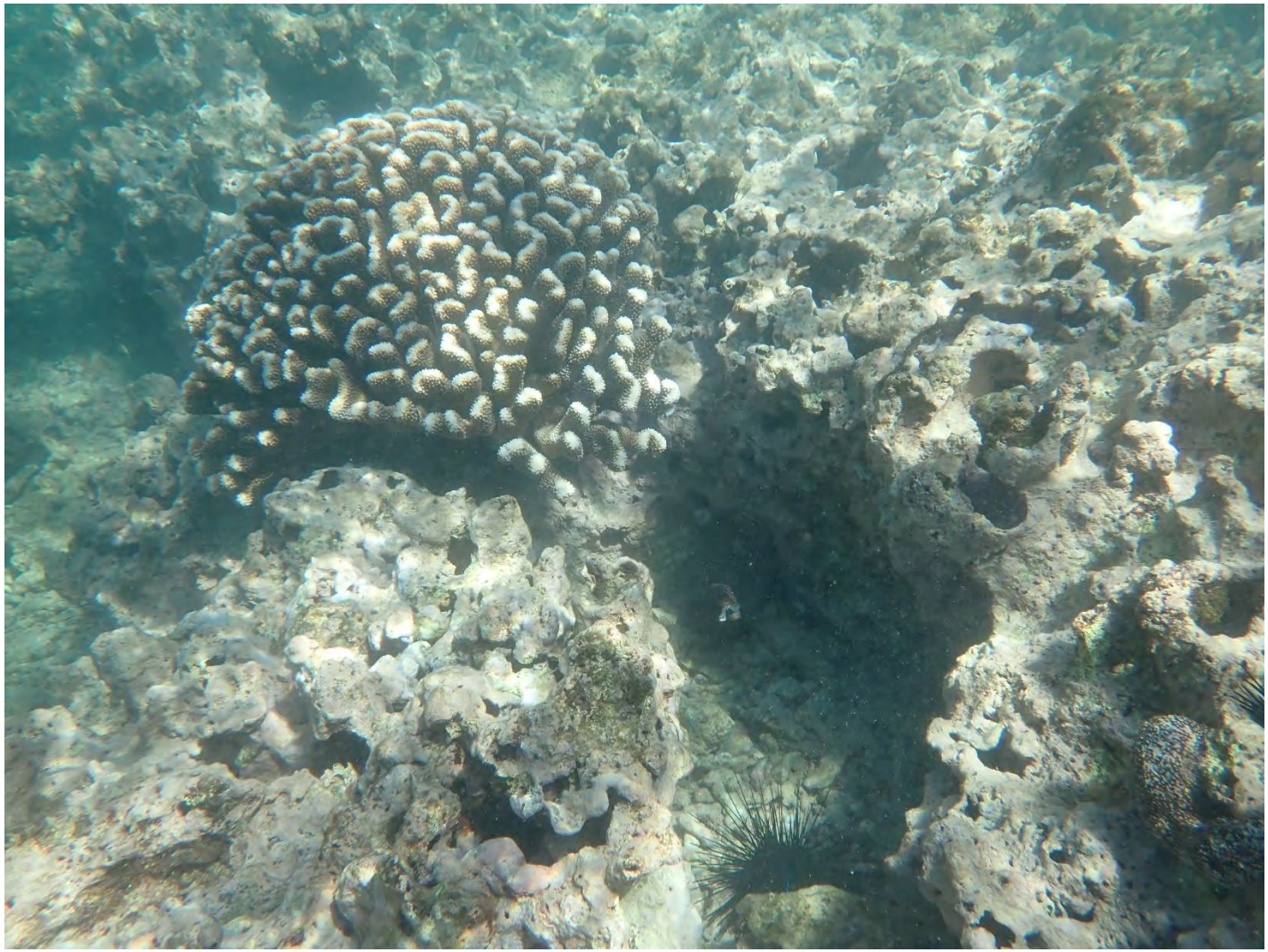

Figure 16: Small Medium Branching Coral. Of a typical small medium branching coral in the Project Area. Typical reef flat pavement and an urchin can also be seen. Photograph by Jeremy Raynal, USFWS (24 January 2023).

Figure 17: Filamentous and Invasive Red Algae. Photograph of filamentous green algae and red algae, *Gracilaria salicornia*, one of the most successful invasive algae in Hawaii, within the Project Area. Photograph by Nadiera Sukhraj, USFWS (24 January 2023).

Figure 18: Rock Boring Urchins. Photograph of rock boring urchins and turf algae on the reef flat in the Project Area. Photograph by Nadiera Sukhraj, USFWS (24 January 2023).

TABLES

Table 2: Area Calculations for Target Area.

AREA TYPE	CLASSIFICATION	AREA (M^2)	PERCENT OF AREA
STRUCTURE	LAND	3,631	0.5
	SCATTERED CORAL ROCK IN UNCONSOLIDATED SEDIMENT	108,820	15.9
	ARTIFICIAL	6,142	0.9
	UNCONSOLIDATED SEDIMENT	548	0.1
	PAVEMENT	103,204	15.0
	PAVEMENT WITH SAND CHANNELS	23,666	3.4
	REEF HOLE	1,315	0.2
	UNKNOWN	439,047	64.0
	TOTAL	686,373	
ZONE	LAND	1,761	0.3
	HARBOR	102,314	14.9
	REEF FLAT	132,718	19.4
	REEF CREST	26,702	3.9
	FORE REEF	134,801	19.7
	BANK/ SHELF	287,274	41.9
	TOTAL	685,570	
MAJOR STRUCTURE	LAND	3,631	0.5
	MIXED	132,126	19.3
	HARD BOTTOM	110,660	16.1
	UNCONSOLIDATED SEDIMENT	548	0.1
	UNKNOWN	439,047	64.0
	TOTAL	686,013	
SEDIMENT	SAND/RUBBLE	489	89.3
	SAND/ RUBBLE/ COBBLE	59	10.7
	TOTAL	548	

APPENDICES

APPENDIX A: Fish and Wildlife Coordination Act Scope of Work: Ala Wai Canal Flood Risk Management Project General Reevaluation Report

Fish and Wildlife Coordination Act Scope of Work
Ala Wai Canal Flood Risk Management Project
General Reevaluation Report
July 11, 2022

1.0 Purpose

This Scope of Work defines the expectations between the U.S. Corps of Engineers' (Corps) and the U.S. Fish and Wildlife Service (the Service) pursuant to coordination under the Fish and Wildlife Coordination Act for the Ala Wai Canal Flood Risk Management Project, General Reevaluation Study, Honolulu County, Hawaii.

2.0 Study Area

The Ala Wai Canal Flood Risk Management Project (Ala Wai Canal Project) is a joint cooperative effort between the Corps and the City and County of Honolulu. The Ala Wai Canal project was authorized in Section 209 of the Flood Control Act of 1962 (Public Law 87-874) and Section 216 of the Flood Control Act of 1970, as amended.

The study area for the Ala Wai Canal Project is located within the Ala Wai watershed, which is located on the southeastern side of the island of O'ahu, Hawai'i. The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Ko'olau Mountains to the nearshore waters of Māmala Bay (Figure 1). It includes the Makiki, Mānoa, and Pālolo streams, which flow to the Ala Wai Canal, a two mile long, man-made waterway constructed during the 1920's. The project area encompasses conservation areas in the upper reaches of the watershed and highly urbanized areas in the valleys and lower reaches of the watershed.

Figure 1: Regional Map of the Project Area.

3.0 Fish and Wildlife Coordination Act

This Scope of Work is particularly directed at implementing coordination between the Corps and the Service in accordance with the Fish and Wildlife Coordination Act (FWCA) of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 et seq.). The Fish and Wildlife Coordination Act of 1934 included requirements that were the first formal expressions in U.S. law of a duty to minimize the negative environmental impacts of major water resource development projects and to compensate for those impacts that remained (Bean 2016). The duties imposed by the FWCA were reinforced and expanded by the National Environmental Policy Act of 1969 (NEPA) (Bean 2016). Under NEPA and its implementing regulations, all federal agencies have a duty to assess the impacts of the major actions they propose to undertake and to consider reasonable alternatives to reduce or eliminate those impacts (Bean 2016). The Service, as the federal agency charged by Congress in the Fish and Wildlife Act of 1956 with the responsibility for management, conservation, and protection of fish and wildlife resources, routinely recommends mitigation measures to other federal agencies through the NEPA and FWCA processes (Bean 2016).

The FWCA directs and authorizes consultation, reporting, consideration, and installation/implementation of fish and wildlife conservation features. The authorities of the FWCA are considered to be "supplementary legislation" to the various Federal project authorizations, such as the Corps public works authorizations (Smalley and Mueller 2004). The FWCA conditions or supplements other water development statutes to require consideration of recommendations generated under the FWCA procedures, including portions of the Clean Water Act [*Zabel* v. *Tabb*, 430 F2d 199 (5th Cir. 1970) cert. denied 401 U.S. 910 (1972)]. For Federal water resources development projects, the FWCA requires that fish and wildlife conservation receive equal consideration by Federal agencies with other project purposes, and that such conservation be coordinated with other project features. The FWCA authorizes the Federal project implementation of these noted means and measures for both mitigating losses of fish and wildlife resources, and for enhancing these resources beyond the offsetting of project effects (Smalley and Mueller 2004).

4.0 Project Purpose

A high level of flood risk exists within the Ala Wai Watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) and aging and undersized infrastructure result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Mānoa, and Pālolo valleys. The population within the Ala Wai watershed is approximately 200,000 residents. The watershed also contains the University of Hawai'i and the Waikīkī District — a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state.

It is estimated that the Ala Wai Canal has the capacity to contain about a 20% annual exceedance probability (AEP) flood event. Overtopping of the Canal has previously flooded Waikīkī multiple times, including November 1965 and December 1967 storms and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by several recent events, including the October 2004 storm that flooded the Mānoa Valley and the March 2006 storm that flooded Makiki. The October 2004 event was estimated to have a 4% AEP that caused more than $85 million in damages.

The purpose of the general reevaluation report and environmental assessment that the Corps is preparing is to analyze a series of alternatives designed to reduce the on-going flood risks throughout the Ala Wai watershed, including a no action plan, as well as various combinations of structural, nonstructural, and natural and nature-based measures.

5.0 Measures Under Consideration

The project delivery team held a planning charrette in July 2021 to develop an initial list of management measures. The planning charette included not only the project delivery team, but also the local sponsor and relevant stakeholders. During the charette a total of 223 management measures were identified that could potentially address the study area problems and realize the study area opportunities within the Ala Wai watershed. Through subsequent screening by the PDT, the initial list of management measures has been reduced to 66 management measures still under consideration. Table 1 shows the management measures still under consideration as of July 2022.

The Corps is requesting that the U.S. Fish and Wildlife Service begin development of a planning aid letter (PAL) with the management measures presented in Table 1. As further screening of management measures occurs and an initial array of alternatives are formulated, the U.S. Fish and Wildlife will be provided this information for development of a Draft Fish and Wildlife Coordination Act Report (CAR) that describes any conservation recommendations and best management practices that the Service believes will help conserve fish and wildlife resources under the Service's jurisdiction. As the Corps analyses proceed to a final array of alternatives, they will be provided to the Service to support preparation of the Final CAR.

Table 1: List of Management Measures for the Ala Wai Canal Flood Risk Management Project, as of July 2022.

Management Measure	Basin	Description
No Action		
Do Nothing	Watershed Wide	Let it flood and federal government continues to provide funds to assist in clean-up efforts.
Nonstructural		
Emergency Preparedness Plans	Watershed Wide	Develop and maintain a flood emergency preparedness plan that identifies hazards, risks and vulnerabilities, and encourages the development of local mitigation. Plans should include the community's response to flooding, location of evacuation centers, evacuation routes, and flood recovery processes.
Flood Warning System	Watershed Wide	Flood warning systems alert citizens in flood prone areas of impending high water, giving the opportunity to evacuate damageable property and themselves from flood-prone areas.
Physical Nonstructural Measures	Watershed Wide	Nonstructural measures are permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding. Measures can include elevation, relocation, acquisition, dry flood proofing, or wet flood proofing.
Risk Communication/Education	Watershed Wide	Risk communication develops and uses educational tools such as presentations, workshops, hand-outs, and pamphlets to communicate flood risk and flood risk reduction measures.
Natural and Nature-Based		

Management Measure	Basin	Description
Forest Management	Upper Watershed	Manage the forest above Waiakeakua and along Waihi. The forest is changing and becoming increasingly degraded by feral pigs and invasive plants and trees, thus reducing the resiliency of the watershed to major flooding events. Should look at the watershed starting at the top where the majority of the rainfall is and the natural systems in place that may be improved to mitigate flooding.
Daylight streams	Makiki	Daylight streams at constrictions – will need hydraulic results to identify pinch points.
Pālolo Channel Naturalization	Pālolo	Return channel to a more natural state by removing concrete and adding natural slope material. This measure will likely be in conjunction with channel deepening, upstream detention and/or bridge modification to offset increased water elevations. Naturalization will reduce velocities and dampen peak flow.
Reduce Hardcover and Impervious Surfaces	Watershed Wide	Limit and reduce hardcover in the urban environment that increase runoff. Remove impervious surfaces and replace with porous surfaces.
Traditional Hawaiian Resource Management Practices	Watershed Wide	Utilize traditional Hawaiian resource management practices like loko ia, loi kalo, and fishponds for sediment retention and flood mitigation.
Structural		
Bridge Bypass and Debris	Upper Watershed	Spot treatment to low spots along the streams – debris screening and emergency bypasses or spillways for each bridge in the valleys so that the waters don't raise and erode neighboring properties.
Debris Basins	Upper Watershed	Install debris basins to collect debris in the upper watershed before it clogs up the Ala Wai Canal.
Detention Basins	Upper Watershed	Detention basins in government lands in mauka conservation districts if the City will maintain it. There is not enough width and depth in the existing flood channels to accommodate a large flood.
Floodgate & Bypass or Floodgate & Pump at Makiki Confluence	Makiki	If floodwalls around the canal are necessary, include a floodgate with bypass or a floodgate with pump at the Makiki Stream confluence to reduce backup to interior drainage along Makiki Stream.
Kalawahine Reservoir	Makiki	
Makiki District Park and Tennis Courts Detention Pond	Makiki	Approximately 13 acre-feet of storage at confluence of Kanaha and Makiki Streams.

Management Measure	Basin	Description
Makiki Stream Conduit	Makiki	Put a conduit that goes under the Makiki Stream and divert the water directly out to the harbor.
Makiki Tunnel System	Makiki	Tunnel System with Storage (can outlet to harbor and/or release with pumps); Inflow from Kanaha at Makiki District Park.
Modify Makiki Stream Entry Angle	Makiki	Modify the angle that the Makiki Stream enters the canal to minimize additional head on the water trying to exit near McCully. The current stream outflow has less than a 90-degree angle, increasing the chance to produce higher water level with backwater during a flood, accumulate sediment, higher cost on channel wall maintainers, etc.
Piikoi Bypass	Makiki	Utilize or upgrade existing storm sewer to route water from Kanaha Stream to Ala Moana Park.
Check Dams	Mānoa	Construct check dams in Mānoa to slow the water down ahead of areas prone to flooding.
Kanewai Detention Pond	Mānoa	Approximately 4.5 acre-feet of storage on the right bank of Manoa Stream.
Kanewai Underground Storage	Mānoa	Underground detention structure below park; storage capacity not yet determined.
Koali Road Floodwall	Mānoa	Floodwall along left bank of Manoa Stream, downstream of Kanewai Community Park to protect community from upstream peak flows.
Mānoa Channel Modification	Mānoa	Deepen/widen channel to provide more within-bank storage.
Mānoa Valley District Park Detention Pond	Mānoa	Approximately 33.5 acre-feet of storage on the right bank of Mānoa Stream.
Subsurface Kanewai Tunnel	Mānoa	Subsurface tunnel from Kanewi Community Park to the harbor using gravity flow.
Woodlawn Bridge Bypass Box Culvert	Mānoa	Create a bypass box culvert that traverses around both bridge abutments and exit into the existing stream channel on the south side of Woodlawn Drive. As an added precaution and catch basin and the drainpipes along Woodlawn Drive number and sizes could be increased.
Woodlawn Bridge Floodwall	Mānoa	Floodwall (permanent or deployable) at Woodlawn Drive Bridge vicinity to contain water to channel.
Woodlawn Drive Bypass	Mānoa	Capture overflow water from Woodlawn Drive and return to stream.
City Mill Culvert	Pālolo	Utilize the culvert next to City Mill to slow down or detain water; culvert is 15-feet deep in this area.

Management Measure	Basin	Description
Modify Pālolo Stream Entry Angle	Pālolo	Modify the angle that the Pālolo Stream intercepts the Mānoa Stream with a diverter or other channel modification. The 90-degree angle disrupts Mānoa Stream flow.
Pālolo Channel Modification	Pālolo	Deepen or widen channel to provide more within-bank storage; can be used in conjunction with channel naturalization.
Pālolo Floodwalls	Pālolo	Raise existing floodwalls higher to contain more water.
Pālolo Park Detention Basin	Pālolo	Use Pālolo Valley District Park for above ground or underground storage.
Pālolo Pipe within Culverts	Pālolo	Lay a pipe within the existing culverts to evacuate water directly out to the ocean.
Pālolo Stilling Basin(s)	Pālolo	Stilling basin to dissipate energy and reduce velocities from channelized stream – will need hydraulic results to identify areas of high velocities with minimal upstream impacts.
Add Pump to the Storm Drainage System in McCully-Moiliili	Lower Watershed	Add a pump to the storm drainage system in McCully and other areas that pooling occurs (at the "bottom of the bowl").
Dredge Mānoa-Pālolo	Lower Watershed	Dredge the Mānoa-Pālolo channel.
Kapiolani Park Detention Basin	Lower Watershed	Divert water to Kapiolani Park for additional flood storage.
Ala Wai Canal Floodwall System	Ala Wai Canal	Series of new floodwalls on the left and right banks of the Ala Wai canal and M-P canal; Design considerations could include road closure structures and access for the canoes; deployable/passive system, glass system to keep viewshed, or aesthetically acceptable (e.g., lava rock wall) design will be considered.
Ala Wai Canal Pump Station(s)	Ala Wai Canal	Pump or system of smaller pumps along the canal to reduce standing water or used in conjunction with floodwalls/berms to increase storage.
Ala Wai Canal Surge Barrier	Ala Wai Canal	Pump or system of smaller pumps along the canal to reduce standing water or used in conjunction with floodwall/berms to increase storage.
Deepen the Canal, Replace Canal Walls with Higher Flood Protection	Ala Wai Canal	Dredge canal down to its original depth of 15-feet to 25-feet, and replace the degraded infrastructure with new canal walls that are set for greater flood protection.
Flap Gates on Storm Drains	Ala Wai Canal	During high tide Ala Wai Boulevard between Kalakaua and the cul de sac ending at Ala Moana Boulevard floods. Ala Wai Canal in this area needs flap gates to keep Ala Wai Canal water from flooding storm drains and flooding streets.

Management Measure	Basin	Description
Golf Course Debris Basin	Ala Wai Canal	Create a debris basin at the golf course as a first flush before entering the canal.
Golf Course Detention Basin	Ala Wai Canal	Excavate the golf course to increase storage capacity.
Golf Course Underground Parking Structure	Ala Wai Canal	Create an underground parking structure at the golf course that connects to Waikiki and can be used as flood storage.
Kaimuki High Detention Basin	Ala Wai Canal	Utilize Kaimuki High School's football field.
Microtunnel through Waikiki	Ala Wai Canal	Several microtunnels along the canal (i.e., under Paoakalani Avenue, Ohua Avenue, Liliuokalani Avenue, Kanekapolei Street, Nohonani Street, Lewers Street, Kalaimoku Street, etc.) going under Waikiki and straight out to the ocean to increase conveyance.
Paki Avenue Bypass	Ala Wai Canal	Utilize existing storm sewer system along Paki Avenue as a bypass for Ala Wai Canal waters; Outfall is away from the highly traveled beach and tourist area; Existing outfall near Tahitienne Condos of Honolulu.
Retention or Detention Pond	Ala Wai Canal	Implement retention or detention pond of a constructed wetland at Ala Wai Community Park.
Second Outlet on East End of Canal (Open Canal)	Ala Wai Canal	Open up the east end of the canal with an open system extending down Paki Avenue and Makai through Kapiolani Park
Underwater Pipes in Canal	Ala Wai Canal	Use underwater pipes laid on the flood of the canal to redirect floodwaters directly to the harbor. These pipes could redirect flows directly from Makiki or the Manoa-Palolo straight out to sea without entering the Ala Wai Canal.
Widen Canal	Ala Wai Canal	Widen the canal to provide greater flow and storage capacity.
Basement Parking Structure Detention	Watershed Wide	Convert or create basement parking structures within the watershed into underground detention (multiuse underground parking).
Berm Around all Schools	Watershed Wide	Build a three feet tall berm around all schools: Iolani School, Ala Wai Elementary, Noelani Elementary, and Hokulani Elementary.
Bridge Modification	Watershed Wide	Modify by raising or widening bridges that act as choke points, such as the bridges at Woodlawn Drive, Kahaloa, Lowery, East Manoa, and Kapiolani Boulevard.
Diversion Tunnels	Watershed Wide	Construct tunnels that can serve as a dual purpose to convey floodwaters in large storm events and can also be used as transportation (or other utility) infrastructure.
Install Baffling in Streams	Watershed Wide	Install baffling in the streams to slow the water down.

Management Measure	Basin	Description
Install Silt Dams	Watershed Wide	Build silt dams in all accessible gullies. The silt dam is composed of local rock from the immediate stream bed, encased in wire fencing. The rushing water is slowed as it goes through the dam, the gravel and dirt drop out behind the dam, the water has more time to penetrate subsoil and rock – replenishing the freshwater lens.
Redetention	Watershed Wide	Two or more detention basins in series.
Storage Tunnels	Watershed Wide	Utilize large, deep vertical tunnels to store stormwater throughout the watershed.
Underground Detention - Fields	Watershed Wide	Excavate beneath existing parks and open green spaces to create underground detention basins.
Underground Detention - Parking Lots	Watershed Wide	Excavate beneath existing parking lots to create underground detention.
Swift Tunnels	Watershed Wide	Two 12-feet diameter sub-surface tunnels (approximately 40-feet under) from Manoa and Palolo shooting straight out to the ocean using gravity flow.

6.0 U.S. Fish and Wildlife Service and Corps tasks to be implemented under the Fish and Wildlife Coordination Act

Coordination

The Service and Corps will coordinate pursuant to the FWCA. The National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (EPA), Hawaii Department of Land and Natural Resources – Department of Aquatic Resources (DLNR-DAR), Hawaii Department of Land and Natural Resources – Department of Forestry and Wildlife (DLNR-DOFAW), Hawaii Office of Conservation and Coastal Lands (OCCL), Coastal Zone Management Program (CZMP), and Hawaii Department of Health – Clean Water Branch and any other relevant agencies will be included as appropriate regarding the Ala Wai Canal project.

Environmental Coordination Meetings

The Corps shall facilitate meetings with the Service, NMFS, EPA, DLNR-DAR, DLNR-DOFAW, OCCL, CZMP, and Hawaii Department of Health – Clean Water Branch and any other relevant agencies as appropriate for the purpose of exchanging information, identifying concerns and potential impacts to fish and wildlife resources, and resolving fish and wildlife resource issues related to the Ala Wai Canal project and document these interactions for use in the CAR and in the Final Integrated General Reevaluation Report and Environmental Assessment for the Ala Wai Canal project.

Planning Aid Letters/Coordination Act Reports

The Service with assistance from the Corps shall assemble FWCA letters and reports that describe project related opportunities and constraints regarding fish and wildlife resources (including listed species), potential modifications, the authorized project's potential impacts on fish and wildlife, measures to avoid, minimize, and mitigate these impacts, and any opportunities for enhancement of fish and wildlife resources that consider the Corps' authorized project purpose for the Ala Wai Canal project (i.e., flood risk management). The final FWCA report will become a part of the Ala Wai Canal Final Integrated General Reevaluation Report and Environmental Assessment.

7.0 U.S. Fish and Wildlife Service Tasks Not Included Under this Scope of Work

1) Cooperating agency role under the National Environmental Policy Act (NEPA)
2) Section 7, Endangered Species Act, Consultation for the Ala Wai Canal project
3) Mitigation for inter-jurisdictional trust resource issues (migratory fish, treaties, international agreements)

8.0 Working Schedule and Milestones

Milestone	Completion Date
Alternatives Milestone	July 2021
Planning Aid Letter (PAL)	August 2022
Tentatively Selected Plan Milestone	September 2022
Draft Fish and Wildlife CAR	October 2022
Conduct ATR, IEPR, Policy Review, and NEPA Public Review	November 2022
Final Fish and Wildlife CAR	December 2023
Agency Decision Milestone	January 2023
Chief's Report Milestone	June 2023

This schedule is based upon optimistic assumptions including sufficient and timely funding and no unforeseen delays arising from internal, Agency and public reviews. Changes to this schedule will be coordinated with the Service by modification of this Scope of Work.

9.0 Budget

Task	Service (days)
Meetings with Corps, NMFS, DLNR-DAR, and other relevant agencies, as needed, for preparation of Planning Aid Letter and Draft Fish and Wildlife CAR	5
Planning Aid Letter (PAL)	15
Draft Fish and Wildlife CAR	20
Meetings with Corps, NMFS, DLNR-DAR, and other relevant agencies, as needed, for preparation of the Final Fish and Wildlife CAR	5
Prepare Final Fish and Wildlife CAR	15
Total Number of Days	**60**
Cost (Daily rate of $914.14/day)	$ 54,848.40
Overhead (38% of total cost)	$20,842.39
Total Cost	**$75,690.79**

This budget reflects the use of previous information and surveys that were collected and conducted by the U.S. Fish and Wildlife Service in preparation of the 2015 Draft Fish and Wildlife Coordination Act Report, Ala Wai Watershed Flood Risk Management Study, Oahu Island, Hawaii and the 2016 Final Fish and Wildlife Coordination Act Report, Ala Wai Watershed Flood Risk Management Study, Oahu Island, Hawaii.

10.0 Payment Schedule

Item	Fiscal Year (FY)	Funding
Planning Aid Letter + 2.5 meetings	FY22	$22,076.48
Draft Coordination Act Report + 2.5 meetings	FY22	$28,384.05
Final Coordination Act Report + 5 meetings	FY23	$25,230.26
	Total	**$75,690.79**

11.0 Points of Contact

Name	Phone	Email
U.S. Army Corps of Engineers:		
Shawna Herleth-King	312-846-5407	shawna.s.herleth-king@usace.army.mil
U.S. Fish and Wildlife Service:		
Dan Polhemus	808-792-9415	dan_polhemus@fws.gov
Financial Point of Contact (U.S. Fish and Wildlife Service)		

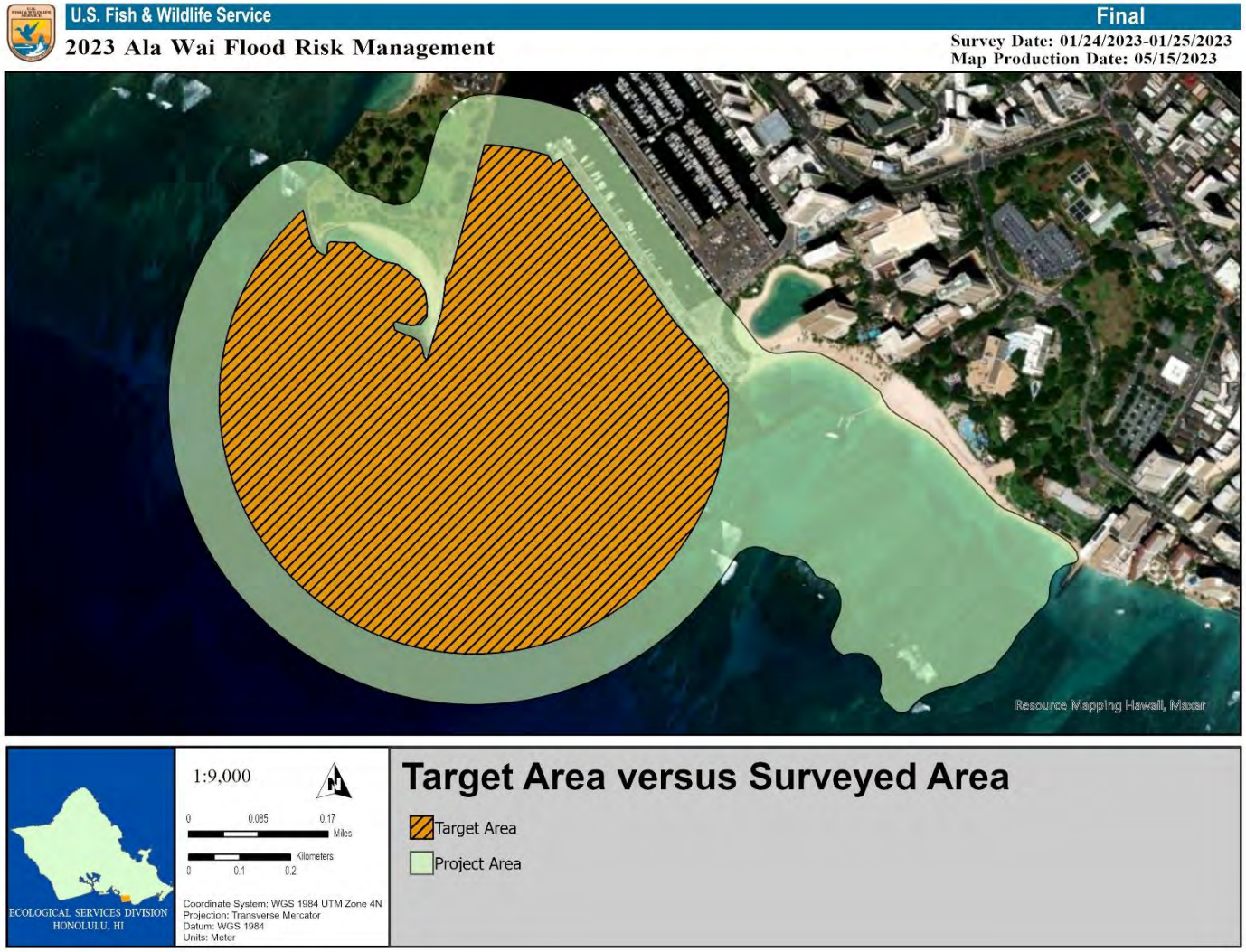

Figure B1. Target Area versus Surveyed Area. Map of the Target Area (500 m radius from Ala Wai Canal discharge point) and the Project Area (Target and surveyed are plus 100 m buffer).

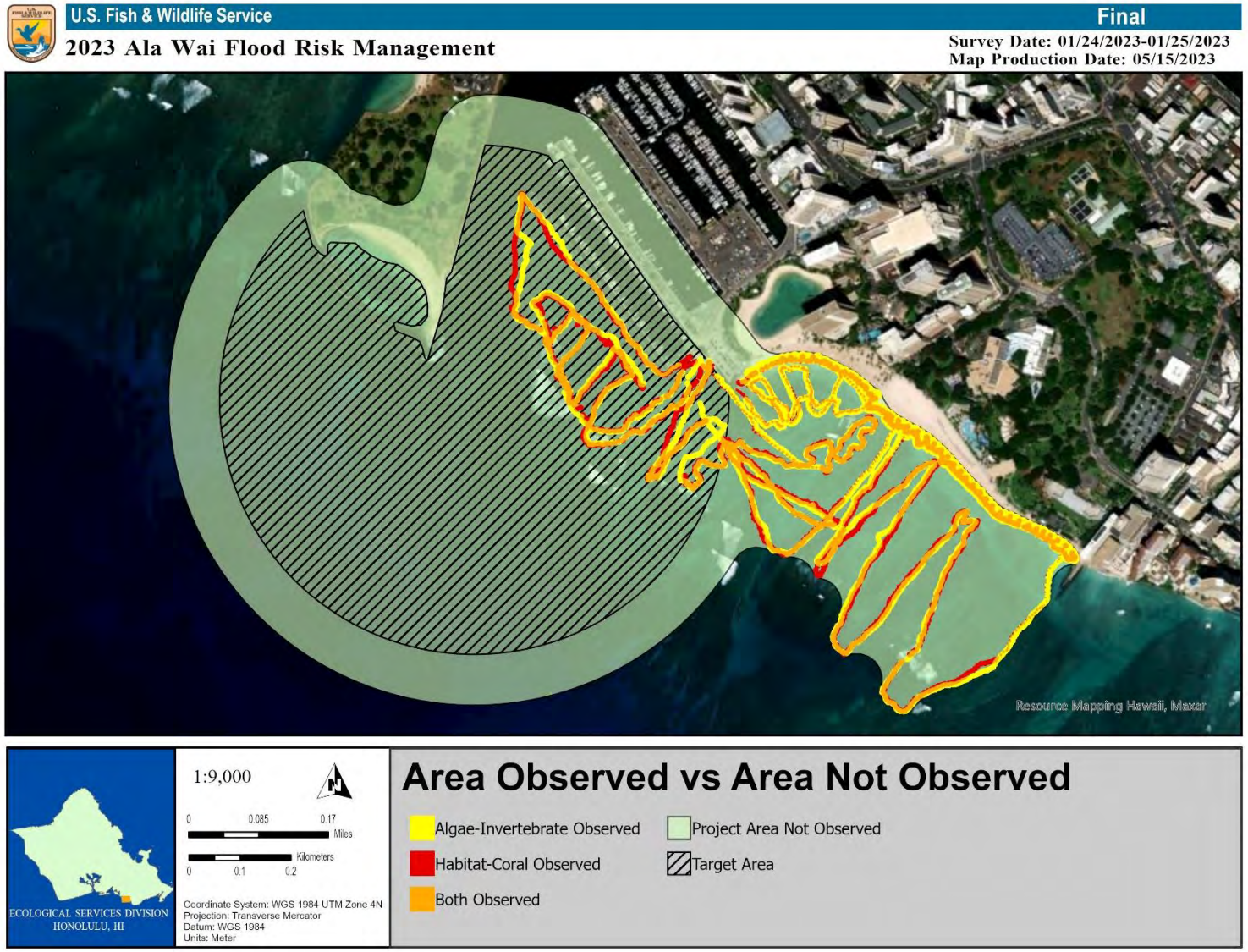

Figure B2. Area Observed vs Area Not Observed. Map of the Project Area directly observed during Service surveys.

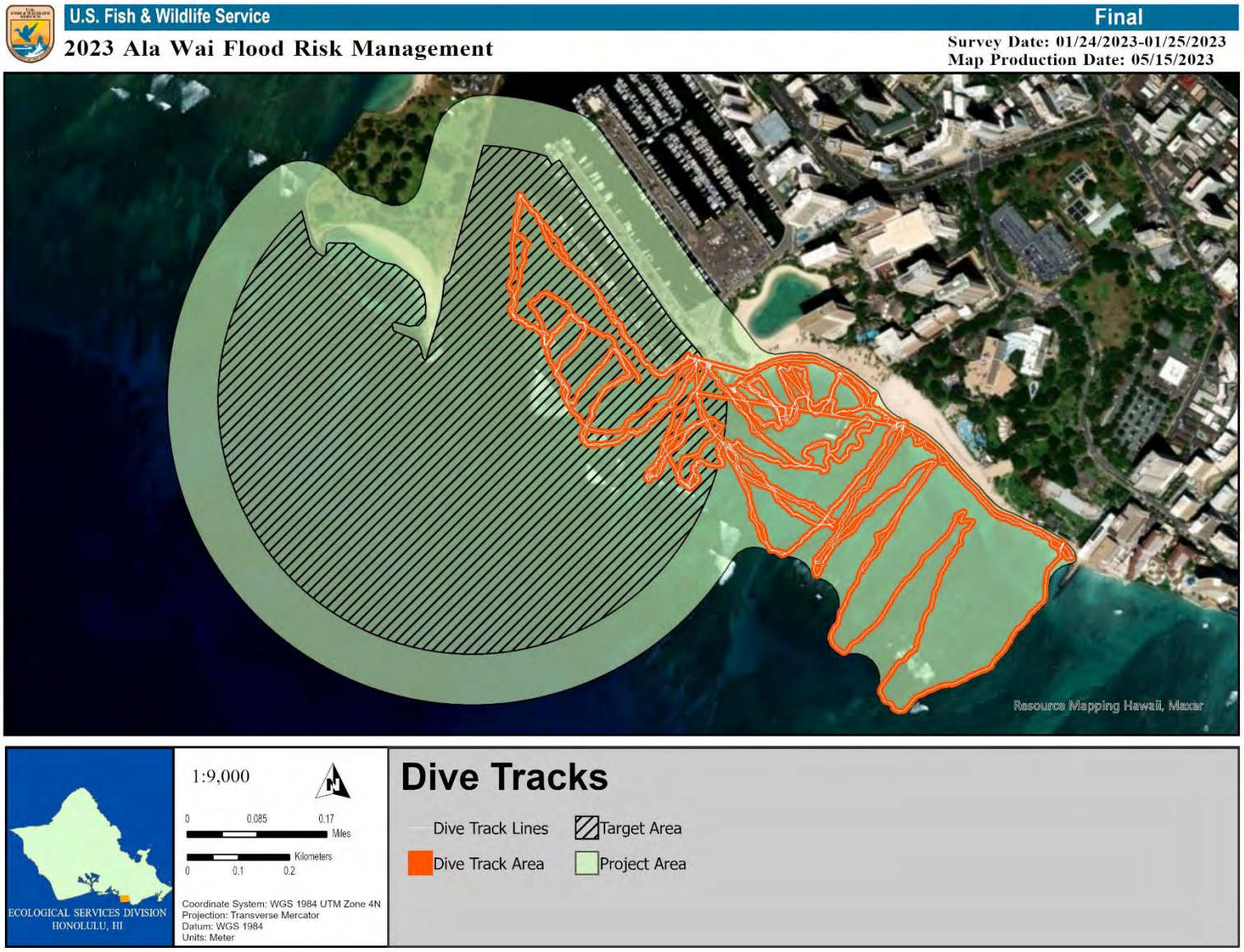

Figure B3. Dive Tracks. Map of the survey dive tracks completed by the Service.

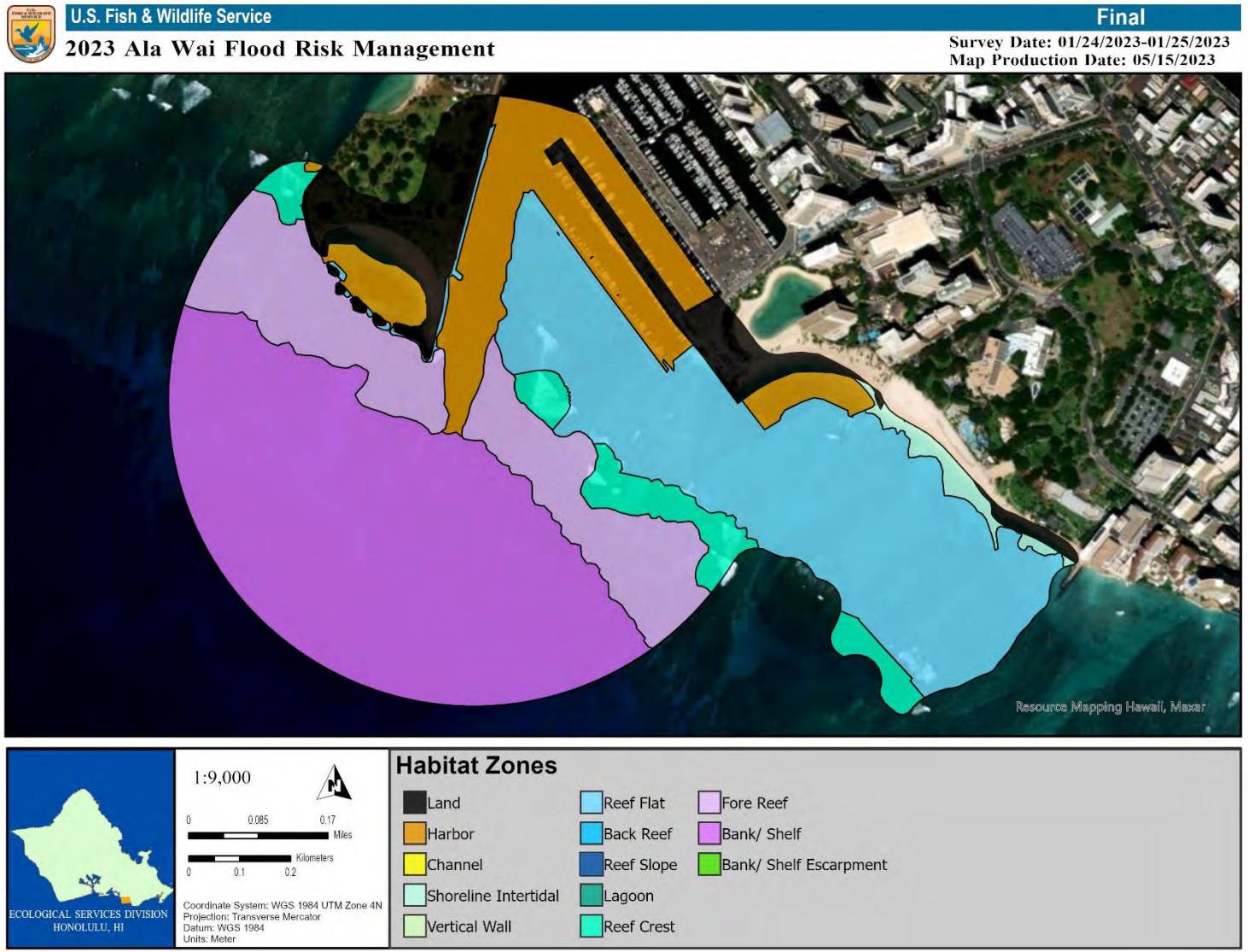

Figure B4. Habitat Zones. Map of the habitat zones within the Project Area. This image includes data obtained from NOAA Benthic Habitat Maps, ground truthed and edited based on field observations in surveyed areas.

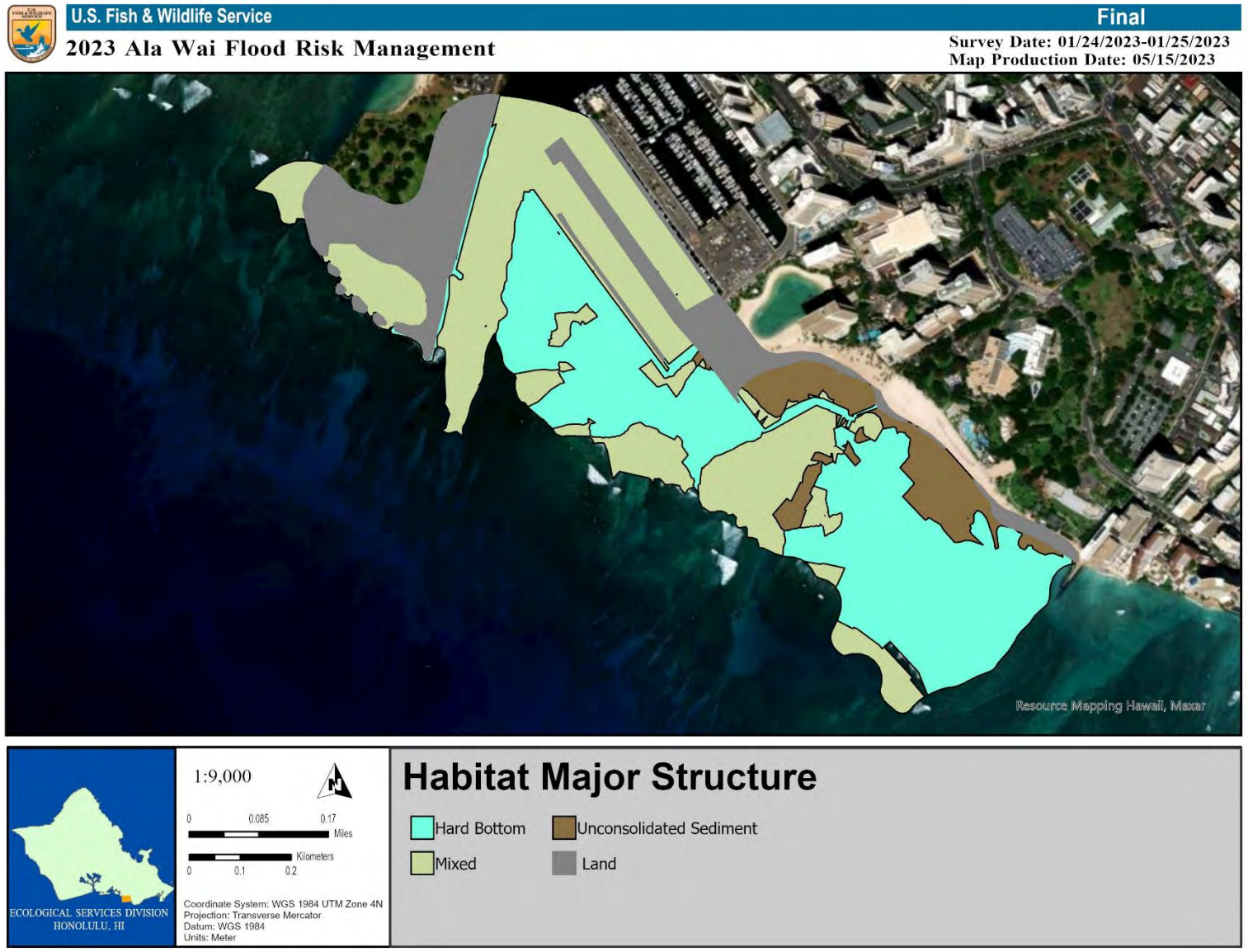

Figure B5. Habitat Major Structure. Map of habitat major structure observed within the Project Area.

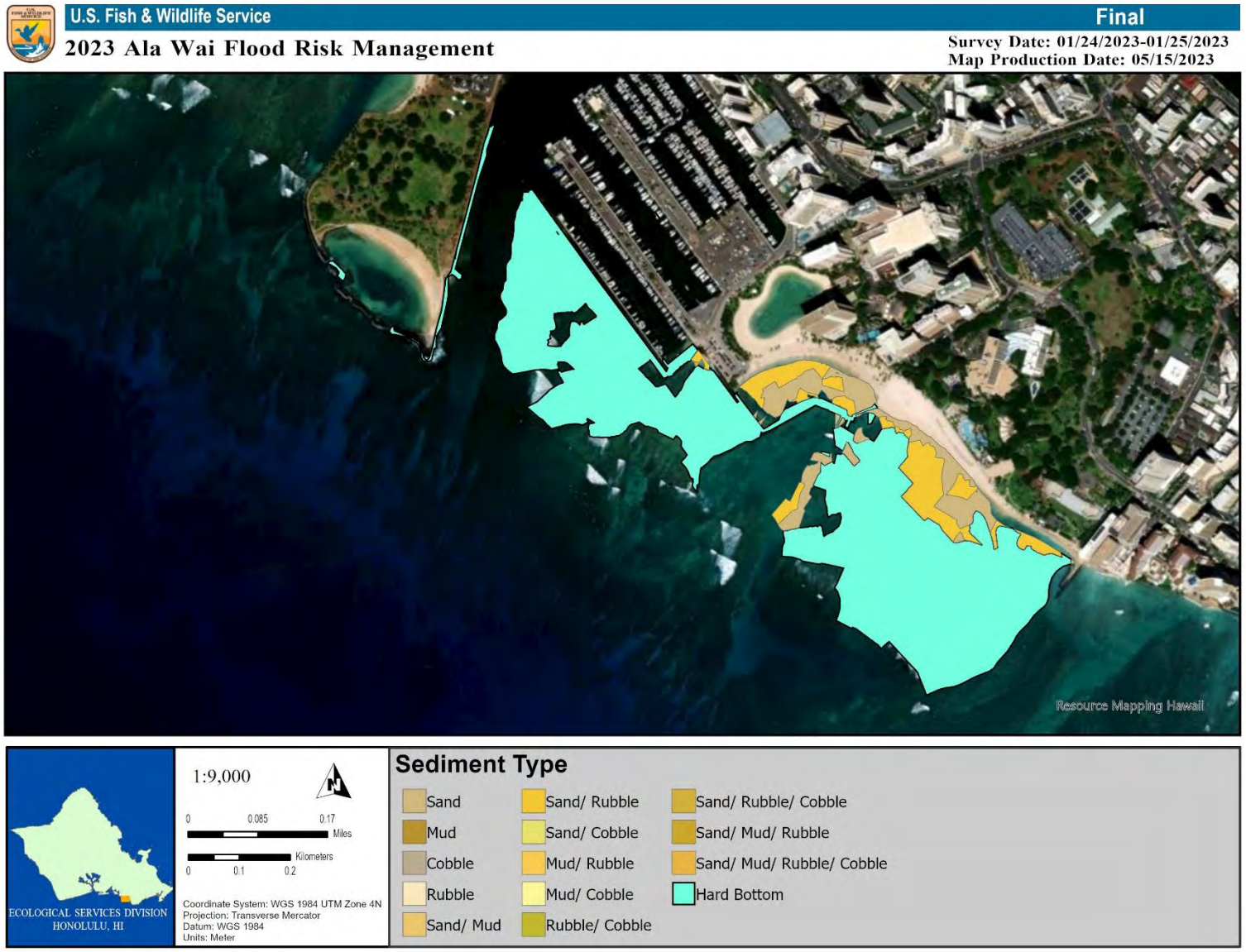

Figure B6. Sediment Type. Map of sediment types found within the Project Area.

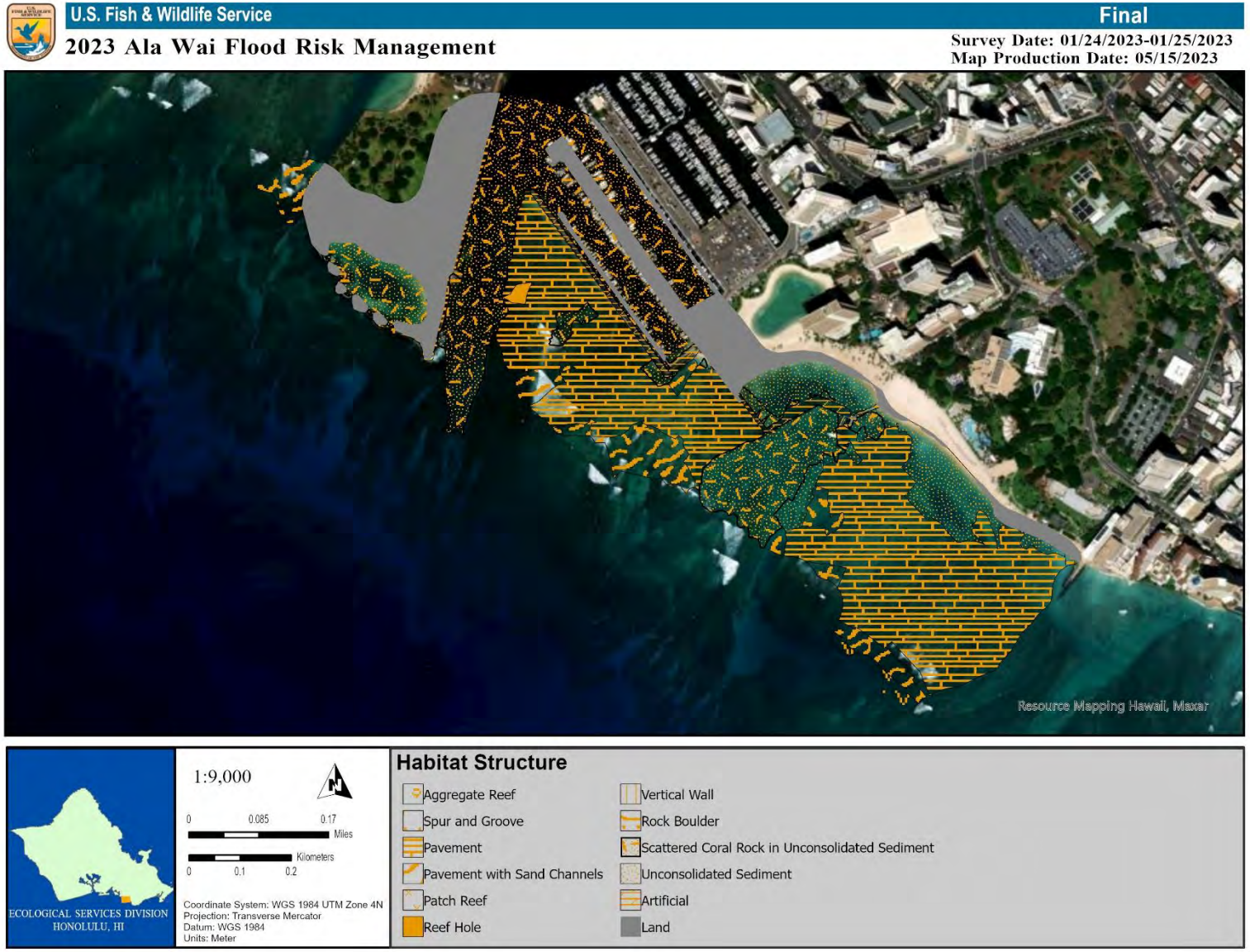

Figure B7. Habitat Structure. Map of habitat structure observed within the Project Area.

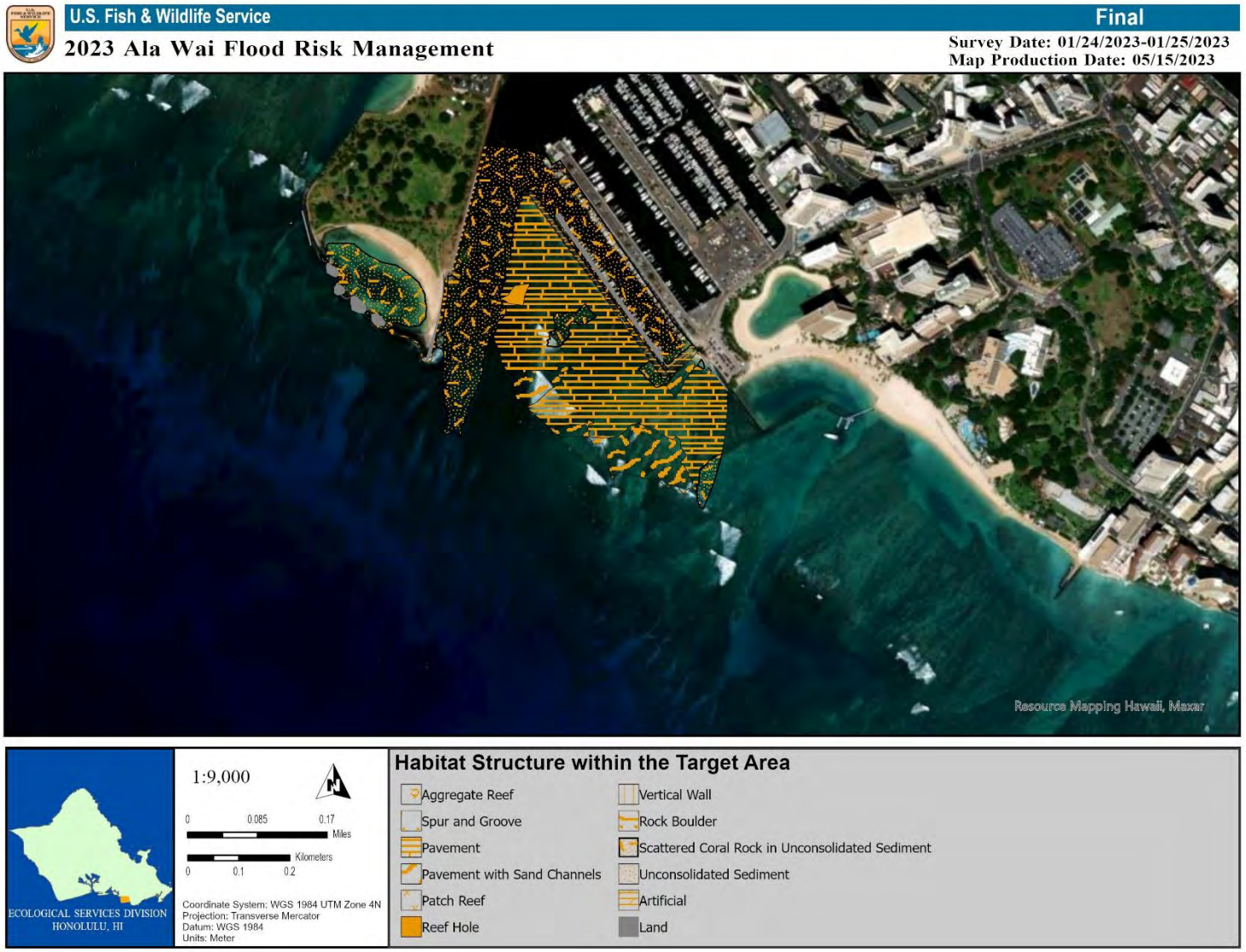

Figure B8. Habitat Structure within the Target Area. Map habitat structure observed within the Target Area.

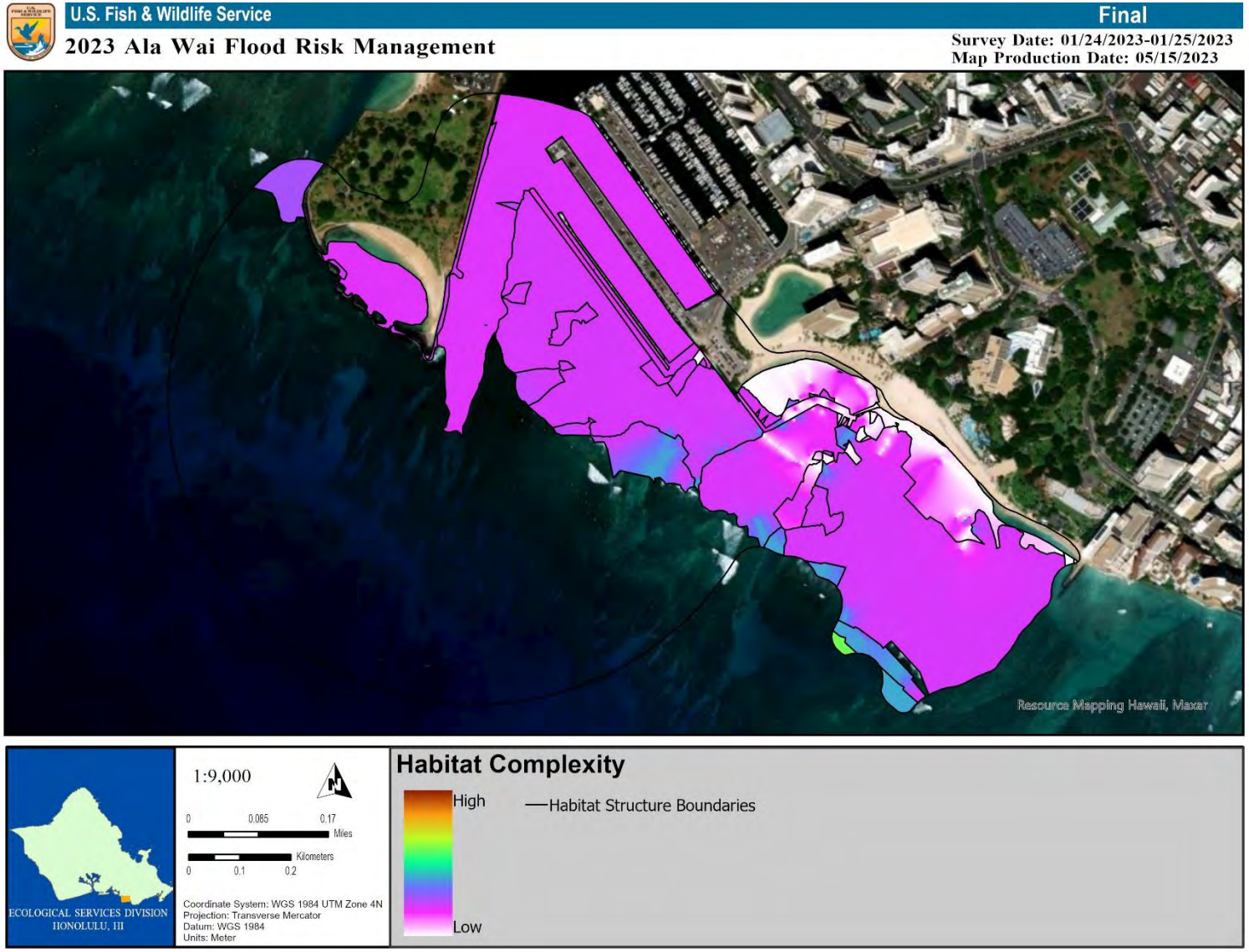

Figure B9. Habitat Complexity. Map of habitat complexity observed at the Project Area.

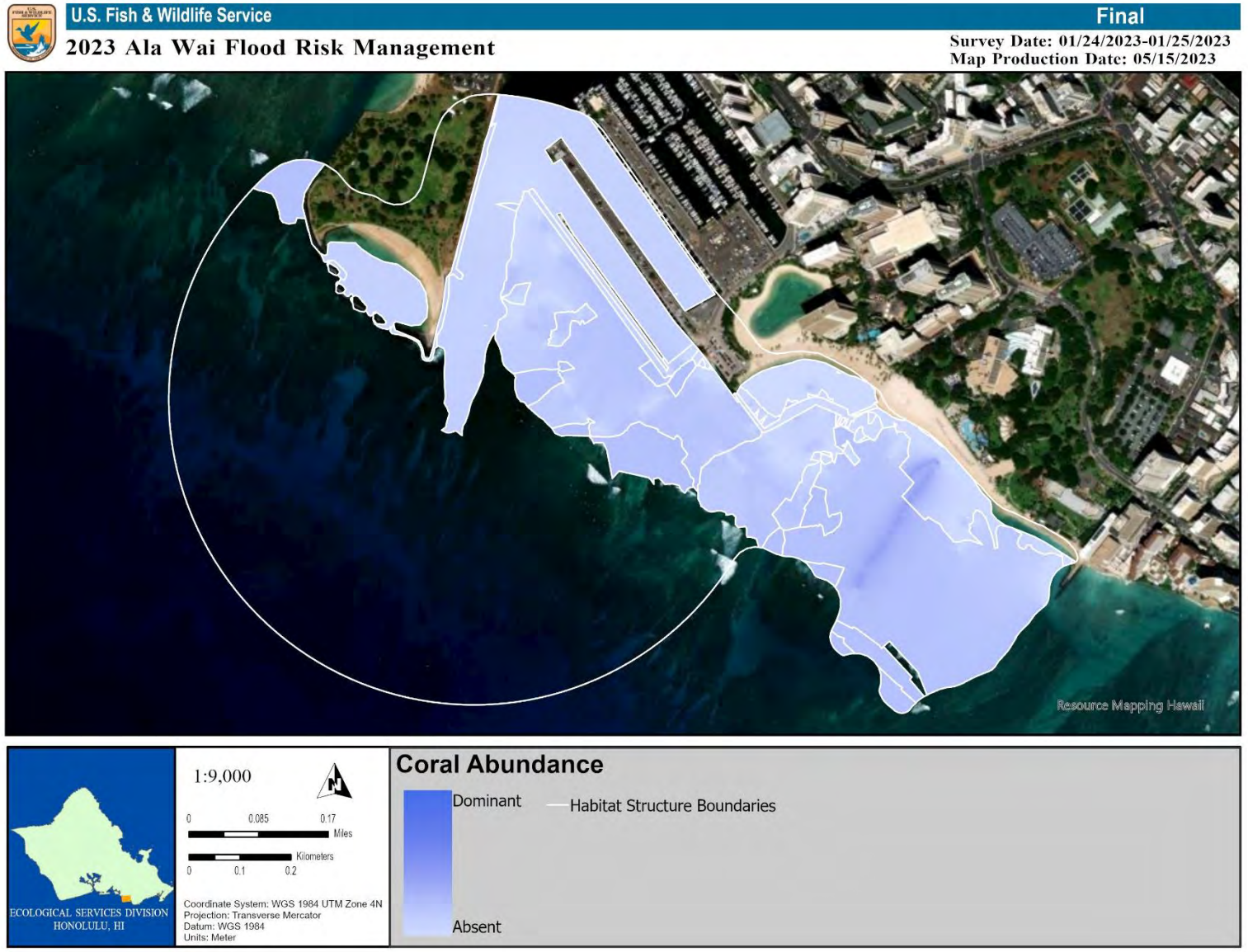

Figure B10. Coral Abundance. Map of the coral abundance observed at the Project Area.

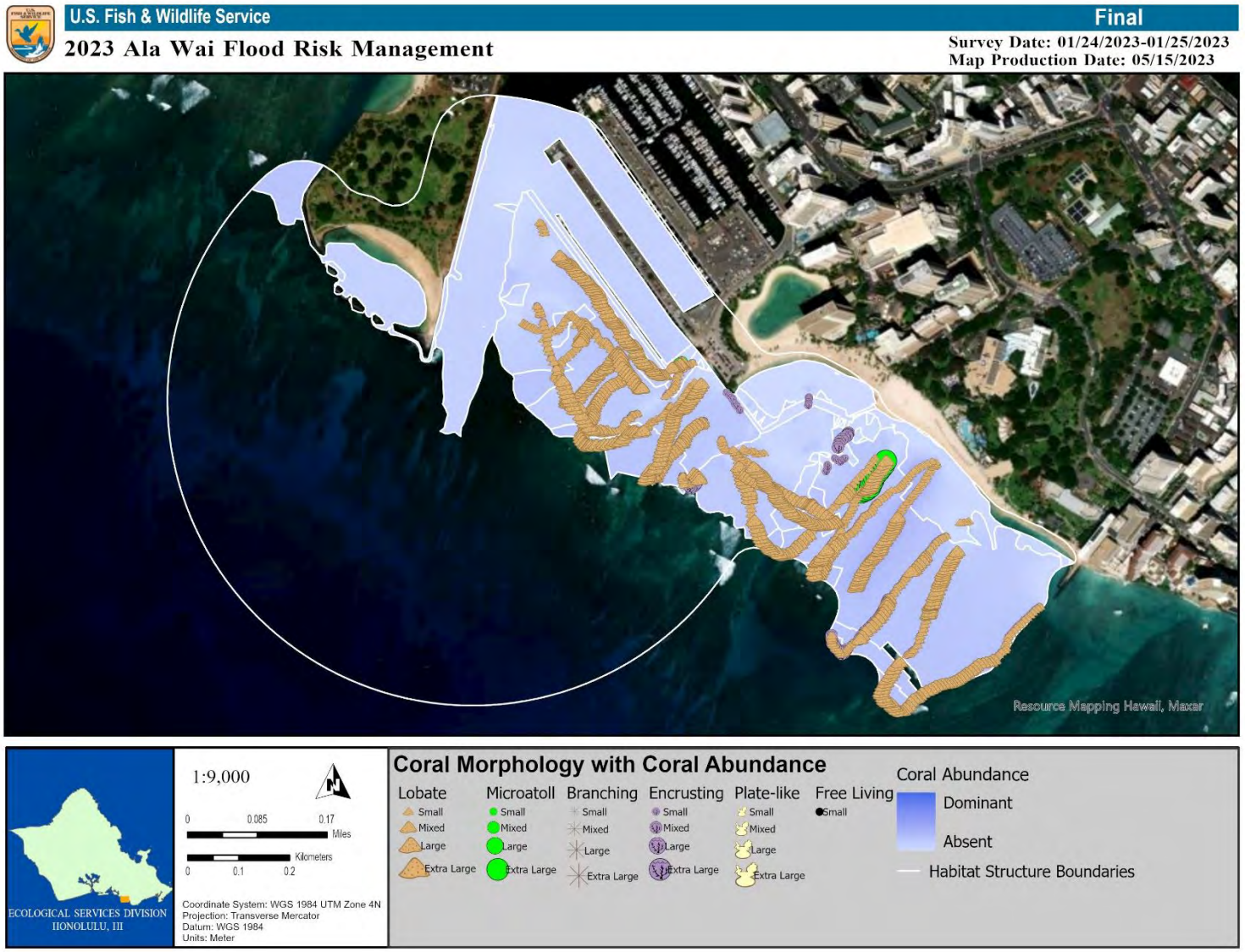

Figure B11. Coral Morphology with Coral Abundance. Map of the coral morphology and abundance observed at the Project Area.

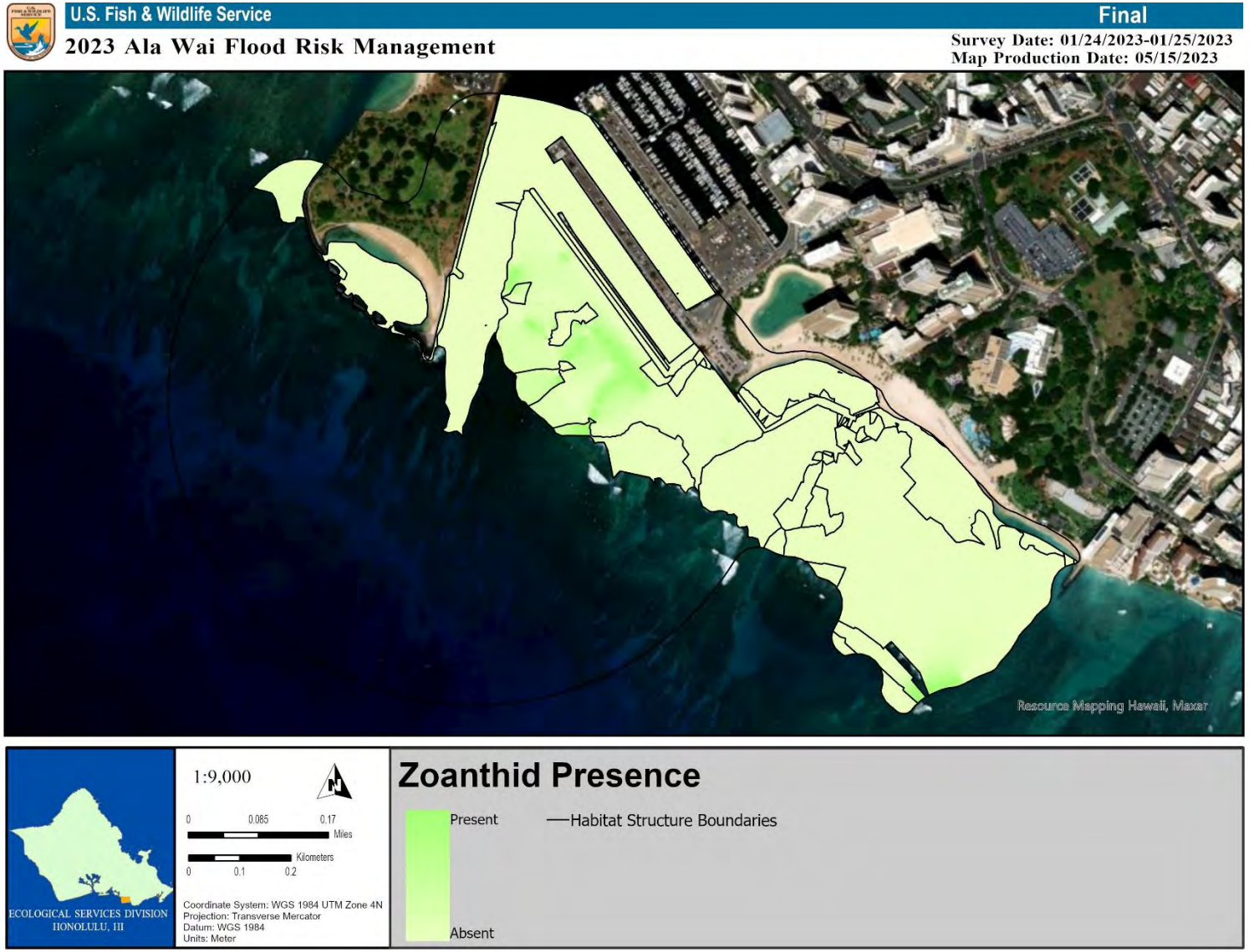

Figure B12. Zoanthid Presence. Map of the zoanthid presence observed at the Project Area.

Figure B13. Frondose Algae Abundance. Map of the frondose algae abundance observed at the Project Area.

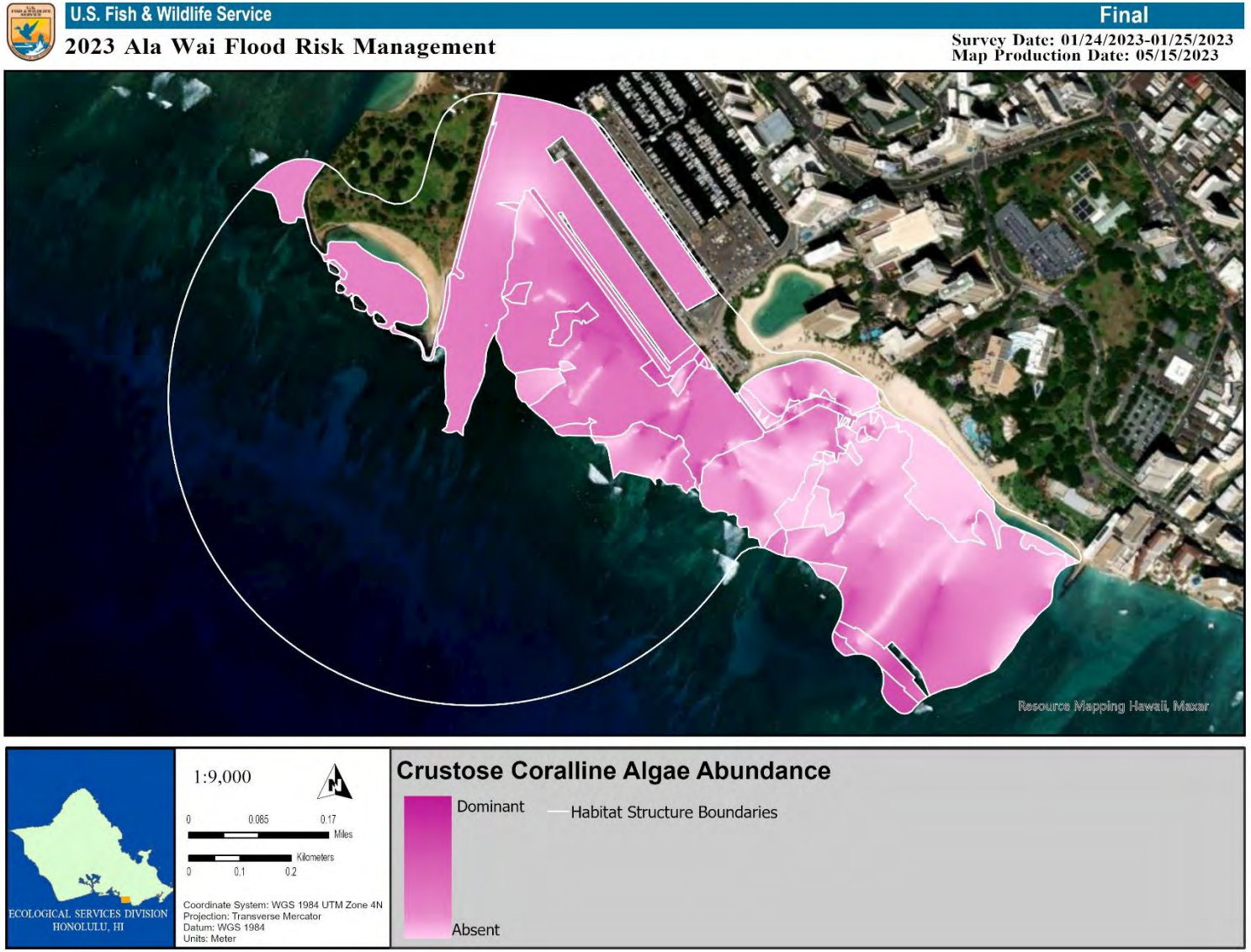

Figure B14. Crustose Coralline Algae Abundance. Map of the CCA abundance observed at the Project Area.

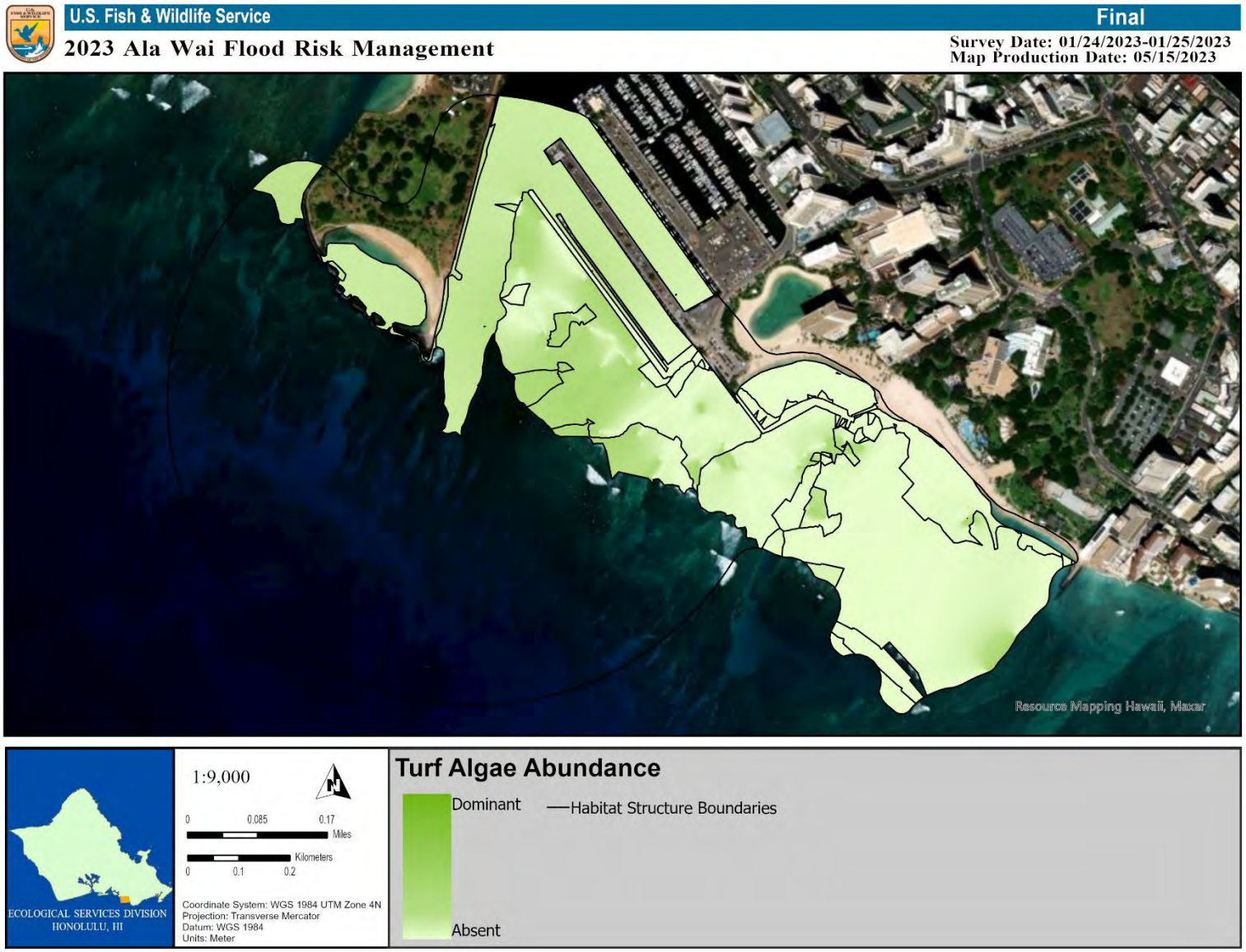

Figure B15. Turf Algae Abundance. Map of the turf algae abundance observed at the Project Area.

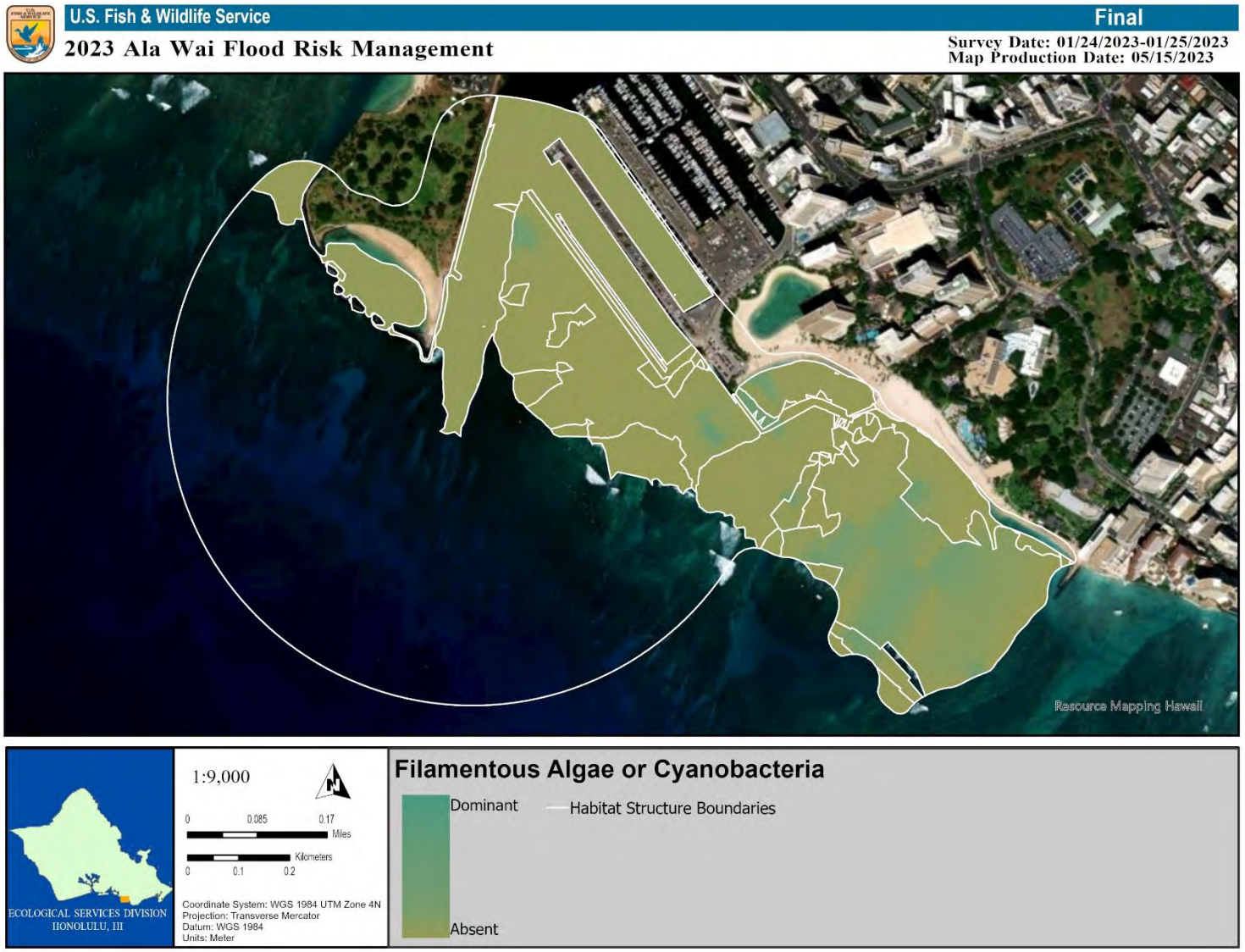

Figure B16. Filamentous Algae or Cyanobacteria Abundance. Map of the filamentous algae or cyanobacteria abundance observed at the Project Area.

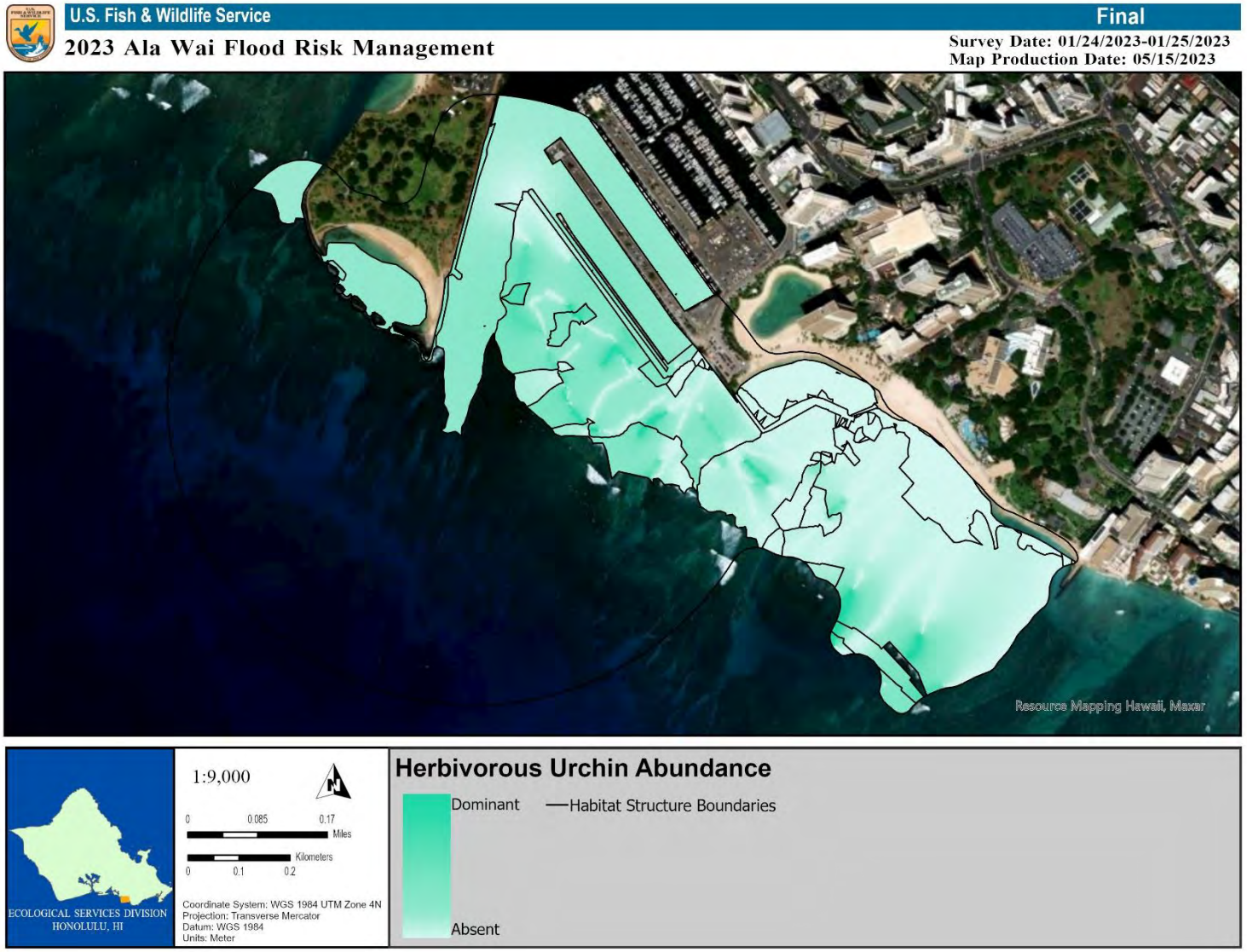

Figure B17. Herbivorous Urchin Abundance. Map of the herbivorous urchin abundance observed at the Project Area.

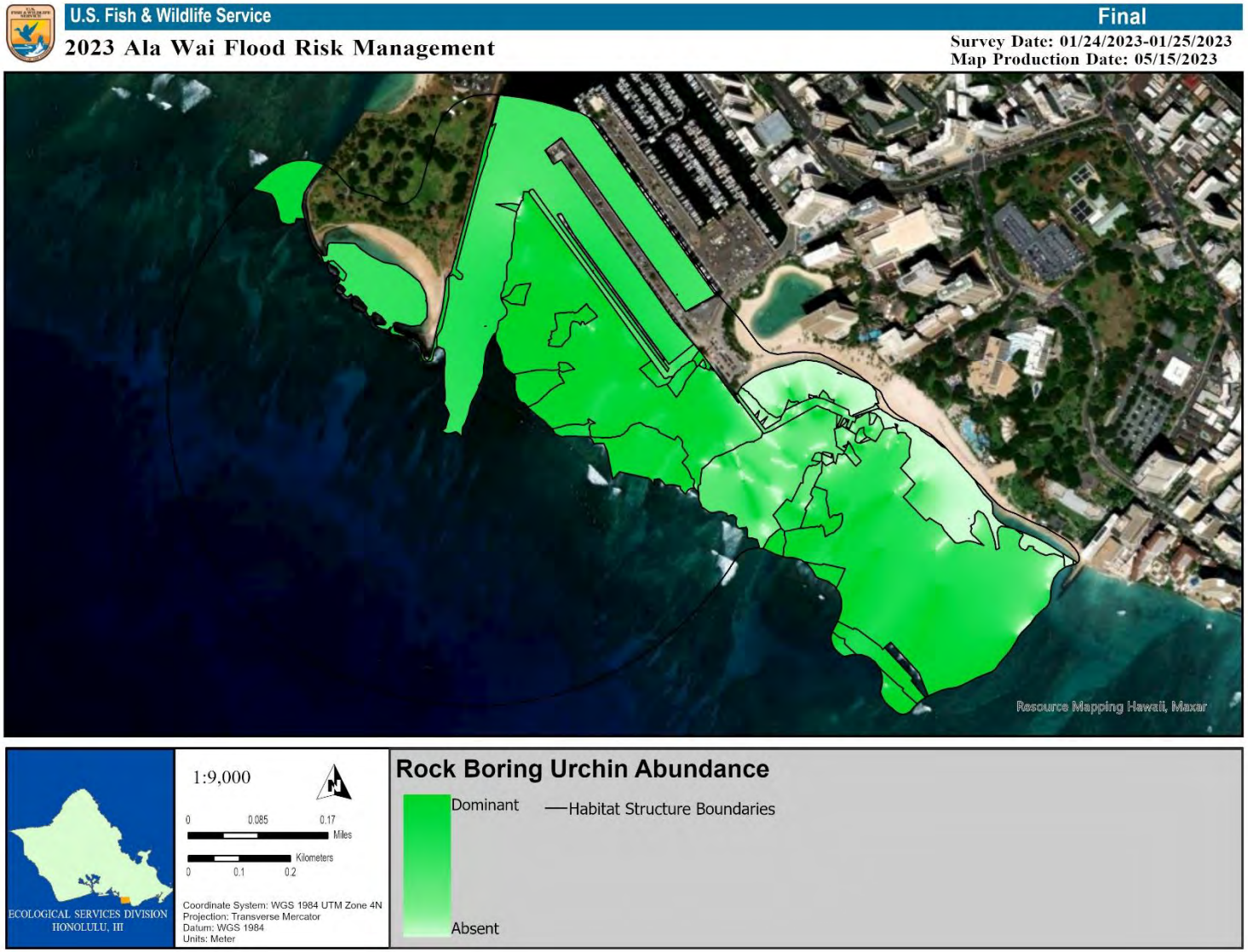

Figure B18. Rock Boring Urchin Abundance. Map of rock boring urchin abundance observed at the Project Area.

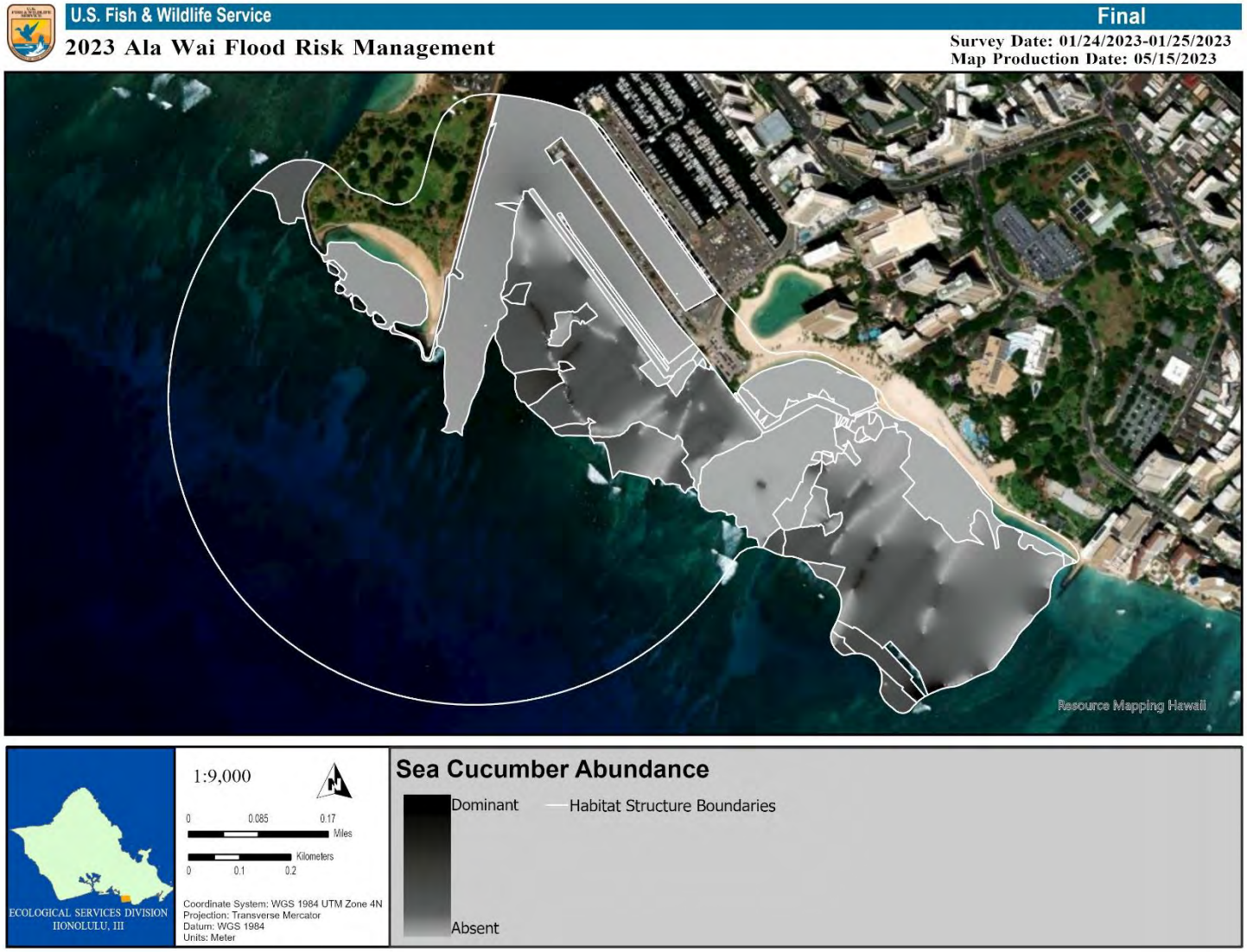

Figure B19. Sea Cumber Abundance. Map of the sea cumber abundance observed at the Project Area.

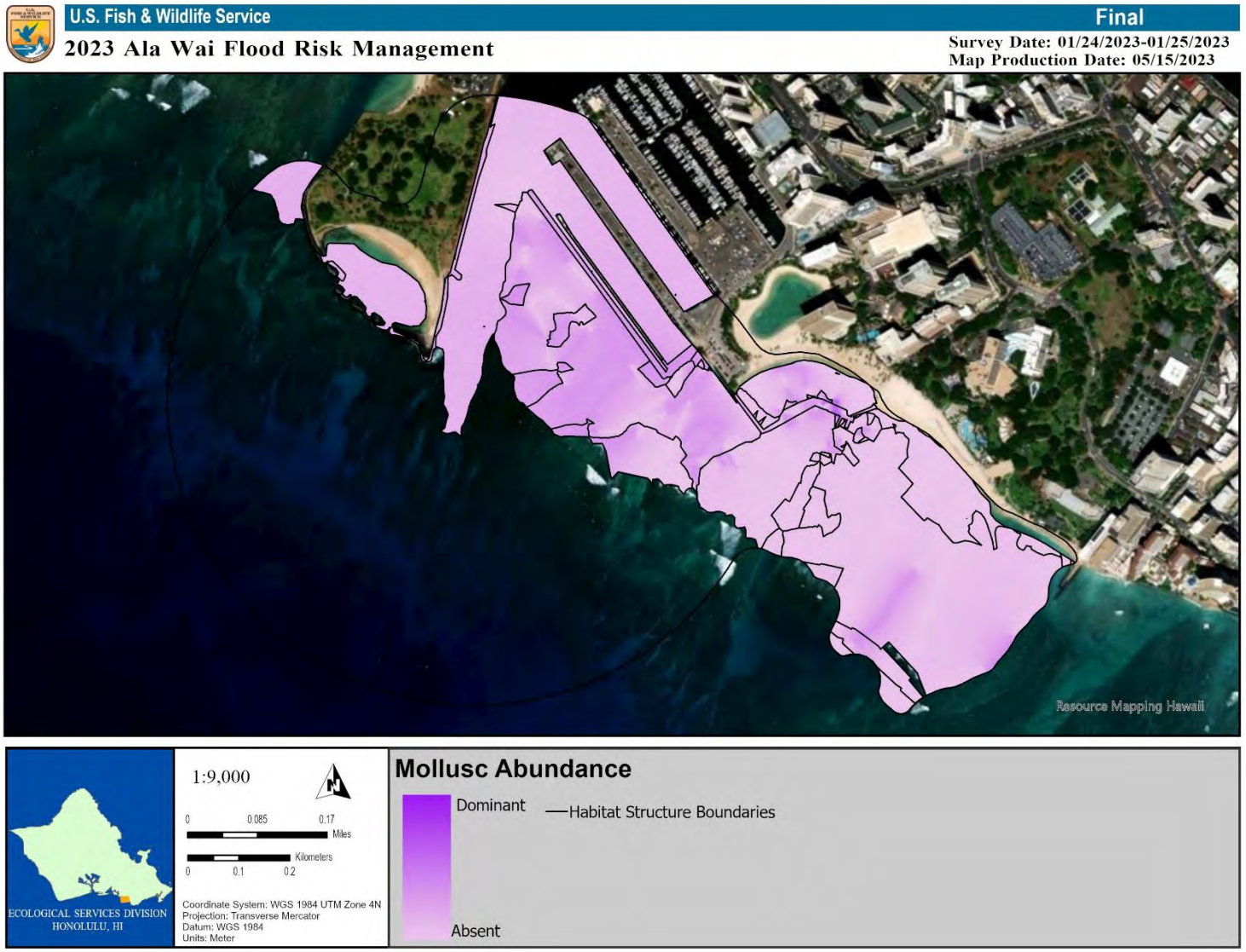

Figure B20. Mollusc Abundance. Map of mollusc abundance observed at the Project Area.

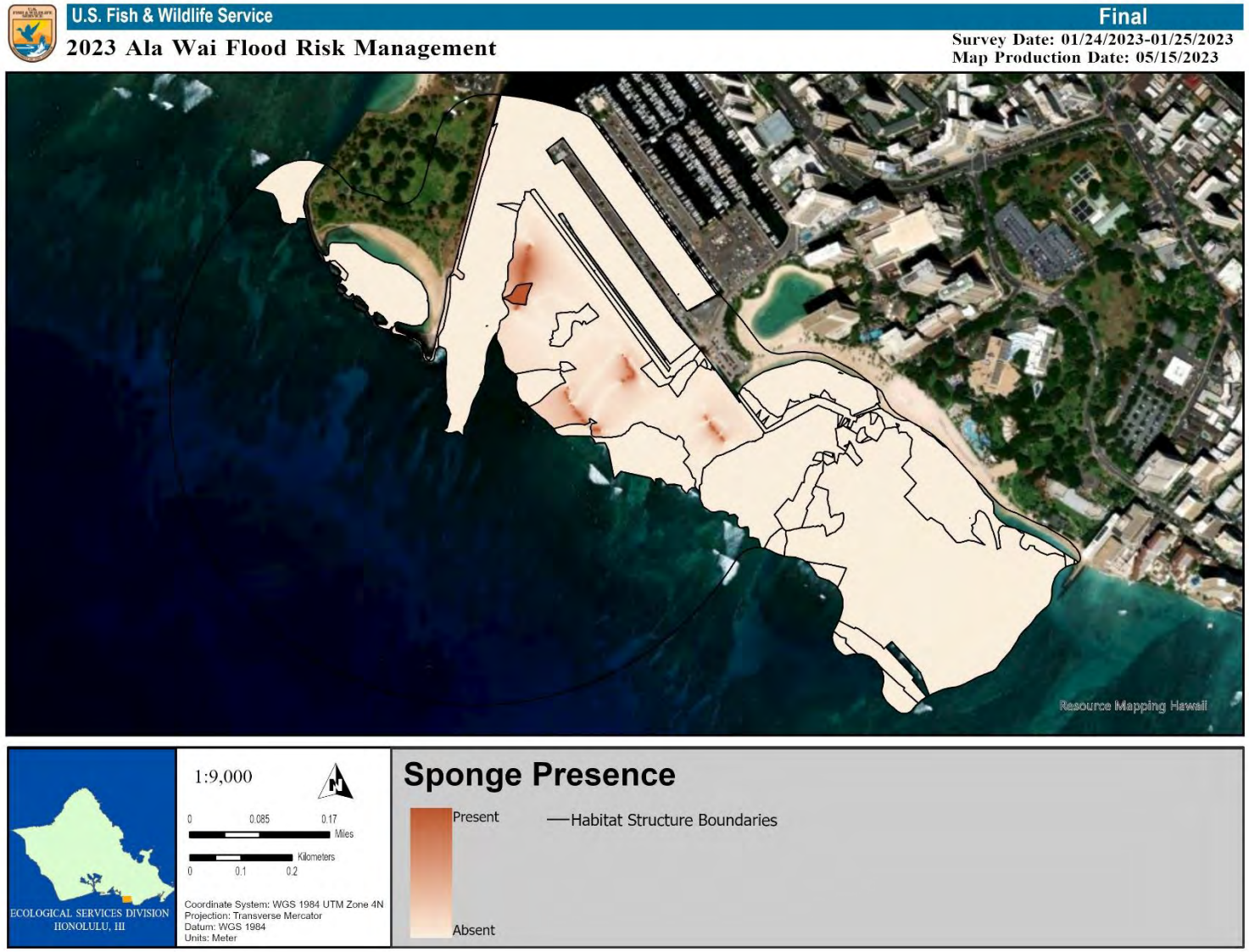

Figure B21. Sponge Presence. Map of the sponges observed at the Project Area.

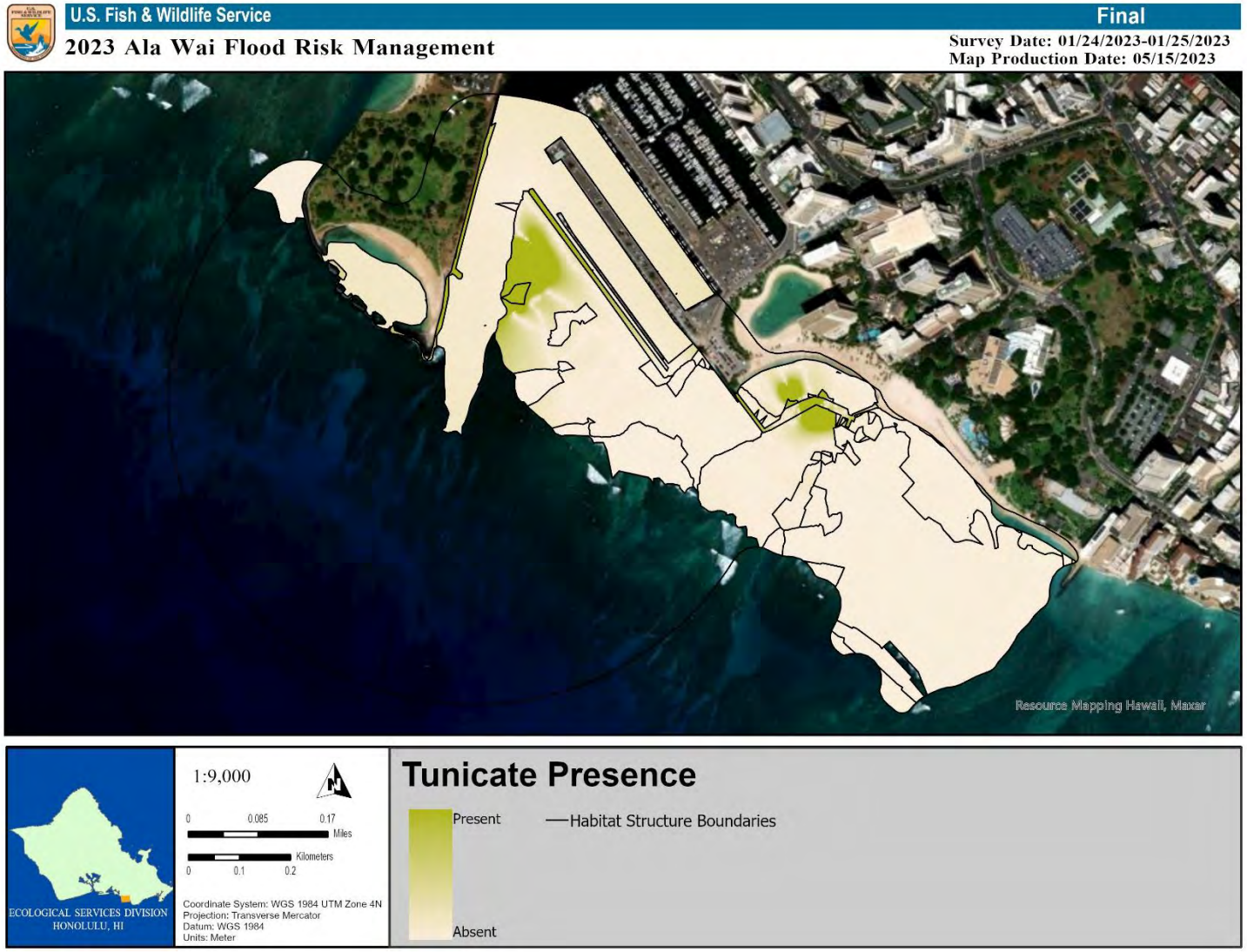

Figure B22. Tunicate Presence. Map of the tunicates observed at the Project Area.

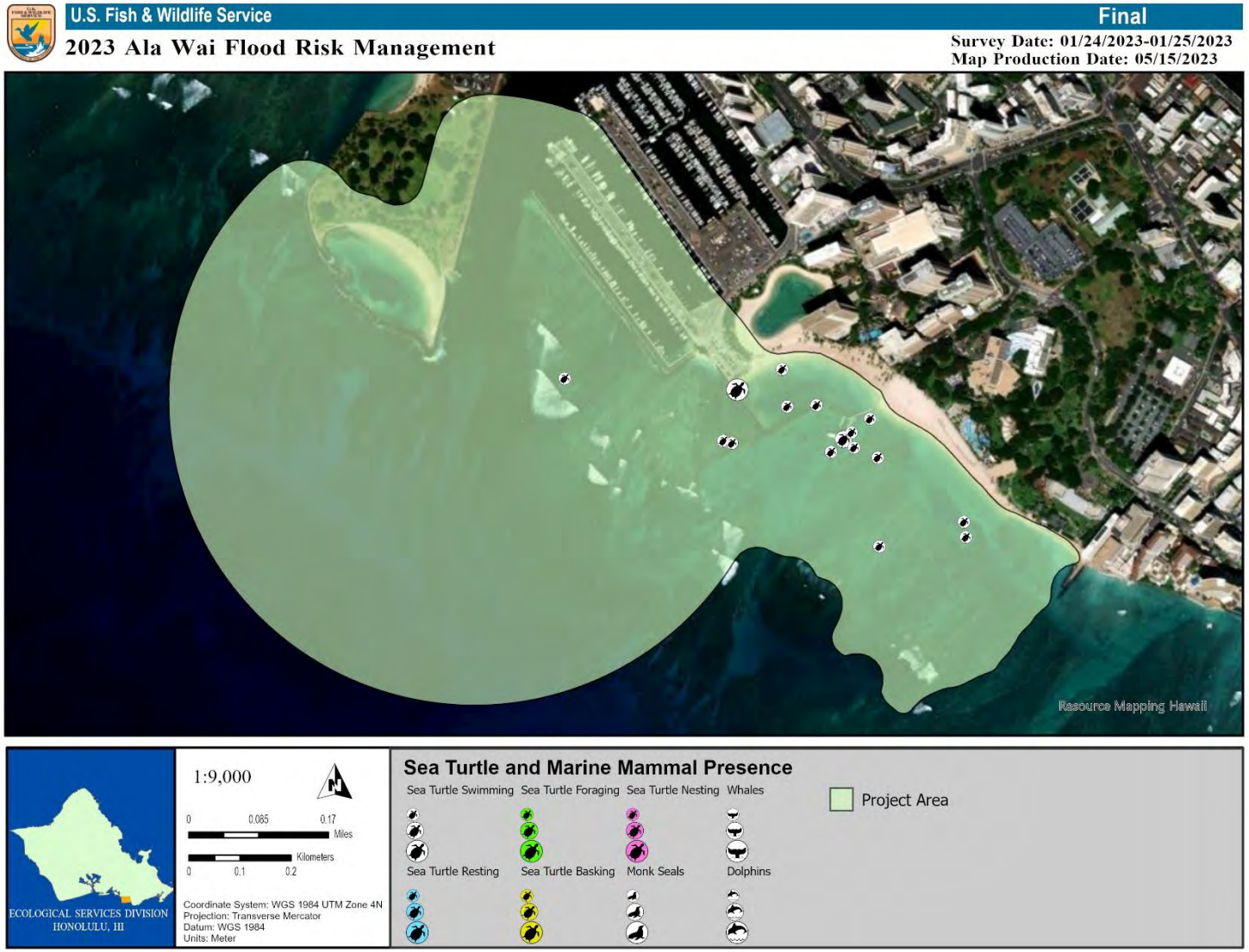

Figure B23. Sea Turtle and Marine Mammal Presence. Map indicating marine turtle presence at the Project Area. No marine mammals were observed.

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to; marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see https://www.fws.gov/policy/A1750fw1.html) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (*e.g.*, with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.

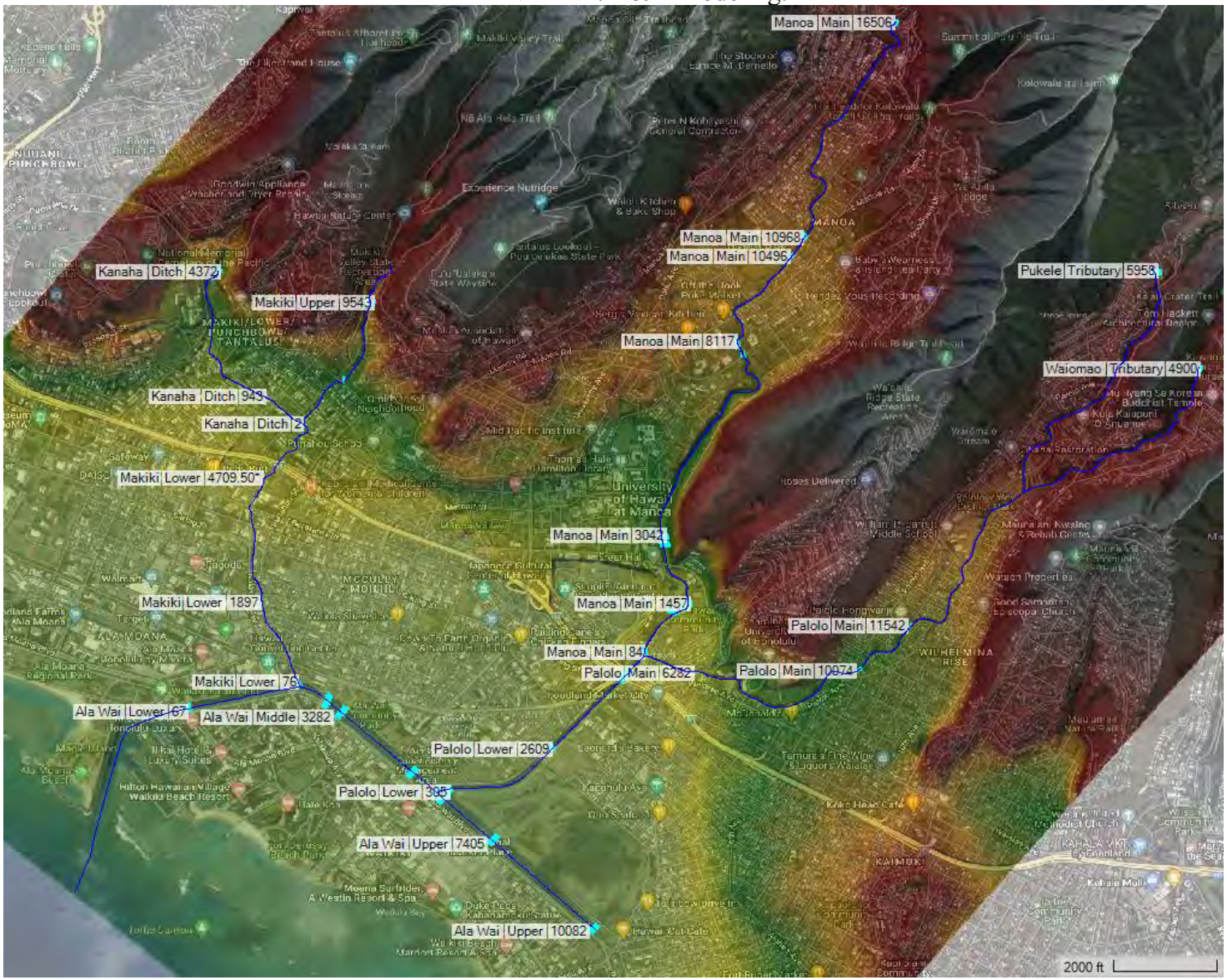

Figure D1: H&H Modeling. Image of H&H modeling of Ala Wai Watershed completed by the Corps.

Table D1: H&H Modeling Results. Table providing results of H&H modeling of Ala Wai Watershed provided by Corps.

River	Reach	River Sta	Plan	FWOP		Alternative 1		Alternative 2b		Alternative 5	
				Q Total (cfs)	W.S. Elev (ft)	Q Total (cfs)	W.S. Elev (ft)	Q Total (cfs)	W.S. Elev (ft)	Q Total (cfs)	W.S. Elev (ft)
Ala Wai	Upper	10082	50% AEP	176.63	4.20	696.40	3.75	176.63	4.23	176.63	4.27
Ala Wai	Upper	10082	20% AEP	312.35	5.27	1204.00	4.57	315.56	5.59	315.56	5.87
Ala Wai	Upper	10082	10% AEP	397.46	5.91	1643.00	5.24	363.37	6.68	427.99	7.14
Ala Wai	Upper	10082	5% AEP	465.75	6.50	2168.60	5.81	411.94	7.97	557.20	7.91
Ala Wai	Upper	10082	2% AEP	649.40	7.18	2972.80	6.44	587.70	9.00	569.21	8.87
Ala Wai	Upper	10082	1% AEP	684.39	7.52	3598.70	7.41	846.14	9.26	833.02	9.54
Ala Wai	Upper	10082	0.5% AEP	945.97	7.92	4276.50	8.03	1051.92	9.46	1051.92	9.89
Ala Wai	Upper	10082	0.2% AEP	676.84	8.37	5028.90	8.73	1135.16	9.75	1234.16	10.17
Ala Wai	Upper	7405	50% AEP	551.52	4.20	683.46	3.74	527.07	4.23	541.96	4.27
Ala Wai	Upper	7405	20% AEP	994.75	5.27	1169.20	4.57	1356.98	5.58	833.70	5.86
Ala Wai	Upper	7405	10% AEP	1427.45	5.90	1581.35	5.23	2367.98	6.66	1185.43	7.12
Ala Wai	Upper	7405	5% AEP	1713.18	6.49	2082.46	5.81	3163.96	7.94	1336.81	7.91
Ala Wai	Upper	7405	2% AEP	1732.37	7.16	2854.34	6.44	3356.62	8.98	3045.50	8.85
Ala Wai	Upper	7405	1% AEP	1990.62	7.52	3457.22	7.40	3685.01	9.23	4543.83	9.49
Ala Wai	Upper	7405	0.5% AEP	2419.37	7.91	4133.06	8.03	4322.24	9.42	5701.63	9.82
Ala Wai	Upper	7405	0.2% AEP	2771.48	8.36	4820.09	8.73	6104.63	9.69	6680.85	10.09
Ala Wai	Upper	6095	50% AEP	751.24	4.19	726.62	3.73	794.97	4.22	604.31	4.27
Ala Wai	Upper	6095	20% AEP	1454.25	5.26	935.00	4.56	1866.78	5.57	1127.74	5.85
Ala Wai	Upper	6095	10% AEP	1899.01	5.89	1152.11	5.23	2926.17	6.65	1590.38	7.12
Ala Wai	Upper	6095	5% AEP	2084.55	6.48	1585.61	5.81	3968.88	7.92	1790.10	7.91
Ala Wai	Upper	6095	2% AEP	2323.86	7.15	2240.83	6.44	4195.87	8.95	4240.95	8.83
Ala Wai	Upper	6095	1% AEP	2715.52	7.52	2761.58	7.40	5132.08	9.19	6665.57	9.44
Ala Wai	Upper	6095	0.5% AEP	3326.57	7.91	3443.12	8.02	6071.15	9.37	8813.78	9.73
Ala Wai	Upper	6095	0.2% AEP	3916.92	8.37	3717.17	8.71	8214.51	9.62	10687.86	9.96
Ala Wai	Middle	5770	50% AEP	5499.95	4.19	2693.42	3.73	5499.42	4.22	5613.87	4.27
Ala Wai	Middle	5770	20% AEP	8706.13	5.26	6071.33	4.56	8919.25	5.57	9561.87	5.85
Ala Wai	Middle	5770	10% AEP	10418.26	5.89	7951.07	5.23	11340.68	6.65	12202.05	7.12
Ala Wai	Middle	5770	5% AEP	12150.36	6.48	9313.38	5.81	13806.30	7.92	13325.68	7.91
Ala Wai	Middle	5770	2% AEP	13958.64	7.15	9789.72	6.44	18757.42	8.95	16959.00	8.83
Ala Wai	Middle	5770	1% AEP	14568.90	7.52	11841.29	7.40	20387.56	9.19	22295.88	9.44
Ala Wai	Middle	5770	0.5% AEP	15111.36	7.91	12755.76	8.02	21786.87	9.37	25565.58	9.73
Ala Wai	Middle	5770	0.2% AEP	14734.14	8.37	13817.58	8.71	24126.95	9.62	28329.54	9.96
Ala Wai	Middle	5195	50% AEP	5543.26	4.15	2540.67	3.71	5581.81	4.18	5701.91	4.23
Ala Wai	Middle	5195	20% AEP	8695.29	5.19	6229.00	4.52	9046.83	5.50	9702.07	5.77
Ala Wai	Middle	5195	10% AEP	10441.73	5.81	8016.82	5.17	11492.26	6.56	12373.21	7.02
Ala Wai	Middle	5195	5% AEP	12101.76	6.39	9425.96	5.74	13986.54	7.81	13589.35	7.80
Ala Wai	Middle	5195	2% AEP	13974.68	7.04	9999.99	6.37	18206.54	8.82	17039.99	8.69
Ala Wai	Middle	5195	1% AEP	14620.00	7.40	12014.34	7.31	19551.41	9.06	21797.48	9.26
Ala Wai	Middle	5195	0.5% AEP	15529.27	7.80	12953.27	7.92	20693.49	9.24	24695.84	9.54
Ala Wai	Middle	5195	0.2% AEP	16094.16	8.26	14074.42	8.62	22699.74	9.48	27174.51	9.75
Ala Wai	Middle	3282	50% AEP	5740.15	4.05	3145.09	3.66	5814.53	4.08	5938.33	4.12
Ala Wai	Middle	3282	20% AEP	8769.03	5.02	6704.28	4.39	9429.06	5.31	10118.78	5.57

Ala Wai	Middle	3282	10% AEP	10308.02	5.61	8529.85	4.99	11909.95	6.32	12922.90	6.76
Ala Wai	Middle	3282	5% AEP	11700.63	6.17	9934.90	5.53	14550.96	7.55	14429.46	7.53
Ala Wai	Middle	3282	2% AEP	13238.95	6.82	11055.30	6.14	16736.88	8.62	16688.99	8.43
Ala Wai	Middle	3282	1% AEP	13833.08	7.18	13053.30	7.06	17142.33	8.90	18922.74	9.08
Ala Wai	Middle	3282	0.5% AEP	14393.69	7.58	13994.12	7.67	17450.33	9.12	20310.88	9.40
Ala Wai	Middle	3282	0.2% AEP	14760.03	8.04	15349.29	8.36	18053.90	9.42	21535.04	9.66
Ala Wai	Middle	2961	50% AEP	5770.45	4.01	3202.08	3.64	5836.54	4.03	5964.00	4.07
Ala Wai	Middle	2961	20% AEP	8788.79	4.93	6753.59	4.33	9466.24	5.21	10157.76	5.46
Ala Wai	Middle	2961	10% AEP	10274.28	5.50	8576.95	4.91	11945.13	6.19	12968.70	6.61
Ala Wai	Middle	2961	5% AEP	11570.43	6.05	9982.44	5.43	14600.00	7.37	14499.68	7.35
Ala Wai	Middle	2961	2% AEP	12988.28	6.68	11295.64	6.01	16781.60	8.46	16313.18	8.30
Ala Wai	Middle	2961	1% AEP	13596.45	7.04	13287.38	6.90	17168.97	8.75	17732.59	8.98
Ala Wai	Middle	2961	0.5% AEP	14203.99	7.43	14351.01	7.50	17430.43	8.97	18603.63	9.33
Ala Wai	Middle	2961	0.2% AEP	14933.96	7.89	15789.16	8.19	17838.73	9.28	19343.17	9.61
Ala Wai	Lower	67	50% AEP	4763.84	3.23	4721.41	3.23	6598.70	3.23	6756.52	3.23
Ala Wai	Lower	67	20% AEP	2292.10	3.22	7856.01	3.23	10633.06	3.23	11290.01	3.23
Ala Wai	Lower	67	10% AEP	2541.76	3.23	9768.28	3.23	13163.31	3.23	14115.26	3.23
Ala Wai	Lower	67	5% AEP	2831.25	3.23	11261.77	3.23	15715.02	3.23	15687.46	3.23
Ala Wai	Lower	67	2% AEP	3177.29	3.23	12789.45	3.23	17667.45	3.24	17387.20	3.23
Ala Wai	Lower	67	1% AEP	3475.10	3.23	14958.03	3.23	18261.87	3.28	18622.24	3.32
Ala Wai	Lower	67	0.5% AEP	3724.62	3.23	16347.32	3.24	18707.24	3.32	19250.72	3.37
Ala Wai	Lower	67	0.2% AEP	3924.78	3.23	17950.42	3.26	19309.65	3.38	19767.11	3.42
Kanaha	Ditch	4372	50% AEP	93.50	126.72	93.50	126.72	93.50	126.72	93.50	126.72
Kanaha	Ditch	4372	20% AEP	199.90	127.30	199.90	127.30	199.83	127.30	199.82	127.30
Kanaha	Ditch	4372	10% AEP	287.88	127.68	287.91	127.68	287.94	127.68	287.92	127.68
Kanaha	Ditch	4372	5% AEP	394.67	128.07	394.65	128.07	394.65	128.07	394.67	128.07
Kanaha	Ditch	4372	2% AEP	567.89	128.61	567.82	128.61	567.82	128.61	567.82	128.61
Kanaha	Ditch	4372	1% AEP	711.73	129.02	711.73	129.02	711.68	129.02	711.68	129.02
Kanaha	Ditch	4372	0.5% AEP	866.46	129.40	866.55	129.40	866.46	129.40	866.55	129.40
Kanaha	Ditch	4372	0.2% AEP	1038.41	129.78	1038.39	129.78	1038.37	129.78	1038.39	129.78
Kanaha	Ditch	943	50% AEP	210.53	65.75	210.32	65.75	210.33	65.75	210.33	65.75
Kanaha	Ditch	943	20% AEP	326.65	68.03	385.00	68.08	380.51	68.12	379.37	68.13
Kanaha	Ditch	943	10% AEP	344.77	68.48	476.03	68.73	476.08	68.73	473.26	68.73
Kanaha	Ditch	943	5% AEP	351.40	68.87	599.35	69.59	596.31	69.59	603.51	69.61
Kanaha	Ditch	943	2% AEP	365.76	69.54	768.27	70.93	684.03	70.45	756.15	70.86
Kanaha	Ditch	943	1% AEP	381.66	70.05	906.12	71.96	748.05	70.96	906.01	71.74
Kanaha	Ditch	943	0.5% AEP	384.97	70.69	984.59	72.89	828.05	71.54	1000.22	72.65
Kanaha	Ditch	943	0.2% AEP	396.99	71.21	1060.49	73.59	881.98	71.75	1079.32	73.48
Kanaha	Ditch	2	50% AEP	236.93	59.29	237.00	59.29	237.06	59.29	237.06	59.29
Kanaha	Ditch	2	20% AEP	357.18	60.27	361.27	60.27	360.78	60.28	360.99	60.28
Kanaha	Ditch	2	10% AEP	372.50	60.52	376.80	60.62	375.31	60.55	374.77	60.52
Kanaha	Ditch	2	5% AEP	379.00	60.76	403.15	61.32	398.82	60.84	399.67	60.90
Kanaha	Ditch	2	2% AEP	386.79	61.12	461.93	66.16	436.74	61.35	454.84	64.17
Kanaha	Ditch	2	1% AEP	363.63	64.20	498.01	68.99	459.91	63.97	494.98	68.09
Kanaha	Ditch	2	0.5% AEP	308.43	66.62	515.76	70.06	483.12	66.69	513.50	69.69
Kanaha	Ditch	2	0.2% AEP	317.56	67.26	530.40	71.12	486.26	67.46	527.35	70.96

Makiki	Upper	9543	50% AEP	238.40	170.63	238.40	170.63	238.40	170.63	238.40	170.63
Makiki	Upper	9543	20% AEP	485.90	171.28	485.90	171.28	485.87	171.28	485.90	171.28
Makiki	Upper	9543	10% AEP	705.30	171.80	705.30	171.80	705.30	171.80	705.30	171.80
Makiki	Upper	9543	5% AEP	960.76	172.26	960.77	172.26	960.77	172.26	960.76	172.26
Makiki	Upper	9543	2% AEP	1342.22	172.91	1342.22	172.91	1342.22	172.91	1342.22	172.91
Makiki	Upper	9543	1% AEP	1608.20	173.30	1608.25	173.30	1608.25	173.30	1608.20	173.30
Makiki	Upper	9543	0.5% AEP	1901.44	173.71	1901.62	173.71	1901.44	173.71	1901.62	173.71
Makiki	Upper	9543	0.2% AEP	2386.11	174.29	2385.88	174.29	2385.88	174.29	2385.88	174.29
Makiki	Upper	7672	50% AEP	294.00	102.96	294.00	102.96	294.28	102.97	294.27	102.97
Makiki	Upper	7672	20% AEP	588.43	106.23	585.37	106.20	588.53	106.23	586.65	106.21
Makiki	Upper	7672	10% AEP	669.54	107.02	667.56	107.01	667.39	107.00	667.88	107.01
Makiki	Upper	7672	5% AEP	721.36	107.51	718.74	107.49	718.57	107.49	719.20	107.49
Makiki	Upper	7672	2% AEP	757.91	107.85	757.25	107.85	755.27	107.83	757.90	107.85
Makiki	Upper	7672	1% AEP	771.55	107.98	771.98	107.98	771.12	107.97	772.75	107.99
Makiki	Upper	7672	0.5% AEP	783.08	108.08	789.32	108.14	781.82	108.07	793.29	108.18
Makiki	Upper	7672	0.2% AEP	803.35	108.27	812.95	108.35	806.52	108.30	814.81	108.37
Makiki	Lower	5940.67*	50% AEP	627.55	47.35	627.50	47.35	627.50	47.35	627.84	47.35
Makiki	Lower	5940.67*	20% AEP	1143.16	49.56	1141.29	49.55	1147.08	49.57	1142.46	49.56
Makiki	Lower	5940.67*	10% AEP	1334.67	50.38	1361.64	50.50	1346.06	50.41	1334.22	50.38
Makiki	Lower	5940.67*	5% AEP	1516.64	51.21	1731.22	53.12	1568.76	51.35	1562.25	51.52
Makiki	Lower	5940.67*	2% AEP	1782.97	54.03	2086.85	62.85	1906.08	53.22	2013.78	63.11
Makiki	Lower	5940.67*	1% AEP	2030.93	63.12	2164.08	65.12	2270.16	62.73	2123.63	64.22
Makiki	Lower	5940.67*	0.5% AEP	1992.95	62.47	2177.19	65.93	2271.22	63.32	2161.23	65.54
Makiki	Lower	5940.67*	0.2% AEP	2037.51	62.45	2197.99	66.90	2278.16	63.44	2181.66	66.84
Makiki	Lower	4709.50*	50% AEP	629.75	30.33	629.49	31.21	629.74	30.33	629.73	30.33
Makiki	Lower	4709.50*	20% AEP	1150.10	36.46	1145.61	36.65	1135.04	36.00	1148.78	36.68
Makiki	Lower	4709.50*	10% AEP	1345.52	38.83	1368.86	39.30	1352.91	38.15	1345.74	39.15
Makiki	Lower	4709.50*	5% AEP	1518.87	40.40	1741.57	42.36	1582.36	39.00	1571.71	41.22
Makiki	Lower	4709.50*	2% AEP	1798.57	42.57	2102.08	45.25	1924.43	39.89	2029.59	44.79
Makiki	Lower	4709.50*	1% AEP	2040.31	44.25	2181.91	46.00	2281.84	40.52	2128.47	45.74
Makiki	Lower	4709.50*	0.5% AEP	2060.63	44.96	2200.21	46.50	2318.29	40.70	2138.49	46.27
Makiki	Lower	4709.50*	0.2% AEP	2062.40	45.47	2223.93	47.11	2326.97	40.83	2194.20	46.99
Makiki	Lower	1897	50% AEP	743.96	9.53	744.17	9.53	722.80	9.22	743.99	9.53
Makiki	Lower	1897	20% AEP	1047.46	10.91	1047.62	10.90	998.67	9.49	1047.04	10.91
Makiki	Lower	1897	10% AEP	1098.28	11.45	1098.24	11.44	1075.70	9.57	1096.47	11.45
Makiki	Lower	1897	5% AEP	1121.90	11.80	1124.32	11.80	1111.58	9.63	1121.30	11.82
Makiki	Lower	1897	2% AEP	1139.41	12.23	1143.53	12.23	1142.87	9.72	1139.52	12.25
Makiki	Lower	1897	1% AEP	1149.78	12.52	1154.96	12.54	1160.55	9.78	1149.14	12.55
Makiki	Lower	1897	0.5% AEP	1158.22	12.83	1162.99	12.83	1176.44	9.86	1157.99	12.85
Makiki	Lower	1897	0.2% AEP	1163.60	13.18	1167.91	13.18	1190.17	9.97	1163.37	13.20
Makiki	Lower	76	50% AEP	634.52	3.79	880.82	3.49	842.22	3.81	878.98	3.84
Makiki	Lower	76	20% AEP	879.80	4.52	1118.67	4.02	993.00	4.74	1108.70	4.95
Makiki	Lower	76	10% AEP	957.09	4.98	1228.51	4.49	1071.02	5.56	1196.33	5.91
Makiki	Lower	76	5% AEP	969.23	5.44	1302.76	4.92	1177.11	6.56	1255.81	6.55
Makiki	Lower	76	2% AEP	1001.06	5.98	1384.34	5.41	1378.51	7.44	1300.89	7.31
Makiki	Lower	76	1% AEP	1028.75	6.30	1442.01	6.17	1476.25	7.71	1316.67	7.92

Makiki	Lower	76	0.5% AEP	1055.18	6.64	1516.57	6.68	1484.76	7.92	1332.22	8.23
Makiki	Lower	76	0.2% AEP	1000.96	7.01	1605.65	7.21	1492.31	8.20	1359.80	8.49
Manoa	Main	16506	50% AEP	1499.33	275.69	1499.33	275.69	1498.87	275.69	1498.92	275.69
Manoa	Main	16506	20% AEP	2723.00	277.47	2723.00	277.47	2723.00	277.47	2723.00	277.47
Manoa	Main	16506	10% AEP	3657.00	278.58	3657.00	278.58	3657.00	278.58	3657.00	278.58
Manoa	Main	16506	5% AEP	4623.00	279.57	4623.00	279.58	4623.00	279.57	4623.00	279.58
Manoa	Main	16506	2% AEP	5934.00	280.75	5934.00	280.77	5934.00	280.75	5934.00	280.77
Manoa	Main	16506	1% AEP	6834.00	281.49	6834.00	281.52	6834.00	281.49	6834.00	281.52
Manoa	Main	16506	0.5% AEP	7583.00	282.07	7583.00	282.11	7583.00	282.07	7583.00	282.11
Manoa	Main	16506	0.2% AEP	8413.00	282.67	8413.00	282.71	8413.00	282.67	8413.00	282.71
Manoa	Main	10968	50% AEP	2468.88	178.55	2477.53	178.56	2473.42	178.67	2475.63	178.56
Manoa	Main	10968	20% AEP	3993.98	181.63	4009.00	181.57	3988.46	181.64	4008.51	181.61
Manoa	Main	10968	10% AEP	5048.51	182.64	5030.89	182.69	5028.25	182.67	5034.68	182.71
Manoa	Main	10968	5% AEP	6113.48	183.44	6087.57	183.59	6058.05	183.46	6087.09	183.59
Manoa	Main	10968	2% AEP	7311.77	184.27	7455.92	184.57	7276.47	184.31	7461.27	184.56
Manoa	Main	10968	1% AEP	8294.58	184.87	8526.55	185.10	8267.16	184.85	8531.83	185.10
Manoa	Main	10968	0.5% AEP	9150.59	185.27	9285.26	185.61	9123.61	185.24	9332.29	185.61
Manoa	Main	10968	0.2% AEP	9971.20	185.71	10142.51	186.09	9941.00	185.69	10153.04	186.09
Manoa	Main	10496	50% AEP	2692.34	172.93	2609.71	172.82	2705.20	172.94	2607.13	172.82
Manoa	Main	10496	20% AEP	3796.51	178.23	3720.34	177.97	3748.25	178.13	3726.25	177.99
Manoa	Main	10496	10% AEP	4257.14	178.84	4329.45	179.01	4191.20	178.68	4341.18	179.04
Manoa	Main	10496	5% AEP	4516.87	179.39	4782.34	179.98	4423.65	179.21	4791.73	180.00
Manoa	Main	10496	2% AEP	4736.46	179.88	5352.69	180.89	4664.58	179.71	5354.92	180.90
Manoa	Main	10496	1% AEP	4889.73	180.16	5745.68	181.50	4813.07	180.03	5751.76	181.51
Manoa	Main	10496	0.5% AEP	5004.49	180.35	6093.29	182.01	4926.61	180.22	6104.53	182.02
Manoa	Main	10496	0.2% AEP	5112.56	180.51	6387.32	182.42	5039.04	180.40	6397.39	182.44
Manoa	Main	8117	50% AEP	2921.23	148.71	2848.31	148.61	2931.03	148.72	2846.79	148.61
Manoa	Main	8117	20% AEP	3427.25	150.94	3495.26	150.59	3542.62	151.10	3488.20	150.54
Manoa	Main	8117	10% AEP	3394.60	152.01	3565.61	152.03	3570.20	152.40	3350.14	152.01
Manoa	Main	8117	5% AEP	3325.22	152.76	3976.60	153.10	4348.97	153.48	3986.28	153.08
Manoa	Main	8117	2% AEP	3379.37	153.48	5366.60	154.15	5642.55	154.36	5342.82	154.13
Manoa	Main	8117	1% AEP	3890.30	153.92	6216.70	154.78	6458.18	154.98	6200.93	154.76
Manoa	Main	8117	0.5% AEP	4252.63	154.21	6855.71	155.27	6966.73	155.29	6819.94	155.26
Manoa	Main	8117	0.2% AEP	4746.00	154.50	7381.20	155.71	7569.27	155.78	7320.95	155.69
Manoa	Main	8016	50% AEP	2930.35	147.55	2860.54	147.45	2940.20	147.57	2858.63	147.45
Manoa	Main	8016	20% AEP	3224.45	150.57	3461.39	149.97	3494.25	150.80	3376.17	149.86
Manoa	Main	8016	10% AEP	2900.22	152.08	3480.16	152.02	3495.00	152.45	2900.27	152.03
Manoa	Main	8016	5% AEP	2549.36	153.00	3484.16	153.25	3596.72	153.67	3316.25	153.24
Manoa	Main	8016	2% AEP	2308.67	153.82	4456.05	154.38	4658.23	154.63	4432.00	154.37
Manoa	Main	8016	1% AEP	2702.70	154.31	5164.36	155.06	5328.95	155.27	5156.12	155.04
Manoa	Main	8016	0.5% AEP	2998.34	154.64	5696.18	155.58	5753.27	155.67	5668.96	155.56
Manoa	Main	8016	0.2% AEP	3414.48	154.97	6138.80	156.04	6228.58	156.16	6094.03	156.03
Manoa	Main	7839	50% AEP	2952.57	145.85	2886.28	145.74	2965.19	145.87	2884.23	145.74
Manoa	Main	7839	20% AEP	5013.13	149.58	4663.25	148.98	4985.74	149.86	4635.90	148.87
Manoa	Main	7839	10% AEP	5379.37	150.97	5126.63	151.17	5265.48	151.68	5122.36	151.16
Manoa	Main	7839	5% AEP	5498.35	151.79	5139.53	152.60	5319.89	153.08	5146.80	152.58

Manoa	Main	7839	2% AEP	5694.71	152.50	5970.73	153.84	6200.41	154.09	5949.80	153.82
Manoa	Main	7839	1% AEP	6173.39	152.87	6616.83	154.58	6848.91	154.77	6608.12	154.55
Manoa	Main	7839	0.5% AEP	6546.32	153.16	7104.07	155.13	7774.59	155.06	7087.30	155.11
Manoa	Main	7839	0.2% AEP	6942.79	153.44	7577.89	155.60	7942.24	155.61	7541.01	155.58
Manoa	Main	3042	50% AEP	3069.44	62.63	3007.28	62.56	3086.14	62.64	3003.80	62.56
Manoa	Main	3042	20% AEP	5562.45	65.17	5088.60	64.75	5719.30	65.32	5006.34	64.67
Manoa	Main	3042	10% AEP	7159.79	66.69	7121.01	66.66	7816.98	67.19	7080.51	66.62
Manoa	Main	3042	5% AEP	8407.54	67.79	9019.81	68.20	9712.85	68.67	9006.22	68.19
Manoa	Main	3042	2% AEP	9536.27	68.85	11649.02	70.24	12199.30	70.54	11601.69	70.22
Manoa	Main	3042	1% AEP	10708.84	69.85	12447.42	71.79	12306.95	72.01	12397.32	71.79
Manoa	Main	3042	0.5% AEP	11700.62	70.80	13551.25	72.44	14859.00	72.98	13516.66	72.43
Manoa	Main	3042	0.2% AEP	11491.13	71.87	15195.66	73.84	15317.32	74.68	15284.60	73.91
Manoa	Main	2891	50% AEP	3069.10	60.51	3006.57	60.44	3085.95	60.53	3003.25	60.44
Manoa	Main	2891	20% AEP	5561.52	63.54	5086.31	63.08	5719.23	63.69	5002.77	62.99
Manoa	Main	2891	10% AEP	7151.55	65.38	7120.07	65.34	7810.10	65.93	7080.20	65.28
Manoa	Main	2891	5% AEP	8389.34	66.74	9011.22	67.19	9708.35	67.71	8997.10	67.18
Manoa	Main	2891	2% AEP	9533.90	68.05	11633.17	69.57	12183.36	69.85	11584.39	69.55
Manoa	Main	2891	1% AEP	10672.67	69.23	12816.77	71.22	14045.04	71.34	12801.26	71.22
Manoa	Main	2891	0.5% AEP	11660.62	70.30	13445.90	72.07	14754.12	72.59	13408.30	72.06
Manoa	Main	2891	0.2% AEP	11634.15	71.50	14705.79	73.56	15643.73	74.50	14912.35	73.65
Manoa	Main	1457	50% AEP	3495.19	39.77	3439.67	39.72	3515.05	39.79	3435.21	39.71
Manoa	Main	1457	20% AEP	6370.92	42.16	5899.65	42.06	6524.70	42.46	5811.76	41.98
Manoa	Main	1457	10% AEP	8509.90	43.53	8322.25	43.69	9030.76	44.09	8262.15	43.65
Manoa	Main	1457	5% AEP	10019.31	44.36	10580.74	45.02	11226.75	45.38	10565.06	45.00
Manoa	Main	1457	2% AEP	11664.26	44.98	13589.29	46.59	13926.59	46.74	13583.57	46.57
Manoa	Main	1457	1% AEP	13135.72	45.49	15816.60	47.61	16006.79	47.63	15851.25	47.60
Manoa	Main	1457	0.5% AEP	14505.38	45.93	17437.04	48.27	17875.57	48.31	17566.85	48.33
Manoa	Main	1457	0.2% AEP	16361.97	46.46	19008.26	48.89	19183.19	48.78	19136.56	48.96
Manoa	Main	1378	50% AEP	3495.01	39.54	3439.42	39.49	3514.82	39.57	3434.96	39.49
Manoa	Main	1378	20% AEP	6370.36	41.75	5899.38	41.79	6524.05	42.14	5811.59	41.71
Manoa	Main	1378	10% AEP	8504.99	42.83	8321.83	43.21	9029.61	43.53	8260.70	43.17
Manoa	Main	1378	5% AEP	10019.17	43.37	10587.29	44.33	11245.55	44.60	10565.00	44.32
Manoa	Main	1378	2% AEP	11672.51	43.84	13611.23	45.66	13980.16	45.81	13621.63	45.64
Manoa	Main	1378	1% AEP	13179.87	44.21	15975.01	46.70	16204.33	46.69	16050.52	46.68
Manoa	Main	1378	0.5% AEP	14608.65	44.52	17804.39	47.33	18269.36	47.33	18072.14	47.39
Manoa	Main	1378	0.2% AEP	16577.02	44.91	19927.49	47.95	19971.23	47.79	20272.64	48.02
Manoa	Main	1107	50% AEP	3585.13	36.83	3529.60	36.79	3605.25	36.85	3525.00	36.78
Manoa	Main	1107	20% AEP	5494.79	38.38	6068.86	38.80	6691.95	39.16	5980.53	38.74
Manoa	Main	1107	10% AEP	6496.56	38.87	8573.99	40.31	9283.11	40.66	8507.88	40.27
Manoa	Main	1107	5% AEP	6977.36	39.23	10920.46	41.52	11571.05	41.80	10896.56	41.51
Manoa	Main	1107	2% AEP	7453.17	39.53	14133.35	42.90	14462.03	43.05	14091.50	42.89
Manoa	Main	1107	1% AEP	7759.94	39.81	16556.01	44.05	16445.53	44.04	16548.72	44.05
Manoa	Main	1107	0.5% AEP	8098.65	40.04	18421.01	44.65	18210.05	44.61	18641.90	44.70
Manoa	Main	1107	0.2% AEP	8503.15	40.33	20394.42	45.26	19928.40	45.01	20678.87	45.33
Manoa	Main	84	50% AEP	3541.37	19.85	3497.23	19.80	3574.00	19.87	3493.88	19.80
Manoa	Main	84	20% AEP	5276.23	22.69	5950.37	22.84	6641.04	23.19	5893.06	22.74

Manoa	Main	84	10% AEP	6081.61	25.21	8504.62	25.65	9248.46	26.15	8458.98	25.65
Manoa	Main	84	5% AEP	6613.04	26.85	10869.49	29.83	11471.24	30.64	10879.33	29.67
Manoa	Main	84	2% AEP	7235.59	30.94	12398.96	32.55	14430.42	32.56	11498.74	32.60
Manoa	Main	84	1% AEP	5789.45	32.72	15894.32	33.54	16556.47	33.54	15556.96	33.69
Manoa	Main	84	0.5% AEP	7426.53	32.83	18586.31	34.59	19452.94	34.73	18589.56	35.31
Manoa	Main	84	0.2% AEP	8942.89	33.24	19641.93	35.48	20501.38	36.21	19707.55	36.65
Palolo	Main	11542	50% AEP	1806.11	133.87	1806.24	133.87	1816.33	133.88	1815.86	133.88
Palolo	Main	11542	20% AEP	3125.22	135.25	3138.78	135.26	3146.49	135.27	3131.32	135.26
Palolo	Main	11542	10% AEP	3971.69	135.99	4010.64	136.03	4010.65	136.03	3971.54	135.99
Palolo	Main	11542	5% AEP	4701.85	136.59	4776.10	136.65	4776.10	136.65	4701.91	136.59
Palolo	Main	11542	2% AEP	5576.48	137.25	5612.95	137.28	5612.99	137.28	5576.61	137.25
Palolo	Main	11542	1% AEP	6212.25	137.69	6142.92	137.65	6142.92	137.65	6211.57	137.69
Palolo	Main	11542	0.5% AEP	6696.57	138.03	6678.61	138.02	6678.70	138.02	6696.65	138.03
Palolo	Main	11542	0.2% AEP	7275.36	138.42	7242.61	138.40	7242.20	138.40	7277.21	138.42
Palolo	Main	10074	50% AEP	1891.63	110.61	1891.66	110.61	1900.41	110.63	1900.11	110.63
Palolo	Main	10074	20% AEP	2800.99	112.38	2775.45	112.33	2778.73	112.33	2803.26	112.38
Palolo	Main	10074	10% AEP	3205.67	113.10	3112.14	112.93	3112.15	112.93	3205.65	113.10
Palolo	Main	10074	5% AEP	3587.06	113.75	3440.81	113.50	3440.81	113.50	3587.06	113.75
Palolo	Main	10074	2% AEP	4054.35	114.51	3858.12	114.19	3858.16	114.19	4053.09	114.51
Palolo	Main	10074	1% AEP	4397.09	115.06	4214.54	114.77	4214.64	114.77	4397.91	115.06
Palolo	Main	10074	0.5% AEP	4708.56	115.54	4572.90	115.33	4573.05	115.33	4708.55	115.54
Palolo	Main	10074	0.2% AEP	5086.40	116.11	4993.03	115.97	4992.39	115.97	5087.08	116.11
Palolo	Main	6282	50% AEP	2041.89	32.20	2038.94	32.20	2044.64	32.20	2048.12	32.21
Palolo	Main	6282	20% AEP	3506.82	33.55	3575.88	33.61	3582.68	33.62	3512.09	33.56
Palolo	Main	6282	10% AEP	4720.15	34.67	4899.26	34.73	4899.01	34.74	4869.01	34.71
Palolo	Main	6282	5% AEP	5799.85	35.66	6366.42	35.94	6388.49	36.00	6226.20	35.83
Palolo	Main	6282	2% AEP	7188.58	36.91	8229.26	37.73	8227.69	37.71	8003.85	37.57
Palolo	Main	6282	1% AEP	8075.01	38.44	9857.14	40.23	9836.96	39.69	9546.59	39.97
Palolo	Main	6282	0.5% AEP	9404.02	39.84	11212.00	41.04	11066.87	40.61	11009.93	41.00
Palolo	Main	6282	0.2% AEP	10942.51	40.62	12585.27	41.75	12404.49	41.25	12396.36	41.71
Palolo	Lower	4810	50% AEP	5435.83	18.39	5394.07	18.34	5460.18	18.42	5384.02	18.35
Palolo	Lower	4810	20% AEP	9138.38	21.27	9327.83	21.43	9855.94	21.79	9206.43	21.33
Palolo	Lower	4810	10% AEP	12422.47	24.09	13123.38	24.55	13857.62	25.08	13073.27	24.56
Palolo	Lower	4810	5% AEP	15088.53	25.72	16847.32	26.77	17335.72	27.53	16622.50	26.91
Palolo	Lower	4810	2% AEP	19224.69	27.79	22628.85	29.32	21386.64	29.72	22294.80	29.99
Palolo	Lower	4810	1% AEP	20521.75	28.34	25256.68	30.62	22903.29	30.63	24968.78	31.34
Palolo	Lower	4810	0.5% AEP	21025.01	28.84	27114.58	31.54	24636.25	31.50	27033.58	32.39
Palolo	Lower	4810	0.2% AEP	23203.64	29.61	29089.03	32.54	26933.81	32.77	29168.05	33.54
Palolo	Lower	4653	50% AEP	5435.65	16.24	5393.77	16.32	5460.09	16.26	5383.90	16.20
Palolo	Lower	4653	20% AEP	9137.54	19.00	9326.67	19.23	9855.79	19.49	9206.33	19.06
Palolo	Lower	4653	10% AEP	12418.85	22.54	13125.11	22.94	13855.87	23.46	13072.84	22.98
Palolo	Lower	4653	5% AEP	15082.84	23.92	16811.98	24.89	17335.72	25.99	16622.50	25.26
Palolo	Lower	4653	2% AEP	19218.27	25.36	22148.29	26.49	21110.95	28.01	22289.29	28.07
Palolo	Lower	4653	1% AEP	19584.12	25.61	25084.47	26.52	22903.29	28.88	24946.20	29.15
Palolo	Lower	4653	0.5% AEP	20999.20	26.46	27000.19	26.94	24556.38	29.51	27012.42	29.80
Palolo	Lower	4653	0.2% AEP	19854.48	26.43	29070.96	27.49	26941.74	30.32	29167.70	30.50

Palolo	Lower	4557	50% AEP	5435.44	16.19	5393.11	16.33	5460.03	16.21	5383.81	16.14
Palolo	Lower	4557	20% AEP	9136.67	19.15	9326.00	19.42	9855.74	19.67	9206.24	19.21
Palolo	Lower	4557	10% AEP	12414.38	22.91	13041.84	23.34	13855.67	23.84	13072.83	23.36
Palolo	Lower	4557	5% AEP	15117.10	24.28	16653.65	25.30	17335.27	26.38	16605.93	25.66
Palolo	Lower	4557	2% AEP	18788.00	25.82	17227.82	26.92	20988.96	28.51	21907.15	28.63
Palolo	Lower	4557	1% AEP	19325.88	26.18	17758.98	27.30	22452.61	29.40	23918.23	29.84
Palolo	Lower	4557	0.5% AEP	20780.92	26.92	18048.09	27.68	23832.36	30.12	25359.94	30.59
Palolo	Lower	4557	0.2% AEP	20316.26	26.71	18060.58	28.08	25507.55	31.05	26778.10	31.43
Palolo	Lower	2609	50% AEP	5499.09	7.86	5556.61	13.49	5524.74	7.89	5447.40	7.83
Palolo	Lower	2609	20% AEP	9265.28	10.20	9877.21	14.14	9998.93	10.61	9367.67	10.42
Palolo	Lower	2609	10% AEP	12146.22	11.64	13680.89	14.58	12953.47	12.46	12798.00	12.04
Palolo	Lower	2609	5% AEP	13585.19	12.26	16832.85	15.06	15025.05	14.44	14973.91	13.12
Palolo	Lower	2609	2% AEP	14779.70	12.81	18802.59	15.41	17937.06	16.91	18102.42	14.36
Palolo	Lower	2609	1% AEP	14992.22	12.95	20137.31	15.68	19491.52	17.26	19708.84	14.80
Palolo	Lower	2609	0.5% AEP	15470.52	13.28	21129.30	15.87	20290.38	17.36	20535.07	15.09
Palolo	Lower	2609	0.2% AEP	15581.83	13.45	22229.33	16.09	23934.59	18.03	21377.15	15.40
Palolo	Lower	305	50% AEP	5062.62	3.99	1992.45	3.70	5110.83	4.01	5328.00	4.05
Palolo	Lower	305	20% AEP	7857.19	4.90	5204.73	4.40	8271.06	5.19	8922.02	5.42
Palolo	Lower	305	10% AEP	8599.47	5.50	6426.76	5.01	9935.65	6.25	11269.06	6.57
Palolo	Lower	305	5% AEP	10215.84	6.08	7968.80	5.54	11417.07	7.49	13268.20	7.28
Palolo	Lower	305	2% AEP	11171.07	6.76	8132.50	6.26	14069.96	8.43	13220.42	8.26
Palolo	Lower	305	1% AEP	11418.89	7.15	9512.79	7.25	14674.65	8.65	15497.57	8.79
Palolo	Lower	305	0.5% AEP	11520.60	7.58	9862.38	7.97	15108.96	8.81	16564.70	9.03
Palolo	Lower	305	0.2% AEP	11436.10	8.20	10561.79	8.76	15539.95	9.04	12702.23	9.32
Pukele	Tributary	5958	50% AEP	654.20	518.92	654.20	518.92	653.57	518.92	653.42	518.92
Pukele	Tributary	5958	20% AEP	1242.60	520.19	1242.60	520.19	1241.21	520.19	1240.87	520.19
Pukele	Tributary	5958	10% AEP	1722.09	520.98	1720.60	520.98	1720.60	520.98	1722.09	520.98
Pukele	Tributary	5958	5% AEP	2231.49	521.73	2229.58	521.73	2229.58	521.73	2231.49	521.73
Pukele	Tributary	5958	2% AEP	2947.92	522.68	2947.92	522.68	2947.92	522.68	2947.92	522.68
Pukele	Tributary	5958	1% AEP	3418.67	523.26	3418.67	523.26	3418.67	523.26	3418.67	523.26
Pukele	Tributary	5958	0.5% AEP	3935.83	523.85	3935.83	523.85	3935.83	523.85	3935.83	523.85
Pukele	Tributary	5958	0.2% AEP	4730.12	524.69	4730.88	524.69	4727.08	524.69	4730.88	524.69
Waiomao	Tributary	4900	50% AEP	638.43	395.73	638.43	395.73	638.43	395.73	638.43	395.73
Waiomao	Tributary	4900	20% AEP	1135.38	397.38	1135.38	397.38	1134.61	397.38	1134.90	397.38
Waiomao	Tributary	4900	10% AEP	1537.51	398.49	1537.37	398.49	1537.37	398.49	1537.51	398.49
Waiomao	Tributary	4900	5% AEP	1973.61	399.51	1973.00	399.51	1973.00	399.51	1973.23	399.51
Waiomao	Tributary	4900	2% AEP	2573.04	400.66	2573.04	400.66	2573.04	400.66	2573.04	400.66
Waiomao	Tributary	4900	1% AEP	3070.11	401.49	3069.54	401.49	3070.11	401.49	3070.11	401.49
Waiomao	Tributary	4900	0.5% AEP	3625.10	402.32	3625.10	402.32	3625.10	402.32	3625.10	402.32
Waiomao	Tributary	4900	0.2% AEP	4307.81	403.23	4309.37	403.23	4308.69	403.23	4308.69	403.23

7. Coastal Zone Management Act – Consistency Determination

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Draft
General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii

Draft Federal Consistency Determination
Under Coastal Zone Management Act of 1972, as amended

Prepared for:
State of Hawaii
Office of Planning and Sustainable Development
Honolulu, Hawai'i

Prepared by:
U.S. Army Corps of Engineers, Pittsburgh District

November 2023

(Revised: MONTH YEAR)

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CONTROLLED UNCLASSIFIED INFORMATION (CUI)

1. Project Summary

At the request of the City and County of Honolulu, the Pittsburgh District, U.S. Army Corps of Engineers (USACE) is conducting a general reevaluation report for the proposed Ala Wai Canal Project in Honolulu, Hawaii. The study is authorized under Section 209 of the Flood Control Act of 1962 (Public Law 87-874), which is a general authority that authorizes surveys in harbors and rivers in Hawaii "with a view to determining the advisability of improvements in the interest of navigation, flood control, hydroelectric power development, water supply, and other beneficial water uses, and related land resources."

The Ala Wai watershed is located on the southeastern side of the island of Oahu, Hawaii. The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Ko'olau Mountains to the nearshore waters of Mamala Bay. It includes Makiki, Manoa, and Palolo streams, which drain to the Ala Wai Canal, a 2-mile long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands (see Figure 1). This construction and subsequent draining allowed the development of the Waikiki district.

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Figure 1: Regional Location of the Project Action Area.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

1.1 Purpose and Need

The purpose of the study is to analyze a series of preliminary alternatives designed to reduce the on-going flood risks throughout the Ala Wai watershed in Oahu, Hawaii. The study is needed because there is a high level of flood risk that exists within the Ala Wai watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) and aging and undersized infrastructure result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Manoa, and Palolo valleys. In addition to the above, the population density within the Ala Wai watershed is high, with approximately 200,000 residents in a 19 square mile area. The watershed also contains the University of Hawaii and the Waikiki District—a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state.

It is estimated that the Ala Wai Canal has the capacity to contain about a 20% annual exceedance probability (AEP) flood event. Overtopping of the canal has previously flooded Waikiki multiple times, including November 1965 and December 1967 storm and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by several recent events, including the October 2004 storm that flooded Manoa Valley and the March 2006 storm that flooded Makiki. The October 2004 event was estimated to have a 4% AEP and caused more than $85 million in damages.

1.2 Project Description

In response to the flood-related problems and opportunities identified for the Ala Wai watershed, a variety of structural and non-structural flood risk management measures were considered, with a focus on the following approaches to flood risk management: (1) peak flow reduction, (2) increased channel capacity, (3) debris management, and (4) minimization of flood damages. The conceptual measures were sited and screened using a set of project-specific criteria, including technical feasibility, availability of land, implementation costs, O&M requirements, legal and public acceptability, and flood risk reduction. Through the screening process, some measures were eliminated while others were further refined and combined into an array of alternatives; this process incorporated the range of agency and public input obtained through the 2017 feasibility study, 2021 and 2023 scoping efforts, and other stakeholder engagement activities conducted to date. This effort resulted in the tentative selection of an alternative plan for implementation (also referred to as the tentatively selected plan). The measures included in this plan are:

Woodlawn Drive Floodwall and Koali Road Floodwall - Also within Manoa Valley, a floodwall extending six feet above ground level (i.e., Woodlawn Drive Floodwall) would be constructed along the right descending bank of Manoa Stream (Figure 2). The floodwall would be approximately 1,270 feet in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 feet above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream (Figure 3). The floodwall would be approximately 2,510 feet in length. Two concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two flap gates would be retrofitted on smaller stormwater

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culverts along this feature. Two road closure structures would be constructed — one at Koali Road and one at the pedestrian bridge crossing Palolo upstream (approximately 690 feet upstream of Koali Road Bridge) — to bridge the gap between the floodwall as it crosses these two throughways. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road Floodwall function as a system.

Kaimuki High School Floodwall - At the Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending six feet above ground (i.e., Kaimuki High School Floodwall [extension of Ala Wai Canal Floodwall]) would be constructed along the Kaimuki High School's track field and extending down to the vicinity of the Kaimuki High School's discus and shot put throwing area (Figure 4). The floodwall would be approximately 3,260 feet long and would be constructed of a combination of steel sheetpile (1,460 feet) and micropiles (1,800 feet) with a concrete fascia. The Alternative 5.3 Kaimuki High School Floodwall would be shorter in length than the Kaimuki High School Floodwall described under Alternative 1 and Alternative 2B. Like Alternative 2B, though, the Kaimuki High School Floodwall would join up with the Ala Wai Canal Floodwall discussed below. The purpose of the floodwall would be to reduce the risk of flooding to residential structures east/southeast of Kaimuki High School.

Ala Wai Golf Course Detention Basin – At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately six to nine feet in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 8,315 feet in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. On the left descending bank of the Manoa-Palolo Canal, there is an overtopping spillway section, approximately 100 feet in length, that is reinforced with erosion protection. The levee along the Manoa-Palolo Canal is also lined with erosion protection on the canal-side. A portion of the existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be riprapped and used as an inlet location for overflow into the Ala Wai Golf Course Detention Basin. A small inlet channel would be excavated and lined with erosion control material to improve the flow onto the golf course. Three concrete drainage structures and three flap gates would be constructed along the levee alignment of the Ala Wai Golf Course to allow collected stormwater within the basin and from local runoff to slowly drain into Ala Wai Canal. The three drainage structures would be approximately three feet (wide) x three feet (high) and would be located at the downstream end of three existing natural drainages along the southwest side of the golf course (west of the Ala Wai Golf Course Clubhouse). The detention basin also includes a floodwall along the golf course parking lot near the Ala Wai Canal, which is nine feet in height. The floodwall has one concrete drainage structure and two flap gates. The drainage structure at this location serves to outlet flow from the Diamond Head neighborhood. The original outlet will be enclosed by concrete (instead of daylighted) and will need reconstruction of the vehicle and pedestrian access at this location. A small section of floodwall near the Kapahulu Avenue and Ala Wai Boulevard intersection at the Diamond Head end of the canal will tie-in to the golf course levee and Ala Wai Canal floodwall system. This section is 6 ft in height and includes one road closure structure and one drainage structure. Finally, there is one canoe access point in this location. One road closure structure would be constructed at the Ala Wai Golf Course Maintenance Facility driveway. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

Ala Wai Canal Floodwall - At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending

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six feet above ground (i.e., Ala Wai Canal Floodwall) would be constructed (Figure 4). The floodwall would be approximately 22,852 feet long and would be constructed of a combination of J-wall on micropiles (17,125 feet), L-wall on micropiles (4,069 feet), and tieback I-wall (1,658 feet) with a lava rock fascia. Existing stormwater sewers inletting into the Ala Wai Canal would be modified so that fourteen would be drainage structures and 59 would be retrofitted with flap gates. Eleven road closure structures would be constructed: (1) King Street (Manoa-Palolo Canal right descending bank), (2) King Street (Manoa-Palolo Canal left descending bank), (3) Kapiolani Boulevard (Manoa-Palolo Canal right descending bank), (4) Kapiolani Boulevard (Manoa-Palolo Canal left descending bank), (5) Date Street (near the Date Street and Laau Street junction), (6) Date Street (near the vicinity of the Kaimuki High School's discus and shot put throwing area, (7) Ala Wai Golf Course Drive, (8) McCully Street (Ala Wai Canal right descending bank), (9) McCully Street (Ala Wai Canal left descending bank), (10) Kalakaua Avenue (Ala Wai Canal right descending bank), and (11) Kalakaua Avenue (Ala Wai Canal left descending bank). The typical cross section of this feature varies along the alignment, but all are assumed to be 6 ft above ground. The floodwall along the Ala Wai Canal and the lower right descending bank of the Manoa-Palolo Canal will include an elevated walking path. On the left descending bank of the Manoa-Palolo Canal and near Kaimuki High School, there will be a floodwall on micropiles with no walking path. Where space is constricted, along the upper right descending bank of the Manoa-Palolo Canal, tieback I-walls will be constructed, with no walking path. The purpose of the Ala Wai Canal Floodwall system would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki.

Mitigation Measures – Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cubic feet per second (cfs). At the time of compiling this Draft Report, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed. If Alternative 5.3 moves forward, additional analysis would be conducted during the Preconstruction Engineering and Design (PED) phase to determine the above as well as if a pump station is even necessary to reduce induced flooding. If determined to be necessary during PED, appropriate supplemental National Environmental Policy Act (NEPA) analysis and coordination would be conducted as necessary. In addition to considering pumps as potential mitigation for induced flooding within the watershed, nonstructural measures such as dry/wet floodproofing, elevation, and acquisition are also under consideration. Additional analysis would be conducted during PED to determine the precise number and location of structures recommended for dry/wet floodproofing, elevation, or acquisition. Appropriate supplemental NEPA analysis and coordination would be conducted as necessary.

Future Operation, Maintenance, Repair, Replacement, and Rehabilitation
Maintenance, including routine inspections and minor repairs of the project and its associated features, would be required after construction is completed. The following activities may occur:

- Routine and special inspection with pickup trucks and sport utility vehicles, as needed, and up to daily during flood events.
- Vegetation management where floodwalls and earthen berms are located. Vegetation management in the areas with floodwalls would be in accordance with Corps of Engineers Engineering Pamphlet 1110-2-18; at a minimum 15-feet down slope of the floodwall would need to be a vegetation free zone (VFZ). The VFZ applies to all vegetation except for grasses for the purpose of erosion control.
- Periodic clearing of debris around inlet/outlet structures.
- Periodic clearing of accumulated sediment and debris from detention basin.

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- Periodic vegetation management such as weeding, herbicide application, and re-seeding.
- Periodic graffiti removal and vandalization repair.

Rarely, following large and erosive flood flows, larger-scale maintenance and repairs may be required, which could require access and use of heavy equipment within the floodplain adjacent to the project feature. A temporary work area may need to be established around a repair site. The local sponsor would be required to obtain emergency or standard permits from regulatory agencies, including Corps Regulatory, who would coordinate and consult, if needed, with the USFWS and NMFS. These permits would likely require active habitat restoration of temporary construction and access roads. It is likely that a storm event large enough to damage the detention basins and/or floodwalls would also have removed vegetation in the immediate area, but specific impacts cannot be evaluated until or unless damage occurs, and repair work is defined.

At this time, no unavoidable adverse impacts to biological resources have been identified. Avoidance and minimization measures included as part of the Draft Fish and Wildlife Coordination Act will be implemented during project construction to minimize potential impacts to biological resources. The Draft Genera Reevaluation Report with integrated Supplemental Environmental Impact Statement (GRR/SEIS) will be available for public review during fall 2023.

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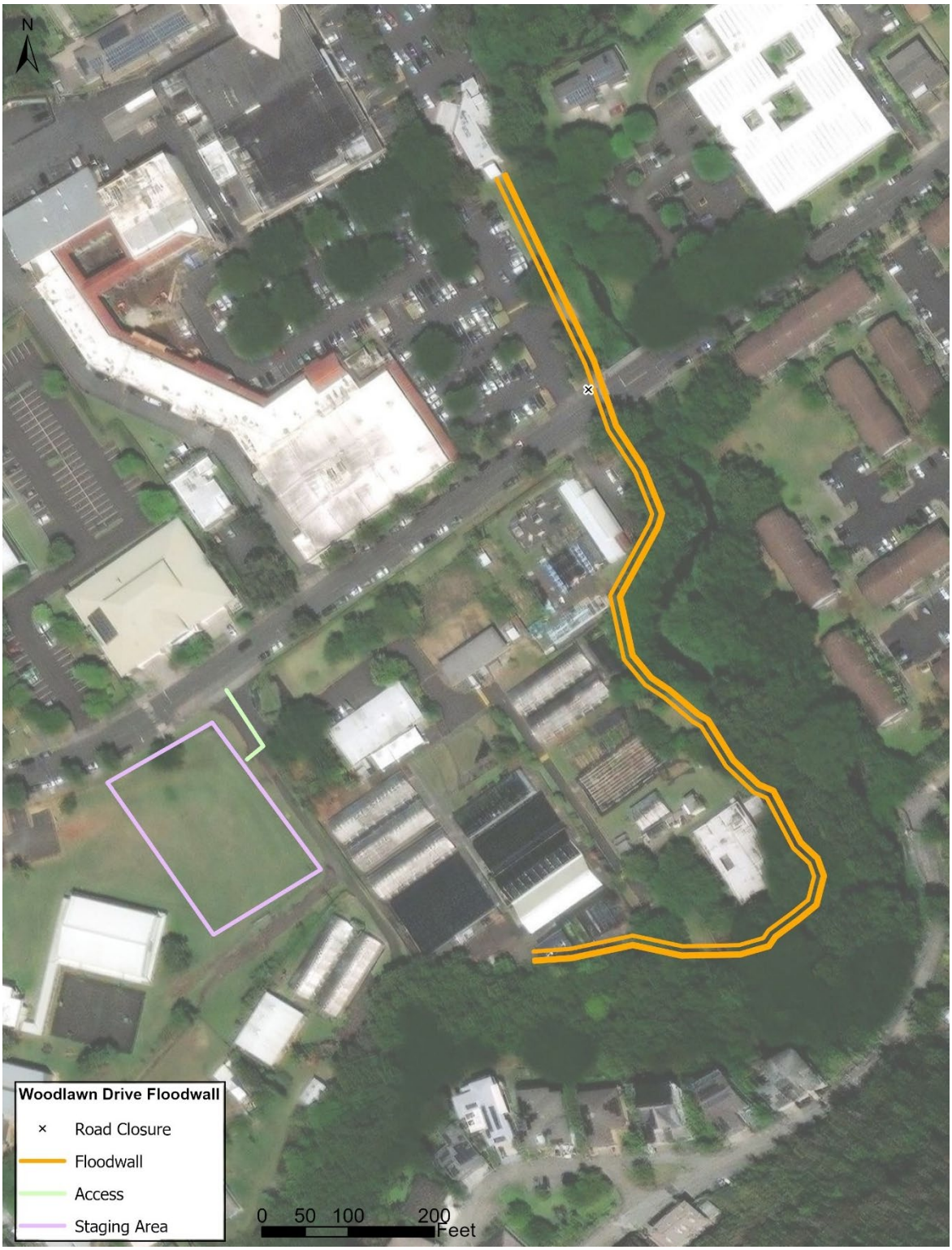

Figure 2: Woodlawn Drive Floodwall Proposed Project Footprint.

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Figure 3: Koali Road Floodwall Proposed Project Footprint.

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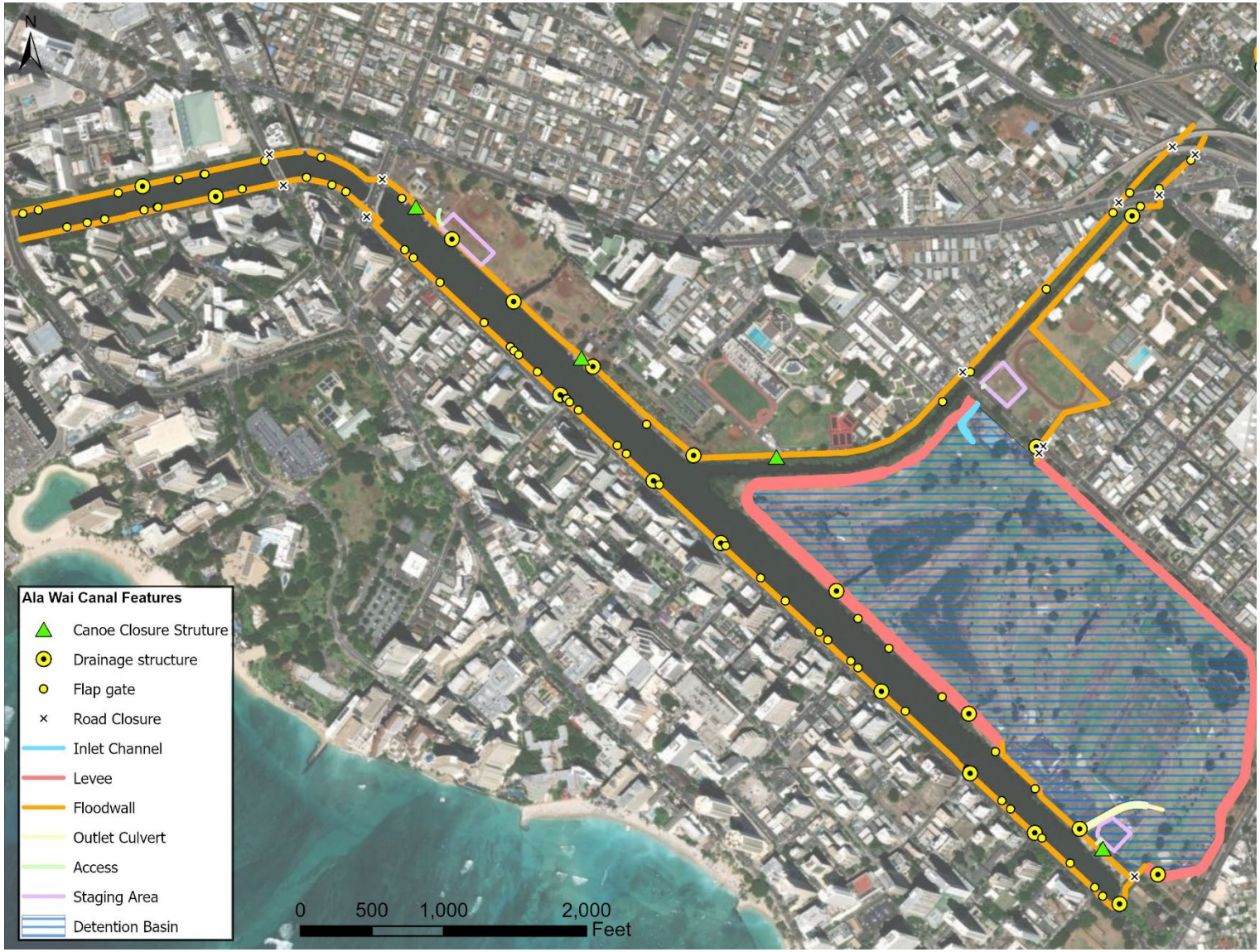

Figure 4: Ala Wai Canal Floodwall and Ala Wai Golf Course Detention Basin Proposed Project Footprint.

2. Recreational Resources

Hawaii CZM Program
Coastal Zone Management

RECREATIONAL RESOURCES (continued)

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. Will the proposed action occur in or adjacent to a dedicated public right-of-way? E.g., public beach access, inland or coastal hiking trail, shared-use path	☐	☑
2. Will the proposed action affect public access to or along the shoreline?	☐	☑
3. Is the project parcel adjacent to the shoreline?	☐	☑
4. Is the project site on or adjacent to a sandy beach?	☐	☑
5. Is the project site in or adjacent to a state or county park?	☑	☐
6. Is the project site in or adjacent to a water body such as a stream, river, pond, lake, or ocean?	☑	☐
7. Will the proposed action occur in or affect an ocean or coastal recreation area, swimming area, surf site, fishing or gathering area, or boating area?	☑	☐

Discussion: Explain "Yes" responses to the questions above. If more space is needed, attach a separate sheet, or append additional information.

See next page.

2.1 Recreational Resources Discussion

Given the project objective of reducing the risk of riverine flooding in the Ala Wai Watershed, the flood risk management features would generally be located within or adjacent to a stream (or the Ala Wai Canal). Several of the features would also be located within or near areas used for recreational purposes. Recreational areas that could be affected (at least in part) include Kanewai Community Park, Ala Wai Community Park, Ala Wai Golf Course, and Ala Wai Promenade. Kanewai Community Park would be used for staging and access for construction of the proposed Koali Road floodwall. Similarly, the Ala Wai Community Park would be used for staging and access for construction of the proposed Ala Wai Canal floodwall. During construction, recreational activities would be restricted within the construction limits of each feature, thus limiting the range and/or accessibility of recreational opportunities temporarily. Construction of the floodwalls would not preclude recreational use of the Manoa Stream, the Manoa-Palolo Canal, or the Ala Wai Canal, but certain access points may be temporarily unavailable during the construction phase. Similarly, the proposed project potentially includes mitigation measures for induced flooding. Proposed nonstructural measures such as wet/dry floodproofing, elevation, and acquisition would not have any impacts on recreational resources as these measures would occur on existing structures and would be staged on site of the structure. The only structural mitigation measure under consideration is a pump station along Makiki Stream between Fern Street and the confluence of Makiki Stream with the Ala Wai Canal. The location of the potential pump station is unknown currently; however, there are no recreational resources along Makiki Stream in this area that would be impacted if construction of a pump station were to occur.

Over the long-term, an earthen berm would occupy a portion of the Ala Wai Golf Course. To the extent practicable, the flood risk management feature design has the smallest footprint possible and minimizes impacts to recreational activities during non-flood conditions. For example, the berm for the Ala Wai Golf Course detention basin design would accommodate the existing golf cart path, such that the layout and use of the golf course would not be significantly affected over the long-term. The floodwall around occupying a portion of the Ala Wai Community Park would be located around the outer perimeter of the park. The floodwall is not expected to impact recreation long term, although access to recreational fishing from the bank of the Ala Wai Community Park would be somewhat impeded because of the presence of the floodwall. However, the floodwall would have an elevated walking path that would still provide access to fishing over the floodwall.

In the event of a flood, when the Ala Wai Golf Course detention basin would detain floodwaters, the area would be temporarily unavailable for recreation. In the case of a 1% AEP flood event, the projected inundation period is approximately two days. Following the flood event, post-flood maintenance would remove accumulated debris/sediment; this could require several days. Potential recreational impacts associated with post-flood maintenance could occur at those sites with detention basins where established recreational activities regularly occur. However, project analyses indicate that the golf course already floods (thereby impacting recreational uses) under without-project conditions. Furthermore, project operation and maintenance (O&M) activities would be programmed as part of the standard flood response activities to minimize post-flood maintenance response time.

In addition to the above, the Ala Wai Canal floodwall and the Manoa-Palolo Canal floodwall would potentially limit access to outrigger canoes. There are four canoe launches along Ala Wai Canal that would require closure structures. These canoe launch closure structures would primarily be open and would only be closed for a period prior to a storm event, during a storm

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event, and for a period after the storm event until they can be reopened. Closing the canoe launch closure structures prior to a storm event and the opening of the closed structures post storm event would likely have the greatest impact by limiting access to these canoe launches when they would normally be open under the existing condition. However, closure of the canoe launch structures would likely occur within one or two days of a predicted storm event occurring and would likely open within one or two days after a storm event has passed. Therefore, this is a temporary long-term impact to recreation. During a storm event it is unlikely that the canoe launch closure structures would have an impact on recreation because a storm event would typically cause boats to refrain from being launched into the water due to human safety concerns.

Overall, these impacts are not expected to significantly decrease the long-term availability and accessibility to recreational opportunities in the coastal zone management area. Although some limited areas would be affected, the project would also provide flood risk management benefits throughout much of the watershed. Additional detail is provided in Section 3.5.1 and 3.5.4 of the Draft GRR/SEIS.

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3. Historic Resources

Hawaii CZM Program
Coastal Zone Management

HISTORIC RESOURCES

Objective: Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

1) Identify and analyze significant archaeological resources.
2) Maximize information retention through preservation of remains and artifacts or salvage operations.
3) Support state goals for protection, restoration, interpretation, and display of historic resources.

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. Is the project site within a designated historic or cultural district?	☐	☑
2. Is the project site listed on or nominated to the Hawaii or National Register of Historic Places?	☑	☐
3. Has the project site been surveyed for historic or archaeological resources?	☐	☑
4. Has the State Historic Preservation Division been consulted?	☑	☐
5. Does the project parcel include undeveloped land which has not been surveyed by an archaeologist?	☑	☐
6. Is the project site within or adjacent to a Hawaiian fishpond or historic settlement area?	☑	☐

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3.1 Historic Resources Discussion

As detailed in the Draft IFR/SEIS, the project development effort in 2016 included an assessment of archaeological resources and a historic structure inventory for portions of the project action area. The results of these studies indicated that multiple historic properties were located within the project action area and could be affected by the project, including the Ala Wai Canal which is listed on the Hawaii Register of Historic Places; a detailed listing of historic properties is provided in Section 3.5.1 of the Draft GRR/SEIS.

Potential impacts to historic properties include modifications that may affect the integrity and/or characteristics of historic properties because of construction and operation of the project. As detailed in Section 3.5.1 of the Draft IFR/SEIS, treatment recommendations have been identified for properties that are expected to be adversely affected, with the intention of identifying conditions that can be placed on the design and construction to mitigate impacts to the resource. Historic buildings, bridges, and walls affected by construction would undergo appropriate historic documentation, and design input will be solicited from the State Historic Preservation Officer (SHPO); input would be incorporated into the final design where feasible. Where possible, impacts to archaeological resources would be avoided. Where avoidance is not possible, data recovery would be performed. Where practicable, community assistance would be solicited for re-use of materials, and possible reconstruction of features of Native Hawaiian cultural significance that would be disturbed by project actions. For the current effort, several variables remain unknown that may result in adverse effects through the future planning, design, and construction phases. A Programmatic Agreement was executed November 16, 2016, and is in effect until November 16, 2023. Updating and renewal of the Programmatic Agreement is currently in progress with the Advisory Council on Historic Preservation (ACHP), SHPO, and others as appropriate.

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4. Scenic and Open Space Resources

Hawaii CZM Program
Coastal Zone Management

SCENIC AND OPEN SPACE RESOURCES

Objective: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

1) Identify valued scenic resources in the coastal zone management area.
2) Ensure that new developments are compatible with their visual environment by designing and locating those developments to minimize the alteration of natural landforms and existing public views to and along the shoreline.
3) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources.
4) Encourage those developments that are not coastal dependent to locate in inland areas.

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. Will the proposed action alter any natural landforms or existing public views to and along the shoreline?	✓	
2. Does the proposed action involve the construction of a multi-story structure?		✓
3. Is the project site located on or adjacent to an undeveloped parcel, including a beach or oceanfront land?	✓	
4. Does the proposed action involve the construction of a structure visible between the nearest coastal roadway and the shoreline?		✓
5. Will the proposed action involve constructing or placing a structure in waters seaward of the shoreline?		✓

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4.1 Scenic and Open Space Resources Discussion

The visual landscape of the proposed project action area is generally comprised of open spaces within the heavily developed middle to lower watershed. The General Plan for the City and County of Honolulu has identified specific views that should be preserved within the watershed, including panoramic views from the Ala Wai Canal promenade and Ala Moana Beach Park toward the Koolau Mountains, as well as mauka-makai view corridors along major roadways. In addition to these viewplanes, other important scenic resources that have been identified include those in the Waikiki District, including the Ala Wai Canal itself, which is listed as a historic property on the Hawaii Register of Historic Places. Two scenic byways have also been established in this area under the Hawaii Scenic Byways Program: the Diamond Head Scenic Byway and the Waikiki-Kauhale O Hookipa Scenic Byway. The Diamond Head Scenic Byway spans from Kapiolani Park to Diamond Head Crater. The Waikiki-Kauhale O Hookipa Scenic Byway includes the major thoroughfares through Waikiki, including Ala Wai Boulevard.

Construction of the detention basins would introduce built elements to the natural environment which could alter the visual landscape to some degree. Recognizing the effect that the measures could have on the visual landscape; project siting and design would be conducted in a manner to best integrate each measure with the natural characteristics of the site and minimize visual impacts to the extent possible. open space park environment: however, these features have been designed to maintain open space characteristics of each site to the extent possible. This effort focused on using the natural topography to minimize the overall size and obtrusiveness of the proposed flood risk management structures.

In the case of the Ala Wai Golf Course detention basin, the implementation of this feature introduces a built element to an existing open space area and would be visible from adjacent areas including surrounding residences. However, the detention basin would be comprised primarily of an earthen/grass berm designed to be a multi-purpose feature, which once constructed, is expected to blend and be visually commensurate with the existing golf course facility. The detention basin is not expected to substantially diminish important environmental or landscape views from or toward the open space areas, nor is it expected to affect significant view corridors, including mauka views of the Koolau Mountains.

As planned, the floodwalls along the Ala Wai Canal would be approximately six feet high (on average) extending from King Street to Ala Moana Boulevard on both the left and right descending banks of the channel. It is important to note that the Ala Wai Canal floodwall includes floodwall along Manoa-Palolo Canal and Kaimuki High School. The proposed project also includes a floodwall along Woodlawn Drive and Koali Road. Based on the conceptual designs, the floodwalls along all these areas are currently expected to be approximately six feet high (on average). The above floodwalls would result in permanent landscape features, leading to the following changes in visual/open space resources. The floodwalls would typically dominate the view and would often only be somewhat compatible due to the project action area being a coastal landscape commonly holding panoramic views of water. The floodwalls, being an enclosure by design, often block views and become a dominant feature in a now enclosed landscape. The floodwalls are characterized as only somewhat compatible because in many places they disrupt the current harmony with the coastal landform, causing the broad and open experience currently available to be lost. For example, the floodwalls would partially obstruct views of the streams from the sides of the channels they are located on. Views from within the streams by paddlers would also be obstructed. Although the floodwalls may have a significant adverse effect on open space/views, construction of the floodwalls would provide significant benefits in the form of protecting residential structures and commercial structures from the risk

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of inundation and resulting structural damage. To mitigate for the adverse impacts to aesthetic resources, the proposed floodwalls would have a fascia of lava rack on both sides to blend the walls into the surrounding environment as well as incorporate materials from the island.

In addition to the above, the floodwalls around Ala Wai Canal are expected to partially obstruct views of the canal from cars driving along Ala Wai Boulevard and from pedestrians along both sides of the canal. The Ala Wai Canal floodwall would also partially obstruct views from within the canal (e.g., paddlers and others using the Canal for recreation). In addition to these views being an important resource for the Waikiki District in general, they are also significant in terms of the Ala Wai Canal as a historic property on the Hawaii Register of Historic Places as well as the Kauhale O Hookipa Scenic Byway (which includes Ala Wai Boulevard). However, as stated above, the feasibility analysis determined that the floodwalls would be a necessary feature to provide adequate flood protection for this area. Efforts throughout the planning process would minimize the impacts to the extent possible, particularly as related to the overall structure heights. Further refinements would be made during the design phases and would further evaluate opportunities to reduce the dimensions of the floodwalls, as well as incorporate design details to further minimize potential visual impacts (i.e., lava rock fascia), such as use of construction materials and/or landscaping to blend the structures into the surrounding environment.

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5. Coastal Ecosystems

COASTAL ECOSYSTEMS

Objective: Protect valuable coastal ecosystems, including reefs, beaches, and coastal dunes, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

1) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources.
2) Improve the technical basis for natural resource management.
3) Preserve valuable coastal ecosystems of significant biological or economic importance, including reefs, beaches, and dunes.
4) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land water uses, recognizing competing water needs.
5) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. Does the proposed action involve dredge or fill activities?	☑	☐
2. Is the project site within the Special Management Area (SMA) or the Shoreline Setback Area?	☐	☑
3. Is the project site within the State Conservation District?	☐	☑
4. Will the proposed action involve some form of discharge or placement of material into a body of water or wetland?	☑	☐
5. Will the proposed action require earthwork, grading, clearing, grubbing, or stockpiling?	☑	☐
6. Will the proposed action include the construction of waste treatment facilities, such as injection wells, discharge pipes, or septic systems?	☐	☑
7. Will the proposed action involve the construction or installation of a stormwater discharge or conveyance system?	☑	☐
8. Is an intermittent or perennial stream located on or adjacent to the project parcel?	☑	☐

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Hawaii CZM Program
Coastal Zone Management

COASTAL ECOSYSTEMS (continued)

	Yes	No
9. Does the project site provide habitat for endangered species of plants, birds, or mammals?	✓	
10. Is any such habitat located near the project site?	✓	
11. Is a wetland located on the project site or parcel?	✓	
12. Is the project site situated in or abutting a Natural Area Reserve, Marine Life Conservation District, Marine Fisheries Management Area, or an estuary?	✓	
13. Will the proposed action occur on or near a coral reef or coral colonies?		✓

Discussion: Explain "Yes" responses to the questions above. If more space is needed, attach a separate sheet, or append additional information.

See next page.

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5.1 Coastal Ecosystems

Given the project objective to reduce riverine flooding, all the proposed flood risk management features would involve work adjacent to a stream or the Ala Wai Canal. However, the majority of the proposed features (i.e., Koali Road floodwall, Woodlawn Drive floodwall, Ala Wai Canal floodwall with Kaimuki High School extension, and the Ala Wai Golf Course detention basin) do not involve work directly within a waterway. Floodwall features would be set back from the existing edges of the relevant waterways where they are proposed to be constructed and the detention basin would be constructed upland within the Ala Wai Golf Course. A portion of the Ala Wai Canal, along the right descending bank of the Manoa-Palolo Canal, would require the placement of a temporary rock bench within waters of the U.S. for construction of the floodwall. The rock bench is necessary due to the limited space on the right-descending bank of the Manoa-Palolo Canal and residences for construction of the floodwall in this area. The rock bench would be comprised of clean inert material from a commercial supplier. This fill would be temporary and would be removed once construction of this portion of floodwall is complete.

It is important to note that the Ala Wai Golf Course detention basin would require an inlet structure and four outlet structures. In addition, the floodwall features would require inland drainage outlet structures. The inlet and outlet drainage structures would need to abut the waterways they are associated with, in order to allow floodwaters to either enter a detention basin or a waterway. Construction of the inlet and outlet features for the Ala Wai Golf Course detention basin would require placement of materials including compacted fill, concrete, and grouted riprap. These features would also require periodic removal of sediment/debris. There are small pockets of wetland habitat within the Ala Wai Golf Course that would experience fill from the construction of the drainage structures. Other areas of wetlands within the project action area would not be impacted by the discharge of fill material. Similarly, the golf course is adjacent to waters of the U.S., some of which would require the discharge of fill material to construct drainage structures for the detention basin. Drainage structures for the Ala Wai Canal and Koali Road would not include the construction of new drainage structures, but instead would include the modification of existing drainage structures with flap gates. This would be a modification to an existing structure and would not constitute fill being placed into other waters of the U.S. or wetlands. Where fill is required as discussed above, fill material would be imported materials from approved sources and would be clean and free of contaminants. The proposed action also includes mitigation measures for induced flooding. Potential nonstructural mitigation measures under consideration include wet/dry floodproofing, elevation, and acquisition. While these activities could occur adjacent to a stream, they would not involve the placement of fill within a wetland or within other waters of the U.S. Overall, the placement of fill material within wetlands and other waters of the U.S. would be minimal. While the project is located adjacent to streams, most work would occur upland with only minor work occurring near streams related to discharge inlets/outlets. BMPs listed in Section 3.3.7 of the Draft GRR/SEIS would be implemented to minimize potential impacts to coastal ecosystems.

During construction of the floodwalls and the Ala Wai Golf Course detention basin, clearing and grubbing would be required to prepare the area for construction. Clearing and grubbing would not occur within waters but would be adjacent to waters and/or wetlands (i.e., Ala Wai Golf Course detention basin). Since construction would disturb more than one acre of land, the project would be regulated under the State's National Pollution Discharge Elimination System (NPDES) stormwater program, which requires the preparation of a Stormwater Pollution Prevention Plan (SWPPP) to obtain permit coverage. The objective of a SWPP is to describe the measures that would be implemented to prevent sedimentation, erosion, and stormwater contamination, in compliance with requirements of the NPDES program. Best management practices (BMPs) would

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be implemented to minimize impacts associated with potential pollutants and are listed in the Draft IFR/SEIS in Section 3.3.7 of the Draft GRR/SEIS. In addition, during construction, storage and use of some hazardous materials would occur. If handled inappropriately, these materials could accidentally spill or inadvertently discharge to adjacent waterways or groundwater. Construction activities would involve the use of heavy equipment, cranes, compactors, and other construction equipment that use petroleum products such as fuels, lubricants, hydraulic fluids, and coolants all of which are detrimental to water quality. BMPs listed in Section 3.3.7 of the Draft GRR/SEIS would be implemented to minimize the risk of inadvertent spills.

Impacts to aquatic habitat would primarily be expected to occur because of placing the inlet and outlet structures, but these would involve minimal in-stream work (i.e., primarily along the banks of the waterways. The design process incorporated efforts to avoid and minimize potential impacts to the extent practicable. Project designs reduce the footprint of these structures to the extent practicable and include design features to minimize impacts to waterway banks. The avoidance and minimization measures should reduce any potential impacts to aquatic habitat. Overall, associated earthwork and grubbing would occur upland and not within the coastal ecosystem. With the implementation of BMPS, potential impacts to coastal ecosystems due to earthwork, clearing, and grubbing would be minimized.

It is important to note that the Ala Wai Canal is considered an estuary, therefore, construction of the Ala Wai Canal would be abutting an estuary. Construction of the floodwall along the canal would be upland with BMPs implemented to minimize potential impacts to nearby estuary waters. Construction of the floodwall also includes modification of existing drainage structures within the Ala Wai Canal. Where these structures are located above the surface water within the canal, modification of these structures is expected to occur from upland. Where these existing drainage structures are located below the water's surface, temporary cofferdams would be used to block off the area so that construction work could occur while minimizing potential impacts to estuary resources. Once modification of the drainage structures is complete, any temporary fill placed for a cofferdam would be completely removed from the area. Material used for cofferdams would be clean inert material from a commercial supplier. Overall, with the implementation of BMPs listed in Section 3.3.7 of the Draft GRR/SEIS the risk of an adverse impact to estuary habitat would be minimized.

In general, the terrestrial habitat within the project action area is comprised of non-native species, many of which are considered invasive. Federally listed threatened or endangered species that have the potential to occur within the measure locations are Hawaiian hoary bat, seabirds (i.e., band-rumped storm-petrel and Newell's Townsend's shearwater), Hawaiian waterbirds (i.e., Hawaiian duck, Hawaiian gallinule, Hawaiian coot, Hawaiian petrel, and Hawaiian stilt), Hawaiian monk seal, green sea turtle, and hawksbill sea turtle. The project action area does include critical habitat for the Hawaiian monk seal and proposed critical habitat for the green sea turtle where the mouth of the Ala Wai canal is located. Pursuant to Section 7 of the Endangered Species Act, the USACE has been informally consulting with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service regarding potential impacts to threatened and endangered species. Based on this ongoing consultation, the USACE evaluated the potential impacts of the proposed project and has determined that the project may affect but is not likely to adversely affect the Hawaiian hoary bat, seabirds (i.e., band-rumped storm-petrel and Newell's Townsend's shearwater), Hawaiian waterbirds (i.e., Hawaiian duck, Hawaiian common gallinule, Hawaiian coot, and Hawaiian stilt), Hawaiian monk seal, green sea turtle, and hawksbill sea turtle. In addition, the USACE has determined that the project may affect but is not likely to destroy or degrade designated critical habitat for the Hawaiian monk seal or proposed critical habitat for the

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green sea turtle. Additional detail regarding potential impacts to these resources is provided in Section 3.4.4 of the Draft GRR/SEIS.

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6. Economic Uses

Hawaii CZM Program
Coastal Zone Management

ECONOMIC USES

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

1) Concentrate coastal development in appropriate areas.
2) Ensure that coastal dependent development and coastal related development are located, designed, and constructed to minimize exposure to coastal hazards and adverse social, visual, and environmental impacts in the coastal zone management area.
3) Direct the location and expansion of coastal development to areas designated and used for that development and permit reasonable long-term growth at those areas, and permit coastal development outside of designated areas when:
   a) Use of designated locations is not feasible;
   b) Adverse environmental effects and risks from coastal hazards are minimized; and
   c) The development is important to the State's economy.

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. Does the proposed action involve a harbor or port?	☐	☑
2. Is the proposed action a visitor industry facility or a visitor industry related activity?	☑	☐
3. Does the project site include agricultural lands or lands designated for such use?	☐	☑
4. Does the proposed action relate to commercial fishing or seafood production?	☐	☑
5. Is the proposed action related to energy production or transmission?	☐	☑

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6.1 Economic Uses

Several of the flood risk management features would be located within the vicinity of the Waikiki District, a prime tourist destination that attracts more than 79,000 visitors per day. In combination with the other flood risk management features included in the proposed project, these would function to reduce flood risk within the watershed (including the Waikiki District), thus providing significant economic benefits. A detailed discussion of the economic benefits is provided in Section 4.1 of the Draft GRR/SEIS.

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7. Managing Development

Hawaii CZM Program
Coastal Zone Management

MANAGING DEVELOPMENT

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

1) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development.
2) Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements.
3) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. List the permits or approvals required for the proposed action and provide the status of each in the Discussion section below.	☑	☐
2. Does the proposed action conform with state and county land use designations for the site?	☑	☐
3. Has an environmental impact statement or environmental assessment been prepared for the proposed action?	☑	☐
4. Has the public, applicable neighborhood board, or community groups been notified of the proposed action?	☑	☐

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7.1 Managing Development

Potential permits that may need to be obtained for the project include Community Noise Permit from the City of Honolulu, General Construction Permit, NPDES Permit, Water Quality Certification, and a Special Management Area Permit. Other permits not listed may also need to be obtained to implement the proposed project.

Proposed project features conform with the state and county land use designations for the site. Project footprints are designated as urban state land use. None of the project footprints appear to be located in a Special Management Area (Figure 5); however, the Ala Wai Canal floodwall footprint near the Ala Moana Boulevard Bridge could either be located within a Special Management Area or directly adjacent to a Special Management Area. In addition, the Ala Wai Canal floodwalls are in the Waikiki Special District. Proposed project features would not conflict with the above state and county land use designations and a permit would be obtained for any work within a Special Management Area. Refer to Section 3.5.2 for additional details on state and county land use designations.

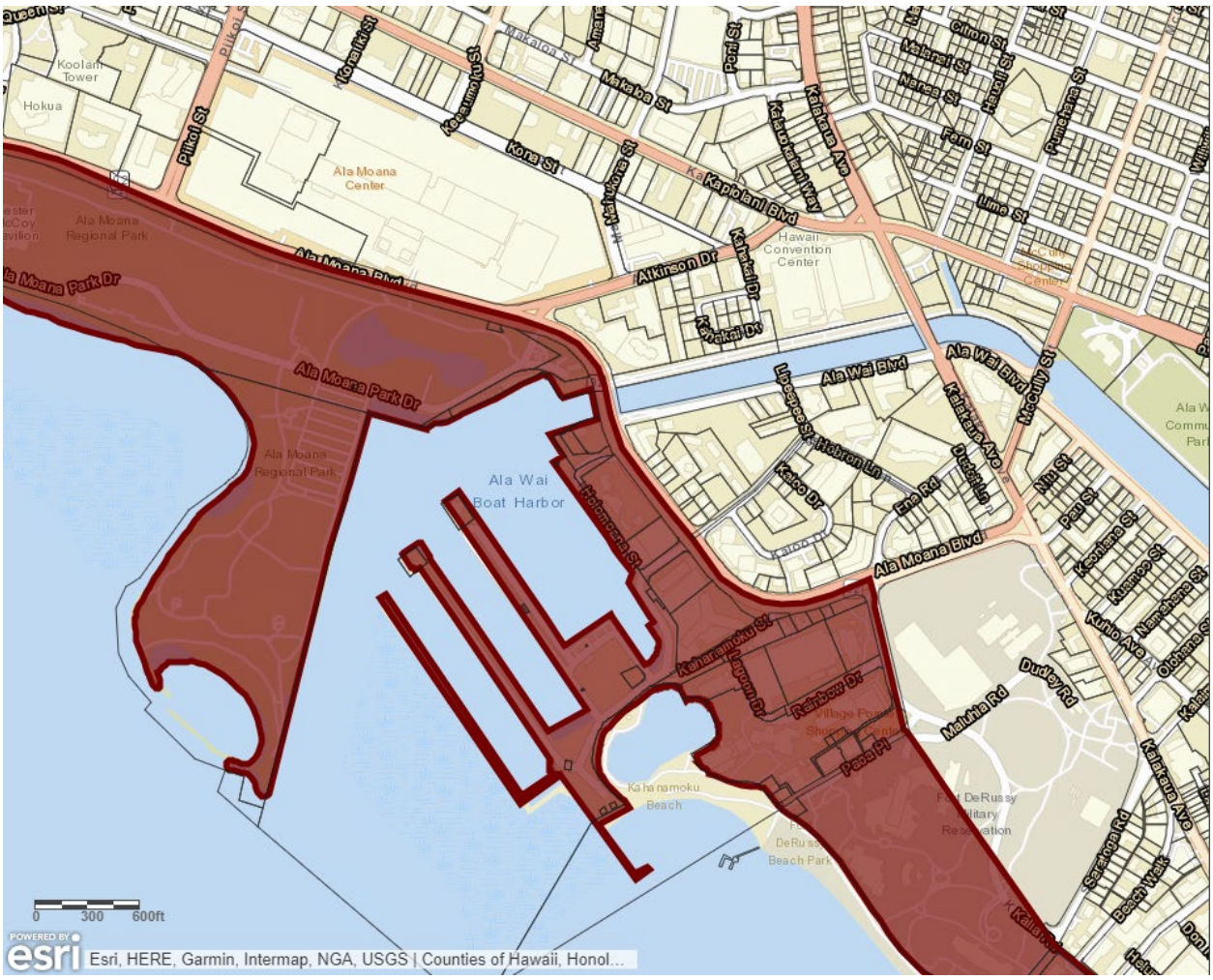

Figure 5: Results of Hawaii Special Management Area Locator Within the Vicinity of the Ala Wai Canal Project Action Area.

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A scoping letter dated August 9, 2021, was sent to various federal, state, and local agencies, other governmental organizations, and interested stakeholders. The scoping letter provided a 30-day public comment period. In addition to the scoping letter, initial public scoping meetings were held on November 10 and November 13, 2021. Additional scoping opportunities were also afforded through other stakeholder outreach events, including focus group meeting. Once it was determined that the environmental document would be a SEIS as well as pursuant to the two-year completion requirement for an EIS as required in the NEPA, a Notice of Intent (NOI) was published on February 22, 2023 (889 FR 10880). Similarly, as required by HRS Chapter 343, an Environmental Impact Statement Public Notice (EISPN) was published in the Office of Environmental Quality Control's (OEQC) *The Environmental Notice* on April 8, 2023. Publication of the NOI and EISPN included an additional 30-day public comment period. Initial public scoping meetings were held November 10 and November 13, 2021. Additional scoping opportunities were also afforded through other stakeholder outreach events, including focus group meetings. Refer to Section 7 in the Draft IFR/SEIS for additional details on public coordination.

The potential impacts of the proposed project are detailed in the Draft GRR/SEIS (Section 3), which is being published for public review. A 45-day public review will occur once the Draft GRR/SEIS is published.

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8. Public Participation

Hawaii CZM Program
Coastal Zone Management

PUBLIC PARTICIPATION

Objective: Stimulate public awareness, education, and participation in coastal management.

Policies:

1) Promote public involvement in coastal zone management processes.
2) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities.
3) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. Has information about the proposed action been disseminated to the public, applicable neighborhood board, or community groups?	☑	☐
2. Has the public been provided an opportunity to comment on the proposed action?	☑	☐
3. Has or will a public hearing or public informational meeting be held?	☑	☐

Discussion: Explain "Yes" responses to the questions above. If more space is needed, attach a separate sheet, or append additional information.

See discussion below.

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8.1 Public Participation

A scoping letter dated August 9, 2021, was sent to various federal, state, and local agencies, other governmental organizations, and interested stakeholders. The scoping letter provided a 30-day public comment period. In addition to the scoping letter, initial public scoping meetings were held on November 10 and November 13, 2021. Additional scoping opportunities were also afforded through other stakeholder outreach events, including focus group meeting. Once it was determined that the environmental document would be a SEIS as well as pursuant to the two-year completion requirement for an EIS as required under NEPA, a NOI was published on February 22, 2023 (889 FR 10880). Similarly, as required by Hawaii Revised Statute (HRS) Chapter 343, an EISPN was published in OEQC's *The Environmental Notice* on April 8, 2023. Publication of the NOI and EISPN included an additional 30-day public comment period. Initial public scoping meetings were held November 10 and November 13, 2021. Additional scoping opportunities were also afforded through other stakeholder outreach events, including focus group meetings. Refer to Section 7 in the Draft GRR/SEIS for additional details on public coordination.

The potential impacts of the proposed project are detailed in the Draft GRR/SEIS (Section 3), which is being published for public review. A 45-day public review will occur once the Draft GRR/SEIS is published.

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9. Beach and Coastal Dune Protection

Hawaii CZM Program
Coastal Zone Management

BEACH AND COASTAL DUNE PROTECTION

Objective:

(A) Protect beaches and coastal dunes for:
  (i) Public use and recreation;
  (ii) The benefit of coastal ecosystems; and
  (iii) Use as natural buffers against coastal hazards; and

(B) Coordinate and fund beach management and protection.

Policies:

1) Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion.

2) Prohibit construction of private shoreline hardening structures, including seawalls and revetments, at sites having sand beaches and at sites where shoreline hardening structures interfere with existing recreational and waterline activities.

3) Minimize the construction of public shoreline hardening structures, including seawalls and revetments, at sites having sand beaches and at sites where shoreline hardening structures interfere with existing recreational and waterline activities.

4) Minimize grading of and damage to coastal dunes.

5) Prohibit private property owners from creating a public nuisance by inducing or cultivating the private property owner's vegetation in a beach transit corridor.

6) Prohibit private property owners from creating a public nuisance by allowing the private property owner's unmaintained vegetation to interfere or encroach upon a beach transit corridor.

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. Will the proposed action occur on a shoreline parcel?	☐	☑
2. Will the proposed action occur in an area or parcel that is adjacent to a shoreline parcel?	☑	☐
3. Is the proposed action located within the shoreline setback area?	☐	☑
4. Will the proposed action affect natural shoreline processes?	☐	☑
5. Will the proposed action affect recreational activities?	☐	☑
6. Will the proposed action affect public access to or along the shoreline?	☐	☑

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9.1 Beach and Coastal Dune Protection

The proposed project does not occur on a shoreline parcel nor is it located within the shoreline setback area. The proposed project will not affect natural shoreline processes, recreational activities associated with the beach and coast, or public access to or along the shoreline.

The proposed project includes the Ala Wai Canal floodwall which extends around the Ala Wai Canal up to Ala Moana Boulevard. Although not a direct shoreline parcel, the Ala Wai Canal floodwall in this location is relatively near Ala Moana Regional Park and the Ala Wai Small Boat Harbor. Although the Ala Wai Canal floodwall is near these locations it does not extend into the locations and would not have an effect on recreational activities located on these parcels.

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10. Beach and Coastal Dune Protection

Hawaii CZM Program
Coastal Zone Management

MARINE AND COASTAL RESOURCES

Objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

1) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial.
2) Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency.
3) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone.
4) Promote research, study, and understanding of ocean and coastal processes, impacts of climate change and sea level rise, marine life, and other ocean resources to acquire and inventory information necessary to understand how coastal development activities relate to and impact ocean and coastal resources.
5) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Check either Yes or No for each of the following questions, and provide an explanation or information for Yes responses in the Discussion section that follows:

	Yes	No
1. Will the proposed action involve the use or development of marine or coastal resources?	☐	☑
2. Will the proposed action affect the use or development of marine or coastal resources?	☐	☑
3. Does the proposed action involve research of ocean processes or resources?	☐	☑
4. Will the proposed action occur in or abutting a Natural Area Reserve, Marine Life Conservation District, Marine Fisheries Management Area, or an estuary?	☑	☐

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10.1 Marine and Coastal Resources

The proposed project would not directly affect any marine resources.

It is important to note that the Ala Wai Canal is considered an estuary, therefore, construction of the Ala Wai Canal would be abutting an estuary. Construction of the floodwall along the canal would be upland with BMPs implemented to minimize potential impacts to nearby estuary waters. Construction of the floodwall also includes modification of existing drainage structures within the Ala Wai Canal. Where these structures are located above the surface water within the canal, modification of these structures is expected to occur from upland. Where these existing drainage structures are located below the water's surface, temporary cofferdams would be used to block off the area so that construction work could occur while minimizing potential impacts to estuary resources. Once modification of the drainage structures is complete, any temporary fill placed for a cofferdam would be completely removed from the area. Material used for cofferdams would be clean inert material from a commercial supplier. Overall, with the implementation of BMPs listed in Section 3.3.7 of the Draft GRR/SEIS the risk of an adverse impact to estuary habitat would be minimized.

The operation of the proposed project could potentially have an indirect adverse effect to marine resources. Informal coordination with the National Marine Fisheries Service (NMFS) has been occurring and an Essential Fish Habitat Assessment will be provided to NMFS when the Draft GRR/SEIS is released for public review.

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8. Draft 404(b)(1) Analysis

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Draft
General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii

Clean Water Act, Section 404(b)(1) Draft Analysis
Under Clean Water Act of 1972, as amended

Prepared for:
State of Hawaii
Department of Health, Clean Water Branch
Honolulu, Hawaii

Prepared by:
U.S. Army Corps of Engineers, Pittsburgh District

November 2023

(Revised: MONTH YEAR)

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SECTION 1 – PROJECT DESCRIPTION

At the request of the City and County of Honolulu, the Pittsburgh District, U.S. Army Corps of Engineers (USACE) is conducting a general reevalution report (GRR) for the Ala Wai Canal Project (hereafter referred to as “the project”).

a. Location

The Ala Wai watershed is located on the southeastern side of the island of Oahu, Hawaii. The watershed encompasses 19 square miles (12,064 acres) and extends from the ridge of the Koolau Mountains to the nearshore waters of Mamala Bay (Figure 1). It includes the Makiki, Manoa, and Palolo streams, which flow to the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands. The construction and subsequent draining allowed the development of the Wakiki District.

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Figure 1: Regional Location of the Project Action Area.

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b. Background and History

The U.S. Army Corps of Engineers (USACE), Honolulu District, received the authority to conduct the Ala Wai Canal Flood Risk Management Study under Section 209 of the Flood Control Act of 1962 (Public Law 84-874). The feasibility study's recommended plan consisted of six in-stream debris and detention basins of varying height in the upper reaches of the watershed, one standalone debris catchment structure, three multiple-purpose detention basins, floodwalls along the Ala Wai Canal averaging four feet in height, and an earthen levee at the perimeter of an adjacent golf course averaging seven feet in height, two pump stations to reduce the threat of interior flooding, and a flood warning system. The feasibility study determined the technical, economic, environmental, and social feasibility of the recommended plan to reduce the flood risk within the Ala Wai Canal watershed of Honolulu, Hawaii.

Section 1401 of the Water Resources Development Act of 2018 (Public Law 115-270) authorized construction of the Ala Wai Canal Flood Risk Management Project, as described in the Chief's Report, (*https://www.poh.usace.army.mil/Portals/10/docs/Civil%20Works%20Sponsor%20Letters/Tab%201%20Chiefs%20Report%20Ala%20Wai%20Chiefs%20Report%20SIGNED%20(003).pdf?ver=2018-09-14-171850-833*), dated December 21, 2017, and the *Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii, Feasibility Study with Integrated Environmental Impact Statement*, dated May 2017. The record of decision (ROD) was signed on September 18, 2018, initiating the next phase of the study, Preconstruction Engineering and Design (PED). In 2020, an Engineering Documentation Report (EDR) provided the technical basis for modifications necessary to the Authorized Project. Subsequent analysis found that the modifications in the 2020 EDR were not cost effective and lacked the economic justification necessary for continued federal involvement. Acknowledging the need to reduce the risk to life, safety, and economic damages from flooding throughout the Ala Wai watershed, USACE, Pittsburgh District, is currently reevaluating the previously completed Ala Wai Canal Flood Risk Management Study in a GRR, using current planning criteria and policies.

c. General Description

The proposed project is Alternative 5.3 which focuses on increasing storage and conveyance of stormwater throughout the Ala Wai watershed to reduce flood risk. The proposed project includes the following measures:

Woodlawn Drive Floodwall and Koali Road Floodwall - Within Manoa Valley, a floodwall extending six feet above ground level (i.e., Woodlawn Drive Floodwall) would be constructed along the right descending bank of Manoa Stream. The floodwall would be approximately 1,270 feet in length. A single road closure structure at Woodlawn Drive would be constructed. The Woodlawn Drive Floodwall would reduce the risk of flooding to the University of Hawaii and downstream residential structures due to overtopping at Woodlawn Drive Bridge. At Koali Road, near the convergence of Manoa and Palolo streams, a floodwall extending 6 ft above ground (i.e., Koali Road floodwall) would be constructed along the left descending bank of Manoa Stream and the right descending bank of Palolo Stream. The floodwall would be approximately 2,510 feet in length. Two concrete drainage structures would be constructed to provide interior drainage of stormwater flows from the residential neighborhood behind the Koali Road floodwall. Two flap gates would be retrofitted on smaller stormwater culverts along this feature. Two road closure structures would be constructed — one at Koali Road and one at the pedestrian bridge crossing Palolo upstream (approximately 690 ft upstream of Koali Road Bridge) — to bridge the gap between the floodwall as it crosses these two throughways. The purpose of the Koali Road Floodwall is to reduce risk to adjacent residential structures, including induced damages caused by the Woodlawn Drive Floodwall. Thus, the Woodlawn Drive Floodwall and Koali Road

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Floodwall function as a system.

Kaimuki High School Floodwall - At the Kaimuki High School, adjacent to the Manoa-Palolo Canal, a floodwall extending six feet above ground (i.e., Kaimuki High School Floodwall [extension of Ala Wai Canal Floodwall]) would be constructed along the Kaimuki High School's track field and extending down to the vicinity of the Kaimuki High School's discus and shot put throwing area. The floodwall would be approximately 3,260 feet long and would be constructed of a combination of steel sheetpile (1,460 feet) and macropiles (1,800 feet) with a concrete fascia. The Alternative 5.3 Kaimuki High School Floodwall would be shorter in length than the Kaimuki High School Floodwall described under Alternative 1 and Alternative 2B. Like Alternative 2B, though, the Kaimuki High School Floodwall would join up with the Ala Wai Canal Floodwall discussed below. The purpose of the floodwall would be to reduce the risk of flooding to residential structures east/southeast of Kaimuki High School.

Ala Wai Golf Course Detention Basin – At Ala Wai Golf Course, adjacent to the Manoa-Palolo Canal and the Ala Wai Canal, an earthen levee approximately six to nine feet in height would be constructed around the perimeter of Ala Wai Golf Course to create a detention basin (i.e., Ala Wai Golf Course Detention Basin). The total length of the earthen levee would be approximately 8,315 feet in length and would extend along the perimeter of the Ala Wai Golf Course along the Manoa-Palolo and Ala Wai canals. On the left descending bank of the Manoa-Palolo Canal, there is an overtopping spillway section, approximately 100 feet in length, that is reinforced with erosion protection. The levee along the Manoa-Palolo Canal is also lined with erosion protection on the canal-side. A portion of the existing drainage ditch that runs along the north side of the golf course (parallel to Date Street) would be riprapped and used as an inlet location for overflow into the Ala Wai Golf Course Detention Basin. A small inlet channel would be excavated and lined with erosion control material to improve the flow onto the golf course. Three concrete drainage structures and three flap gates would be constructed along the levee alignment of the Ala Wai Golf Course to allow collected stormwater within the basin and from local runoff to slowly drain into Ala Wai Canal. The three drainage structures would be approximately 3 feet (Width) x 3 feet (Height) and would be located at the downstream end of three existing natural drainages along the southwest side of the golf course (west of the Ala Wai Golf Course Clubhouse). The detention basin also includes a floodwall along the golf course parking lot near the Ala Wai Canal, which is nine feet in height. The floodwall has one concrete drainage structure and two flap gates. The drainage structure at this location serves to outlet flow from the Diamond Head neighborhood. The original outlet will be enclosed by concrete (instead of daylighted) and will need reconstruction of the vehicle and pedestrian access at this location. A small section of floodwall near the Kapahulu Avenue and Ala Wai Boulevard intersection at the Diamond Head end of the canal will tie-in to the golf course levee and Ala Wai Canal floodwall system. This section is 6 ft in height and includes one road closure structure and one drainage structure. Finally, there is one canoe access point in this location. One road closure structure would also be constructed at the Ala Wai Golf Course Maintenance Facility driveway. The Ala Wai Golf Course Detention Basin would reduce the risk of flooding within the lower watershed.

Ala Wai Canal Floodwall - At the Manoa-Palolo Canal and Ala Wai Canal, a floodwall extending six feet above ground (i.e., Ala Wai Canal Floodwall) would be constructed. The floodwall would be approximately 22,852 feet long and would be constructed of a combination of J-wall on macropiles (17,125 feet), L-wall on macropiles (4,069 feet), and tieback I-wall (1,658 feet) with a lava rock fascia. Existing stormwater sewers inletting into the Ala Wai Canal would be modified so that fourteen would be drainage structures and 59 would be retrofitted with flap gates. Eleven road closure structures would be constructed: (1) King Street (Manoa-Palolo Canal right

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descending bank), (2) King Street (Manoa-Palolo Canal left descending bank), (3) Kapiolani Boulevard (Manoa-Palolo Canal right descending bank), (4) Kapiolani Boulevard (Manoa-Palolo Canal left descending bank), (5) Date Street (near the Date Street and Laau Street junction), (6) Date Street (near the vicinity of the Kaimuki High School's discus and shot put throwing area, (7) Ala Wai Golf Course Drive, (8) McCully Street (Ala Wai Canal right descending bank), (9) McCully Street (Ala Wai Canal left descending bank), (10) Kalakaua Avenue (Ala Wai Canal right descending bank), and (11) Kalakaua Avenue (Ala Wai Canal left descending bank). The typical cross section of this feature varies along the alignment, but all are assumed to be 6 ft above ground. The floodwall along the Ala Wai Canal and the lower right descending bank of the Manoa-Palolo Canal will include an elevated walking path. On the left descending bank of the Manoa-Palolo Canal and near Kaimuki High School, there will be a floodwall on macropiles with no walking path. Where space is constricted, along the upper right descending bank of the Manoa-Palolo Canal, tieback I-walls will be constructed, with no walking path. The purpose of the Ala Wai Canal Floodwall system would be to reduce the risk of flooding within the McCully-Moiliili neighborhood, Diamond Head neighborhood, and Waikiki.

Mitigation Measures – Mitigation measures related to induced flooding include potentially adding permanent pump station(s) of moderate to large size, ranging from 500 to 20,000 cubic feet per second (cfs). At the time of compiling this Draft Report, it is unknown as to the number of pumps that may be necessary to minimize induced flooding, the size of the pumps, or the location of pumps within the watershed. If Alternative 5.3 moves forward, additional analysis would be conducted during the PED phase to determine the above as well as if a pump station is even necessary, and appropriate supplemental National Environmental Policy Act (NEPA) analysis and coordination would be conducted as necessary. In addition to considering pumps as potential mitigation for induced flooding within the watershed, nonstructural measures such as dry/wet floodproofing, elevation, and acquisition are also under consideration. Similar to the above, if Alternative 5.3 moves forward, additional analysis would be conducted during PED to determine the precise number and location of structures recommended for dry/wet floodproofing, elevation, or acquisition. Appropriate supplemental NEPA analysis and coordination would be conducted as necessary.

Table 1: Proposed Project Features Summary

Measure	Structure Type[1]	Maximum Wall Height	Total Wall Length	Number of Road Closures	Number of Drainage Structures[1]	Number of Flapgates[2]
Woodlawn Drive Floodwall	L-wall on Macropiles	6 ft	1,270 ft	1	--	--
Koali Road Floodwall	L-wall on Macropiles	6 ft	2,510 ft	2	2	2
Ala Wai Golf Course Detention Basin	Berm (8,315 ft) L-wall on Macropiles[3] (1,861 ft)	6-9 ft	10,176 ft	1	5	5
Ala Wai Canal Floodwall[4]	J-wall on Macropiles[3] (17,125 ft)	6 ft	22,852 ft	11	14	59

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Measure	Structure Type[1]	Maximum Wall Height	Total Wall Length	Number of Road Closures	Number of Drainage Structures[1]	Number of Flapgates[2]
	L-wall on Macropiles[3] (4,069 ft) Tieback I-Wall[3] (1,658 ft)					

[1] Berms assumed to be 6-9 ft tall and have side slopes of 3Horizontal (H):1Vertical (V) with a 12-foot crown.
L-walls along the Ala Wai Canal assumed to be 6 feet tall with a 12-foot-wide X 40-inch-thick base supported on 16-inch diameter X 40 feet long cased macropiles with a 14-inch outer diameter X ½-inch thick full-length permanent casing and a full-length No. 11 all-thread center bar. The macropiles to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 3V:1H.
L-walls at the Golf Course assumed to be 9 feet tall with a 13-foot-wide X 44-inch-thick base supported on 18-inch diameter by 50 feet long cased macropiles with a 18-inch outer diameter X ½-inch thick full length permanent casing and a full-length No. 11 all-thread center bar. The macropiles to be in two rows with 5-foot on-center spacing, with the first row vertical and the second row battered at 6V:1H.
J-wall assumed to be the same design as 6-foot L-walls (i.e., same width, macropiles configuration, etc.), except the wall will include a 3-foot-tall concrete wall on the heel, with the 3-foot-deep area created between the front and rear walls backfilled with soil to create an elevated walkway along the Ala Wai Canal.
Tieback I-wall assumed to be toed into rock or extended 15 feet below the stream level with PZ30 sheet piles and 50-foot-long angled ties at 7 feet on-center with a continuous HP12X53 waler located 6 feet below the streambank crest.
[2] Indicates the number of assumed outlet structures. It is assumed that existing storm drains larger than 36 inches will require a drainage structure (and positive closure). Smaller sizes may require drainage structures during future design phases.
[3] J-wall on macropiles assumed to be used along the Ala Wai Canal only. L-wall on macropiles assumed to be used adjacent to streams where visibility of the canal is not a major consideration and where erosion is more of a concern, while the I-wall assumed to be used in areas away from streams where there is flat ground and erosion is not a concern; however, there are no I-walls in the proposed project. The Tieback I-wall will be used where space limitations and vibrations are major considerations and prevent the use of the other wall types (i.e., specifically planned on the Manoa-Palolo Stream from Date Street to Kapiolani Boulevard).
[4] The floodwall around the canal also accounts for four canoe closure structures.

Future Operation, Maintenance, Repair, Replacement, and Rehabilitation

Maintenance, including routine inspections and minor repairs of the project and its associated features, would be required after construction is completed. The following activities may occur:

- Routine and special inspection with pickup trucks and sport utility vehicles, as needed, and up to daily during flood events.
- Vegetation management where floodwalls and earthen berms are located. Vegetation management in the areas with floodwalls would be in accordance with Corps of Engineers Engineering Pamphlet 1110-2-18; at a minimum 15-feet down slope of the floodwall would need to be a vegetation free zone (VFZ). The VFZ applies to all vegetation except for grasses for the purpose of erosion control.
- Periodic clearing of debris around inlet/outlet structures.
- Periodic clearing of accumulated sediment and debris from detention basin.
- Periodic vegetation management such as weeding, herbicide application, and re-seeding.
- Periodic graffiti removal and vandalization repair.

Rarely, following large and erosive flood flows, larger-scale maintenance and repairs may be required, which could require access and use of heavy equipment within the floodplain adjacent to the project feature. A temporary work area may need to be established around a repair site. The local sponsor would be required to obtain emergency or standard permits from regulatory agencies, including Corps Regulatory, who would coordinate and consult, if needed, with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). These

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permits would likely require active habitat restoration of temporary construction and access roads. It is likely that a storm event large enough to damage the detention basins and/or floodwalls would also have removed vegetation in the immediate area, but specific impacts cannot be evaluated until or unless damage occurs, and repair work is defined.

d. Authority and Purpose

The project is authorized under Section 209 of the Flood Control Act of 1962. Section 209 is a general authority that authorizes surveys in harbors and rivers in Hawaii "with a view to determining the advisability of improvements in the interest of navigation, flood control, hydroelectric power development, water supply, and other beneficial water uses, and related land resources."

The purpose of the project is to analyze a series of alternatives designed to reduce the on-going flood risks throughout the Ala Wai watershed. The project is needed because a high level of flood risk exists within the Ala Wai Watershed. Extensive urban development throughout the watershed, coupled with the basin's unique topography and hydrology (i.e., steep mountainous terrain and propensity for intense rainfall events within the headwaters) and aging and undersized infrastructure result in elevated flood risk for a large proportion of the population both along the Ala Wai Canal and within the Makiki, Manoa, and Palolo valleys. The population density within the Ala Wai watershed, with approximately 200,000 residents. The watershed also contains the University of Hawaii and the Wakiki District—a prime tourist destination that attracts more than 79,000 visitors per day and accounts for approximately 8% of the gross state product and 11% of all civilian jobs in the state.

It is estimated that the Ala Wai Canal has the capacity to contain about a 20% annual exceedance probability (AEP) flood event. Overtopping of the Canal has previously flooded Wakiki multiple times, including November 1965 and December 1967 storms and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by several recent events, including the October 2004 storm that flooded the Manoa Valley and the March 2006 storm that flooded Makiki. The October 2004 event was estimated to have a 4% AEP and caused more than $85 million in damages.

e. General Description of Dredged of Fill Material

(1) General Characteristics of Material

The exact specifications of the materials have not yet been determined. In general, the materials would be obtained from existing sources. Stone for the riprap would be durable material free from cracks, seams and other defects that would tend to increase deterioration from natural causes. Rip-rap stone used for scour protection would have a mean diameter of 2.2 feet. Fill material would consist of soil and stones less than 3-inches in diameter; concrete would be a 4000 pounds per square inch (psi) standard mix. Base course material would consist of clean gravel. Box culverts would be used for inlet and outlets for detention basins; the size of these would vary. Culverts and storm sewers would be either concrete or corrugated steel; the size of these would vary.

(2) Quantity of Material

Table 2, Table 3, Table 4, and Table 5 lists the type and quantities of fill material specific to each measure. These quantities are based on the 35% level of design and will be revisited and modified as needed during the detailed design phase. Specific to operations and maintenance (O&M), no placement of fill material is anticipated. O&M activities would require work within the ordinary high water mark (OHWM); however, these activities would generally

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be limited to trimming/clearing vegetation around the perimeter of the berms, floodwalls, and detention basin. Accumulated sediment and debris would also be removed from the Ala Wai Golf Course detention basin as necessary; the Golf Course is not within the OHWM.

Table 2: Ala Wai Canal North, Lower Manoa-Palolo Canal Right Descending Bank, and Upper Manoa-Palolo Canal Right Descending Bank Floodwall Material Quantities.

Ala Wai Canal Floodwall		
Ala Wai Canal North (Right Bank/Mauka) and Lower Manoa-Palolo Canal Right Descending Bank	QUANTITY	UNIT
CONCRETE J-WALL	15,880	LF
CONCRETE J-WALL	7,398	CY
MACROPILES	114,592	LF
CONCRETE, Sidewalk	1,507	CY
FILL, Bathtub	7,535	CY
EXCAVATION, J-Wall Foundation	10,949	CY
SEWER RELOCATION	840	LF
WATER RELOCATION	480	LF
GAS RELOCATION	180	LF
POWER RELOCATION	1,260	LF
FLAP GATE	12	EA
DRAINAGE STRUCTURE	5	EA
ROAD CLOSURE STRUCTURE	2	EA
CANOE CLOSURE	3	EA
Upper Manoa-Palolo Canal Right Descending Bank	QUANTITY	UNIT
I-WALL	1,658	LF
CONCRETE, I -Wall	982	CY
TIEBACK I-WALL SHEET PILES	6,816	SY
TIE BACK / ANCHOR, I-WALL	11,842	LF
TEMPORARY BENCH FILL, I-WALL	9,210	CY
L-WALL	670	LF
CONCRETE, L-WALL	1,438	CY
EXCAVATION, L-WALL	992	CY
SEWER RELOCATION	120	LF
WATER RELOCATION	60	LF

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GAS RELOCATION	60	LF
POWER RELOCATION	60	LF
FLAP GATE	4	EA
DRAINAGE STRUCTURE	-	EA
ROAD CLOSURE STRUCTURE	3	EA
CANOE CLOSURE	-	EA

Table 3: Ala Wai Canal South and Manoa-Palolo Canal Left Descending Bank Floodwall Quantities.

Ala Wai Canal South (Left Bank/Makai)	QUANTITY	UNIT
J-WALL	9,727	LF
CONCRETE, J-WALL	23,463	CY
CONCRETE, Sidewalk	1,982	CY
MACROPILES	150,686	LF
FILL, Bathtub	9,908	CY
EXCAVATION, (J-wall Foundation)	16,978	CY
SEWER RELOCATION	720	LF
WATER RELOCATION	240	LF
GAS RELOCATION	120	LF
POWER RELOCATION	17,577	LF
FLAP GATE	40	EA
DRAINAGE STRUCTURE	7	EA
ROAD CLOSURE STRUCTURE	2	EA
Manoa-Palolo Canal Left Descending Bank	**QUANTITY**	**UNIT**
CONCRETE L-WALL	3,399	LF
CONCRETE L-WALL	7,821	CY
MIRCOPILES	52,653	LF
EXCAVATION, L-Wall Foundation	5,933	CY
SEWER RELOCATION	180	LF
WATER RELOCATION	1,530	LF
GAS RELOCATION	60	LF
POWER RELOCATION	120	LF
FLAP GATE	3	EA
DRAINAGE STRUCTURE	2	EA
ROAD CLOSURE	4	EA

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STRUCTURE		

Table 4: Golf Course Detention Basin Quantities.

Golf Course Detention		
Golf Course	QUANTITY	UNIT
DEWATERING	1	LS
CHANNEL DIVERSION/ ENCLOSURE	1	LS
COFFER DAM	1	LS
BRIDGE REPLACEMENT (One lane and walking path)	1	LS
BRIDGE REMOVAL (Pedestrian)	1	LS
LEVEE	8,315	LF
FILL, Levee	90,636	CY
ACB, Levee and Channel	5,833	SY
HYDROSEEDING	15	ACRE
L-WALL (6-ft)	240	LF
CONCRETE, L-WALL (6-ft)	552	CY
L-WALL (9-ft)	1,621	LF
CONCRETE, L-WALL (9-ft)	4,303	
MIRCOPILES	28,828	LF
EXCAVATION, (Channel, Levee and Wall Foundation)	43,887	CY
ABC, Levee Access Road	4,927	TON
(2) 6'x12' RCB	505	LF
FILL, Channel	7,257	CY
SEWER RELOCATION	400	LF
WATER RELOCATION	120	LF
GAS RELOCATION	120	LF
POWER RELOCATION	600	LF
FLAP GATE	5	EA
DRAINAGE STRUCTURE	5	EA
ROAD CLOSURE STRUCTURE	1	EA
CANOE CLOSURE	1	EA

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Table 5: Woodlawn Drive and Koali Road Floodwall Quantities.

Woodlawn Drive Floodwall		
Woodlawn Drive	QUANTITY	UNIT
CONCRETE L-WALL	1,270	LF
CONCRETE L-WALL	2,586	CY
MIRCOPILES	19,679	LF
EXCAVATION, L-Wall Foundation	1,880	CY
SEWER RELOCATION	240	LF
WATER RELOCATION	60	LF
GAS RELOCATION	-	LF
POWER RELOCATION	No Data	
FLAP GATE	-	EA
DRAINAGE STRUCTURE	-	EA
ROAD CLOSURE STRUCTURE	1	EA
Koali Road Floodwall		
Koali Road	QUANTITY	UNIT
CONCRETE L-WALL	2,510	LF
CONCRETE L-WALL	5,109	CY
MIRCOPILES	38,882	LF
EXCAVATION, L-Wall Foundation	3,715	CY
SEWER RELOCATION	1,100	LF
WATER RELOCATION	1,010	LF
GAS RELOCATION	60	LF
POWER RELOCATION	990	LF
FLAP GATE	2	EA
DRAINAGE STRUCTURE	2	EA
ROAD CLOSURE STRUCTURE	2	EA

(3) Source Material

The exact source of the material has yet to be determined. However, all fill material would be obtained from a certified pit/quarry or other approved source and will be free of contaminants. All stone and rock would be clean and reasonably free from soil, quarry fines, and would contain no refuse. Concrete and steel would be standard, commercially purchased materials. There is no dredging planned, nor use of dredged materials. Any excavated soil would meet clean fill requirements for reuse within the project site.

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f. Description of the Proposed Discharge Site(s)

(1) Location

The proposed measures would be located within and along the various waterways within the Ala Wai watershed; these include Manoa and Palolo Streams and the Ala Wai Canal. Proposed mitigation measures, structural and nonstructural could occur along Manoa, Palolo, Makiki, and the Ala Wai Canal. Each measure is briefly described above. The following maps (Figure 2, Figure 3, and Figure 4) show the general locations of project features at this phase of feasibility, including construction footprints, staging areas, and access.

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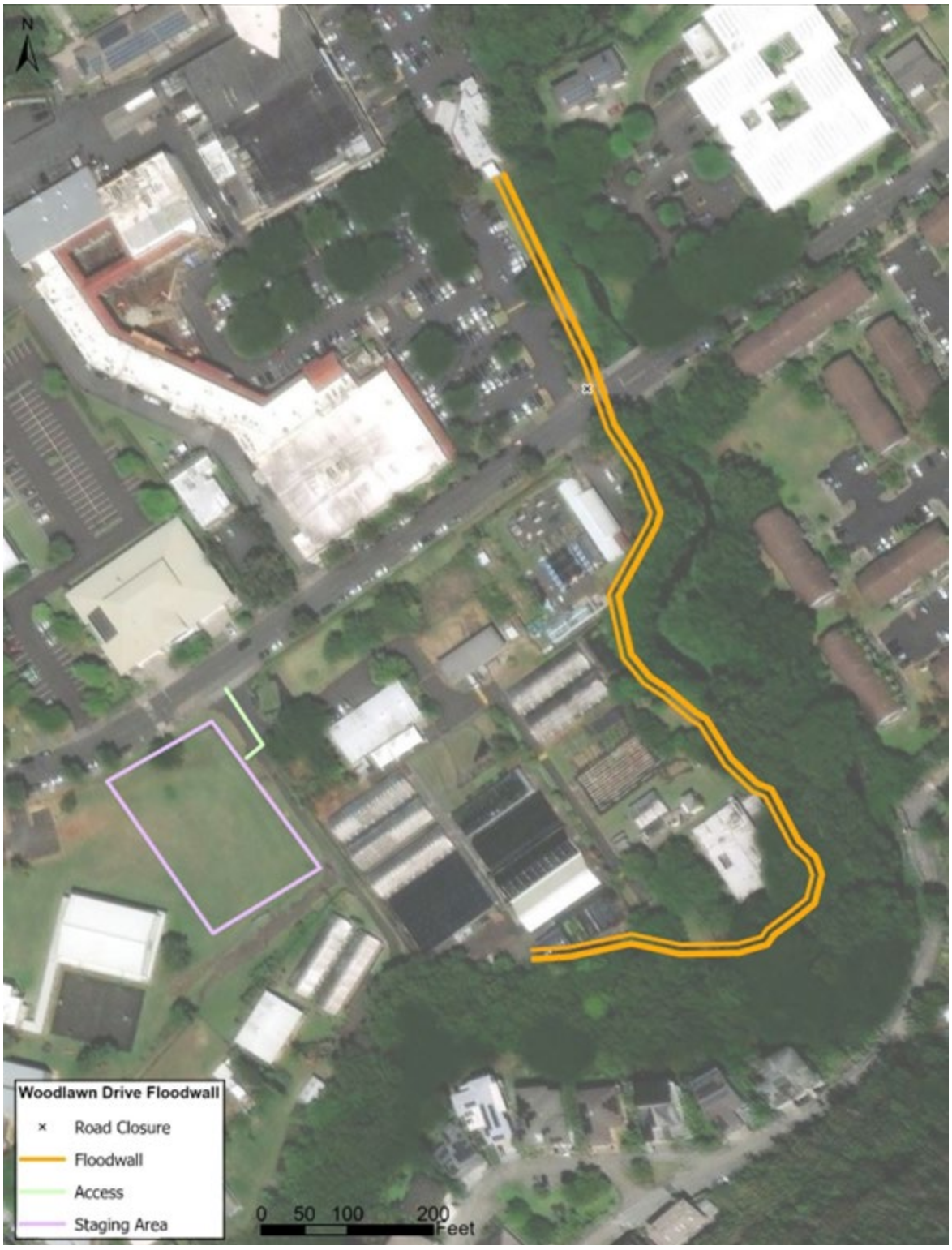

Figure 2: Woodlawn Drive Floodwall Proposed Project Footprint.

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Figure 3: Koali Road Floodwall Proposed Project Footprint.

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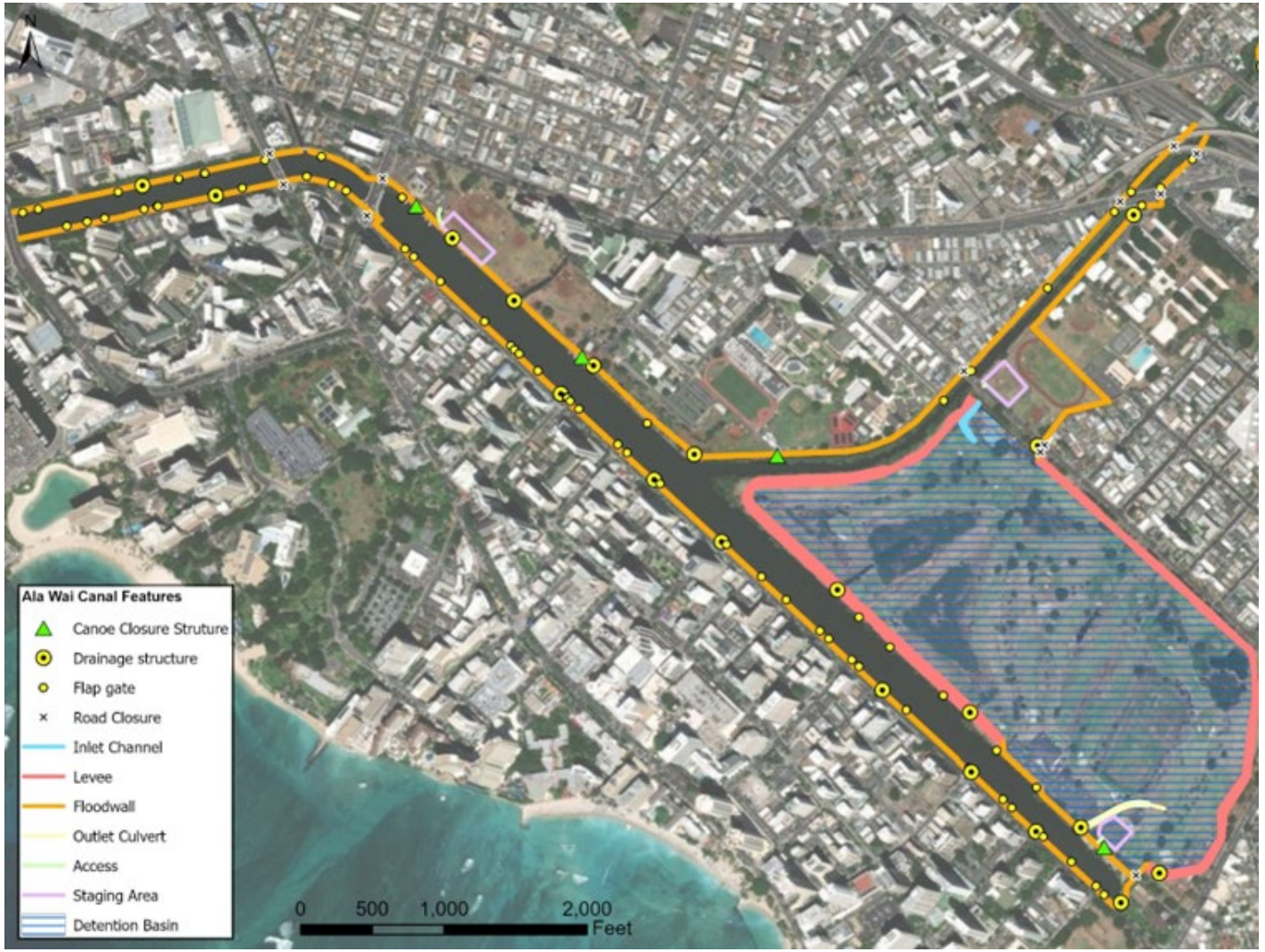

Figure 4: Ala Wai Canal Floodwall and Ala Wai Golf Course Detention Basin Proposed Project Footprint.

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(2) Size

The amount of area within which fill material would be discharged varies by measure. The length of channel that would be within the footprint of each permanent structure (i.e., the areas that would be subject to placement of fill), as well as the length of channel within the overall construction limits for each measure is summarized in Table 6. (It is noted that much of the floodwall construction will be adjacent to the waterways but will not include work within the OHWM. Drainage structures will involve work within the OHWM.)

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Table 6: Estimated Excavation and Discharge of Fill Within Waters of the U.S.

Measure	Length of Stream to be Disturbed (feet)	Length of Stream in Permanent Footprint (feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Woodlawn Drive Floodwall	0	0	0	0	0	0
Koali Road Floodwall	0	0	0	0	0	0
Koali Road Floodwall Drainage Structure 1	50	8	38.2	19.1	0	0
Koali Road Floodwall Drainage Structure 2	50	8	38.2	19.1	0	0
Ala Wai Golf Course Berm	0	0	0	0	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 1	50	39	170.0	83.1	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 2	50	10	3.3	2.0	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 3	50	10	3.3	2.0	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 4	50	10	3.3	2.0	0	0
Ala Wai Golf Course Detention Basin Drainage Structure 5	505	505	1179.26	570.93	0	0
Ala Wai Canal Floodwall (includes Kaimuki High School extension)	1,100[1]	0	0	9,210[2]	0	0

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Measure	Length of Stream to be Disturbed (feet)	Length of Stream in Permanent Footprint (feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Ala Wai Canal Drainage Structure 1	50	10	4.4	2.6	0	0
Ala Wai Canal Floodwall Drainage Structure 2	50	8	1.8	1.4	0	0
Ala Wai Canal Floodwall Drainage Structure 3	50	10	4.4	2.6	0	0
Ala Wai Canal Floodwall Drainage Structure 4	50	9	3	2	0	0
Ala Wai Canal Floodwall Drainage Structure 5	50	8	1.8	1.4	0	0
Ala Wai Canal Floodwall Drainage Structure 6	50	10	4.4	2.6	0	0
Ala Wai Canal Floodwall Drainage Structure 7	50	10	4.4	2.6	0	0
Ala Wai Canal Floodwall Drainage Structure 8	50	8	1.8	1.4	0	0
Ala Wai Canal Floodwall Drainage Structure 9	50	8	1.8	1.4	0	0
Ala Wai Canal Floodwall Drainage Structure 10	50	8	1.8	1.4	0	0

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Measure	Length of Stream to be Disturbed (feet)	Length of Stream in Permanent Footprint (feet)	Construction Excavation (yd^3)	Construction Fill (yd^3)	O&M Excavation (yd^3)	O&M Fill (yd^3)
Ala Wai Canal Floodwall Drainage Structure 11	50	10	4.4	2.6	0	0
Ala Wai Canal Floodwall Drainage Structure 12	50	11	30.6	16.7	0	0
Ala Wai Canal Floodwall Drainage Structure 13	50	10	5.6	3.4	0	0
Ala Wai Canal Floodwall Drainage Structure 14	50	10	5.6	3.4	0	0
TOTAL	**2,605**	**720**	**1,511.36**	**9,953.73**	**0**	**0**

[1] Disturbance to stream is due to the placement of a temporary rock bench for construction of floodwall.
[2] Fill is a temporary rock bench for construction of floodwall along the right descending bank of the Manoa-Palolo Canal. Fill would be removed once construction of the wall is complete.

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(3) Type of Habitat

Streams in the Ala Wai watershed arise on the southern slopes of the Koolau range. Manoa and Palolo valleys contain the two major streams draining to the Ala Wai Canal, with Manoa Stream consisting of a complex radial set of six tributaries in its upper reaches. Makiki Stream also flows to the Ala Wai Canal, but drains a much smaller area, with at least one of its four tributaries (Kanaha Stream) flowing only intermittently (Englund and Arakaki, 2004). A formal jurisdictional determination of Waters of the U.S. has not yet been completed for the project area; however, all the streams and canals in the watershed are assumed to be Waters of the U.S. (AECOS, 2014). Jurisdictional wetlands are not expected to be present outside the defined channel limits. This information will be verified during the next phase of the project through a formal jurisdictional determination in accordance with the new Clean Water Rule: Definition of "Waters of the United States" (33 CFR Part 328).

Each stream generally consists of an upper, middle, and lower reach that flow to an estuarine reach and then to the Ala Wai Canal, before discharging to the ocean. In this context, upper reaches are the tributary streams with youthful profiles (steep, relatively straight courses in down-cutting channels). Middle reaches have more mature profiles, slightly meandering and eroding mostly laterally. Lower reaches flow across the coastal plain and are typified by sediment accumulation. The estuarine reaches are those in which sea water and freshwater mix, typically along a gradient of increasing salinity seaward.

Riparian vegetation is present along all of the upper stream reaches, and is generally dominated by non-native species (many of which are considered invasive), including large trees such as Chinese banyan, *kukui* (*Aleurites moluccana*), mango, octopus tree, *hau* (*Hibiscus tiliaceus*), fiddlewood (*Citharexylum spinosum*), mountain apple (*Syzygium malaccense*), gunpowder tree (*Trema orientalis*), and gum (*Eucalyptus* sp.), as well as smaller herbaceous species such as exotic ginger (*Hedychium* sp.) and Job's tears (*Coix lachryma-jobi*) (Kido, 2006; Kido, 2007; Kido, 2008; Oceanit, 2004).

Within the urbanized portion of the watershed, riparian vegetation is generally limited to unchannelized stream reaches, such as along portions of Manoa Stream (for example, near the Dole Street Bridge). A majority of Palolo and Makiki streams are channelized and lack a riparian zone (Oceanit, 2004; Englund and Arakaki, 2004; Kido, 2008). Mangrove trees (*Rhizophora mangle*) are present in some areas in the lower estuarine reaches of the Manoa–Palolo Drainage Canal and the Ala Wai Canal, although concrete and concrete masonry (CRM) walls constructed as banks have eliminated much of the riparian vegetation.

(4) Timing and Duration of Discharge

Subject to approvals and appropriation of funds, construction would begin in the year 2027. In total, construction is expected to last approximately 4 years; it is expected that construction of individual measures will require on the order of 6 to 12 months each.

g. Description of Placement Method

In general, all material would be moved and placed mechanically. Cranes, backhoes, scrapers, dump trucks and other appropriate heavy machinery would be used to deliver and place fill materials during construction. Materials would be placed in a manner that minimizes disturbance of the aquatic environment. Riprap would generally be placed in a systematic manner to ensure a continuous uniform layer of well-graded stone. Concrete for footings would be placed using pumps into wooden formwork.

Concrete for riprap may be placed using pumps or by hand. Piles would be pounded using a large

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crane. For the Tieback I-wall construction, a temporary stone bench would be constructed within the channel for equipment access. Stone would be clean quarried materials free from contamination and would be placed using a crane. Post construction, stone would be removed, and the stream would be restored to the pre-construction condition.

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SECTION 2 - FACTUAL DETERMINATIONS

The purpose of the Section(b)(1) Guidelines is to restore and maintain the chemical, physical, and biological integrity of the waters of the U.S. through the control of discharges of dredged or fill material. Except as provided under the Clean Water Act Section 404(b)(2), no discharge of dredged or fill material will be authorized if there were a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. In accordance with the Section 404(b)(1) Guidelines, the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment must be determined.

The following discussion evaluates impacts of the proposed project on environmental resources identified in Subpart C through Subpart F of the Section 404(b)(1) Guidelines.

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope

In general, the proposed measures are designed to conform to the existing elevation and slope of the stream channel/canal, as further described below.

Placement of fill material as part of the proposed project could alter substrate elevations and slopes but this would primarily be where inlet and outlet structures are located. The exception is the placement of a rock bench within the Manoa-Palolo Canal to construct the Tieback I-wall on the right-descending bank of the channel. The rock bench would be approximately 15-feet wide and would run parallel to the channel bank. The rock bench would temporarily alter substrate elevation and slope within this area of the Manoa-Palolo Canal, however, once construction of the Tieback I-wall is complete, the rock bench would be completely removed. Similarly, temporary cofferdams may need to be placed in areas where inlet and outlet discharge structures are being constructed and/or modified as part of the project. The placement of fill for the cofferdams would also temporarily alter substrate elevation and slope within these localized areas, however, once construction/modification of drainage structures is complete, the cofferdam fill would be completely removed, and the substrate elevation and slope would be returned to the existing condition. Based on the minimal degree of change in channel substrate elevation and slope, there are not expected to be significant changes in substrate elevation and slope because of the proposed project.

(2) Substrate Type

The existing substrate in stream channel within the Ala Wai watershed includes a gradation of materials, with a mixed size of rock and varying levels of sediment. The substrate in the upper reaches of the watershed is typically comprised of large boulders and cobbles, and the middle reaches incorporate a mixed substrate, with a larger percentage of medium-sized substrate. The lower reaches of the watershed, including, the Ala Wai Canal, include a large component of sediment and other fine particulates. The proposed project would have no substantial adverse effect on substrate types within the adjacent waterways. Only minor amounts of riprap would need to be placed around inlet/outlet drainage structures to prevent scouring and erosion of the structures. The exception is the placement of a temporary rock bench within the Manoa-Palolo Canal to construct the Tieback I-wall on the right-descending bank of the channel. The rock bench would be approximately 15 feet wide and would run parallel to the channel bank. The rock bench would temporarily alter substrate type where it is located, however, once construction of the Tieback I-wall is complete, the rock bench would be

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completely removed. Similarly, temporary cofferdams may need to be placed in areas where inlet/outlet discharge structures are being constructed and/or modified as part of the project. The placement of fill material for the cofferdams would also temporarily alter substrate type within these localized areas, however, once construction/modification of drainage structures is complete, the cofferdam fill would be completely removed, and the substrate elevation and slope would be returned to the existing condition. Based on the minimal degree of permanent changes in substrate type, there are not expected to be any significant changes to substrate type because of the proposed project.

(3) Dredged/Fill Material Movement

There is no plan to dredge sediment during construction. Riprap fill material used around inlet/outlet drainage structures would be sized appropriately to ensure no material movement, especially since the material is needed to prevent scour and erosion around the inlet/outlet drainage structures. Best management practices (BMPs) would also be implemented to reduce the potential for erosion and sedimentation during construction. Similarly, the temporary rock bench placed within the Manoa-Palolo Canal would be sized appropriately to ensure that movement of the fill material comprising the rock bench does not occur. Likewise, fill material used for temporary cofferdams would also be sized appropriately to ensure movement of the material does not occur while construction is occurring. Once construction is complete, the rock bench and cofferdam fill material would be permanently removed from the waterways. Based on the minimal amount of permanent fill and fill being sized appropriately to prevent movement, fill material is not expected to move within the waterways.

(4) Physical Effects on Benthos

Since there is no major work (dredging for example) proposed for the stream channel, there is expected to be minimal impact on benthic organisms. Small areas of disturbance, for example at drainage structures, will result in minor localized impacts. Placement of the temporary rock bench for construction of the Tieback I-wall along the right descending bank of the Manoa-Palolo Canal would be expected to destroy benthic habitat and organisms under the bench area. Similarly, the placement of temporary fill for cofferdams needed to construct/modify drainage structures would also destroy benthic habitat and organisms where it is placed. While it is possible these temporary structures could be colonized by benthic organisms, depending on the time they are needed for construction, any colonies established on the temporary structures would also be destroyed when the temporary fill is removed permanently from the waterways. However, once the temporary fill material is removed, it is anticipated that nearby adjacent benthic communities would be able to recolonize these areas and benthic habitat would ultimately be established. Overall, no detrimental loss of benthic organisms in the short-term or long-term is anticipated.

(5) Other Effects

Construction of the proposed project could cause water quality impacts if best management practices, including erosion control and stormwater pollution prevention practices, are not followed. Any environmental impacts caused by the short-term increases in suspended solids due to construction activities are anticipated to be temporary and minimal; the use of best management practices as a proactive approach is recommended.

(6) Actions Taken to Minimize Impacts

Efforts to minimize stream-related impacts on the physical substrate include the use of approved construction procedures, in compliance with Federal and State requirements, as well as implementation of BMPs. These include:

- Work along the banks of the stream channels would be limited to periods of low flow, with proper diversion/ dewatering techniques, as appropriate.
- Construction activities would be sequenced to limit the extent of exposed soil at any given time.
- Erosion prevention and sedimentation control measures would be implemented and maintained for the duration of construction, including for staging and storage areas.
- Dirt stockpile areas containing more than 100 cubic yards of material would be covered or kept wet.
- All fill materials would be acquired from approved sources and will be free of contaminants.
- Appropriate vehicles and equipment would be utilized for all stages of construction, and construction crews would be adequately trained to avoid and minimize impacts to the aquatic environment.
- Good housekeeping, such as the use of tire brushes and silt fencing, will be used to limit soil tracking and erosion.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water Chemistry

The use of clean fill material (such as clean rock for riprap) would preclude any significant impacts on water chemistry because of the proposed bank work. Minor, short-term decreases in water clarity could occur during construction, but are not expected to occur long-term. No significant impacts on water color, odor, taste, dissolved oxygen levels, temperature or nutrient levels are anticipated.

(a) Salinity

The proposed project is not expected to have a direct impact on salinity due to the placement of fill material. The operation of the proposed project could introduce freshwater into the adjacent marine environment faster during a storm event than it would under the existing condition. However, the total discharge is not expected to be significantly different coming out of the Ala Wai Canal between the Future Without Project Condition and the Future with Project Condition. Overall, no significant adverse impacts to salinity concentrations are anticipated.

(b) Water Chemistry

Temporary and permanent fill material would be new, inert materials such as rock and concrete. Short-term effects on water quality are expected because of the temporary increase in the concentration of suspended solids and turbidity following the placement of riprap during construction of inlet/outlet drainage structures, placement of temporarily fill for the rock bench, and placement of temporarily fill for cofferdams. The potential temporary increase of suspended solids is expected to cause short-term decreases in water clarity and minor changes to the color of the water, particularly if erosion controls are not used. There would also be expected to be a temporary increase in the concentration of suspended solids and turbidity with the removal of the temporary rock bench and cofferdams fill material. Overall, the long-term water chemistry of the waterways should not be impacted by construction of the project.

(c) Clarity

Temporary and permanent fill material would be new, inert materials such as rock and

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concrete. Short-term effects on water clarity are expected because of the temporary increase in the concentration of suspended solids and turbidity following the placement of riprap during construction of inlet/outlet drainage structures, placement of temporarily fill for the rock bench, and placement of temporarily fill for cofferdams. The potential temporary increase of suspended solids is expected to cause short-term decreases in water clarity and minor changes to the color of the water, particularly if erosion controls are not used. There would also be expected to be temporary increase in the concentration of suspended solids and turbidity with the removal of the temporary rock bench and cofferdams fill material. Overall, the long-term water clarity of the waterways should not be impacted by construction of the project.

(d) Color

The proposed project is not anticipated to cause any considerable long-term effects or changes to water color, but a temporary increase of suspended solids during construction could cause short-term minor changes to the color of water. The temporary increase of suspended solids during construction would occur from the placement of riprap during construction of inlet/outlet drainage structures, placement of temporary fill for a rock bench, and placement of temporary fill for cofferdams. The potential temporary increase in suspended solids would be expected to cause a short-term minor impact on water color, particularly if erosion controls are not used. There would also be expected to be temporary increase in the concentration of suspended solids and turbidity with the removal of the temporary rock bench and cofferdams once construction is complete. Overall, the long-term color of water within the waterways should not be impacted by construction.

(e) Odor

The proposed project is not anticipated to cause any considerable long-term effects on, or changes to, the odor of water within the waterways. Minor excavation required for the construction of inlet/outlet drainage structures would be stockpiled before proper disposal on site and could cause temporary upland odor impacts due to the anaerobic nature of most sediment. These odors would dissipate over a relatively short time as the substrate dries and is slowly hauled off to an approved disposal site.

(f) Taste

The proposed project would not be anticipated to cause any short-term or long-term effects on, or changes to, the tase of water. Surface water in the Ala Wai watershed is not used as a drinking water source.

(g) Dissolved Gas Levels

The proposed project is not anticipated to alter dissolved gas levels in the adjacent waterways in the short-term or long-term.

(h) Nutrients

Temporary increases of turbidity during construction could produce minor, localized effects on nutrient levels in the water column. Turbidity would primarily be a result of the placement of riprap during construction of inlet/outlet drainage structures, placement of temporary fill for a rock bench, and placement of temporary fill for cofferdams. Overall, the proposed project is not expected to increase nutrient levels of adjacent waterways.

(i) Eutrophication

Eutrophication is typically caused by excessive nutrient levels. As discussed above, the

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proposed project could produce minor, localized effects on nutrient levels in the water column during construction, but these effects are expected to be short-term and minor aesthetic impacts. Overall, the proposed project is not expected to increase eutrophication of the adjacent waterways.

(j) Others as Appropriate

No other impacts were identified.

(2) Current Patterns and Circulation, Current Flow, and Water Circulation

(a) Current Patterns and Flow

None of the measures involve placement of fill materials that would substantially modify the existing flow patterns under normal flow conditions. During construction, a temporary rock bench would be placed along the right-descending bank of the Manoa-Palolo Canal as a work area for construction the Tieback I-wall in this location. The rock bench would run parallel to the channel bank and would not completely cut off flow in the area it is placed, however, the channel would be constricted due to the rock bench which in turn could have some effects on currents upstream and downstream of the rock bench as well as a temporary increase flow in the constriction area (less than 1700 ft total length of construction area). Once construction of the floodwall is complete, the rock bench would be permanently removed, and the full width of the channel would be restored. Similarly, temporary cofferdams would be used in areas where inlet/outlet drainage structures are being constructed as well as in areas where existing drainage structures are being modified. The cofferdams would not completely restrict flow, as flow would be able to continue around them. The cofferdams would also be sized to occupy the least amount of area possible, but still allow construction. Once construction/modification of the drainage structures are complete, the fill materials for the cofferdams would be permanently removed.

Some aspects of the proposed project could temporarily alter flow patterns during high flow events. The Ala Wai Detention Basin is located upland but adjacent to the Ala Wai Canal and Manoa-Palolo Canal. The detention basin would include an inlet and outlets along the waterway banks to divert stream flows during flood conditions. The inlet would not affect flow patterns or current patterns during normal stream flows. During flood flows, the detention basin would temporarily fill with stream flows, which would then be returned to the Ala Wai Canal over time as canal flows reduce. As this feature is located off-channel and would serve to reduce peak flow volumes on an infrequent basis, it is not expected to affect flow patterns in a manner that would substantially affect stream characteristics. Floodwalls would be located on upland areas near the waterways. The floodwalls would have no impact on normal flows. The floodwalls would contain floodwaters within the channel during high flow conditions, but these conditions would only occur on an infrequent basis and for a short duration (e.g., less than 12 hours for a 1% AEP event). Potential mitigation measures for induced flooding include a pump station constructed along Makiki Stream. Although the precise location is unknown still, it would be generally located between Fern Street and the confluence of Makiki Stream with the Ala Wai Canal. The pump station would collect stormwater during a flood event and pump it over and/or under a nearby floodwall. This could affect flow as the water is being pumped into the receiving waterway, however, the pump station would only be operational during a flood event during which the flood waters would also be impacting flow. Overall, the proposed project is not expected to substantially alter current patterns or flow.

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(b) Velocity

Velocities in the waterways during storm events can vary depending on location and severity of the storm event. Measures that involve placement of fill materials are not expected to substantially modify the existing velocities under normal flow conditions. During construction, a temporary rock bench would be placed along the right-descending bank of the Manoa-Palolo Canal as a work area for construction of the Tieback I-wall. The rock bench would run parallel to the channel bank and would not completely cut off flow since it will only be partial channel width, however, the channel would be constricted due to the rock bench which in turn would likely increase flow velocity of surface water traveling through the reach. Once construction of the floodwall is complete, the rock bench would be permanently removed, and the full width of the channel would be restored. Temporary cofferdams would also be used in areas where inlet/outlet drainage structures are being constructed as well as in areas where existing drainage structures are being modified. The cofferdams would be sized to occupy the least amount of area possible, but still allow construction; therefore, they are not anticipated to have a substantial affect on surface water velocity while they are in place. Once construction/modification of the drainage structures are complete, the fill materials for the cofferdams would be permanently removed.

Floodwalls, especially those along the Ala Wai Canal, would contain floodwaters within the channel during high flow conditions, which is likely to cause an increase in surface water velocity. However, a change in surface water velocity would be experienced under existing conditions when a storm event occurs currently. It is expected, though, that velocities with the floodwalls present would be slightly higher than those observed under the existing condition during a storm event. Overall, though, the proposed project is not expected to substantially alter surface water velocity.

(c) Stratification

The waterways comprising the Ala Wai watershed are unlikely to be deep enough to allow for stratification. Therefore, due to the lack of stratification occurring during the current condition, the proposed project is not anticipated to have any adverse effect to thermal stratification in the short-term or long-term.

(d) Hydrologic Regime

Flows within the various waterways can be variable, with the highest flows typically occurring during the rainy season (November – April). The proposed project does include features that would alter the hydrologic regime, but only during storm events. During normal flows, the flood risk features would have no effect on the hydrologic regime.

(3) Normal Water Level Fluctuations

In general, the proposed project is designed to maintain the normal flow regime, such that typical water level fluctuations would not be affected. However, during flood flows, the Ala Wai Golf Course detention basin is intended to retain water, resulting in areas of inundation within the detention basin berms. However, these conditions would only occur on an infrequent basis and for a short duration (e.g., less than 12 hours for a 1% AEP event), such that no substantial changes are anticipated relative to the stream characteristics and values.

(4) Salinity Gradients

The proposed projects features are mostly located in areas that are not tidally influenced. The only measures that would be in areas subject to salinity gradients are the Ala Wai Golf Course Detention Basin and the Ala Wai Canal floodwall. However, implementation of these

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measures would not divert or restrict flows in a manner that would affect the salinity gradients. The Ala Wai Golf Course Detention Basin would only divert flood flows that exceed the 20% AEP storm event and flows would return to the Ala Wai Canal as the flood waters subside (estimated to occur within less than 12 hours). The Ala Wai Canal floodwall will retain flows within the channel during high flow periods (estimated to occur for a duration of less than 12 hours) such that there will be only short-term impacts on any salinity gradients.

(5) Actions Taken to Minimize Impact

Standard BMPs for erosion control would be implemented, including those listed above (Section II(A)(5)).

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site

As previously described, the fill materials to be placed include riprap, which would consist of clean stone and would be adequately stabilized during construction. In general, the size and characteristics of these materials would not substantially contribute to increased turbidity or suspended particulate levels over the long term. However, some degree of increased turbidity and increased concentration of suspended solids may occur during construction of project features. Proper diversion/dewatering techniques and other BMPs would be implemented to avoid and minimize the potential for erosion and sedimentation to the extent possible. As such, these are expected to be temporary impacts, and would be relatively minor and restricted to a localized area. No long-term adverse effects on water quality are expected.

(2) Effects on Chemical and Physical Properties of the Water Column

(a) Light Penetration

Construction of the inlet/outlet drainage structures would require the placement of riprap to prevent scour of the immediate area. In addition, construction of the Tieback I-wall along the right-descending bank of the Manoa-Palolo Canal would require the placement of a temporary rock bench to serve as a work platform. Lastly, the modification of existing drainage structures within the Ala Wai Canal would likely require the placement of temporary cofferdams to allow construction work to occur. The placement of fill material as described above could cause minor, temporary, and localized increases of suspended solids that in turn could cause temporary decreases in the clarity of water and reduce the penetration of light through the water column. If the penetration of light is reduced for an extended period, it can lower the rate of photosynthesis and “primary productivity” of an aquatic area. Primary productivity generally refers to the fixation of solar energy by green plants (i.e., autotrophs) in a terrestrial ecosystem, or phytoplankton for an aquatic c ecosystem. Persistently high turbidity can cause adverse impacts to sight-dependent species because the reduced clarity can hinder the feeding ability of these species, and thereby limit their growth and increase their susceptibility to disease.

Regarding elevated suspended solids concentrations, it explains the following in 40 CFR 230.21:

> “The extent and persistence of these adverse impacts caused by discharges depend upon the relative increase in suspended particulates above the amount

> occurring naturally, the duration of the higher levels, the current patterns, water level, and fluctuations present when such discharges occur, the volume, rate, and duration of the discharge, particulate deposition, and the seasonal timing of the discharge."

Since the placement of permanent fill within the vicinity of a water way is limited to riprap around inlet/outlet drainage structures or concrete weirs and temporary construction features, the proposed project is not expected to cause any long-term adverse impacts to light penetration within the waterways.

(b) Dissolved Oxygen

The proposed project is not anticipated to alter dissolved gas levels in the adjacent waterways in the short-term or long-term.

(c) Toxic Metals and Organics

Sediment-bound pollutants are known to occur throughout the Ala Wai watershed (particularly in the urbanized areas). Construction of the proposed project would involve placement of imported materials (i.e., riprap and concrete), with only minimal amounts of excavation for the construction of new inlet/outlet drainage structures. None of the soils that would be exposed by construction are expected to contain excessive levels of contamination. All fill materials used would be from approved sources and would be clean and free of contaminants. Areas requiring excavation (e.g., inlet and outlet drainage structures and the Ala Wai Golf Course Detention Basin) are located on bank areas above the sediment floor of the canal, such that a significant increase in pollutant delivery to the receiving waterways would be expected because of construction. Any excavated sediment or soil will be tested for proper (upland) disposal.

(d) Pathogens

The drainage area is primarily an urban environment. The sediment and water within the lower reaches of the waterways may reflect the urban area and its potential pathogen sources such as uncontrolled waste disposal (dumping) and urban storm runoff. Since all excavated material will be disposed of upland, any pathogens entrained in the sediment will not be released to the environment. Proposed fill materials will be clean materials that are not anticipated to be a source of pathogens.

(e) Aesthetics

Construction of the proposed project would involve placement of imported materials (i.e., riprap and concrete), with only minimal amounts of excavation for the construction of new inlet/outlet drainage structures. In addition, temporary fill would be placed within the Manoa-Palolo Canal for a rock bench that would be a work area for construction of the Tieback I-wall in this area. Similarly, temporary fill would be placed in the form of a cofferdam around inlet/outlet drainage structures that would be modified as part of the proposed project. The placement of temporary fill and the removal of the temporary fill is likely to cause suspended solids and turbidity. Turbidity created by the temporary placement of fill would be localized and expected to dissipate quickly, although there could be some temporary effects to the aesthetics of the waterways in the vicinity of where temporary fill is placed.

(f) Others as Appropriate

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The proposed project is not expected to cause any other adverse effects on the chemical and physical properties of the water column.

(3) Effects on Biota

(a) Primary Production, Photosynthesis

Construction of the inlet/outlet drainage structures would require the placement of riprap to prevent scour of the immediate area. In addition, construction of the Tieback I-wall along the right-descending bank of the Manoa-Palolo Canal would require the placement of a temporary rock bench to serve as a work platform. Lastly, the modification of existing drainage structures within the Ala Wai Canal would likely require the placement of temporary cofferdams to allow construction work to occur. The placement of fill material as described above could cause minor, temporary, and localized increases of suspended solids that in turn could cause temporary decreases in the clarity of water and reduce the penetration of light through the water column. If the penetration of light is reduced for an extended period, it can lower the rate of photosynthesis and “primary productivity” of an aquatic area. Primary productivity generally refers to the fixation of solar energy by green plants (i.e., autotrophs) in a terrestrial ecosystem, or phytoplankton for an aquatic c ecosystem.

(b) Suspension/Filter Feeders

Construction of the inlet/outlet drainage structures would require the placement of riprap to prevent scour of the immediate area. In addition, construction of the Tieback I-wall along the right-descending bank of the Manoa-Palolo Canal would require the placement of a temporary rock bench to serve as a work platform. Lastly, the modification of existing drainage structures within the Ala Wai Canal would likely require the placement of temporary cofferdams to allow construction work to occur. The placement of fill material as described above could cause minor, temporary, and localized increases of suspended solids that in turn could impact the feeding ability of suspension and filter feeders. This would be expected to only be a minor short-term impact to these species and no different than an increase in suspended solids that is likely experienced during a storm event.

(c) Sight Feeders

Construction of the inlet/outlet drainage structures would require the placement of riprap to prevent scour of the immediate area. In addition, construction of the Tieback I-wall along the right-descending bank of the Manoa-Palolo Canal would require the placement of a temporary rock bench to serve as a work platform. Lastly, the modification of existing drainage structures within the Ala Wai Canal would likely require the placement of temporary cofferdams to allow construction work to occur. The placement of fill material as described above could cause minor, temporary, and localized increases of suspended solids that in turn could cause temporary decreases in the clarity of water and reduce the penetration of light through the water column. Persistently high turbidity can cause adverse impacts to sight-dependent species because the reduced clarity can hinder the feeding ability of these species, and thereby limit their growth and increase their susceptibility to disease. This would be expected to only be a minor short-term impact to these species and no different than an increase in suspended solids that is likely experienced during a storm event.

(4) Action Taken to Minimize Impacts

As required by the Clean Water Act, the project would comply with an NPDES Permit. The NPDES Permit Program regulates storm water and urban runoff discharges from developments to natural and constructed storm drain systems. Since the project would

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disturb one or more acres of soil, construction activities would be subject to the Construction General Permit. The Construction General Permit requires implementation of a SWPPP for site clearing, grading, and disturbances such as stockpiling or excavation. The SWPPP would generally contain a site map showing the construction perimeter, proposed structures, storm water collection and discharge points, general pre- and post-construction topography, drainage patterns across the site, and adjacent roadways. Appropriate erosion control measures would be incorporated into the SWPPP by the construction contractor to prevent sediment from entering waterways and to minimize temporary turbidity impacts. Examples include, but are not limited to, strawbales/wattles, erosion blankets, silt fencing, silt curtains, mulching, revegetation, and temporary covers.

d. Contaminant Determinations

As previously specified, all materials used for construction would be from approved sources and would be clean and free of contaminants. Previous studies have investigated the extent of pollution in the water column and sediments within the Ala Wai Canal, with a few studies also sampling the main streams in the watershed. In general, these studies have identified the presence of contaminants including bacteria, trace metals, nutrients, pesticides, and toxic organics (Spengler et al., 2019; USGS, 2004). As previously described, the detention basins would function to temporarily hold stream flows, slowly releasing them within the streams and Canal. To the extent that contaminants are present in the detention areas (which may be subject to herbicide applications), detained water could flush contaminants into the streams, thus contributing to degraded water quality conditions. However, the detention features are located within areas that are already subject to flooding, such that the project is not expected to substantially increase delivery of contaminants to the streams beyond that which already occurs. Control of turbidity in discharges will have the effect of controlling contaminants, since pollutants such as pesticides and organics tend to adhere to the sediment particles. As such, the proposed work is not expected to introduce or increase the presence of contaminants into the streams.

(e) Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton

During construction, an increase in turbidity and suspended solids in the areas associated with the proposed activities might have a short-term localized effect on phytoplankton productivity. It is expected that any potential impacts would be temporary, such that the plankton populations would recover quickly following construction.

(2) Effects on Benthos

Placement of riprap on stream banks may impact benthic communities located within the footprint of each measure. However, it is expected that any affected areas would be small and rapidly colonized, with little to no long-term effects on benthic organisms.

(3) Effects on Nekton

Construction activities are expected to temporarily increase turbidity and suspended solids in localized areas, as well as noise and overall level of habitat disturbance, which could affect the various species present in the streams, including the assemblage of native aquatic species. However, the work area (such as streambanks) for each measure would be dewatered prior to construction if needed, such that fish and other free-moving organisms would be precluded from the temporarily impacted areas. Once stream flows are returned to the work areas, construction-related impacts are expected to rapidly dissipate such that

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significant effects on nekton are not anticipated.

Measures have been designed to minimize the potential impacts to aquatic habitat and have been designed to maintain passage for native species. The concrete box culverts necessary at some of the detention basins are expected to have an effect on aquatic organisms similar to that of a short stretch of channelized stream. Passage through the culvert may be limited during peak storm flows when the detention basins are inundated, but these conditions would only occur on an infrequent basis and for short duration, such that impacts are expected to be minor. In addition, the mitigation measures focus on removal of existing passage barriers and improved access to high-quality upstream habitat and would serve to mitigate for potential impacts associated with the flood management measures.

(4) Effects on Aquatic Food Web

The proposed fill activities would temporarily disrupt aquatic biota during project construction but are not expected to affect overall productivity of the stream ecosystem within the watershed.

(5) Effects on Special Aquatic Sites

(a) Sanctuaries and Refuges

There are no sanctuaries or refuges located within the project footprint.

(b) Wetlands

A jurisdictional determination has not been conducted for this phase of the project but will be conducted during PED. The U.S. Fish and Wildlife Service's National Wetlands Inventory (NWI) Database was used to query wetlands that have been identified within the project footprint. It is important to note that the NWI Database provides only reconnaissance level information on the location, type, and size of wetland resources. Certain wetland habitats are excluded from the NWI because of limitations of aerial imagery as the primary data source used to detect wetlands. Wetland habitats that are excluded from the NWI include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (e.g., coral or tuberficid worm reefs) have also been excluded from the database.

The only wetland habitat, according to the NWI Database, that would be impacted by the project is located on the Ala Wai Golf Course. Approximately 0.005 acres of freshwater forested/shrub wetland would be permanently filled with a concrete weir that would act as one of the drainage structures for the Ala Wai Golf Course detention basin.

(c) Mud Flats

There is no mud flat habitat located within the project footprint.'

(d) Vegetated Shallows

No vegetated shallows were determined to be present within the project footprint.

(e) Coral Reefs

There are no coral reefs located within the project footprint.

(f) Riffle and Pool Complexes

There are no riffle/pool complexes located within the project footprint.

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(6) Threatened and Endangered Species

An assessment of the federally listed threatened and endangered species that could potentially be affected by the project was conducted, in consultation with the U.S. Fish and Wildlife Service (USFWS). The results of this analysis indicate there are several listed species that the project may affect but is not likely to adversely affect; these are summarized below. Additional detail, including a discussion of the species that are not expected to be affected by the project is provided in the Biological Assessment, which is included as an appendix to the Draft General Reevaluation Report/EIS.

- **Hawaiian hoary bat (ESA status – Endangered):** Should they occur, Hawaiian hoary bats could be directly or indirectly impacted by the project. Direct effects could include mortality or other forms of take (e.g., harm or harassment) to individual bats because of heavy equipment used for clearing and grubbing of the project sites and construction of the flood risk management structures. The use of heavy equipment would also generate noise, which could disrupt bats that are present within the project area. To avoid and minimize the potential for these impacts, vegetation clearing for the project would be performed during times of the year when Hawaiian hoary bats are not expected to be breeding to avoid potential for harm or disruption of juvenile bats that are unable to fly; specifically trees greater than 15 feet in height would not be cleared between June 1 and September 15. In addition, all construction activities would be scheduled to occur during daytime hours, thus avoiding potential bat foraging activities, which typically occur in the evening hours.

  Other effects could include permanent loss or temporary impacts to habitat. However, given the amount of habitat available through the upper Ala Wai watershed, tree clearing within the project area is not expected to measurable decrease the amount of forest available to the local population of bats for roosting. In addition, on Oahu roost trees are plentiful and are not expected to be a limiting factor for the species. The forest habitat in the upper portions of the Ala Wai watershed is homogenous and does not vary significantly in composition or structure between adjacent patches. For these reasons, it is expected that any bats displaced by the clearing would readily find alternate roost sites in surrounding undisturbed forest.

  With the implementation of seasonal restrictions for tree trimming/clearing and enforcement of construction hours, impacts to the Hawaiian hoary bat are expected to be insignificant, such that the project may affect, but is not likely to adversely affect the species.

- **Seabirds (i.e., band-rumped storm petrel [ESA status – Endangered], Hawaiian petrel [ESA status – Endangered], and Newell's Townsend's shearwater [ESA status – Endangered]):** No direct effects due to implementation of the project are expected to sea bird species since the proposed project area does not provide suitable nesting habitat. Therefore, there would be no direct impacts to sea bird nesting habitat. During construction of the proposed project, artificial lighting could be used during pre-dawn and pre-dusk hours within staging areas. Seabirds show a strong attraction to light sources, including artificial lights. Artificial lights can act as an attractant causing disorientation, confusion, and eventual grounding. The effects of artificial lights lead to a condition known as fallout, where fledgling young and adults are grounded and unable to regain flight, making them vulnerable to depredation or

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dehydration. Avoidance and minimization measures regarding artificial lighting would be implemented to reduce potential indirect impacts to seabirds that may be flying over the proposed project area. Given the above, coupled with the nature of activities proposed in the project area, impacts to seabirds are expected to be insignificant, such that the project may affect, but is not likely to adversely affect seabird species.

- **Hawaiian Waterbirds (i.e., Hawaiian duck (ESA status – Endangered), Hawaiian common gallinule [ESA status – Endangered], Hawaiian coot [ESA status – Endangered], and Hawaiian stilt [ESA status – Endangered]):** The extent and quality of potentially suitable habitat within the proposed project area is very limited and is likely to only be used as resting habitat for Hawaiian waterbird species. In the unlikely event that Hawaiian waterbird species are present within the proposed project area, it is expected that they would readily disperse to nearby areas with higher quality habitat (e.g., Pearl Harbor National Wildlife Refuge) in response to disturbance; as such, the potential effects of the proposed project are expected to be limited to temporary construction-related disturbance (e.g., noise). Injury or mortality of Hawaiian waterbird species (or their nests) is not expected.

  Areas of potentially suitable wetland habitat may be temporarily unavailable during construction (due to increased levels of disturbance), but sufficient habitat is expected to be available in nearby areas (e.g., Pearl Harbor National Wildlife Refuge). Following construction, the extent and quality of habitat is expected to be the same as the existing condition. During large-scale flood events, the detention basins would be inundated for short periods of time (i.e., about 1 day for Manoa Valley and Makiki Park District detention basins and about 2 days for the Ala Wai Golf Course detention basin), which could temporarily increase the extent of potential habitat. Although increased habitat may be viewed as a benefit, in heavily urbanized areas (such as the Ala Wai watershed), it can also create an attractive nuisance for waterbird species. Specifically, areas of increased habitat may attract waterbirds, which are then vulnerable to predator species that are prevalent in an urban environment (e.g., feral cats, mongoose). However, given the low probability of species occurrence and the infrequent recurrence and short-term duration of flooding, these conditions are not expected to significantly affect Hawaiian waterbirds. Based on the minimal extent and quality of suitable habitat, there is a low probability of species occurrence in the proposed project area. Given the above, coupled with the nature of activities proposed, impacts to Hawaiian waterbirds are expected to be insignificant, such that the proposed project may affect, but is not likely to adversely affect Hawaiian waterbird species.

- **Hawaiian monk seal (ESA status – Endangered):** Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with Hawaiian monk seal through:

  1. Collision with vessels;
  2. Direct physical impact;
  3. Disturbance from human activity and equipment operation;
  4. Exposure to elevated noise levels;
  5. Exposure to elevated turbidity;
  6. Exposure to wastes and discharges; and
  7. Loss of forage habitat.

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Collision with vessels:
Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

Direct physical impact:
Physical impact to Hawaiian monk seal is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact Hawaiian monk seal should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Hawaiian monk seal could also be pinned to the bottom and drowned. To minimize potential physical impacts to Hawaiian monk seal during cofferdam material placement, avoidance and minimization measures listed under environmental commitments, located further below in this section, would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization measures (refer to environmental commitments located further below in this section for the complete list) would minimize the potential physical impact to Hawaiian monk seal during the placement and removal of cofferdam material.

Disturbance from human activity and equipment operation:
Although construction of the floodwalls would occur upland, work would occur near marine habitat where ESA-listed marine species may be directly exposed to project-related activity. Hawaiian monk seal may experience a startle reaction and resulting stress should they encounter site preparation and construction activities. The reaction could range from one extreme where an animal calmly approaches and investigates the activity, to an opposite reaction of panicked flight, where an animal injures itself in an attempt to flee. However, marine mammals such as Hawaiian monk seal typically avoid human activity. Thus, the most likely effect of this interaction will be moderate level stress with a moderate to high energy avoidance behavior leading to the Hawaiian monk seal rapidly leaving the project footprint without injury.

Exposure to elevated noise levels:
Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for Hawaiian monk seal. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, most of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal

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between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot-wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot-wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise during construction of these types of floodwalls. However, like the pile installation along the reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose Hawaiian monk seals to project-related activity. However, Hawaiian monk seals typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted

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through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

Exposure to elevated turbidity and sedimentation:
In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed under environmental commitments, located further below in this section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon Hawaiian monk seal.

USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the Hawaiian monk seal due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 7. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

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Table 7: Future Without Project and Future with Project Modeled Velocities at the 5%, 2%, and 1% AEP.

Ala Wai Canal Location	Existing Velocities at Different AEPs without Project			Predicted Velocities at Different AEPs with Project			Velocity Difference (+) increase (-) decrease		
	5% AEP	2% AEP	1% AEP	5% AEP	2% AEP	1% AEP	5% AEP	2% AEP	1% AEP
Mouth of Manoa-Palolo Canal	10,215	11,171	11,418	13,268	13,220	15,497	(+) 3,053	(+) 2,029	(+) 4,079
Ala Wai Golf Course Midpoint	1,713	1,732	1,990	1,336	3,045	4,543	(-) 377	(+) 1,313	(+) 2,553
Ala Wai Canal Terminus	465	649	684	557	569	833	(+) 92	(-) 80	(+) 149
Ala Wai Community Park	11,700	13,238	13,833	14,429	16,688	18,922	(+) 2,729	(+) 3,450	(+) 5,089
Mouth of Ala Wai Canal (Ala Moana Boulevard)	2,831	3,177	3,475	15,687	17,387	18,622	(+) 12,856	(+) 14,210	(+) 15,147

Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 5 shows selected time progressions of this storm's modeled turbidity plume.

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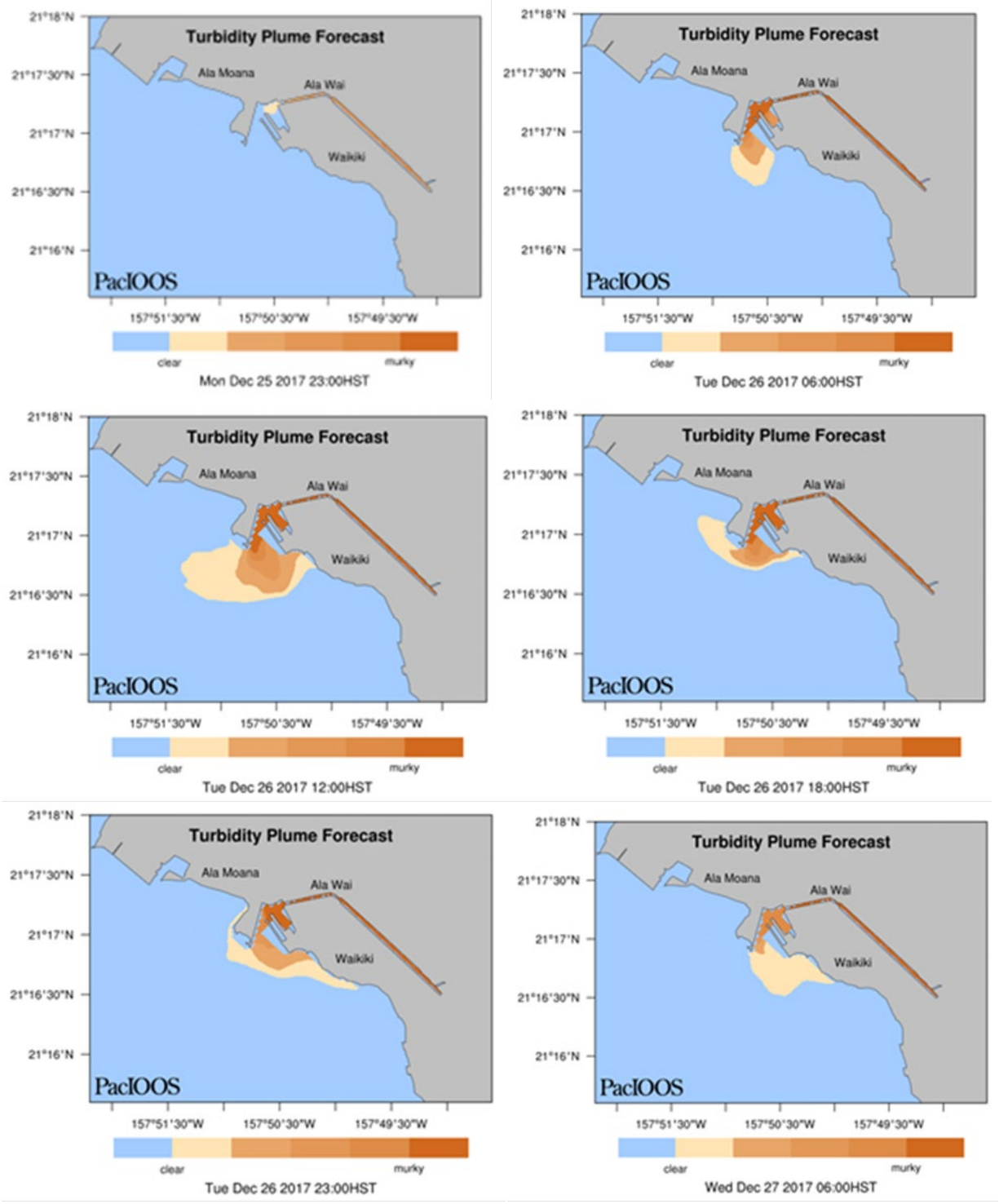

Figure 5: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

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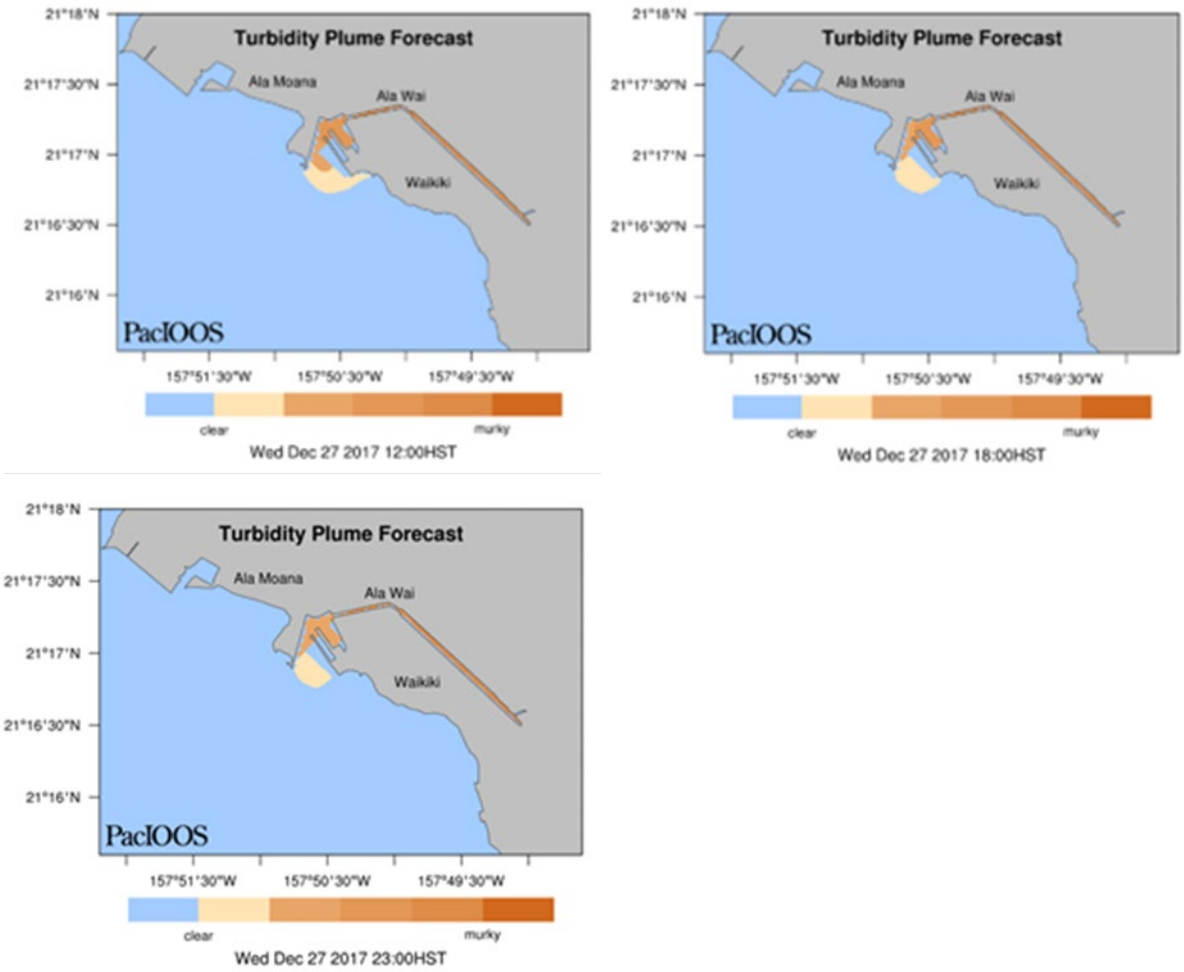

Figure 5, cont'd: Modeled Turbidity Plume Forecast for December 25-27, 2017, High Rainfall Event.

As seen in the above time progressions, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours

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has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact Hawaiian monk seal. However, given that Hawaiian monk seal breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by Hawaiian monk seal from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

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Exposure to wastes and discharges:
Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle Hawaiian monk seal. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose Hawaiian monk seal to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed under environmental commitments, located further below in this section, include measures intended to prevent or reduce exposure of Hawaiian monk seal to wastes and discharges in the marine environment.

Loss of forage habitat:
Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where Hawaiian monk seal may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure is located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.

Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother Hawaiian monk seal foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, Hawaiian monk seal foraging habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

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Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to Hawaiian monk seal foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on Hawaiian monk seal foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of Hawaiian monk seal foraging habitat.

Critical Habitat

Activities associated with the proposed action that could reasonably be expected to impact designated marine critical habitat for the Hawaiian monk seal include:

1. Exposure to elevated turbidity and sedimentation; and
2. Exposure to wastes and discharges.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area which could include proposed designated critical habitat for the green sea turtle. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed under environmental commitments, located further below in this section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat, green sea turtle proposed designated critical habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon designated critical habitat for the Hawaiian monk seal.

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USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The long-term operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to designated critical habitat for the Hawaiian monk seal from potential water quality degradation. Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced primarily at nearby designated critical habitat for the Hawaiian monk seal sooner than under the without project condition. Turbidity plumes extending into nearby designated critical habitat for the Hawaiian monk seal may also take longer than approximately 24 hours for dissipation to begin. The degraded water quality caused by the turbidity plumes could stimulate and sustain algae growth within the action area. Currently, frondose algae, crustose coralline algae, and turf algae are common but not dominant in the action area. Filamentous algae or cyanobacteria are also present primarily seaward of Waikiki beaches but do not dominate the habitat. While the proposed project is likely to increase nutrient and sediment concentrations reaching the nearshore marine environment during a storm event, the degree of increase in concentrations is not expected to stimulate algae growth in such a way that algae would be expected to become dominant in the action area and smoother corals that provide habitat for Hawaiian monk seal prey. Hawaiian monk seals are “generalist” feeders, meaning they eat a wide variety of foods depending on availability. Hawaiian monk seals eat many species of common fishes, squids, octopuses, eels, and crustaceans (crabs, shrimps, and lobsters). There could be slight increases in algae growth observed due to increased nutrient and sediment concentrations and turbidity taking longer to begin to dissipate, but the increase in algae growth would not be expected to be substantial to cause a loss of foraging habitat for the Hawaiian monk seal in the action area. Overall, the proposed project is not expected to substantially affect foraging habitat for the Hawaiian monk seal; therefore, the proposed project is not expected to destroy or adversely modify designated critical habitat for the Hawaiian monk seal.

Exposure to discharges:
Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, equipment spills and discharges likely consisting of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, could enter the nearshore marine environment and designated critical habitat for the Hawaiian monk seal to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects. Regarding foraging habitat for the Hawaiian monk seal (i.e., designated critical habitat), inadvertent spills and discharges from construction equipment has the potential to quickly kill Hawaiian monk seal prey. Highly motile prey such as fish, squid, octopus, and eels may be able to avoid harm by moving out of the area. Highly motile prey is also expected to be able to recolonize the affected

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area faster once contamination is contained and/or dissipates. Less motile prey such as crabs, shrimps, and lobsters are likely to be killed. Less motile prey is also expected to take longer to recolonize the affected area once contamination is contained and/or dissipates. Although inadvertent spills and discharges from construction equipment have the potential to kill Hawaiian monk seal prey, motile prey are expected to be able to avoid harm and recolonize the area quickly. Less motile prey species would likely take longer to recolonize the area, but since Hawaiian monk seals eat a wide variety of foods depending on availability, diet for the seals would likely consist of more motile species until less motile species are able to recolonize the area. It is important to note that local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed under environmental commitments, located further below in this section, include measures intended to prevent or reduce exposure of the marine environment to wastes and discharges from construction equipment. Based on the above and the implementation of measures under environmental commitments, located further below in this section, the proposed project is not expected to substantially affect foraging habitat for the Hawaiian monk seal; therefore, the proposed project is not expected to destroy or adversely modify designated critical habitat for the Hawaiian monk seal.

In summary, the proposed action involves minor in-water work which could expose Hawaiian monk seal to project-related activity. However, with the implementation of avoidance and minimization measures listed under environmental commitments, located further below in this section, potential impacts to Hawaiian monk seal due to project-related activity is expected to be minimized such that the proposed action may affect, but is not likely to adversely affect Hawaiian monk seal or designated critical habitat for Hawaiian monk seal.

- **Green Sea Turtle (ESA status – Threatened):** Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with green sea turtle through:

    1. Collision with vessels;
    2. Direct physical impact;
    3. Disturbance from human activity and equipment operation;
    4. Exposure to elevated noise levels;
    5. Exposure to elevated turbidity;
    6. Exposure to wastes and discharges; and
    7. Loss of forage habitat.

<u>Collision with vessels:</u>
Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

<u>Direct physical impact:</u>
Activities associated with the proposed action do not include the use of vessels in nearshore Physical impact to green sea turtle is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some

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of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact green sea turtle should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Green sea turtle could also be pinned to the bottom and drowned. To minimize potential physical impacts to green sea turtle during cofferdam material placement, avoidance and minimization measures listed under environmental commitments, located further below in this section, would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization measures (refer to environmental commitments, located further below in this section,for the complete list) would minimize the potential physical impact to green sea turtle during the placement and removal of cofferdam material.

Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. Construction of the Ala Wai Canal floodwall, however, includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose green sea turtles to project-related activity. However, sea turtles typically avoid human activity, so exposure to the project-related activity detailed above would be infrequent and non-injurious. In addition, avoidance and minimization measures would be implemented during construction such that in insignificant effects on the green sea turtle are anticipated.

Exposure to elevated noise levels:
Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for green sea turtle. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, a majority of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland

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area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at a distance of 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise during construction of these types of floodwalls. However, like the pile installation along the reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose green sea turtle to project-related activity. However, green sea turtles typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting green sea turtle from potential noise-related impacts.

<u>Exposure to elevated turbidity and sedimentation:</u>
In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column,

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thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed under environmental commitments, located further below under this section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon green sea turtle.

USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the green sea turtle due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 7. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during

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storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 5 shows selected time progressions of this storm's modeled turbidity plume.

As seen in Figure 5, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced

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at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact green sea turtle. However, given that green sea turtles breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by green sea turtle from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

Exposure to wastes and discharges:
Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle green sea turtle. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose green sea turtles to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed under environmental commitments, located further below under this section, include measures intended to prevent or reduce exposure of green sea turtles to wastes and discharges in the marine environment.

Loss of forage habitat:
Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where green sea turtles may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage

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or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure is located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.
Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother green sea turtle foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, green sea turtle foraging habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to green sea turtle foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on green sea turtle foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of green sea turtle foraging habitat.

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Critical Habitat

Activities associated with the proposed action that could reasonably be expected to impact proposed designated habitat for the green sea turtle include:

1. Exposure to elevated turbidity and sedimentation; and
2. Exposure to wastes and discharges.

Exposure to elevated turbidity and sedimentation:

In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area which could include proposed designated critical habitat for the green sea turtle. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization measures listed under environmental commitments, located further below in this section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat, green sea turtle proposed designated critical habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon proposed designated critical habitat for the green sea turtle.

USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

The long-term operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to proposed designated critical habitat for the green sea turtle from potential water quality degradation. Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced primarily at nearby proposed designated critical habitat for the green sea turtle sooner than under the without project condition. Turbidity plumes extending into nearby proposed designated critical habitat for the green sea turtle may also take longer than approximately 24 hours for dissipation to begin. The degraded water quality caused by the turbidity plumes could stimulate and sustain

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algae growth within the action area. Currently, frondose algae, crustose coralline algae, and turf algae are common but not dominant in the action area (USFWS, 2023b). Filamentous algae or cyanobacteria are also present primarily seaward of Waikiki beaches but do not dominate the habitat (USFWS, 2023b). While the proposed project is likely to increase nutrient and sediment concentrations reaching the nearshore marine environment during a storm event, the degree of increase in concentrations is not expected to stimulate algae growth in such a way that algae would be expected to become dominant in the action area. Green sea turtles are herbivores and eat mostly seagrasses and algae. Although the project is not expected to significantly stimulate algae growth, the project is also not expected to substantially decrease algae growth beyond that which currently occurs in the action area. Overall, the proposed project is not expected to substantially affect foraging habitat for the green sea turtle; therefore, the proposed project is not expected to destroy or adversely modify proposed designated critical habitat for the green sea turtle.

Exposure to discharges:
Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, equipment spills and discharges likely consisting of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, could enter the nearshore marine environment and proposed designated critical habitat for the green sea turtle to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects. Regarding foraging habitat for the green sea turtle (i.e., proposed designated critical habitat), inadvertent spills and discharges from construction equipment has the potential to quickly kill algae filaments; however, populations may recover rapidly by growth and vegetative reproduction of any unharmed fragments or spores (O'Brien and Dixon, 1976). Although inadvertent spills and discharges from construction equipment have the potential to kill algae, hydrocarbon-based chemicals generally have a greater adverse impact on algal grazers than algae (O'Brien and Dixon, 1976). Therefore, inadvertent spills and discharges would likely kill algal grazers and result in a temporary increase in algae until algal grazers are able to recolonize the impacted area (O'Brien and Dixon, 1976). It is important to note that local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, environmental commitments listed further below in the section include measures intended to prevent or reduce exposure of the marine environment to wastes and discharges from construction equipment. Based on the above and the implementation of environmental commitments listed further below in the section, the proposed project is not expected to substantially affect foraging habitat for the green sea turtle; therefore, the proposed project is not expected to destroy or adversely modify proposed designated critical habitat for the green sea turtle.

Overall, the proposed action involves minor in-water work which could expose green sea turtle to project-related activity. However, with the implementation of avoidance and minimization environmental commitments, listed further below in the section, potential impacts to green sea turtle due to project-related activity is expected to be minimized such that the proposed action may affect, but is not likely to adversely affect green sea turtle or proposed designated critical habitat for green sea turtle.

- **Hawksbill Sea Turtle (ESA status – Endangered):** Activities associated with the proposed action could reasonably be expected to interact directly or indirectly with hawksbill sea turtle through:

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1. Collision with vessels;
2. Direct physical impact;
3. Disturbance from human activity and equipment operation;
4. Exposure to elevated noise levels;
5. Exposure to elevated turbidity;
6. Exposure to wastes and discharges; and
7. Loss of forage habitat.

Collision with vessels:
Activities associated with the proposed action do not include the use of vessels in nearshore marine waters or lower reaches of rivers and streams. All work is anticipated to occur from upland with equipment staged upland.

Direct physical impact:
Activities associated with the proposed action do not include the use of vessels in nearshore Physical impact to hawksbill sea turtle is not expected to occur. At this time, all construction work would occur from upland with no construction equipment (i.e., push barge, vessel, etc.) anticipated to be present within the aquatic habitat. The exception is construction of the Ala Wai Canal floodwall which includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area. The placement of cofferdam materials could potentially physically impact hawksbill sea turtles should these animals be present when cofferdam materials strike the bottom. Potential injuries and their severity will depend on the animal's proximity to the bottom when struck, the angle of the strike, and the body part impacted, but may include cuts, bruises, broken bones, and amputations, any of which could result in the animal's death. Hawksbill sea turtle could also be pinned to the bottom and drowned. To minimize potential physical impacts to hawksbill sea turtle during cofferdam material placement, avoidance and minimization environmental commitments, listed further below in the section, would be implemented. Some of these avoidance and minimization measures require surveys for ESA-listed species in the area to occur prior to the start of each workday and prior to resumption of work following any break of more than one-half hour. They also require that all work be postponed or halted when motile ESA-listed marine species are within 164 feet of proposed work and resumption of activities should only occur after the animals have voluntarily left the area. These types of avoidance and minimization environmental commitments, listed further below in the section, would minimize the potential physical impact to hawksbill sea turtle during the placement and removal of cofferdam material.

Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. Construction of the Ala Wai Canal floodwall, however, includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal

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of the cofferdam would potentially expose hawksbill sea turtles to project-related activity. However, sea turtles typically avoid human activity, so exposure to the project-related activity detailed above would be infrequent and non-injurious. In addition, avoidance and minimization measures would be implemented during construction such that in insignificant effects on the hawksbill sea turtle are anticipated.

Exposure to elevated noise levels:
Activities such as pile-driving may produce in-air and in-water sound levels capable of injury or adverse behavioral modifications for hawksbill sea turtle. Much of the construction for the proposed action would occur upland and adjacent to waterways, not within a waterway. For example, construction of the floodwalls along Manoa-Palolo Canal and the Ala Wai Canal would occur upland. In addition, most of the floodwalls being constructed do not include pile driving; the exception being the reach along the right-descending bank of the Manoa-Palolo Canal between Kapiolani Boulevard and Date Street. In this reach, the upland area is constricted to such a degree that a steel sheet pile wall (i.e., I-wall) would need to be installed in this location. A 15-foot-wide rock bench would be placed in-water along the right-descending bank of the Manoa-Palolo Canal parallel to the bank. Equipment for construction of the I-wall would be staged along this rock bench. Upon completion of the I-Wall, the rock bench would be permanently removed. Although equipment for constructing of the floodwall would be staged along the 15-foot-wide rock bench, inserting the steel sheet pile for the floodwall would be into the adjacent upland area. The method to be used would be push in place instead of impact pile driving. The push in place method pushes the steel sheet pile into the ground without an impact hammer or vibration. The operation, except for a crane engine (to hold the steel sheet pile) and the generator to power the machine for pushing in the pile, is almost silent. For reference, a crane and a generator typically produce airborne noise levels of 87 dBA at 50 feet from the source. Therefore, using the push in place method would reduce airborne noise levels typically associated with pile driving as well as in water noise levels. In addition, installation of pile would be upland where it is in the dry. Pile installation in the dry is typically a minimization measure designed to reduce the amount of sound that is transmitted through water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since pile installation would occur upland, this would be like pile driving occurring in the dry; therefore, installing the pile upland is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

The floodwall along the Ala Wai Canal does not include the installation of steel sheet pile. Instead, floodwalls along the Ala Wai Canal would be either J-walls or L-walls on macropiles. The macropiles require the use of a drill rig and associated drilling equipment to create a hole to design depth. The drill rig and drilling of the macropile hole would likely create the most noise during construction of these types of floodwalls. However, like the pile installation along the reach of Manoa-Palolo Canal, drilling would occur upland which is effective at minimizing the effects of sound in the water. Although there is no method for calculating sound transmission loss through soil outside of the water, and then calculating the loss in water, it is assumed that transmission loss through soil is greater than what occurs in water or air due to the density of soil. Since drilling of the macropile holes would occur upland, this is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting Hawaiian monk seal from potential noise-related impacts.

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In addition to construction of floodwall, the Ala Wai Canal floodwall also includes upgrading existing stormwater drainage outlets. Upgrades would potentially include increasing the size of the outlets and/or installing flap gates on the outlets. While some outlets would be accessible from upland and would not require in-water work, some of the outlets to be upgraded could be at water level or below water level. For outlets that cannot be upgraded from land only, minor in-water work would occur. In-water work would require the placement of a cofferdam around the work area, pumping the work area within the cofferdam dry, performing the upgrades, and then removal of the cofferdam materials. The size of the cofferdam would be the minimum necessary to perform the upgrade work. Placement of the cofferdam and removal of the cofferdam would potentially expose hawksbill sea turtle to project-related activity. However, Hawaiian monk seals typically avoid human interaction, so exposure to the project-related activity detailed above would be infrequent and non-injurious. The presence of the cofferdam would allow work on the stormwater drainage structures to be completed in the dry. As stated previously, working in the dry is a minimization measure designed to reduce the amount of sound that is transmitted through the water. Therefore, upgrading existing stormwater outlet structures would occur in the dry which is expected to be effective at minimizing the effects of sound in adjacent aquatic habitat and protecting hawksbill sea turtle from potential noise-related impacts.

Exposure to elevated turbidity and sedimentation:
In-water construction activities have the potential to generate turbidity through disturbance of existing in-place substrates causing the resuspension of sediments into the water column, thereby raising ambient turbidity levels. Elevated turbidity levels over ambient turbidity levels would degrade ambient water quality within the construction footprint and immediate surrounding area. Elevated turbidity levels would be discrete, temporary, and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality resulting from construction. Suspended sediments are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column within the Ala Wai Canal due to construction related turbidity, are likely to be limited in both physical and temporal extent due to the lack of currents in the canal and use of avoidance and minimization environmental commitments listed further below in the section. The Ala Wai Canal is generally subjected to low flow velocities from tidal influence which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats (i.e., Ala Wai Small Boat Harbor, nearshore marine habitat). Given that the Ala Wai Canal is subject to bouts of high turbidity during storm events under the existing condition, it is unlikely that temporary increases in turbidity from constructing/modifying existing drainage structures would have any measurable impact upon hawksbill sea turtle.

USACE has proposed BMPs (e.g., silt curtains) to contain resuspended sediments in the immediate in-water work areas during construction/modification of drainage structures to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, USACE would stipulate to the contractor that no in-water construction activities could occur during periods of heavy rainfall. This would minimize the potential compounding adverse water quality impacts resulting from in-water construction work in combination with high turbidity levels from the Manoa-Palolo Canal during a storm event. Additionally, USACE is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). To obtain such certification, all proposed actions would comply with State water quality standards and implement necessary and appropriate monitoring BMPs to curtail water quality impacts.

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The operation of the project is passive, however, components of the project when working as a system could cause adverse indirect impacts to marine habitat occupied by the hawksbill sea turtle due to water quality degradation. The project includes the construction of floodwalls primarily along the Ala Wai Canal (including Manoa-Palolo Canal). Floodwalls would increase the capacity of the Ala Wai Canal to hold more storm water as well as increase storm flow velocities in the canal. Increased storm flow velocities in the canal could in turn disturb and/or resuspend sediments in the water column creating a turbidity plume that could affect water quality in the canal, the Ala Wai Small Boat Harbor, and the nearshore marine environment. Changes to velocities within the Ala Wai Canal were modeled with project features constructed and are compared against velocities within the canal under existing conditions in Table 7. Although the project would result in increased velocities and likely a large turbidity plume during a storm event, it is important to note that increased velocities and turbidity plumes already occur under the existing condition during a storm event.

Currently, under existing conditions, high rainfall events disturb sediments in the upper reaches of the Ala Wai watershed and cause these sediments to become suspended in the water column. There are also three general areas in the Ala Wai Canal where previously suspended sediments have sedimented out and built up within the canal: Kalakaua Avenue Bridge, mouth of the Manoa-Palolo Canal, and the terminus of the Ala Wai Canal (Montgomery et al., 2009). These built-up sediments within the canal at these locations can become resuspended in the water column during a storm event due to increased water velocities within the canal. The combination of these suspended sediments in the water column cause turbidity plumes during storm events which can extend beyond the canal and degrade water quality within the nearshore marine environment. Predicting how far turbidity plumes could extend during a storm event is difficult and can in turn make it difficult to predict where impacts to the nearshore marine environment could occur. However, PacIOOS has developed a turbidity plume forecast model for the Ala Wai Canal allowing the tracking of potential turbidity levels and extent of turbidity plumes along the nearshore marine environment. As an example of how a turbidity plume might extend out of the Ala Wai Small Boat Harbor and into the nearshore marine environment, PacIOOS conducted a model run of a turbidity plume for a storm event that occurred December 25 through December 27, 2017, in the Honolulu area. Figure 5 shows selected time progressions of this storm's modeled turbidity plume.

As seen in Figure 5, at the beginning of the storm event (i.e., December 25; 23:00 HST) the Ala Wai Canal begins to experience high turbidity with low turbidity beginning to occur within the Ala Wai Small Boat Harbor. Following approximately 12 hours (i.e., December 26, 2017; 12:00 HST), high turbidity is experienced throughout Ala Wai Canal and Ala Wai Small Boat Harbor, while low to medium turbidity is beginning to occur along the reef flat area outside of Ala Wai Harbor and within the vicinity of the Atlantis Submarines harbor. Following the passage of another 12 hours (i.e., December 26, 2017; 23:00 HST), high turbidity continues to be experienced throughout the Ala Wai Canal, but high turbidity within the Ala Wai Boat Harbor is beginning to dissipate. Similarly, medium turbidity is still being experienced within the vicinity of the Atlantis Submarines Harbor and low turbidity is being experienced along the nearshore marine area (reef flat)—within the vicinity of the Sheraton Hotel on Waikiki. Following the passage of another 6 hours (i.e., December 27, 201; 06:00 HST), the turbidity plume begins to dissipate along the nearshore marine area, although low turbidity is still being experienced. Turbidity within the Ala Wai Boat Harbor has also begun to dissipate currently with moderate turbidity occurring in the harbor. Over the course of the following 18 hours, from 12:00 HST to 23:00 HST on December 27, 2017, the turbidity plume further dissipates, although low/medium turbidity is still being experienced within the Ala Wai Boat Harbor and the harbor channel. In

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addition, the Ala Wai Canal is experiencing medium turbidity still after approximately 48 hours has passed from the beginning of the storm event. The above details a potential turbidity plume under the future without project condition. This means that even under the future without project condition, marine habitat located within Ala Wai Harbor generally experiences high turbidity during a storm event while marine habitat located outside the Ala Wai Boat Harbor and along Waikiki Beach experiences medium to low turbidity during a storm event.

During a storm event under the future without project condition, marine habitat in the harbor (Ala Wai Small Boat Harbor and Atlantis Submarines Harbor), reef flat (adjacent to Ala Wai Small Boat Harbor), reef crest (near Ala Wai Small Boat Harbor), fore reef (near Ala Wai Small Boat Harbor), and bank/shelf (near Ala Wai Small Boat Harbor) zones experiences medium to high turbidity for approximately 24 hours (depending on the size of the storm event) before turbidity begins to dissipate. Low turbidity during this same time occurs in the shoreline intertidal and reef flat zones between the Atlantis Submarines Harbor and the Sheraton Hotel in Waikiki. Between approximately 24 and 48 hours (depending on the size of the storm event) following a storm event, turbidity within the harbor zone has been reduced to medium levels while turbidity along shoreline intertidal, reef flat, reef crest, fore reef, and bank/shelf zones has been reduced to low or clear levels.

Under the proposed project, turbidity plumes occurring during a storm event could carry higher sediment and nutrient concentrations and take additional time to dissipate upon reaching the nearshore marine environment. Therefore, medium to high turbidity levels could be experienced at the harbor, reef flat, reef crest, fore reef, and bank/shelf zones sooner than under the without project condition. Turbidity plumes extending into the nearshore marine environment may also take longer than approximately 24 hours for dissipation to begin. Elevated turbidity and sedimentation may impact green sea turtle. However, given that green sea turtles breathe air instead of water, increased turbidity should not adversely affect their respiration or other biological function.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to marine habitat utilized by hawksbill sea turtle from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment. The operation of the detention basin could also help avoid and minimize the

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potential impact of the proposed project on accelerated discharge of freshwater to the nearshore marine environment.

Exposure to wastes and discharges:
Although construction of the proposed action primarily occurs upland, construction activities are often located adjacent to the aquatic environment. Therefore, construction waste may end up in the aquatic environment if not properly disposed of. Construction wastes may include plastic trash and bags that may be ingested and cause digestive blockage or suffocation, or if large enough, along with discarded sections of ropes and lines, may entangle hawksbill sea turtle. Equipment spills and discharges likely consist of hydrocarbon-based chemicals such as fuel oils, gasoline, lubricants, hydraulic fluids, and other toxicants, which could expose hawksbill sea turtle to toxic chemicals. Depending on the chemicals and their concentration, exposure could result in a range of effects, from avoidance of an area to death. Local and Federal regulations prohibit the intentional discharge of toxic wastes and plastics into the marine environment. In addition, BMPs listed under environmental commitments, located further below in this section, include measures intended to prevent or reduce exposure of hawksbill sea turtle to wastes and discharges in the marine environment.

Loss of forage habitat:
Short-term, the loss of forage habitat could occur with the upgrading/modification of stormwater drainage structures which has the potential to be in habitat where hawksbill sea turtle may forage. The upgrading/modification of drainage structures includes the temporary placement of cofferdam materials within the Ala Wai Canal which may impact forage species through damage or destruction. At the level of the individual, the loss of significant levels of available forage may lead to lower growth rates, reduced fitness, reduced reproductive success, and potential death by starvation. At the population level, significantly reduced forage opportunities may eventually cause local extirpation through the death or emigration of members of that population.

The upgrading and/or modification of stormwater drainage structures would occur from upland if the structure were located above the water level of the canal. If the stormwater drainage structure is located at water level or below water level a cofferdam would need to be constructed so that upgrading and/or modification of the drainage structure could occur in the dry. The placement of cofferdam material would occupy the smallest footprint possible, therefore, limited in-water substrate disturbance is anticipated to occur. Once upgrading/modification of the drainage structure is complete the cofferdam would be removed in its entirety. Therefore, the loss of potential forage habitat located within the cofferdam footprint would be temporary because epibenthic life would likely re-colonize the area once the structure is removed.

Long-term, the operation of the proposed action could cause sediment mobilization that has the potential to smother forage resources. An increase in suspended sediments during a storm event, above that experienced under the future without project condition, would likely result in increased deposition rates within the canal and nearshore marine areas. According to the Ala Wai Canal Watershed Water Quality Improvement Project (City and County of Honolulu, 1998), sedimentation in the Ala Wai Canal occurs at the rate of about 10,300 CY per year. Sedimentation is also prevalent in the Manoa-Palolo Canal which receives the first flush from storm waters. Increased sedimentation in nearshore marine waters could smother hawksbill sea turtle foraging habitat. Although the proposed project is expected to potentially increase sediment delivery to the nearshore marine environment, the degree of increase is not expected to be substantially different from the existing condition; therefore, hawksbill sea turtle foraging

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habitat in the action area is not expected to substantially decrease from its current abundance within the action area.

Although BMPs are not defined for operation of the proposed project, the project does include a detention basin at the Ala Wai Golf Course that would collect storm water runoff from the Manoa-Palolo Canal, detain the runoff, and slowly release the runoff back into the Ala Wai Canal. The operation of the detention basin in conjunction with the floodwalls could minimize potential indirect impacts to hawksbill sea turtle foraging habitat from acceleration of the delivery of storm water runoff to the nearshore marine environment and the quality of storm water runoff reaching the nearshore marine environment. This is because storm water runoff from the Manoa-Palolo canal would be held within the detention basin for up to two days providing time for some sediments entrained within the water column to settle out in the detention basin. After approximately two days, the detained storm water runoff would begin to slowly be released back into the Ala Wai Canal. Sediment retained in the detention basin would then be collected and disposed of at an appropriate facility. With the operation of the detention basin, a negligible or no change to the sediment/nutrient concentration of the storm water runoff reaching the nearshore marine environment could occur and in turn minimize the potential impact on hawksbill sea turtle foraging habitat within the nearshore marine environment. Most of the sediment containing excess nutrients and legacy contaminants comes from the Manoa and Palolo streams which feed into the Manoa-Palolo Canal. Therefore, the operation of the detention basin—which would hold storm water runoff from these streams during a storm event and provide time for sedimentation to occur—has the potential to avoid or minimize the possible impact of the proposed project on increased nutrient and sediment loading to the nearshore marine environment and thereby minimize the potential for resulting habitat degradation of hawksbill sea turtle foraging habitat.

Overall, the proposed action involves minor in-water work which could expose hawksbill sea turtle to project-related activity. However, with the implementation of avoidance and minimization measures listed under environmental commitments, located further below in this section, potential impacts to hawksbill sea turtle due to project-related activity is expected to be minimized such that the proposed action may affect, but is not likely to adversely affect hawksbill sea turtle.

The Draft Biological Assessment will be transmitted to the USFWS with a request for concurrence with the USACE's determination that the project may affect but is not likely to adversely affect the Hawaiian hoary bat, seabirds (band-rumped storm petrel and Newell's Townsend's shearwater), and Hawaiian waterbirds (Hawaiian duck, Hawaiian common gallinule, Hawaiian coot, and Hawaiian stilt); the USACE has determined there would be no effect on all other federally listed/candidate species and/or designated critical habitat. The proposed project has been discussed with the resource agencies, and the Biological Assessment incorporates their input provided to date.

(7) Other Wildlife

Overall, the project is not expected to substantially affect the diversity or productivity of the project area. The proposed project would result in minor losses of habitat for terrestrial and aquatic species as outlined in Section 3.4of the Draft Feasibility Report/EIS.

(8) Actions Taken to Minimize Impacts

Best management practices will be used for all construction. Avoidance and minimization measures will be implemented to minimize potential impacts on the aquatic ecosystem.

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(f) Proposed Disposal Site Determinations

(1) Mixing Zone Determination

Construction of drainage features and placement of stream bank riprap at each measure location would be conducted within an area subject to dewatering and would involve minimal mixing zones. In general, the fill material used for the project would either consist of large components (culverts, rocks), or would be adequately stabilized, such that very little exposed material could be suspended in the water column.

(2) Determination of Compliance with Applicable Water Quality Standards

Specific water quality criteria have been promulgated in the Hawaii Administrative Rules [HAR] §11-54, which, if met, are designed to allow water bodies to achieve designated beneficial uses. Water bodies that do not achieve the criteria are designated as “impaired” and are placed on the CWA §303(d) List of Impaired Waters. Based on the data presented in the 2022 State of Hawaii Water Quality Monitoring and Assessment Report (DOH, 2022), several locations within the Ala Wai watershed are not in attainment of the designated water quality standards.

Locations with impairment listings in the watershed include the three major streams and the Ala Wai Canal. Manoa Stream is listed for total nitrogen, nitrate and nitrite nitrogen, total phosphorus, turbidity, dieldrin, and chlordane. Palolo Stream is listed for trash, and Makiki Stream is listed for total nitrogen and total phosphorus. The Ala Wai Canal is listed for total nitrogen, nitrate and nitrite nitrogen, total phosphorus, turbidity, enterococci, pathogens, metals, suspended solids, and organochlorine pesticides.

For each water body on the §303(d) list, a pollution budget, or Total Maximum Daily Load (TMDL) must be developed to bring that water body into compliance with water quality standards. To date, the only TMDLs that have been developed are for nitrogen and phosphorus in the Ala Wai Canal. Development of the remaining TMDLs has been designated by DOH as a low priority (DOH, 2022).

As described throughout this evaluation, the project would involve placement of riprap and drainage structures, all of which will be adequately stabilized during construction. In general, the size and characteristics of these materials will not contribute to increased turbidity or suspended particulate levels, or other constituents which impair water quality. Some degree of increased turbidity and increased concentration of suspended solids would likely occur during construction of project features. Proper dewatering techniques and other BMPs would be implemented to avoid and minimize the potential for erosion and sedimentation to the degree possible. As such, these are expected to be temporary impacts, and would be relatively minor and restricted to a localized area. No long-term adverse effects on water quality are expected, such that the project is expected to be in compliance with applicable water quality standards. Water quality certification will be obtained from the State of Hawaii Department of Health prior to project construction.

(3) Potential Effects on Human Use Characteristics

(a) Municipal and Private Water Supply

The waterways within the Ala Wai watershed do not directly provide drinking water,

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therefore, the project would have no impacts to municipal and private water supplies.

(b) Recreational and Commercial Fisheries

The project could have temporary and long-term impacts on recreational fishing. The construction of the Ala Wai Canal floodwall would make fishing from the banks of the canal challenging due to the height of the wall currently (i.e., 6 feet tall). However, the floodwall around the Ala Wai Canal does include an approximately 3-foot elevated pathway which would make access to fishing over the canal slightly easier, but accessibility would not be as it is under the current condition. For additional detail on potential impacts to recreational fishing refer to Section 3.5.4 of the Draft GRR/SEIS.

(c) Water Related Recreation

The project would result in some impacts to recreation, as several of the measures are sited in designated recreational areas. Facilities that would be affected (at least in part) include Ala Wai Promenade, Ala Wai Community Park, Ala Wai Golf Course, and Ala Wai Canal. In general, the measures would displace some areas that are currently used for recreation. However, to the maximum extent possible, they have been designed with the smallest footprint possible, and to minimize impacts to recreational activities during non-flood conditions. For example, the Ala Wai Golf Course detention basin has been designed to be a multi-purpose facility, such that the golf course may still be used during non-flood conditions. During a flood event, the golf course would function to temporarily detain water, thereby precluding recreational use; however, the golf course would have minimal recreational value under flood conditions. Additional detail on potential impacts to recreation is provided in Section 3.5.4 of the Draft GRR/SEIS.

(d) Aesthetics

Other potential impacts on human use characteristics include those associated with aesthetics. In general, the measures would introduce a built element (floodwalls for example) to the natural environment, which would impact views from and toward the site. In general, the detention features in the upper portions of the watershed will either be screened by dense vegetation or otherwise fit into the natural topography, such that they are not expected to be prominently visible from any readily accessible public locations. The proposed measures along the Ala Wai Canal, including the flood walls, would diminish views along and toward the Ala Wai Canal. In addition to these views being an important resource for the Waikiki District in general, they are also significant in terms of the Ala Wai Canal's listing on the National and State Register of Historic Places (as well as a component of the Kauhale O Hookipa Scenic Byway). Despite the visual impact of the flood walls, the analysis conducted for this project determined that they are a necessary feature to provide adequate flood protection for Waikiki, such that the impacts are unavoidable. Efforts were made throughout the planning process, to minimize the impacts to the extent possible. Refinements to the measure design will be made during as part of the detailed design phase and will consider opportunities to further reduce the height of the flood walls, as well as incorporate design details that may otherwise minimize potential visual impacts, such as use of construction materials and/or landscaping to blend the structures into the surrounding environment. Additional detail on potential impacts to visual resources is provided in Section 3.5.5 of the Draft GRR/EIS.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

The proposed project does not occur within any parks, national and historical monuments, national seashores, wilderness areas, research sites, or similar preserves; therefore, there

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would be no impact to this human use characteristic.

(g) Determination of Cumulative Effects on the Aquatic Ecosystem

Although there are multiple measures throughout the watershed, they are generally located in geographically distinct areas. BMPs would be implemented for each of the measures to minimize the potential for impacts to the aquatic environment, such that they are not expected to significantly contribute to cumulative impacts. A detailed discussion of cumulative impacts is provided in Section 3.7 of the Draft GRR/SEIS.

(h) Determination of Secondary Effects on the Aquatic Ecosystem

No secondary impacts to the aquatic environment are anticipated to occur.

SECTION 3 – FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

The proposed fill activities would comply with Section 404(b)(1) guidelines of the Clean Water Act, as amended. No significant adaptations of the guidelines were made for this evaluation. As discussed in the Draft IFR/SEIS, other alternatives considered to reduce the flood risk within the Ala Wai Watershed include no action; detention basins throughout the urbanized watershed; floodwalls alone; and non-structural solutions. However, it was determined that these alternatives were prohibitively more costly, were significantly less effective in reducing flood risk, had extensive impacts that would have been difficult to mitigate, and/or did not meet the overall project purpose of reducing flood risk throughout the watershed. Although the tentatively selected plan would involve minor work in areas that support riffle and pool complexes, this type of habitat occurs throughout the mid to upper reaches of the streams where peak flows are greatest. No other practicable alternative with less environmental impact has been identified, such that the tentatively selected plan has been identified as the least environmentally damaging practicable alternative. A detailed discussion of the potential effects of the project is presented in Section 3 of the Draft GRR/SEIS.

The proposed fill activities would comply with all State water quality standards, Section 307 of the Clean Water Act, and the Endangered Species Act of 1973, as amended. The proposed fill activities would not have significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity, and stability, and on recreational, and economic values would not occur. To avoid and minimize the potential for adverse impacts, the project areas would be properly dewatered and standard BMPs would be implemented. Habitat improvements would be implemented to mitigate for loss of aquatic habitat.

A public meeting will be held for the project as part of the public review process for the Draft IFR/SEIS. This draft evaluation will be included as an attachment to the Draft IFR/SEIS and relevant comments will be received as part of the public review process. Comments received at the public meeting and during the following comment period will be considered and this evaluation will be updated as needed.

On the basis of this evaluation, I have determined that the proposed project complies with the requirements of the 404(b)(1) guidelines for the discharge of fill material.

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Date

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District Engineer

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US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement

Appendix L – Cultural Resources

This document contains CONTROLLED UNCLASSIFED INFORMATION (CUI). It contains information that may be exempt from public release under the Freedom of Information Act (5 USC 552). It is to be controlled, stored, handled, transmitted, distributed, and disposed of in accordance with USACE policy relating to CUI information and it is not to be released to the public or other personnel who do not have a valid "need to know" without prior written approval of an authorized USACE official.

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1. Introduction

Cultural and historic resources for the Ala Wai watershed were originally evaluated in the context of a National Historic Preservation Act Programmatic Agreement (PA) signed in 2016 by the U.S. Army Corps of Engineers, the Hawaii State Historic Preservation Office, the State of Hawaii Department of Land and Natural Resources, the Oahu Island Burial Council, the Office of Hawaiian Affairs, and Historic Hawaii Foundation. The Programmatic Agreement was fully executed on November 16, 2016, and remains in effect for a period of seven years. The U.S. Army Corps of Engineers is currently working with the consulting parties on renewal of the Programmatic Agreement.

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2. November 16, 2016, Programmatic Agreement

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PROGRAMMATIC AGREEMENT
AMONG
THE U. S. ARMY CORPS OF ENGINEERS
AND
THE HAWAII STATE HISTORIC PRESERVATION OFFICER
AND
THE STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES ENGINEERING DIVISION
REGARDING THE
ALA WAI CANAL PROJECT
HONOLULU, HAWAII

9 November 2016

WHEREAS, under Section 209 of the Flood Control Act of 1962, the U.S. Army Corps of Engineers (Corps) is conducting a feasibility study of measures to manage flood risk in the Ala Wai watershed; and

WHEREAS, the Corps is considering the following flood risk management measures for the Ala Wai watershed: in-stream detention basins in the upper reaches of Makiki, Manoa and Palolo streams; off-stream detention basins in the middle and lower portions of the watershed; debris catchment features; floodwalls along the Ala Wai Canal; improvements to the flood warning system; and as compensatory mitigation for anticipated impacts to waters of the U.S., in-stream measures to improve passage for native aquatic species (the Undertaking) (Appendix A); and

WHEREAS, the Corps cannot complete the cultural resources investigations, evaluations, and coordination necessary for compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA) (54 U.S.C. § 306108), as amended, prior to the design phase of the Undertaking; and

WHEREAS, the Corps has defined the Area of Potential Effect (APE) for direct and indirect impacts in coordination with the Hawaii State Historic Preservation Officer (SHPO) (Appendix B). The Direct APE is the area that will be directly affected by construction, and includes the footprint of each measure to be constructed and its construction buffer, staging areas, access roads and aquatic habitat mitigation measures. The specific locations for some project features have yet to be determined. The Indirect APE is defined as a one-half mile radius from the outer edge of the Direct APE. The APEs are defined the same for archaeological resources, historic architectural resources, and Traditional Cultural Properties (TCP); and

WHEREAS, the Corps has applied the National Register of Historic Places (NRHP) Criteria (Criteria) to properties identified within the Direct and Indirect APEs, and to date has completed substantial surveys within the Direct and Indirect APEs (Appendix C) with the recognition that additional identifications and evaluations may be required; and

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WHEREAS, the Corps and the SHPO have determined there is only one archaeological resource eligible for the NRHP within the Direct APE; State Site Number 50-80-14-6734, mounds platforms, and wall at the juncture of Aihualama and Waihi Streams; and

WHEREAS, the Corps and the SHPO have determined archaeological resources in the Indirect APE, identified in Appendix D, are eligible for the NRHP; and

WHEREAS, the Corps and the SHPO have determined historic architectural resources in the Direct APE, identified in Appendix E, are eligible for the NRHP; and

WHEREAS, the Corps and the SHPO have determined historic architectural resources in the Indirect APE, identified in Appendix F, are eligible for the NRHP; and

WHEREAS, the Corps, SHPO and consulting parties have agreed that portions of the following TCPs are within the Direct APE: Makiki Stream, Waihi Stream, Waiakeakua Stream, Pukele Stream, Waiomao Stream, Manoa Stream, Palolo Stream; and

WHEREAS, the Corps, SHPO and consulting parties have agreed that the following TCPs are within the Indirect APE: Makiki Stream, Waihi Stream, Aihualama Loi, Waiakeakua Stream, Kanewai Loi, Pukele Stream, Waiomao Stream, Manoa Stream, Palolo Stream; and

WHEREAS, the Corps has determined that the Undertaking, as proposed, may have an adverse effect on archaeological sites, historic structures and TCPs identified in Appendices D, E, and F, as well as Makiki Stream, Waihi Stream, Waiakeakua Stream, Pukele Stream, Waiomao Stream, Manoa Stream, Palolo Stream; and

WHEREAS, the Corps along with consulting parties have developed potential treatment recommendations as mitigation for impacts to archaeological sites, historic structures and TCPs, (Appendices D, E, and F) these treatments will be finalized in a mitigation plan to be developed by the Corps, SHPO, and consulting parties during the planning and design phase of the Undertaking; and

WHEREAS, the Corps has invited agencies, organizations, and other interested parties listed in Appendix G to participate in the Section 106 consultation process; and

WHEREAS, the Advisory Council on Historic Preservation (ACHP) has been notified by the Corps of the finding of adverse effect and has chosen not to participate in consultation; and

WHEREAS, the Corps made the historic resources, effects determinations and proposed mitigations available for public review in the Draft Environmental Impact Statement prepared under the National Environmental Policy Act which will serve as the District's Section 106 public coordination for the Undertaking; and

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WHEREAS, this PA was developed pursuant to Section 106 of the NHPA and in accordance with 36 CFR Part 800.14, the Corps and the SHPO have determined that execution of this PA will establish alternative procedures to streamline the coordination of the Undertaking; and

WHEREAS, the Corps will implement the provisions of this PA during the appropriate phase (e.g. planning, design, construction) as funding for various phases of the project is appropriated in future years; and

NOW, THEREFORE, the Corps and the SHPO agree that the Undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the Undertaking on historic properties.

STIPULATIONS

The Corps shall ensure that the following measures are carried out:

I. APPLICABILITY

This PA applies to all Undertakings associated with the Ala Wai Canal Project, regardless of whether they are carried out by the Corps or another governmental entity. In the event that another federal agency not initially a party to or subject to this PA receives an application for funding/license/permit for the Undertaking as described in this PA, that agency may fulfill its Section 106 responsibilities by stating in writing it concurs with the terms of this PA and notifying the Corps, SHPO, and consulting parties that it intends to do so. Such agreement shall be evidenced by filing the written statement with the ACHP, and implementation of the terms of this PA.

II. IDENTIFICATION

A. The Corps has consulted with the SHPO, and the SHPO has concurred with the surveyed areas and identification of historic properties effort completed thus far. The Corps, in consultation with the SHPO, shall identify areas that require additional investigation to document previously unidentified historic properties eligible for inclusion in the NRHP. Identification of such properties shall occur in the event there are changes to the APE and/or other unforeseen modifications to the scope of work that may affect NRHP eligible historic properties.

B. The Corps shall consult with the SHPO to develop plans to complete the identification of historic properties in locations specified through Stipulation II(A). Plans may include survey prior to construction and archeological monitoring during construction. The level of effort for these activities shall be determined in consultation with the SHPO. See Stipulation IV(C)(2)(c) for archaeological monitoring protocols. Proposed additional Identification efforts shall be submitted by the Corps to the SHPO and consulting parties for review and comment within 30 days of receipt. If the Corps has not received comments from the SHPO and consulting parties within 30 days, the

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Corps may assume concurrence with the additional identification efforts and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

C. The Corps and the SHPO shall take into consideration the views of Native Hawaiian Organizations (NHOs), individuals, the Oahu Island Burial Council (OIBC), and other interested parties in completing its identification responsibilities. When an interested party recommends additional identification efforts, they must do so by letter or e-mail to the Corps, and the Corps will review the request with the SHPO, and respond to the request in writing within 60 days with the Corps' position.

D. The Corps shall ensure that qualified professionals meeting the NPS professional qualifications for the appropriate discipline [National Park Service Professional Qualification Standards, Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44738-39)] are used to complete all identification, evaluation, and mitigation research proposals related to this undertaking.

E. When additional survey is needed prior to the initiation of construction related activities, or during project construction for actions which may affect historic properties, the Corps, in consultation with the SHPO, shall identify:

1. Archaeological Sites

a.) The Corps shall ensure that archaeological surveys and any necessary archaeological testing within areas requiring surveys as per Stipulation II(A) are conducted in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and "Archeological Inventory Survey Standards and Cost Estimation Guidelines for the Department of Defense (Zeidler, 1995).

b.) In the event that an interested party contacts the Corps in accordance with Stipulation II(C) regarding its recognition of an archaeological site located within the Direct or Indirect APE and previously unidentified by the Corps, the Corps shall notify the SHPO, to initiate discussions with all parties to evaluate whether the resource meets the NRHP criteria set forth in 36 CFR Part 60.4, and the effect on the resource by the Undertaking.

c.) The surveys and any testing shall be conducted following consultation with the SHPO, and a report of the findings shall be submitted to the SHPO and consulting parties for review. The SHPO and consulting parties shall complete their review within 30 days of receipt of the report. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the survey's findings and acceptance of the survey as the final draft and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A. Interested parties can request findings, and the Corps, in conjunction with the SHPO, will evaluate their request.

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2. Traditional Cultural Properties

a.) The Corps shall ensure that surveys within areas requiring surveys as per Stipulation II(A) includes procedures to identify TCPs and to consult with Native Hawaiian Organization and other affected parties in accordance with the guidelines provided by National Park Service Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties.

b.) In the event that a Native Hawaiian Organization or affected group contacts the Corps in accordance with Stipulation II(C) regarding its recognition of a TCP located within the Direct or Indirect APE and previously unidentified by the Corps, the Corps shall notify the SHPO, to initiate discussions with all parties to evaluate whether the property is a Traditional Cultural Property that meets the NRHP criteria set forth in 36 CFR Part 60.4, and the effect on the resource by the Undertaking.

c.) The TCP evaluation shall be conducted in consultation with the SHPO and consulting parties, and a report of the findings shall be submitted to the SHPO and consulting parties for review. The SHPO and consulting parties shall complete their review within 30 days of receipt of the report. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the survey's findings and acceptance of the survey as the final draft and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

3. Buildings and Structures

a.) The Corps shall ensure that surveys for buildings and structures within areas requiring surveys as per Stipulation II(A) are conducted in a manner appropriate for the resource and consistent with other reports completed for the Island of Oahu, and the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23).

b.) In the event that an interested party contacts the Corps in accordance with Stipulation II(C) regarding its recognition of a building or structure located within the Direct or Indirect APE and previously unidentified by the Corps, the Corps shall notify the SHPO, to initiate discussions with all parties to evaluate whether the resource meets the NRHP criteria set forth in 36 CFR Part 60.4, and the effect on the resource by the Undertaking.

c.) The survey shall be conducted following consultation with the SHPO, and a report of the survey, shall be submitted to the SHPO and consulting parties for review and comment within 30 days. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the survey's findings and acceptance of the survey as the final draft and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

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4. Cultural Landscapes

a.) In the event that an interested party contacts the Corps in accordance with Stipulation II(C) regarding its recognition of a cultural landscape located within the Direct or Indirect APE and previously unidentified by the Corps, the Corps shall notify the SHPO, to initiate discussions with all parties to evaluate whether the resource meets the NRHP criteria set forth in 36 CFR Part 60.4, and the effect on the resource by the Undertaking.

b.) Cultural landscapes are defined in the National Park Service Preservation Brief 36, Protecting Cultural Landscapes, as "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values." The four general types of cultural landscapes include: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes.

c.) The Corps shall consult National Park Service Bulletins 18, How to Evaluate and Nominate Designed Historic Landscapes, and 30 Guidelines for Evaluating and Documenting Rural Historic Landscapes, National Park Service Preservation Brief 36, Protecting Cultural Landscapes, and other publications and materials made available by the SHPO to assist in defining the criteria that should be applied to such properties.

d.) The objective in conducting the surveys is to identify NRHP listed or potentially eligible historic landscapes not previously identified within the project area that may be adversely affected by the Undertaking implementation, and to determine whether they meet the NRHP criteria set forth in 36 CFR Part 60.4.

e.) The survey shall be conducted following consultation with the SHPO, and a report of the survey shall be submitted to the SHPO and consulting parties for review and comment. The SHPO and consulting parties shall complete their review within 30 days of receipt of the report. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the survey's findings and acceptance of the survey as the final draft and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

III. DETERMINATION OF ELIGIBILITY

A. Eligibility

1. The Corps has completed numerous surveys to identify National Register eligible properties within the Direct and Indirect APEs of the Undertaking. The Corps has consulted with the SHPO, and the SHPO has concurred with the determinations of eligibility of historic properties identified within the APEs (Appendices D, E, and F).

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2. The Corps shall consult with the SHPO and consulting parties to evaluate historic properties using the Criteria established for the NRHP [36 CFR Part 60] when previously unidentified historic properties within the Direct APE are identified.

a.) If the Corps and the SHPO agree that the Criteria apply in evaluating the NRHP eligibility of a property, the property shall be treated accordingly as a historic property eligible for the NRHP.

b.) If the Corps determines, and the SHPO concurs that the property does not meet the Criteria for listing on the NRHP, then the property is not a historic property as defined by statute and regulation and thus shall be treated accordingly.

c.) If the Corps and the SHPO disagree regarding NRHP eligibility, or if the ACHP so requests, prior to the start of any project-related work at the site or in the vicinity of the property, the Corps shall obtain a formal Determination of Eligibility (DOE) from the Keeper of the National Register (Keeper), National Park Service, whose determination shall be final.

d.) Notification of historic property evaluation will be provided by the Corps to all consulting parties within 90 days of identification.

B. Effect Determinations

1. Undertakings Requiring No Further Review

a.) For projects involving historic buildings and structures, archaeological sites, and/or traditional cultural properties, determined by the Corps as having No Adverse Effect, or No Historic Properties Affected and concurred with by the SHPO, as documented in Appendices D, E, and F, no further review under this PA and the NHPA is required.

2. Undertakings Requiring Further Review

a.) The Corps has consulted with the SHPO, and found that the proposed Undertaking may have adverse effects to historic properties. As necessary, the Corps shall consult with the SHPO and consulting parties to determine whether there are additional effects to previously identified, or unidentified historic properties by the proposed Undertaking on eligible resources as per 36 CFR 800.5.

b.) If a change in the scope of work or APE for an Undertaking previously determined to have No Adverse Effect, or No Historic Properties Affected occurs, then the Corps shall follow the process identified in Stipulation VI below.

c.) If a previously unidentified historic property is discovered within the APE of the Undertaking previously determined to have No Adverse Effect, or No Historic Properties Affected, then the Corps shall follow the process identified in Stipulation VI.

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d.) If an inadvertent adverse effect occurs to an historic property within the APE of the Undertaking previously determined to have No Adverse Effect, or No Historic Properties Affected, then the Corps shall follow the process identified in Stipulation VII and/or Stipulation VIII.

3. The Corps shall maintain records of all decisions it makes related to the NRHP eligibility of properties and determinations of effect subsequent to the signing of this Programmatic Agreement, and distribute to consulting parties.

4. For effects on historic properties that have not been resolved through mitigations in this PA (identified in Appendices D, E, and F), the Corps shall resolve adverse effects to historic properties in consultation with the SHPO and consulting parties per Stipulation IV, below.

5. Disagreements on effect determinations. Should the Corps and SHPO disagree as to whether the criteria of adverse effect apply to the effects of the Undertaking on particular historic properties, the Corps will request the ACHP to review the finding and request their written opinion, in accordance with 36 CFR 800.5(c). The Corps will take the ACHP's opinion into account when reaching a final decision.

C. Treatment. The Corps will make a treatment recommendation for adverse effects to NRHP eligible historic properties based on Stipulation IV, below.

IV. TREATMENT OF HISTORIC PROPERTIES

The Corps will incorporate mitigation measures identified in Appendices D, E, and F for adverse effects to all NRHP eligible historic properties. For those resources not previously identified or mitigated, the Corps, in consultation with SHPO and consulting parties shall adhere to the following treatment strategies to avoid, minimize, or mitigate adverse effects to historic properties. The Corps shall notify the ACHP of adverse effect findings. The analysis of alternatives shall consider appropriate treatment of historic properties, program needs, cost, public benefit and values, and design feasibility. The Corps will present their preferred alternative (Avoidance, Minimize, and/or Mitigation) to consulting parties. For any treatment of a historic property under this Stipulation, the Corps shall make information, including documentation specified, available to the public and allow the public to express their views on adverse effects of the undertaking. To engage the public, the Corps, along with the Hawaii Department of Land and Natural Resources will post information for public comment on the DLNR State website and allow 30 days to receive written comment.

A. Avoidance. The preferred treatment is avoidance of adverse effects to historic properties. The Corps shall, to the extent feasible, avoid historic properties either through project design changes, use of temporary fencing or barricades, realignments, or other measures that will protect historic properties. The Corps, the SHPO, and consulting parties shall consult to assist the Corps with developing plans for avoiding effects to known and previously unidentified historic properties. The Corps shall incorporate feasible avoidance measures into project activities as part of the implementation of the Undertaking. If, in consultation with the SHPO and consulting

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parties, avoidance is determined to be infeasible, the Corps shall implement Stipulation IV(B) and/or (C).

B. Minimize. When the Corps, in consultation with the SHPO and consulting parties, determines that complete avoidance of historic properties is infeasible, consulting parties shall explore the practicalities of preservation in place and design compatibility.

1. **Preservation in Place**. Could entail complete avoidance, or may entail partial avoidance or protection of historic properties against project-related activities in proximity to the property.

2. **Design Compatibility**. Where appropriate, the Corps shall minimize impacts through project design, i.e. incorporating color, texture, scale, and/or materials which are compatible with the architectural or historic character of the historic property; and/or preservation of vegetation including mature trees, landscaping and planting which screen the property. Such design compatibility will comply with the Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties (SOI Standards). If the Corps, in consultation with the SHPO and consulting parties, determines that avoidance of the resource is feasible, then the Corps will implement avoidance measures in accordance with Stipulation IV (A). If the Corps, in consultation with the SHPO and consulting parties, determines that efforts to minimize impacts are infeasible, the Corps shall develop and implement treatment/mitigation measures consistent with Stipulation IV(C), below.

C. Mitigation. If the Corps, in consultation with the SHPO and consulting parties, determines a way to avoid or minimize impacts to historic properties, then the Corps will implement the appropriate protective measures in accordance with Stipulation IV(A) or (B). When the Corps, in consultation with the SHPO and consulting parties, determines that complete avoidance, or minimizing impacts to historic properties is infeasible, the Corps shall consult with the SHPO and consulting parties to determine the appropriate mitigation, and implement the appropriate mitigation measure(s) before the initiation of construction activities that will cause the adverse impact(s). Appropriate mitigation measures identified by the consulting parties must be documented in a Mitigation Plan. The Mitigation Plan must include:

1) Identification of the Undertaking and associated PA
2) Location and identification of the historic property adversely effected
3) Explanation of adverse effect
4) Summary of mitigation consultation with SHPO and consulting parties
5) Mitigation measure(s) to be completed
6) Timeline of mitigation measure implementation
7) Review process of mitigation measure(s)
8) Reporting requirements

The Corps will provide a copy of a draft Final Mitigation Plan to the SHPO and consulting parties for concurrence for each historic property adversely affected. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the proposed Mitigation Plan and acceptance of the proposed Mitigation Plan

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as the final draft and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

After the Corps has received concurrence on the Mitigation Plan, implementation may begin. Once all Mitigation Measures are completed the Corps with notify the SHPO and consulting parties and submit all final reporting requirements for concurrence. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the completed Mitigation Plan and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

1. Buildings and Structures

a. Recordation. The Corps shall consult with the SHPO and consulting parties to determine the appropriate level and type of recordation for affected resources, to include Historic American Building Survey/Historic American Engineering Record (HABS/HAER), or Historic American Landscapes Survey (HALS) where appropriate. For NRHP eligible historic properties, recordation shall be consistent with the requirements and standards of the Department of the Interior (April 2003), and the Corps shall consult with the NPS Pacific West Regional Office for any HABS/HAER/HALS requirements. All HABS/HAER/HALS documentation must be submitted to NPS for review, prior to construction affecting the resource, unless otherwise agreed to by either the SHPO or NPS.

b. Treatment of Buildings and Structures. Prior to alteration of historic properties, the Corps, in consultation with the SHPO and other consulting parties, shall develop treatment guidelines and design standards in keeping with the Secretary's Standards or other approved standards. If relocation of historic architectural properties is not feasible prior to demolition, partial demolition, or substantial alteration, the Corps, in consultation with the SHPO and consulting parties, shall develop a salvage and donation plan to identify appropriate parties willing and capable of receiving and preserving the salvaged significant elements from buildings/structures. The Corps shall submit the plans to the SHPO for review and comment.

c. Design Review. SHPO and appropriate consulting parties will be afforded the opportunity to review design plans and specifications (in electronic format) to ensure design elements agreed upon during consultation are implemented. The Corps will provide plans and specs to appropriate consulting parties at every design submittal with a minimum two week review period. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the proposed plans and acceptance of the proposed plans as the final draft and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

d. Interpretation. The Corps will consult with the SHPO and consulting parties to develop an interpretation plan for historic properties affected by the Undertaking to ensure preservation of the historic context of the resource. The Corps will provide interpretation documentation to appropriate consulting parties with a minimum two week review period. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume

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concurrence with the proposed plans and acceptance of the proposed plans as the final draft and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

2. Archaeological Sites

a. Archaeological Data Recovery. The Corps shall develop a data recovery plan for archaeological sites which the Corps determines, in consultation with the SHPO and consulting parties, cannot be avoided or appropriately preserved in place. The data recovery plan to retrieve significant archaeological information will be developed and implemented by the Corps or its representative(s), in consultation with the SHPO and consulting parties, and prior to the implementation of project-related activities within or in the vicinity of the archaeological sites.

i.) The Corps shall ensure that the data recovery plan for each NRHP eligible site addresses substantive research questions developed in consultation with the SHPO and consulting parties. The plan shall be consistent with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734-37) and the ACHP's publication, Treatment of Archaeological Properties.

ii.) The Corps shall submit data recovery plans to the SHPO and consulting parties for review and comment within 30 days of receipt. The Corps and SHPO shall consult to resolve any objections to the data recovery plan as proposed. The data recovery plan shall then be implemented by the Corps. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the proposed data recovery plan and acceptance of the proposed data recovery plan as the final draft and will notify the SHPO and consulting parties in writing, in accordance with Stipulation X.A.

b. Archaeological Documentation. Where appropriate, the Corps shall conduct documentation of archaeological sites in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734-37).

c. Archaeological Monitoring. For locations or actions agreed to by all signatories that archaeological monitoring may be undertaken during construction, the Corps shall develop an Archaeological Monitoring Plan in consultation with the SHPO and consulting parties. The Archaeological Monitoring Plan shall clearly state:

i.) Whether monitor will be on site full-time, part-time or on an on-call basis and rationale for this selection.

ii.) Timing of monitoring (both in the overall construction schedule and time allotted in the field). Ideally work on areas to be monitored shall be conducted at the initiation of construction to allow for consultation and further work, as needed, should significant resources be encountered. See Stipulation IX for protocols should burials be encountered.

iii.) Authority and role of the archaeologist

iv.) Location of monitoring

v.) The nature of the work to be undertaken by the archaeologist (extent of excavation, types of recording, screening, artifact sampling, etc.)

vi.) The type(s) of resource(s) anticipated

vii.) The protocol for actions should a resource be encountered

viii.) Artifact analysis and reporting requirements

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ix.) Archaeological monitoring shall be included in the construction specifications and drawings demarcating where archaeological monitors are to be used. The archaeologist does not have to be hired under the construction contract, and could be hired under a master contract through the Corps. Protocols shall be in the contract specifications regarding responsibilities of all parties and timing for monitoring. The nature of archaeological monitoring (e.g. on-site monitoring to on-call monitoring) can be changed through a written request by either the Agency (Corps), or the SHPO, and with concurrence by the other. The Corps will share changes to archaeological monitoring with consulting parties.

d. Cultural Monitoring. For locations or actions agreed to by all signatories that cultural monitoring may be undertaken during construction, the Corps shall develop a Cultural Monitoring Plan in consultation with the SHPO and consulting parties. The Cultural Monitoring Plan shall clearly state:

i.) Definition of a cultural monitor

ii.) Whether monitor will be on site full-time, part-time or on an on-call basis and rationale for this selection.

iii.) Timing of monitoring (both in the overall construction schedule and time allotted in the field). Ideally work on areas to be monitored shall be conducted at the initiation of construction to allow for consultation and further work, as needed, should significant resources be encountered. See Stipulation IX for protocols should burials be encountered.

iv.) Authority and role of the cultural monitor (including briefings and education of construction personnel)

v.) Location of monitoring

vi.) The nature of the work to be undertaken by the cultural monitor

vii.) The types of resources anticipated

viii.) The protocol for actions should a resource be encountered

ix.) Reporting requirements

x.) Cultural monitoring shall be included in the construction specifications and drawings demarcating where cultural monitors are to be used. The cultural monitor does not have to be hired under the construction contract, and could be hired under a master contract through the Corps. Protocols shall be in the contract specifications regarding responsibilities of all parties and timing for monitoring. The nature of cultural monitoring (e.g. on-site monitoring to on-call monitoring) can be changed through a written request by either the Agency (Corps), or the SHPO, and with concurrence by the other. The Corps will share changes to cultural monitoring with consulting parties.

3. Traditional Cultural Properties (TCPs)

TCPs will be evaluated for NRHP eligibility using the Criteria established for the NRHP [36 CFR Part 60] per Stipulation III(A), above. If the Corps and the SHPO agree that the Criteria apply in evaluating the NRHP eligibility of a property, the property shall be treated accordingly, which may include the following mitigation measures:

a. The Corps, in consultation with the SHPO and Native Hawaiian Organizations, shall identify and evaluate design alternatives and treatment measures which will avoid, minimize, or mitigate impacts when it is determined that a TCP will be affected by the Undertaking.

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b. Treatment ideas may be generated from the guidelines provided by National Park Service Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties, and through ideas proposed by interested parties that are not standard treatment mitigations (creative mitigations).

4. Cultural Landscapes

a. The Corps, in consultation with the SHPO and other consulting parties, shall identify and evaluate design alternatives which will avoid or minimize impacts when it is determined that an NRHP eligible cultural landscape will be affected by Undertaking activities.

b. Treatment measures for historic landscapes shall consider recordation, preservation, rehabilitation, restoration, reconstruction, and additions in accordance with The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes (1996) and Protecting Cultural Landscapes, National Park Service Preservation Brief Number 36.

c. Where recordation is required, the Corps shall consult with the SHPO and other consulting parties to determine the appropriate level and type of recordation for affected resources, including Historic American Landscapes Survey (HALS), as appropriate. For NRHP eligible historic properties, recordation shall be consistent with the requirements and standards of the Department of the Interior (April 2003), and the Corps shall consult with the NPS Pacific West Regional Office for any HABS/HAER/HALS requirements. All HABS/HAER/HALS documentation must be submitted to NPS for review, prior to construction affecting the resource, unless otherwise agreed to by either the SHPO or NPS.

D. Verification. For all records and reports generated by the Corps that document compliance with this PA, submittals to the SHPO will be provided under Memorandum for Record (MFR) cover letter, and reference the appropriate section of the PA. For protection measures developed under Stipulations IV(B) and (C) above, the Corps shall ensure that the measures were implemented by providing photos of the measure during construction along with a brief write up documented as an MFR. The MFR(s) will be submitted to the SHPO, and made available to consulting parties upon request within 30 days of completion of the implemented protection measure. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the verification and acceptance of the verification as the final draft and will notify the SHPO and consulting parties in writing that the applicable PA stipulation has been met, in accordance with Stipulation X.A.

V. CURATION AND DISSEMINATION OF INFORMATION

A. The Corps shall maintain all decision records on identification, evaluation, effects determination and mitigation of historic properties for this Undertaking.

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B. The Corps, in consultation with the SHPO shall ensure that all materials and records resulting from the survey, evaluation, and data recovery or mitigation conducted for the Undertaking, or recovered during construction of the Undertaking, will be curated in accordance with 36 CFR Part 79 Curation of Federally-Owned and Administered Archaeological Collections, unless a private property owner wishes to retain ownership of artifacts recovered from his or her land. For project components that will occur on private land, DLNR will incorporate provisions in the real estate agreement prior to commencement of construction activities that explicitly address the disposition of artifacts that may be found on the subject parcel, including whether the owner or DLNR will retain ownership. Certain materials may not be curated where state law and regulations require different treatment.

C. The parties to this PA acknowledge that historic properties covered by this PA are subject to the provisions of Section 304 of the NHPA (54 U.S.C. § 307103) relating to the disclosure of certain information about historic properties and, having so acknowledged, will ensure that all actions and documentation prescribed by this PA maintain the confidentiality required by law.

VI. ADDITIONS OR CHANGES TO THE UNDERTAKING'S SCOPE OF WORK AND AREA OF POTENTIAL EFFECT

A. In the event of any changes to the Undertaking's scope work that would require a change in the Direct or Indirect APE, the following measure shall be implemented in consultation with the signatories:

1. The Corps shall assess and revise the Undertaking's Direct and Indirect APE as needed to incorporate any additional areas that have the potential to affect historic properties.

2. The Corps shall carry out additional investigations, in accordance with Stipulation II, to identify historic architectural, archaeological, or cultural properties that may be affected.

3. The Corps shall assess the Undertaking's effect on any new historic properties, in accordance with Stipulation III.B, and explore measures to avoid, minimize or mitigate effects on these properties, in accordance with Stipulation IV.

4. The Corps shall ensure the preparation of appropriate reports and documents, notify Section 106 consulting parties, including Native Hawaiian Organizations, of any changes in the Undertaking's effect on historic properties, and provide the SHPO, NHOs, and consulting parties 30 days to review the Corps' findings. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with the new findings and will notify the SHPO and consulting parties in writing that the applicable PA stipulation(s) has been met in accordance with Stipulation X.A.

5. If a change in project scope results in additional adverse effects to historic properties the Corps shall consult with all consulting parties to identify appropriate mitigation in accordance with Stipulation IV.C.

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VII. UNANTICIPATED DISCOVERY

A. If previously unidentified cultural resources are discovered during Undertaking implementation, the Corps shall cease all work in the vicinity of the discovered resource until it can be evaluated pursuant to the guidelines in Stipulation III of this PA.

B. If the cultural resource is determined to be eligible for listing on the NRHP, the Corps shall consult with the SHPO to develop treatment in accordance with Stipulation IV of this PA.

C. The Corps shall implement the treatment for non-burial discoveries in accordance with Stipulation IV. For burials, treatment will be in accordance with Stipulation IX, below.

VIII. INADVERTENT ADVERSE EFFECTS

A. If previously identified or unidentified historic properties are inadvertently adversely affected during the Undertaking implementation, the Corps shall cease all work in the vicinity of the inadvertent adverse effect until it can be evaluated pursuant to the guidelines in Stipulation III of this PA.

B. If the historic property is determination to be NRHP eligible; the Corps shall consult with the SHPO to develop treatment in accordance with Stipulation IV of this PA.

C. The Corps shall implement the treatment for non-burial discoveries in accordance with Stipulation IV. For burials, treatment will be in accordance with Stipulation IX, below

IX. TREATMENT OF HUMAN REMAINS

A. Human remains must be treated with the utmost respect and dignity. Historic and prehistoric human remains from non-federal, non-tribal lands are subject to protection under the state's burial law(s) (Hawaiian Administrative Rules §13-300, Rules of Practice and Procedure Relating to Burial Sites and Human Remains, and Hawaii Revised Statutes 6E-43.6, Inadvertent Discovery of Burial Sites). As such, if human remains are discovered during construction, work on that portion of the project shall stop immediately. The remains shall be covered and/or protected in place in such a way that minimizes further exposure of, and damage to the remains, and the Corps shall immediately consult with the SHPO and Oahu Island Burial Council. A treatment plan shall be developed by the Corps in accordance with Hawaiian Administrative Rules §13-300-1. The Corps shall ensure that any approved treatment and reburial plan is fully implemented.

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X. ADMINISTRATIVE TERMS

A. REVIEW PERIODS

Unless indicated otherwise within this document, the SHPO, ACHP, Native Hawaiian Organizations, consulting parties, and any other interested party shall have thirty (30) days to review and comment on determinations, evaluations, plans, reports, and other documents submitted to them by the Corps. If the Corps has not received comments from the SHPO and consulting parties within 30 days the Corps may assume concurrence with determinations, evaluations, plans, reports, and other documents and will notify the SHPO and consulting parties in writing that the applicable PA stipulation(s) has been met.

B. DISPUTE RESOLUTION

1. Should a signatory, invited signatory, or consulting party to this PA object to the manner in which the terms of this PA are being implemented, they shall notify the Corps in writing of the objection. The Corps shall consult with such party to resolve the objection. If the Corps determines that such objection cannot be resolved then Stipulations X(B)(2) and (3) below will be implemented.

2. The Corps and the signatories shall attempt to resolve any disagreement arising from implementation of this PA. If there is a determination that the disagreement cannot be resolved, the Corps shall request the ACHP`s recommendations or request the comments of the ACHP in accordance with 36 CFR Part 800.7.

3. Any ACHP recommendations or comments provided in response will be considered in accordance with 36 CFR Part 800.7, with reference only to the subject of the dispute. The Corps shall respond to ACHP recommendations or comments indicating how the Corps has taken the ACHP's recommendations or comments into account and complied with same prior to proceeding with Undertaking’s activities that are subject to dispute. Responsibility to carry out all other actions under this PA that are not the subject of the dispute will remain unchanged.

C. SUNSET CLAUSE

This PA will continue in full force and effect until the construction of the Undertaking is complete and all terms of this PA are met, unless the Project is terminated or authorization is rescinded or a period of seven (7) years from execution of the PA has passed. Prior to such time, the Corps may consult with other signatories to reconsider the terms of the PA, and the agreement may be extended as written, or amended, in accordance with Stipulation X(D) below, provided all signatories concur.

D. AMENDMENT

This PA may be amended upon agreement in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the ACHP.

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E. TERMINATION

Any signatory to this PA may terminate it by providing thirty (30) days notice to the signatories by certified mail, provided that the signatories will consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination. In the event of termination, the Corps will comply with 36 CFR Parts 800.4 through 800.6 with regard to individual Undertaking actions covered by this Agreement.

F. ANTI-DEFICIENCY ACT

All requirements set forth in this PA requiring expenditure of funds by the Corps are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. 1341). No obligation undertaken by the Corps under the terms of this PA shall require or be interpreted to require a commitment to expend funds not appropriated for a particular purpose. If the Corps cannot perform any obligation set forth in this PA because of the unavailability of funds, that obligation must be renegotiated among the Corps and the signatories as necessary.

Execution and implementation of this PA evidences that the Corps has satisfied its Section 106 responsibilities for all individual Undertakings of the Project, and that the Corps has afforded the ACHP an opportunity to comment on the Undertaking and its effects on historic properties.

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SIGNATORIES:

U.S. ARMY CORPS OF ENGINEERS

By: _____ Date: 11.25.16
James D. Hoyman, P.E.
Lieutenant Colonel, U.S. Army
District Engineer

HAWAII STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: 11.21.16
Alan S. Downer, PhD
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

STATE OF HAWAII, DEPARTMENT OF LAND AND NATURAL RESOURCES

By: _____ Date: 11/21/16
Suzanne D. Case
Chairperson

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

INVITED SIGNATORIES:

OAHU ISLAND BURIAL COUNCIL

By: Charles A Ehrhorn Date: Nov 16, 2016
Charles Ehrhorn
Chair, Oahu Island Burial Council

OFFICE OF HAWAIIAN AFFAIRS

By: Kamanaopono Crabbe Date: 11/21/16
Kamana'opono M. Crabbe, PhD
Ka Pouhana, Office of Hawaiian Affairs

CONCURRING PARTIES:

HISTORIC HAWAII FOUNDATION

By: Kiersten Faulkner Date: Dec. 5, 2016
Kiersten Faulkner
Executive Director, Historic Hawaii Foundation

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LIST OF APPENDICES

A. Location Map for the Undertaking

B. Direct and Indirect Areas of Potential Effect

C. Map of Surveyed Areas and List of Survey Reports

D. NRHP Eligible Archaeological Resources within the Indirect APE

E. NRHP Eligible Historic Architectural Resources within the Direct APE

F. NRHP Eligible Historic Architectural Resources within the Indirect APE

G. List of Consulting Parties

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Appendix A: Location Map for the Undertaking

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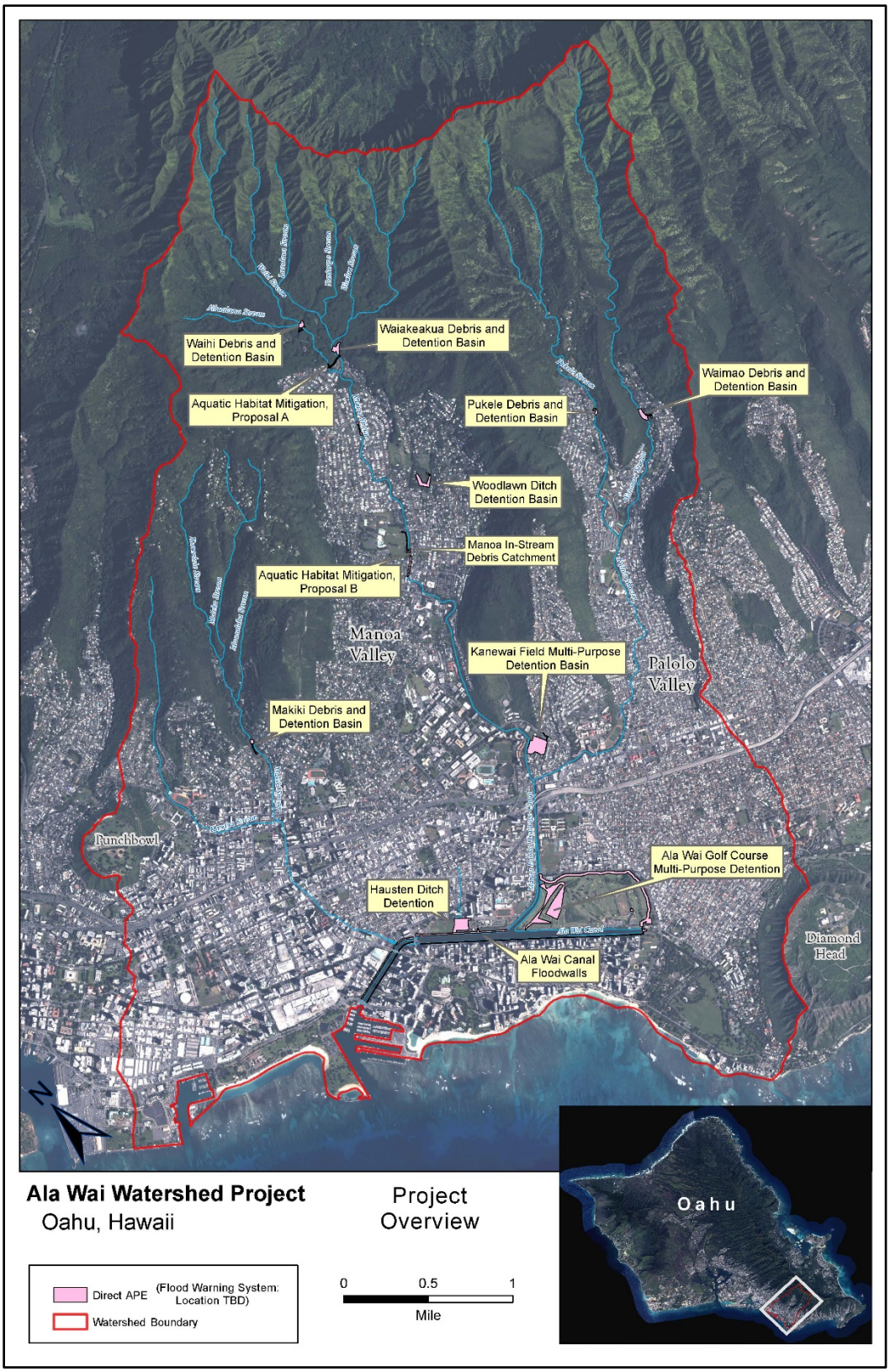

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Appendix B: Direct and Indirect Areas of Potential Effect

[*Note: maps have been removed to protect the locations of cultural resources per 36 CFR 800.11(c)*]

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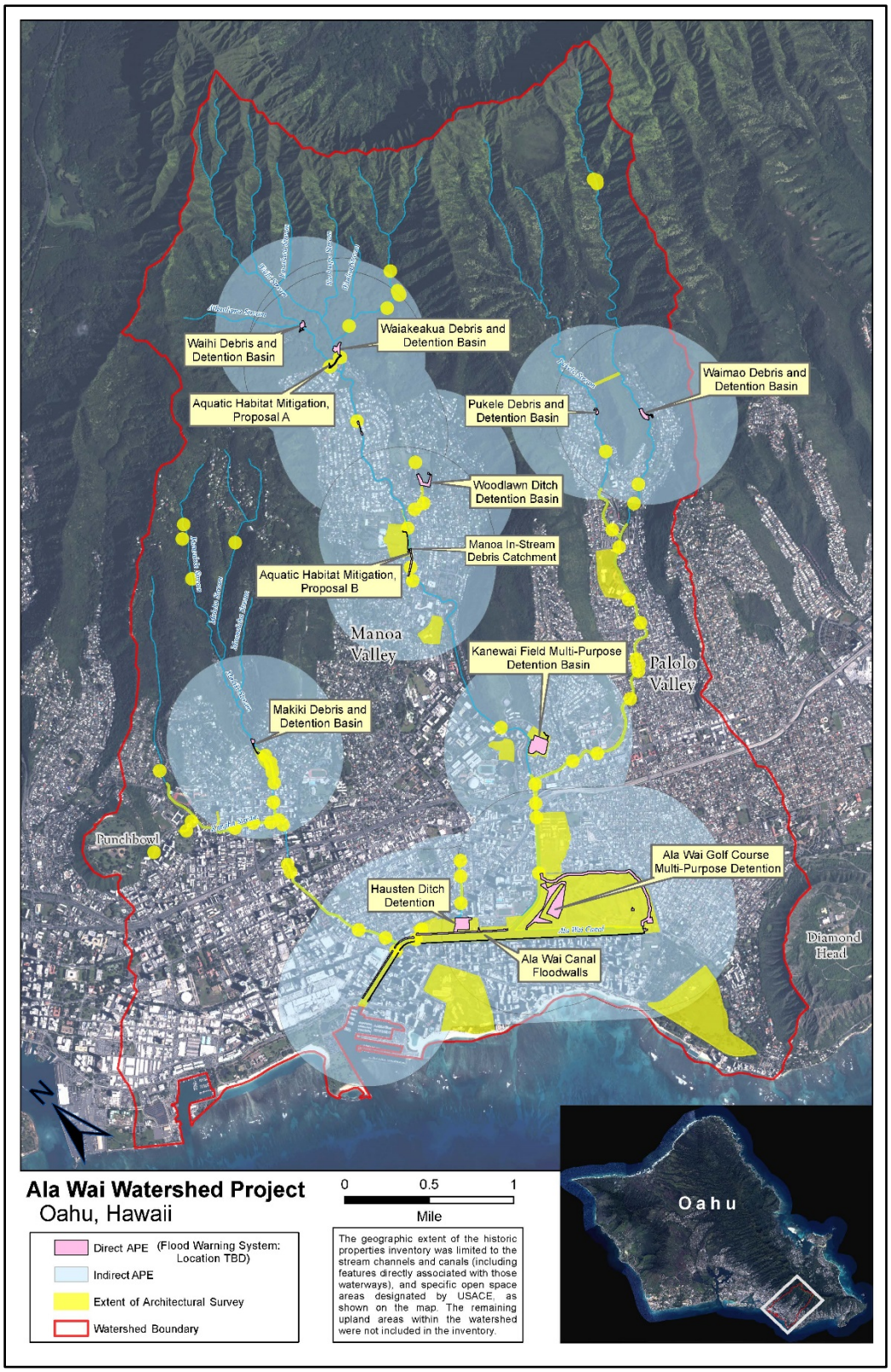
Watershed Overview Showing Indirect APEs with Historic Buildings/Structures Survey Area



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Appendix C: Maps of Surveyed Areas and List of Survey Reports

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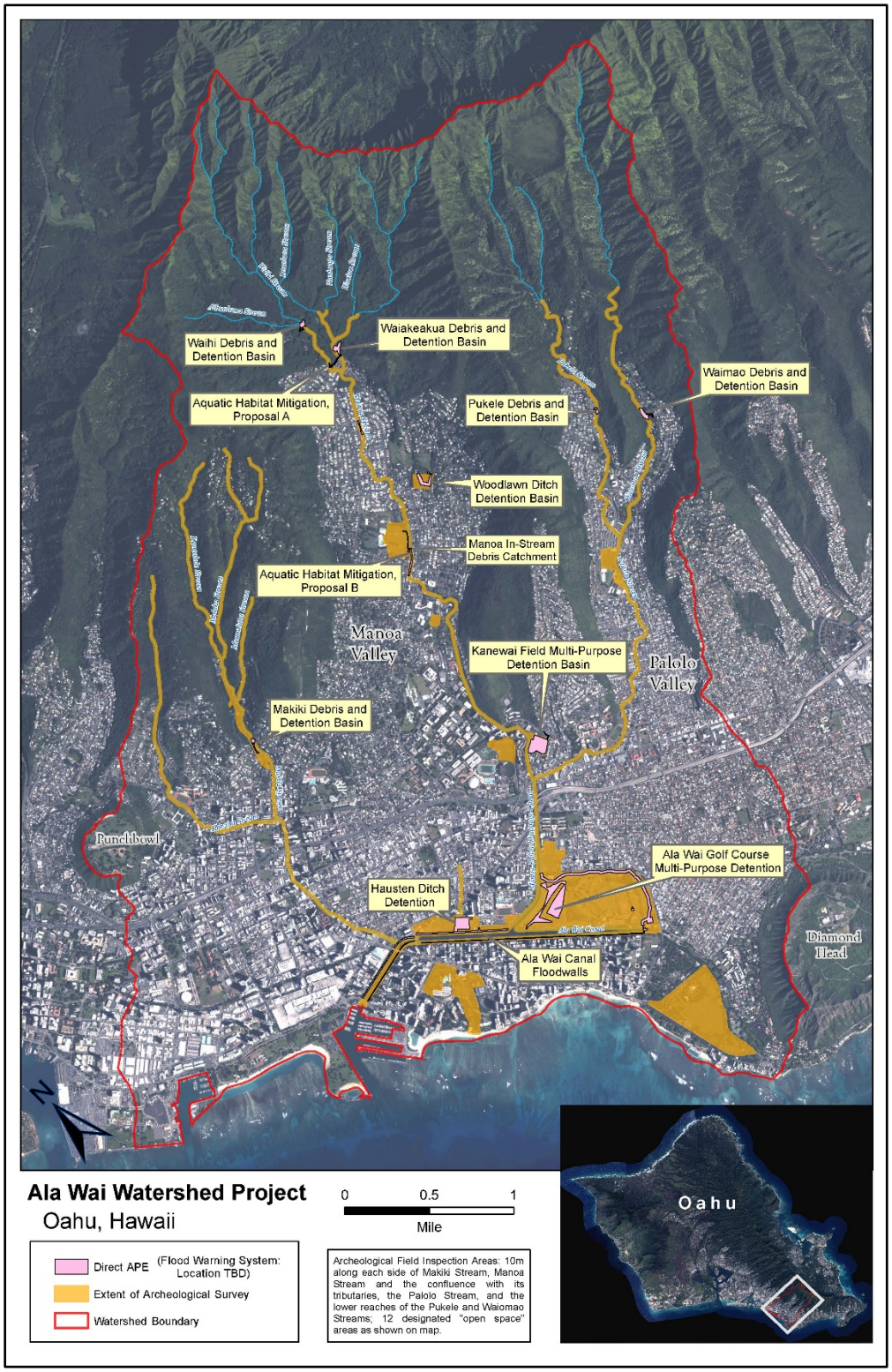
Archaeological Survey



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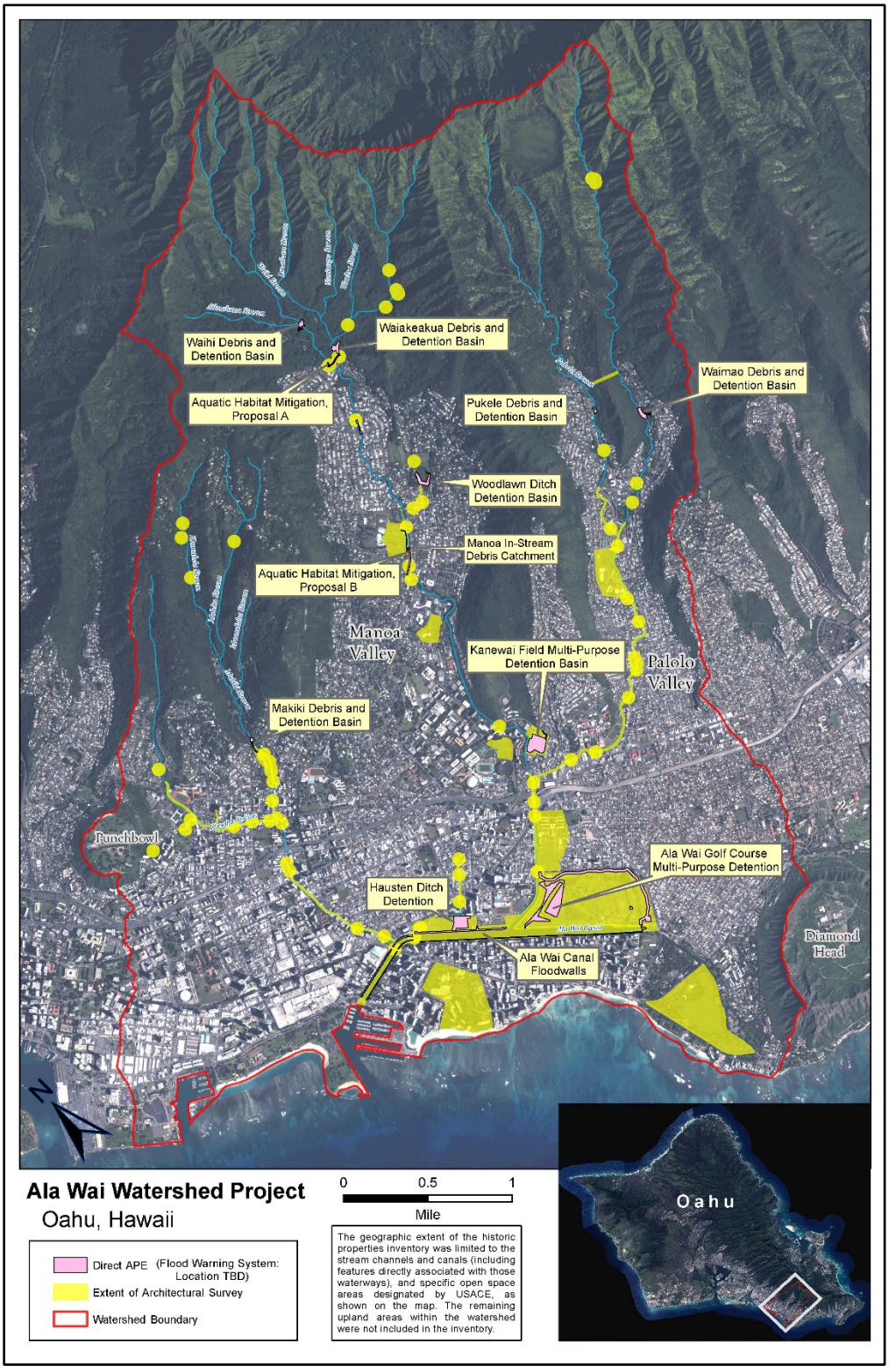
Historic Property (Building and Structure) Survey



CONTROLLED UNCLASSIFIED INFORMATION (CUI)

List of Survey Reports

Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project: Makiki, Mānoa and Pālolo Ahupua'a, Honolulu District, O'ahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume I: Cultural Resources of the Makiki, Mānoa and Pālolo Ahupua'a, prepared for CH2M Hill, prepared by Cultural Surveys Hawai'i, Inc., April 2010.

Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project: Makiki, Mānoa and Pālolo Ahupua'a, Honolulu District, O'ahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume II: Cultural Resources of Kaka'ako and Waikīkī Ahupua'a, prepared for CH2M Hill, prepared by Cultural Surveys Hawai'i, Inc., April 2010.

Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project, Honolulu, Makiki, Mānoa, Pālolo, and Waikīkī Ahupua'a, Honolulu District, O'ahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume III: Ethnographic Study, prepared for CH2M Hill, prepared by Cultural Surveys Hawai'i, Inc., April 2010.

Cultural Impact Assessment for the Ala Wai Canal Project, Waikīkī, Pālolo, Makiki, and Mānoa Ahupua'a, Honolulu (Kona) District, O'ahu, TMKs: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, prepared for CH2M Hill, prepared by Cultural Surveys Hawai'i, Inc., July 2014.

Historic Structures Inventory Survey of the Ala Wai Watershed, prepared for CH2M Hill, prepared by Mason Architects, Inc., March 2010

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Appendix D: NRHP Eligible Archaeological Resources within the Indirect APE

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Appendix D: Archaeological Sites in Indirect APE

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	1) Makiki: Makiki D&D Basin				
	Makiki Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Terrace	50-80-14-6712	*	no effect	avoidance
	Terrace	50-80-14-6717	D	no effect	avoidance
	Bottle Dump	50-80-14-6726	*	no effect	avoidance
	Overhang Shelter	No SIHP Assigned	none	no effect	avoidance
	2) Manoa: Waihi D&D Basin				
	Waihi Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Platform	50-80-14-3726	*	no effect	avoidance
	Historic House	50-80-14-6727	*	no effect	avoidance
	Mounds/Platforms/Walls	50-80-14-6734	D,e	adverse effect	follow PA
	Terraces	50-80-14-6735	D	no effect	avoidance
	Waihi Stream Stone/Mortar Dam	50-80-14-6736/ No.54	A	adverse effect	create more natural stream bed appearance
	Historic House	50-80-14-6737	C,D	no effect	avoidance
	Historic House	50-80-14-6738	C,D	no effect	avoidance
	Wall/Historic Dump	50-80-14-6739	*	no effect	avoidance
	Terrace	50-80-14-6740	*	no effect	avoidance
	Historic Houses	50-80-14-6741	*	no effect	avoidance
	Historic House	50-80-14-6742	*	no effect	avoidance
	Cave/Terrace Complex	50-80-14-6743	*	no effect	avoidance
	Bridge Foundation	50-80-14-6744	C,D	no effect	avoidance
	Bridge Foundation	50-80-14-6745	*	no effect	avoidance
	Historic House	50-80-14-6746	*	no effect	avoidance
	Aihualama Loi	No SIHP Assigned	A,C	no adverse effect	avoidance

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	3) Manoa: Waiakeakua D&D Basin				
	Waiakeakua Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Mounds	50-80-14-1170	*	no effect	avoidance
	Platform	50-80-14-3726	*	no effect	avoidance
	Historic House	50-80-14-6727	*	no effect	avoidance
	Mounds/Platforms/Walls	50-80-14-6734	D,e	adverse effect	follow PA
	Terraces	50-80-14-6735	D	no effect	avoidance
	Waihi Stream Stone/Mortar Dam	50-80-14-6736/ No.54	A	adverse effect	create more natural stream bed appearance
	Historic House	50-80-14-6737	C,D	no effect	avoidance
	Historic House	50-80-14-6738	C,D	no effect	avoidance
	Wall/Historic Dump	50-80-14-6739	*	no effect	avoidance
	Terrace	50-80-14-6740	*	no effect	avoidance
	Historic Houses	50-80-14-6741	*	no effect	avoidance
	Historic House	50-80-14-6742	*	no effect	avoidance
	Cave/Terrace Complex	50-80-14-6743	*	no effect	avoidance
	Bridge Foundation	50-80-14-6744	C,D	no effect	avoidance
	Bridge Foundation	50-80-14-6745	*	no effect	avoidance
	Historic House	50-80-14-6746	*	no effect	avoidance
	Aihualama Loi	No SIHP Assigned	A,C	no adverse effect	avoidance
	4) Manoa: Woodlawn Ditch				
	Historic Bottle Cache	50-80-14-4659	*	no effect	avoidance
	Retaining Wall	50-80-14-6733	*	no effect	avoidance
	5) Manoa: Manoa In-Stream Debris Catchment				
	Terrace/Wall	50-80-14-6728	*	no effect	avoidance
	6) Manoa: Kanewai Field Multi-Purpose Detention Basin				
	UH Agricultural Complex - Kanewai Loi	50-80-14-4498	A,C	no adverse effect	avoidance
	Terrace	50-80-14-6729	*	no effect	avoidance
	Stone/Mortar Dam	50-80-14-6730	*	no effect	avoidance
	Historic Building Foundation	50-80-14-7078	*	no effect	avoidance
	Morgue Egress	50-80-14-7078 2	*	no effect	avoidance
	Koana Cave	No SIHP Assigned		no effect	avoidance

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	7) Palolo: Pukele D&D Basin				
	Pukele Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Old Kawao Community Park	50-80-14-1726	*	no effect	avoidance
	Terrace Complex	50-80-14-6749	*	no effect	avoidance
	Terrace Complex	50-80-14-6750	*	no effect	avoidance
	8) Palolo: Waiomao D&D Basin				
	Waiomao Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Old Kawao Community Park	50-80-14-1726	*	no effect	avoidance
	Terrace Complex	50-80-14-6749	*	no effect	avoidance
	Terrace Complex	50-80-14-6750	*	no effect	avoidance
	9) Ala Wai: Hausten Ditch Detention Basin				
	Subsurface Cultural Deposit	50-80-14-6848	*	no effect	avoidance
	Hawaiian Canoe Malia	50-80-14-9762	*	no effect	avoidance
	Trash Pit	No SIHP Assigned		no effect	avoidance
	10) Ala Wai: Ala Wai Golf Course MPDB				
	Historic Trash Pit	50-80-14-4224	*	no effect	avoidance
	Buried A-Horizon	50-80-14-5883	*	no effect	avoidance
	Cultural Deposit	50-80-14-5940 A	*	no effect	avoidance
	Cultural Deposit	50-80-14-5940 B	*	no effect	avoidance
	Fire Pit	50-80-14-5940 C	*	no effect	avoidance
	Historic Trash Pit	50-80-14-5941	*	no effect	avoidance
	from Honolulu Rapid Transit Rail Study	50-80-14-5942	*	no effect	avoidance
	Muliwai Kukaunahi	50-80-14-5943	*	no effect	avoidance
	Historic Trash Pit	50-80-14-6372	*	no effect	avoidance
	Historic Trash Pit	50-80-14-6398	*	no effect	avoidance
	Historic Trash Pit	50-80-14-7069	*	no effect	avoidance
	Subsurface Cultural Deposit	50-80-14-7208 1-12	*	no effect	avoidance
	Subsurface Cultural Deposit	50-80-14-7208 13	*	no effect	avoidance
	Trash Pit	No SIHP Assigned		no effect	avoidance
	Imu	No SIHP Assigned		no effect	avoidance
	Subsurface Cultural Deposit	No SIHP Assigned		no effect	avoidance

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	11) Ala Wai: Ala Wai Canal Floodwalls/Pump Stations				
	Wood-Lined Subsurface Feature	50-80-14-6847	*	no effect	avoidance
	Subsurface Privy Remnant	50-80-14-7430	*	no effect	avoidance
	Subsurface Historic Structure Remnants	50-80-14-7431	*	no effect	avoidance
	12) Watershed: Flood Warning System (Locations To Be Determined)				
	Manoa Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Makiki Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Palolo Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Waiomao Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Ala Wai Canal	50-80-14-9757	A	adverse effect	mitigation plan/ historic documentation/ consulting party design input & review
	13a) Aquatic Habitat Mitigation, Proposal A (Falls Repair)				
	Waihi Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Waiakeakua Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Manoa Stream	No SIHP Assigned	e	adverse effect	micrositing to avoid significant resources
	Mounds	50-80-14-1170 2	*	no effect	avoidance
	Platform	50-80-14-3726	*	no effect	avoidance
	Historic House	50-80-14-6727	*	no effect	avoidance
	Retaining Wall	50-80-14-6733	*	no effect	avoidance
	Mounds/Platforms/Walls	50-80-14-6734	D,e	adverse effect	follow PA
	Terraces	50-80-14-6735	D	no effect	avoidance
	Waihi Stream Stone/Mortar Dam	50-80-14-6736/ No.54	A	adverse effect	create more natural stream bed appearance
	Historic House	50-80-14-6737	C,D	no effect	avoidance
	Historic House	50-80-14-6738	C,D	no effect	avoidance

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	Wall/Historic Dump	50-80-14-6739	*	no effect	avoidance
	Terrace	50-80-14-6740	*	no effect	avoidance
	Historic Houses	50-80-14-6741	*	no effect	avoidance
	Historic House	50-80-14-6742	*	no effect	avoidance
	Cave/Terrace Complex	50-80-14-6743	*	no effect	avoidance
	Bridge Foundation	50-80-14-6744	C,D	no effect	avoidance
	Bridge Foundation	50-80-14-6745	*		
	Historic House	50-80-14-6746	*	no effect	avoidance
	Aihualama Loi	No SIHP Assigned	A,C	no adverse effect	avoidance
	13b) Aquatic Habitat Mitigation, Proposal B (Manoa Stream)				
	Heiau	50-80-14-3986	*	no effect	avoidance
	Terrace/Wall	50-80-14-6728	*	no effect	avoidance
	Stone/Mortar Dam	50-80-14-6731	*	no effect	avoidance
	Bridge Foundation	50-80-14-6732	*	no effect	avoidance

* Archaeological sites previously assigned a Hawaii Statewide Inventory of Historic Properties number meet NRHP eligibility

Appendix E: NRHP Eligible Historic Architectural Resources within the Direct APE

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Appendix E: Architectural Historic Properties in Direct APE

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	1) Makiki: Makiki D&D Basin				
	Archie Baker Park	Inventory No. 92	A,C	no adverse effect	minimize temporay impacts
	2) Manoa: Waihi D&D Basin				
	None				
	3) Manoa: Waiakeakua D&D Basin				
	Waaloa Way Bridge 2	Inventory No. 51	C	adverse effect	historic documentation / mitigation plan as needed
	Waaloa Way Bridge 1	no inventory number	none	adverse effect	historic documentation
	4) Manoa: Woodlawn Ditch				
	Open Space at Park	No SIHP Assigned	none	not historic	not historic
	5) Manoa: Manoa In-Stream Debris Catchment				
	Manoa Stream Channel	Inventory No. 41	A,C	adverse effect	historic documentation
	6) Manoa: Kanewai Field Multi-Purpose Detention Basin				
	Kanewai Field	Inventory No. 94	C	no adverse effect	avoid architecture & trees, seed the new berm
	7) Palolo: Pukele D&D Basin				
	None				
	8) Palolo: Waiomao D&D Basin				
	Waiomao USGS Gaging Station	No SIHP Assigned	none	not historic	not historic
	9) Ala Wai: Hausten Ditch Detention Basin				
	Ala Wai Canal	50-80-14-9757	A	adverse effect	mitigation plan/ historic documentation/ consulting party design input & review
	Alanaio Stream Channel (Hausten Ditch)	Inventory No. 82	A,C	this section not historic	none
	Ala Wai Park	No SIHP Assigned	none	not historic	not historic
	10) Ala Wai: Ala Wai Golf Course MPDB				
	Ala Wai Golf Course	No SIHP Assigned	none	not historic	monitoring during construction
	Manoa-Palolo Canal	Inventory No. 36	A,C	adverse effect	historic documentation

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	11) Ala Wai: Ala Wai Canal Floodwalls/Pump Stations				
	Kalakaua Ave Bridge	Inventory No. 02	A,C	adverse effect	match design with existing walls
	McCully Street Bridge	Inventory No. 03	A,C	adverse effect	match design with existing walls
	Kapahulu (Ala Wai Golf course) Drainage	No SIHP Assigned	none	not historic	not historic
	Ala Wai Canal	50-80-14-9757	A	adverse effect	mitigation plan/ historic documentation/ consulting party design input & review
	Ala Wai Clubhouse (C&C Art Deco Parks)	50-80-14-1388/ No.90	C	adverse effect	historic documentation / consulting party design input
	12) Watershed: Flood Warning System				
	Ala Wai Canal	50-80-14-9757	A	adverse effect	mitigation plan/ historic documentation/ consulting party design input & review
	Other Locations To Be Determined				follow PA
	13a) Aquatic Habitat Mitigation, Proposal A (Falls Repair)				
	Waaloa Way Bridge 1	no inventory number	none	no adverse effect	historic documentation
	Waaloa Way Bridge 2	Inventory No. 51	C	adverse effect	historic documentation / mitigation plan as needed
	Waihi Gaging Station	Inventory No. 53	A,C	no effect	avoidance
	Waihi Stream Stone/Mortar Dam	50-80-14-6736/ No.54	A	adverse effect	create more natural stream bed appearance
	Waiakeakua Gaging Station	Inventory No. 55	A,C	adverse effect	create more natural stream bed appearance
	13b) Aquatic Habitat Mitigation, Proposal B (Manoa Stream)				
	Manoa Stream Channel	Inventory No. 41	A,C	adverse effect	historic documentation
	Lowrey Avenue Bridge	Inventory No. 45	C	no effect	avoidance

Appendix F: NRHP Eligible Historic Architectural Resources within the Indirect APE

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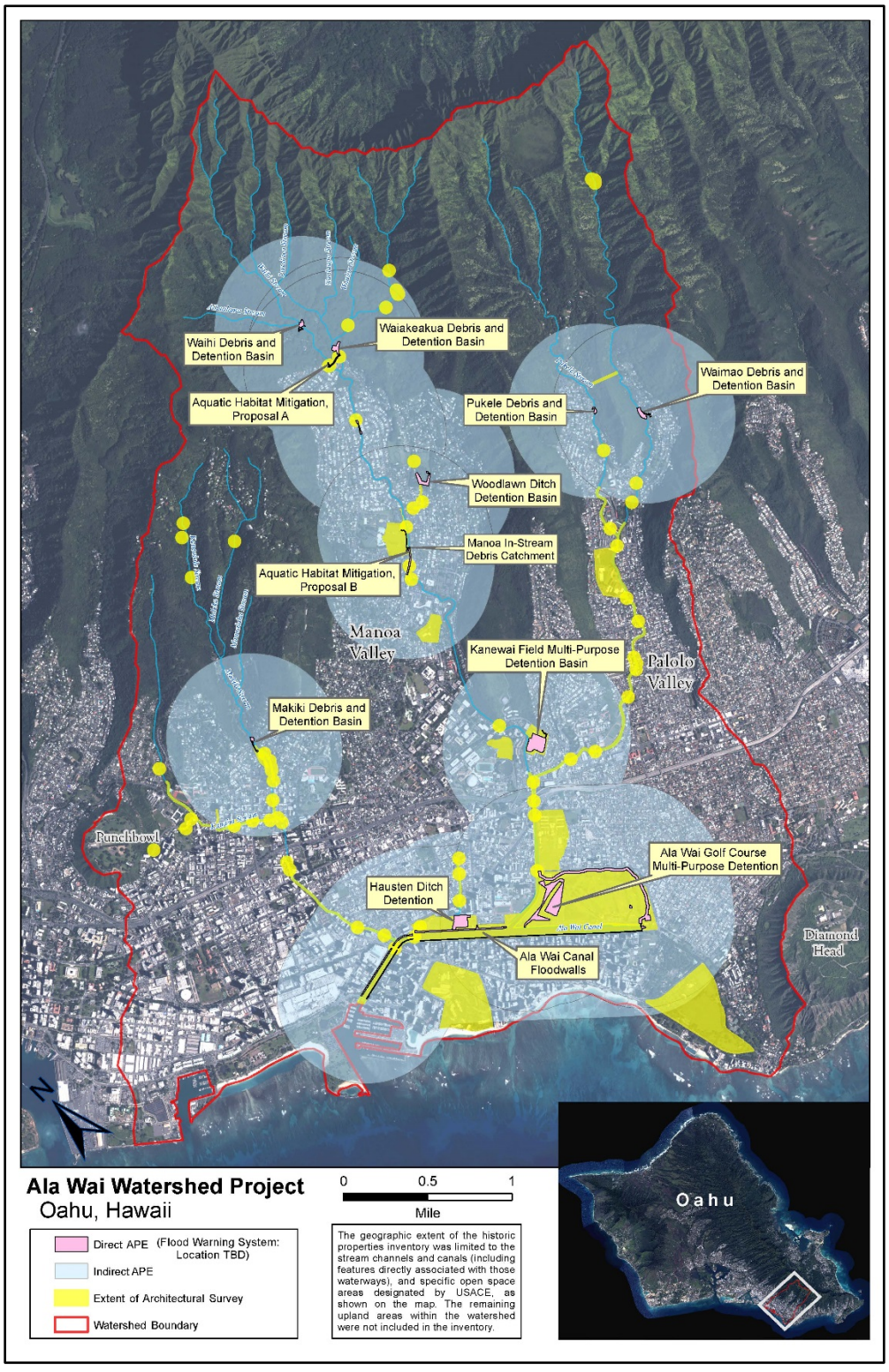
Historic Architectural Resources within the Indirect APE



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Appendix F: Architectural Historic Properties in Indirect APE

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	1) Makiki: Makiki D&D Basin				
	Makiki Stream Channel	Inventory No. 11	C	no effect	avoidance
	Makiki Street Bridge	Inventory No. 17	C	no effect	avoidance
	Oneele Place Bridge	Inventory No. 18	A, C	no effect	avoidance
	Shingle Pedestrian Bridge	Inventory No. 19	A, C		avoidance
	Shingle Driveway Bridge	Inventory No. 20	A, C		avoidance
	Anapuni Street Bridge	Inventory No. 22	C		avoidance
	1727 Makiki Street	Inventory No. 23	C	no effect	avoidance
	Kewalo Street Sulvert	Inventory No. 26	C		avoidance
	Keeaumoku Street Culvert	Inventory No. 27	C		avoidance
	Makiki Street Ext. Culvert	Inventory No. 28	C		avoidance
	Wilder Street Culvert	Inventory No. 29	C		avoidance
	2) Manoa: Waihi D&D Basin				
	Waaloa Way Bridge 2	Inventory No. 51	C	adverse effect	historic documentation / mitigation plan as needed
	Waaloa Way Bridge 4	Inventory No. 52	C	no effect	avoidance
	Waihi Gaging Station	Inventory No. 53	A,C	no effect	avoidance
	Waihi Stream Stone/Mortar Dam	50-80-14-6736/ No.54	A	adverse effect	create more natural stream bed appearance
	Waiakeakua Gaging Station	Inventory No. 55	A,C	adverse effect	create more natural stream bed appearance
	Manoa Tunnel Trail Steps No. 1	Inventory No. 56	C	no effect	avoidance
	3) Manoa: Waiakeakua D&D Basin				
	Waaloa Way Bridge 4	Inventory No. 52	C	no effect	avoidance
	Waihi Gaging Station	Inventory No. 53	A,C	no effect	avoidance
	Waihi Stream Stone/Mortar Dam	50-80-14-6736/ No.54	A	adverse effect	create more natural stream bed appearance
	Waiakeakua Gaging Station	Inventory No. 55	A,C	advese effect	create more natural stream bed appearance
	Manoa Tunnel Trail Steps No. 1	Inventory No. 56	C	no effect	avoidance

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	Manoa Tunnel No. 1	Inventory No. 57	A	no effect	avoidance
	Manoa Tunnel No. 2	Inventory No. 58	A	no effect	avoidance
	Manoa Tunnel Pipe Crossing	Inventory No. 59	C	no effect	avoidance
	Manoa Tunnel Trail Steps No. 2	Inventory No. 60	C	no effect	avoidance
	Manoa Rain Gauge	Inventory No. 61	A	no effect	avoidance
	4) Manoa: Woodlawn Ditch				
	Woodlawn Ditch	Inventory No. 42	A,C	no effect	avoidance
	East Manoa Road Manoa Park Ditch Bridge	Inventory No. 47	C	no effect	avoidance
	East Manoa Road Culvert	Inventory No. 48	C	no effect	avoidance
	Kaamamilo Drive Driveway Bridge	Inventory No. 49	C	no effect	avoidance
	5) Manoa: Manoa In-Stream Debris Catchment				
	East Manoa Road Bridge	Inventory No. 44	C	no effect	avoidance
	Lowrey Avenue Bridge	Inventory No. 45	C	no effect	avoidance
	Kahaloa Drive Bridge	Inventory No. 46	C	no effect	avoidance
	6) Manoa: Kanewai Field Multi-Purpose Detention Basin				
	Manoa-Palolo Canal	Inventory No. 36	A,C	no effect	avoidance
	Old Waialae Rd Bridge	Inventory No. 40	C	no effect	avoidance
	Dole Street Bridge	Inventory No. 43	C	no effect	avoidance
	Palolo Stream Channel	Inventory No. 63	A,C	no effect	avoidance
	St. Louis High School Bridge	Inventory No. 64	A, C	no effect	avoidance
	St. Louis Drive Bridge	Inventory No. 65	A, C	no effect	avoidance
	7) Palolo: Pukele D&D Basin				
	10th Avenue Place Bridge	Inventory No. 74	C	no effect	avoidance
	Palolo Avenue Bridge	Inventory No. 77	C	no effect	avoidance
	Palolo Pipeline Tunnel	Inventory No. 78	A,C	no effect	avoidance
	8) Palolo: Waiomao D&D Basin				
	10th Avenue Place Bridge	Inventory No. 74	C	no effect	avoidance
	10th Avenue Bridge	Inventory No. 75	C	no effect	avoidance
	Palolo Avenue Bridge	Inventory No. 77	C	no effect	avoidance
	Palolo Pipeline Tunnel	Inventory No. 78	A,C	no effect	avoidance

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	9) Ala Wai: Hausten Ditch Detention Basin				
	Ala Wai Clubhouse (C&C Art Deco Parks)	50-80-14-1388/ No. 90	C	adverse effect	follow PA
	Kalakaua Ave Bridge	Inventory No. 02	A,C	adverse effect	match design with existing walls
	McCully Street Bridge	Inventory No. 03	A,C	adverse effect	match design with existing walls
	Alanaio Channel	Inventory No. 82	A,C	no effect	avoidance
	Hausten Street Culvert	Inventory No. 83	C	no effect	avoidance
	Box culvert at Date Street	Inventory No. 84	C	no effect	avoidance
	Box culvert at Kapiolani Blvd	Inventory No. 85	C	no effect	avoidance
	10) Ala Wai: Ala Wai Golf Course MPDB				
	Kapahulu (Ala Wai Golf Course) Drainage	No SIHP Assigned	none	not historic	not historic
	Date Street Bridge	Inventory No. 37	A,C	no effect	avoidance
	Kapiolani Blvd Bridge	Inventory No. 38	C	no effect	avoidance
	King Street Bridge	Inventory No. 39	C	no effect	avoidance
	Alanaio Channel	Inventory No. 82	A,C	no effect	avoidance
	Hausten St Culvert	Inventory No. 83	C	no effect	avoidance
	Box culvert at Date Street	Inventory No. 84	C	no effect	avoidance
	Box culvert at Kapiolani Blvd	Inventory No. 85	C	no effect	avoidance
	Kaimuki High School	Inventory No. 95	C	no effect	avoidance
	11) Ala Wai: Ala Wai Canal Floodwalls/Pump Stations				
	Makiki Stream Flood Control Project	Inventory No. 04	C	no effect	avoidance
	Kapiolani Blvd Bridge #1	Inventory No. 05	C	no effect	avoidance
	Fern Street Bridge	Inventory No. 06	C	no effect	avoidance
	Manoa-Palolo Canal	Inventory No. 36	A,C	adverse effect	historic documentation
	Date Street Bridge	Inventory No. 37	A,C	no effect	avoidance
	Alanaio Channel	Inventory No. 82	A,C	no effect	avoidance
	Hausten Street Culvert	Inventory No. 83	C	no effect	avoidance
	Box culvert at Date Street	Inventory No. 84	C	no effect	avoidance
	Box culvert at Kapiolani Blvd	Inventory No. 85	C	no effect	avoidance

	DESCRIPTION	SITE ID	CRITERIA	EFFECTS DETERMINATION	TREATMENT RECOMMENDATION
	12) Watershed: Flood Warning System				
	Ala Wai Canal	50-80-14-9757	A	adverse effect	mitigation plan/ historic documentation/ consulting party design input & review
	Other Locations To Be Determined				follow PA
	13a) Aquatic Habitat Mitigation, Proposal A (Falls Repair)				
	East Manoa Rd Culvert	Inventory No. 48	C	no effect	avoidance
	Pawaina Street Bridge	Inventory No. 50	C	no effect	avoidance
	Waaloa Way Bridge 2	Inventory No. 51	C	adverse effect	historic documentation / mitigation plan as needed
	Waaloa Way Bridge 1	no inventory number	none	no adverse effect	historic documentation
	Waaloa Way Bridge 4	Inventory No. 52	C	no effect	avoidance
	Waihi Gaging Station	Inventory No. 53	A,C	no effect	avoidance
	Waihi Stream Stone/Mortar Dam	50-80-14-6736/ No.54	A	adverse effect	create more natural stream bed appearance
	Waiakeakua Gaging Station	Inventory No. 55	A,C	adverse effect	create more natural stream bed appearance
	Manoa Tunnel Trail Steps No. 1	Inventory No. 56	C	no effect	avoidance
	13b) Aquatic Habitat Mitigation, Proposal B (Manoa Stream)				
	Manoa Stream Channel	Inventory No. 41	A,C	adverse effect	historic documentation
	Woodlawn Ditch	Inventory No. 42	A,C	no effect	avoidance
	East Manoa Road Bridge	Inventory No. 44	C	no effect	avoidance
	Lowrey Avenue Bridge	Inventory No. 45	C	no effect	avoidance
	Kahaloa Drive Bridge	Inventory No. 46	C	no effect	avoidance
	East Manoa Road Manoa Park Ditch Bridge	Inventory No. 47	C	no effect	avoidance
	East Manoa Road Culvert	Inventory No. 48	C	no effect	avoidance
	Kaamamilo Drive Driveway Bridge	Inventory No. 49	C	no effect	avoidance

Appendix G: List of Consulting Parties

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Luana Froiseth
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Honolulu, HI 96804

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3. List of Cultural Resource Reports

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List of Survey Reports

Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project: Makiki, Mānoa and Pālolo Ahupua'a, Honolulu District, O'ahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume I: Cultural Resources of the Makiki, Mānoa and Pālolo Ahupua'a, prepared for CH2M Hill, prepared by Cultural Surveys Hawai'i, Inc., April 2010.

Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project: Makiki, Mānoa and Pālolo Ahupua'a, Honolulu District, O'ahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume II: Cultural Resources of Kaka'ako and Waikīkī Ahupua'a, prepared for CH2M Hill, prepared by Cultural Surveys Hawai'i, Inc., April 2010.

Cultural Resources and Ethnographic Study for the Ala Wai Watershed Project, Honolulu, Makiki, Mānoa, Pālolo, and Waikīkī Ahupua'a, Honolulu District, O'ahu Island, TMK: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, Volume III: Ethnographic Study, prepared for CH2M Hill, prepared by Cultural Surveys Hawai'i, Inc., April 2010.

Cultural Impact Assessment for the Ala Wai Canal Project, Waikīkī, Pālolo, Makiki, and Mānoa Ahupua'a, Honolulu (Kona) District, O'ahu, TMKs: [1] 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, and 2-9; [1] 3-1, 3-2, 3-3, and 3-4, prepared for CH2M Hill, prepared by Cultural Surveys Hawai'i, Inc., July 2014.

Historic Structures Inventory Survey of the Ala Wai Watershed, prepared for CH2M Hill, prepared by Mason Architects, Inc., March 2010

Note: cultural resource reports are available upon request to qualified and appropriate parties or individuals

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US Army Corps of Engineers

General Reevaluation Report with Integrated Supplemental Environmental Impact Statement Appendix M — Public Coordination

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Report Status: Draft, November 2023

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1. Introduction

The purpose of this appendix is to document the public engagement that has been undertaken in support of the General Reevaluation Report with Integrated Supplemental Environmental Impact Statement document for the Ala Wai Canal Flood Risk Management Study. In this appendix, information on scoping, public meetings, and public comments received as part of the ongoing coordination with the public during the development of the GRR and Supplemental Environmental Impact Statement (SEIS) is documented.

1.1 Public Engagement

The public engagement strategy for the study initially included four rounds of community engagement opportunities for the community throughout the study. The first round of community engagements was to present the problem and discuss possible opportunities and potential solutions. The second round of community engagements were to discuss a more focused set of potential solutions under consideration at that stage; prior to the release of the Draft Report. The third round of community engagements were to discuss the Tentatively Selected Plan as presented in the Draft Report. The final round of community engagements was to review the Recommended Plan prior to release of the Final Report.

The public engagement strategy was then refined based on feedback received during the initial public workshops to provide additional opportunities for interested parties to provide input into the study process and the development of alternative flood risk management plans. Fundamental elements of the revised public engagement plan included:

- Continuous, virtual, asynchronous engagement through website, email, documents
- Workshops and structured meetings aligned with study milestones (hybrid – i.e., simultaneously virtual and in-person – when possible)
- Additional meetings with stakeholders for updates and focused exercises (virtual)

A website (https://www.honolulu.gov/alawai/public-engagement.html) was established that included features for receiving public input, responding to that input, as well as for providing information with regard to the study. The website served not only as an information and communication hub, but it provided a degree of transparency that was equally accessible to all stakeholders and the entire public. Information provided on the website included in general:

- Basis study information
- Public releases and announcements
- Public meeting schedule

Responsive information provided on the website included in general:

- Frequently Asked Questions (FAQs); brief answers to questions, updated regularly and as new questions were received
- Extended (1-pagee) explanations of selected complex issues and questions
- Records of public meetings and sanctioned *ex-parte* discussions
- Table/spreadsheet that tracks measures and alternatives considered, including up-to-date status and briefing notes

Features on the website for receiving input from stakeholders and the public included in general:

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- Contact information, including active email link
- Submittable contact form
- Link to crowdsource reporter for submitting geolocated input (closed April 2022)

The following sections provide information on the public engagement opportunities, as described above, that have occurred to date as part of this study.

1.2 Scoping Notice

Per CFR 43 § 46.235, scoping is required for an environmental impact statement but not for an environmental assessment, although scoping is likely helpful during preparation of an environmental assessment. At the beginning of the feasibility phase for the Ala Wai Canal General Reevaluation Report, it was unknown as to the type of environmental document that would be necessary. Therefore, it was assumed an environmental assessment would be prepared until it was determined the proposed project may have significant, unavoidable impacts. Although an environmental assessment was assumed, scoping was still conducted. Scoping is used to engage federal, State, local, and tribal governments, and the public in the early identification of concerns, potential impacts, relevant effects of past actions and possible alternative actions.

1.3 Scoping Notice

On August 9, 2021, a scoping notice was sent via email to parties identified in the 2017 Ala Wai Canal Integrated Feasibility Study and Environmental Impact Statement. The scoping notice requested feedback from recipients on the scope of issues to be addressed in the NEPA document, any resources, or habitats of concern in the study area, information on ongoing projects in the study area, and input on management measures. The following is the scoping letter that was sent and the distribution list for the scoping notice.

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Environment

DEPARTMENT OF THE ARMY
PITTSBURGH DISTRICT, CORPS OF ENGINEERS
WILLIAM S. MOORHEAD FEDERAL BUILDING
1000 LIBERTY AVENUE
PITTSBURGH, PA 15222-4186

REPLY TO
ATTENTION OF

Environmental and Cultural Resources Section

9 August 2021

To Whom It May Concern:

The U. S. Army Corps of Engineers Pittsburgh District (Corps) is in the process of preparing a General Reevaluation Report (GRR) with integrated environmental documentation for the Ala Wai Canal Flood Risk Management Feasibility Study, O'Ahu, Hawai'i. The GRR will present the results of a Corps study undertaken to identify and evaluate flood risk management problems and opportunities for the Ala Wai Watershed in O'Ahu, Hawai'i. The GRR will constitute a reevaluation of the authorized project proceeding from the 2018 Chief's Report approving the recommended plan from the 2018 Ala Wai Canal Flood Risk Management Feasibility Report, Environmental Impact Statement (EIS), and Record of Decision (ROD). The 2018 Feasibility Study and this GRR are authorized under Section 209 of the Flood Control Act of 1962 (Public Law 87-874). The sponsor for this project is the City and County of Honolulu.

The general purpose of this GRR study is to analyze alternatives to reduce the risk to life safety and economic damages from flooding throughout the entire Ala Wai Watershed (i.e., Manoa, Palolo, and Makiki drainages, including Waikiki and surrounding areas). The scope of this study is to complete a GRR of the authorized project for the Ala Wai Watershed, O'Ahu, Hawai'i. It is a single-purpose study for flood risk reduction. This reevaluation will result in a recommendation that will either update and confirm the authorized project or make a new recommendation. The study will evaluate and compare benefits, costs, and impacts (positive or negative) of alternatives including the No Action Alternative. The study will identify whether a federal interest exists to reduce economic damages and life safety risk due to flooding. The GRR will also satisfy the requirement of the National Environmental Policy Act (NEPA) to evaluate the proposed federal action.

The study area includes encompasses the Ala Wai Watershed, which is located on the southeastern side of the island of O'ahu, and includes Makiki, Manoa, and Palolo streams. All these streams drain to the 2-mile-long Ala Wai Canal, which was constructed during the 1920s to drain extensive coastal wetlands, thus allowing development of the Waikiki District. A large portion of the watershed, including most of Waikiki, is highly susceptible to flooding. Overtopping of the Ala Wai Canal has previously flooded Waikiki multiple times, including November 1965 and December 1967 storms and during the passage of Hurricane Iniki in 1992. Upstream areas are also at risk of flooding, as demonstrated by several recent events, including the October 2004 storm that flooded Manoa Valley and the March 2006 storm that flooded Makiki.

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Flood management measures that are currently being considered to address the study area problems include: traditional structural measures such as channel improvement (widening, deepening, straightening), flood walls, levees, channel relocation, and wet and dry retention/detention; non-structural measures such as flood-proofing, home acquisition and relocation, structure elevation, and emergency planning; and natural and nature-based measures such as wetland retention, riparian restoration, and instream structures (e.g., riffles, cross-vanes, j-hooks, etc.). The GRR study is still within the scoping phase, and therefore the list above may not include all management measures that are ultimately considered for the project; additional measures may be considered, and measures may be removed from consideration, as the GRR study progresses.

Pursuant to compliance with the National Environmental Policy Act (NEPA) and associated environmental laws and regulations, [including the Endangered Species Act, Fish and Wildlife Coordination Act, Coastal Zone Management Act, Magnuson-Stevens Fishery Conservation and Management Act, Clean Water Act, Clean Air Act, National Historic Preservation Act] the Corps will be preparing an environmental document to analyze the potential effects of identified alternatives. At this time, we request your feedback on the scope of issues to be addressed in the environmental document, any resource or habitats of concern in the study area, information on ongoing projects in the study area, and any feedback you may have on the management measures we're considering.

Please provide your input within 30 days of receipt of this letter regarding this GRR. If you have any questions on this matter, please feel free to contact Shawna Herleth-King by email at Shawna.S.Herleth-King@usace.army.mil.

Sincerely,

Marc A. Glowczewski, PE, PMP
Chief, Planning and Environmental Branch

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1.4 Scoping Distribution List

Federal Agencies	
U.S. Geological Survey, Pacific Islands Water Science Center 1845 Wasp Boulevard, B176 Honolulu, HI 96818 Attention John Hoffmann, Director	National Marine Fisheries Service, Pacific Islands Fisheries Science Center 1845 Wasp Boulevard, B176 Honolulu, HI 96818 Attention Evan Howell, Deputy Director
U.S. Environmental Protection Agency, Region 9 75 Hawthorne Street San Francisco, CA 94105 Attention Laura Ebbert, Director of Tribal, Intergovernmental and Policy Division	U.S. Department of Agriculture Natural Resources Conservation Service Pacific Islands Area State Office P.O. Box 50004 Honolulu, HI 96850 Attention Travis Thomason, Director
U.S. Environmental Protection Agency, Region 9 75 Hawthorne Street San Francisco, CA 94105 Attention Amy Miller-Bowen, Director of Enforcement and Compliance Assurance Division	Advisory Council on Historic Preservation 401 F Street NW, Suite 308 Washington, DC 20001 Attention Jaime Loichinger, Assistant Director
U.S. Environmental Protection Agency, Region 9 75 Hawthorne Street San Francisco, CA 94105 Attention Tomas Torres, Director of Water Division	Federal Transit Administration, Region 9 San Francisco Federal Building San Francisco, CA 94103 Attention Ray Tellis, Administrator for Region 9
U.S. Fish and Wildlife Service Pacific Islands Fish and Wildlife Office 300 Ala Moana Boulevard, Room 3-122 Honolulu, HI 96850 Attention Katherine Mullett, Field Supervisor	Federal Highway Administration Hawaii Federal-Aid Division 300 Ala Moana Boulevard, Room 3-306 Honolulu, HI 96850 Attention Ralph Rizzo, Division Administrator
Federal Emergency Management Agency, Region 9 1111 Broadway, Suite 1200 Oakland, CA 94607 Attention Robert J. Fenton Jr., Regional Administrator, Region 9	U.S. Coast Guard Commanding Officer USCG Base Honolulu 400 Sand Island Parkway Honolulu, HI 96819
National Oceanic and Atmospheric Administration Office for Coastal Management, Pacific Islands Attention Kristina Kekuewa, Director Pacific Islands Region Attention Timothy Kott, Rear Admiral	Department of the Navy Commander, Navy Region Hawaii 850 Ticonderoga Street Pearl Harbor, HI 96860
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State of Hawaii Department of Defense Office of the Adjutant General 3949 Diamond Head Road Honolulu, HI 96816	State of Hawaii, Hawaii Emergency Management Agency 3949 Diamond Head Road Honolulu, HI 96816
State of Hawaii Department of Education Office of the Superintendent P.O. Box 2360 Honolulu, HI 96804	Hawaii Community Development Authority 547 Queen Street Honolulu, HI 96813
State of Hawaii Department of Hawaiian Home Lands 91-5420 Kapolei Parkway Kapolei, HI 96707	State of Hawaii Office of Planning and Sustainable Development, Land Use, and TOD P.O. Box 2359 Honolulu, HI 96804
State of Hawaii Department of Land and Natural Resources (DLNR) Kalanimoku Building 1151 Punchbowl Street Honolulu, HI 96707 Attention Suzanne Case, Chairperson	State of Hawaii Office of Planning and Sustainable Development, Coastal Zone Management Program P.O. Box 2359 Honolulu, HI 96804
State of Hawaii, DLNR, State Historic Preservation Division 601 Kamokila Boulevard Kapolei, HI 96707 Attention Alan Downer, Administrator	

1.5 Scoping Comments Received

The following comments were received during the 30-day scoping period. Numerous other comments have been received outside the scoping period, all of which have been considered in the formulation and analysis of Draft Integrated Feasibility Report and Supplemental Environmental Assessment.

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August 27, 2021 Ref.:PO-21-251

Marc A. Glowczewski, PE, PMP
Chief, Planning and Environmental Branch
Environmental and Cultural Resources Section
U.S. Dept. of the Army, Pittsburgh District, Corps of Engineers
1000 Liberty Avenue
Pittsburgh, PA 15222-4186
Attn: Shawna S. Herleth-King
Email: Shawna.S.Herleth-King@usace.army.mil

Aloha Shawna:

Subject: General Reevaluation Report
(with integrated environmental documentation)
Ala Wai Canal Flood Risk Management Feasibility Study
Kona Moku, Honolulu, O'ahu, Hawai'i

The Department of Hawaiian Home Lands acknowledges receiving the request for comments on the above-cited project. After reviewing the materials submitted, due to its lack of proximity to Hawaiian Home Lands, we do not anticipate any impacts to our lands or beneficiaries from the project.

However, we highly encourage all agencies to consult with Hawaiian Homestead community associations and other (N)native Hawaiian organizations when preparing environmental assessments in order to better assess potential impacts to cultural and natural resources, access and other rights of Native Hawaiians.

Mahalo for the opportunity to provide comments. If you have any questions, please call Andrew H. Choy, Acting Planning Program Manager at (808)620-9481, or contact via email at andrew.h.choy@hawaii.gov.

Me ke aloha,

for William J. Ailā, Jr., Chairman
Hawaiian Homes Commission

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
01EPIF00-2021-CPA-0006

September 8, 2020

Marc A. Glowczewski
Chief, Planning and Enviromental Branch
Enviromental and Cultural Resources Section
Department of the Army
Pittsburgh District, Corps of Engineers
William S. Moorhead Federal Building
1000 Liberty Ave.
Pittsburgh, PA 15222-4186

Dear sir,

The U.S. Fish and Wildlife Service (Service) has received the request of August 9, 2021 from the U. S. Army Corps of Engineers (Corps) on a pending General Reevaluation Report (GRR) related to the Ala Wai Canal Flood Risk Management Project located in the Ala Wai watershed in Oahu, Hawaii. Herein, the Service provides response to this request in accordance with the Fish and Wildlife Coordination Act (FWCA) of 1934 [16 U.S.C. 661 *et seq*.; 48 Stat. 401]; the Clean Water Act of 1977 [33 USC 1251 et seq.; 91 Stat. 1566], as amended (CWA); and the National Environmental Policy Act of 1969 (NEPA).

Summary

As most recently proposed, this project aims to enhance flood management in the Ala Wai Canal Watershed with a series of proposed mitigation features. An underground bypass culvert is proposed to be constructed at the Woodlawn Bridge in Manoa Valley to prevent excess waters from overflowing stream banks where a sharp turn in the stream has caused historic flooding in the University of Hawaii campus area. The bypass will be designed to activate at the 2-year flood event. Construction of floodwalls and streambed excavation are proposed south of East Manoa Road Bridge to reduce potential flood impacts of local residences.

A multipurpose detention basin (MDB) is proposed for installation at Kanewai Field to temporarily hold flood waters from Manoa Stream during flood events. MDB construction will include creating a 9-foot earthen berm to hold water in, a grouted riprap inflow spillway from Manoa Stream, and a drainage pipe exit back downstream to Manoa Stream.

A larger-scale MDB is proposed for Ala Wai Golf Course. Its construction will include a 3–6 foot earthen berm around the western half of the golf course, a grouted riprap inflow from the Manoa-Palolo Drainage Canal, passive drainage back to the Ala Wai Canal, and construction of a ramp over the levee to allow for maintenance vehicle entrance.

Flood walls, to approximately 6 feet in height, are proposed to be constructed to maintain floodwaters within Ala Wai Canal. Flood walls are expected to extend from the Manoa-Palolo confluence to the Ala Wai Boat Harbor, and from Date Street southward to the canal. A pump station will be added to convey water from the Kapahulu and Diamondhead interior drainage and the golf course drainage westward through the canal. Gates will be installed to prevent flow from the Ala Wai Canal to the golf course or otherwise upstream.

A MDB is proposed at Hausten Ditch and Ala Wai Community Park. This will include a 5.5-foot-high earthen berm and a concrete wall with slide gate to prevent backflow from the Ala Wai Canal. An outlet will be constructed south of Kalakaua Bridge.

A diversion structure is proposed at the Makiki Stream outlet to alleviate backflow from Ala Wai Canal. The structure will also carry water from the stream directly to the harbor.

Comments & Recommendations

The Service notes that the focus of the project as now proposed has changed from detention of flood waters in the upper basins of Makiki, Manoa, and Palolo streams to efficient conveyance of flood waters to detention basins near the shoreline, with a modified set of flood walls along the Ala Wai Canal carried over from the former proposed design. Of the detention basins, only the one at Kanewai Park was included in the original design that was evaluated by the Service in its FWCA report of 2016. As such, most of the new project features proposed have not been subject to previous review under FWCA or NEPA.

USACE allotted our office very little time in which to evaluate these new project alternatives. In many cases, a re-design this fundamental would result in a supplementary survey and report under FWCA. The Service appreciates the internal dynamics driving USACE timelines, but does note that these USACE timelines are self-imposed, and are not necessarily legally binding on the Service.

In the present letter, our office lays out a variety of concerns and recommendations regarding the new project design. Our previous concerns related to the original project design, as articulated in our FWCA report of 2016, centered primarily on impacts to populations of ESA-listed damselfly species along upper Manoa Stream, potential barriers to longitudinal passage of diadromous biota along stream corridors, and certain aspects of legacy environmental contaminant accumulation in the detention basins.

By contrast, our current concerns include:

1) The progressive accumulation of legacy environmental contaminants, particularly termiticides used in older wood frame neighborhoods such as Manoa, in the proposed retention basins. Many of these basins are proposed to be located in parks or along the margins of the Ala Wai Golf Course,

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in areas which are used by the general public. Such contaminants could be re-mobilized when the basins are filled during spates, and could also constitute a periodic attractive nuisance for ESA-listed waterbirds, particularly Hawaiian stilts, which frequently seek out temporarily flooded sites.

2) Potential conveyance of sediments and environmental contaminants into the Ala Wai Canal, though the Ala Wai Small Boat Harbor, and onto adjacent reefs fronting Ala Moana Park and Waikiki. The Service does not currently have sufficient information to evaluate such impacts, based on both a lack of sufficient hydrological and sediment transport modelling from USACE, and no provision of adequate time or budget to undertake any surveys that would clarify the nature and extent of the resources that might be adversely affected.

Based on these concerns, the Service offers the following recommendations in regard to the pending GRR:

Sediments, Contaminants, and Runoff

a) Sediments, urban runoff, and other contaminants are expected to build up in some areas and be released at higher flows. The associated potential risks to marine habitats are unclear. The Service recommends that the GRR model and quantify expected sediment and contaminant discharges to Ala Wai Canal, Ala Wai Marina, and adjacent marine environments.
b) The Service recommends that the Corps undertake mid to long-term monitoring of marine resources and contaminants in adjacent marine habitats, with the results reported in the GRR.
c) The Service recommends that the GRR provide clarification on location of contaminated sediment disposal.
d) The Service recommends that the GRR evaluate data on sediment organochlorine levels throughout the Manoa Stream.
e) The Service recommends that the GRR evaluate anticipated mobilization of contaminated sediments (AEP%) at expected flow levels.
f) The Service recommends that the GRR evaluate anticipated deposition of sediments in each MDB to be constructed and whether or not any associated contamination will restrict recreational activities in those areas.
g) The Service recommends that the GRR evaluate concentrations of chlordane and dieldrin in each MDB and the nearshore reef.

Woodlawn Bypass

a) The Service recommends that the GRR evaluate the possible construction of an uncovered migration route along the alignment of the previously proposed Woodlawn Bypass to provide a required migration corridor for native diadromous fish species.

Ala Wai Golf Course

a) The golf course provides a good opportunity for a buffer in case of flooding. The Service recommends that the GRR evaluate this area in the context of the recommendations listed above regarding sediments and contaminants, since they will apply to this area as well.

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Makiki Diversion Culvert

a) Contaminants associated with urban runoff are anticipated to flow directly into the harbor in this section of the project. The Service recommends that the GRR provide additional information on anticipated contaminants and levels expected to reach the nearshore environment.

Conclusion

The Service concludes that the Ala Wai Canal Flood Risk Management Project is essential to mitigate future floods that could potentially cause extensive damage withing the Palolo and Manoa watersheds. The Service therefore recommends that the GRR associated with this project take into consideration the above comments and recommendations.

It should also be noted that in correspondence with the Corps over the past 12 months, the Service has requested a significant amount of supplemental information in order to clarify the concerns noted above. Most of our queries are still awaiting response. Because of the extensive re-design and addition of many new alternatives, the Service considers the impact assessment of this project under FWCA to be still ongoing, since in the absence of additional information and field studies we cannot make definitive recommendations for avoidance or minimization of impacts to trust resources. We will await the completion of the GRR to determine the extent to which it addresses these information gaps.

We appreciate the opportunity to provide input on this GRR process, and look forward to your incorporation of our comments and recommendations. If you have questions regarding our comments, please contact Aquatic Ecosystem Conservation Program biologist Jeremy Raynal (jeremy_raynal@fws.gov) or program manager Dan Polhemus (dan_polhemus@fws.gov or 808-792-9400).

Sincerely,

DAN POLHEMUS Digitally signed by DAN POLHEMUS
Date: 2021.09.08 13:39:25 -10'00'

Dan Polhemus
Aquatic Ecosystem Conservation and Environmental
Contaminants Program Manager
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service, Ecological Services
300 Ala Moana Blvd Rm 3-122
Honolulu, HI

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Otani, Meesa (FHWA)
To: Herleth-King, Shawna S CIV USARMY CELRC (USA)
Cc: Meredith Soniat
Subject: [Non-DoD Source] Ala Wai Canal Flood Risk Management Feasibility Study
Date: Thursday, September 9, 2021 3:43:29 PM

Hi Shawna,

The Federal Highway Administration received a letter dated August 9, 2021 from the Army Corps of Engineers regarding the General Reevaluation Report for the Ala Wai Canal Flood Risk Management Feasibility Study. As you likely already know, the City and County of Honolulu is planning the Ala Wai Bridge project, which consists of a new pedestrian and bicycle crossing of the Ala Wai Canal in the vicinity of University Avenue. The project is partially funded through Federal-aid highway funds. From what I understand, the proposed Ala Wai Bridge project design meets the USACE's criteria for the 100 year level flood protection along the Ala Wai Canal and the City and County of Honolulu has coordinated with the Army Corps of Engineers.

If you have any questions about the Ala Wai Bridge project or if there is anything that we should coordinate further on, please feel free to contact me.

Thank you!

Meesa Otani
Environmental Engineer
Federal Highway Administration, Hawaii Division
300 Ala Moana Blvd., Room 3-229
Honolulu, Hawaii 96850
(808) 541-2316
meesa.otani@dot.gov

Think before you print

DAVID Y. IGE
GOVERNOR OF
HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Marc A. Glowczewski, PE, PMP
Chief, Planning and Environmental Branch
Department of the Army
Pittsburgh District, Corps of Engineers
William S. Moorhead Federal Building
100 Liberty Avenue
Pittsburgh, PA 15222-4186

Corr. OA-22-43

SEP 27 2021

SUBJECT: Ala Wai Canal Flood Risk Management Feasibility Study, General Reevaluation Report

Dear Mr. Glowczewski:

The Department of Land and Natural Resources (DLNR) Office of Conservation and Coastal Lands (OCCL) has received your August 23, 2021 letter requesting feedback on the scope of issues being addressed in a Federal Reevaluation Report for the Ala Wai Canal Flood Risk Management Feasibility Study, O'ahu, Hawai'i. It is stated in your letter that the general purpose of the subject study is to analyze alternatives to reduce risk to life, safety, and economic damages from flooding throughout the entire Ala Wai Watershed. It is a single purpose study for flood risk reduction.

We appreciate the opportunity to provide comments and offer the following feedback:

- Overall, the flood management measures currently being considered as part of this project are well put together and feature innovative elements including nature-based measures, emergency planning, wet and dry retention/detention, flood proofing, and structure elevation/relocation. We suggest that you also consider use of bio enhancing materials such as ECOncrete or similarly composed materials as part of Ala Wai channel improvements and other submerged hard structures to improve marine habitat.

- It is unclear if contingencies are being included in the design that would account for increased magnitudes of sea level rise such as the NOAA "intermediate" or "intermediate-high" scenarios (i.e. are structures or other project elements designed such that they can be altered if elevated SLR magnitudes occur?). We suggest including such consideration given that the project represents a substantial addition to the city's infrastructure.

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- Local studies[1] have shown that the project area will be subject to increased flooding from various flood mechanisms in the future that are often overlooked in project development, including groundwater inundation and storm drain failure/backflow. These flood sources can occur in the absence of precipitation but are exacerbated by rainfall events such as those being considered in this study. Thus, we suggest including consideration of these flood sources as part of project development so that flooding is thoroughly addressed.

Thank you again for the opportunity to review the scope of the Ala Wai General Reevaluation Report. Should you have any questions on the matter, please feel free to contact Dr. Shellie Habel, Hawaii Sea Grant Extension Agent in the DLNR Office of Conservation and Coastal Lands at (808) 587-0049 or via email at Shellie.L.Habel@Hawaii.gov.

Sincerely,

for SAMUEL J. LEMMO, ADMINISTRATOR
OFFICE OF CONSERVATION AND COASTAL LANDS

1 Habel, S., Fletcher, C.H., Anderson, T.R. and Thompson, P.R., 2020. Sea-level rise induced multi-mechanism flooding and contribution to urban infrastructure failure. *Scientific reports*, *10*(1), pp.1-12.

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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AQUATIC RESOURCES
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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

TO: Public, Consulting Parties. Federal, State and City Agencies

FROM: Alan S. Downer, Administrator AD

RE: SHPD Migration of Submittals to the Hawaii Cultural Resource Information System (HICRIS)

DATE: November 30, 2020

Aloha,

The State of Hawaii Historic Preservation Division is in the process of moving to an online submission system. The Hawaii Cultural Resource Information System (HICRIS) will be the only way for SHPD to accept and process submittals. We are not accepting submissions currently, while we migrate the data from our existing systems to HICRIS. The transition period is from November 28 to December 16, 2020. Additional information on HICRIS and the launch date can be found on our website. http://dlnr.hawaii.gov/shpd/

Mahalo,

Alan Downer

Alan S. Downer, Administrator

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STATE OF HAWAII
OFFICE OF PLANNING
& SUSTAINABLE DEVELOPMENT

DAVID Y. IGE
GOVERNOR

MARY ALICE EVANS
DIRECTOR

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

Coastal Zone Management Program

Environmental Review Program

Land Use Commission

Land Use Division

Special Plans Branch

State Transit-Oriented Development

Statewide Geographic Information System

Statewide Sustainability Program

DTS 202109021509HE

September 27, 2021

Mr. Marc A. Glowczewski, PE, PMP
Chief, Planning and Environmental Branch
Department of the Army
Pittsburgh District, Corps of Engineers
William S. Moorhead Federal Building
1000 Liberty Avenue
Pittsburgh, Pennsylvania 15222-4186

Dear: Mr. Glowczewski:

Subject: General Reevaluation Report - Ala Wai Canal Flood Risk Management Feasibility Study

Thank you for the opportunity to provide comments on the General Reevaluation Report (GRR) - Ala Wai Canal Flood Risk Management Feasibility Study. The GRR notification was received by our office via memo on August 24, 2021.

It is our understanding that the U.S Army Corps of Engineers (USACE) has authorized a general reevaluation study of the Ala Wai watershed. The feasibility study will include a full reevaluation of measures and alternatives to reduce flood risk in the Ala Wai watershed. The expectation is that a new National Environmental Policy Act (NEPA) Environmental Assessment (EA) will be created based on revised recommendations and agency and public input.

The Office of Planning and Sustainable Development (OPSD) has the following comments to offer:

1. Previous Comments:
   We reference our previous comments on the proposed Ala Wai Canal watershed feasibility study, Ref. No P-15640, dated June 20, 2017. Our comments on the original feasibility study can be summarized as follows:
   a. The concept of developing an upstream debris and detention basin system as a means to protect the lower elevations of Waikīkī and its surroundings against flooding and reducing erosion and contaminated runoff is consistent with low impact development (LID). The use of

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LID design measures are runoff and flood mitigation concepts that OPSD is an advocate for.

b. The Final Environmental Impact Statement included examinations of policies and initiatives that aligned with issues of importance to our office such as: the Hawai'i State Planning Act, Hawai'i Revised Statute (HRS) Chapter 226; and the HRS § 205A-2 objectives and policies of the Hawai'i Coastal Zone Management (CZM) Program.

The issues of concern listed in our previous comments on limiting land-based pollutants, suspended solids, and soils upstream, from being carried away via stormwater runoff, so that they do not have the devastating effects on the downstream environment is an issue of concern and an important subject matter to OPSD.

2. Coastal Zone Management Act (CZMA) – Federal Consistency
We note that the Hawai'i CZM Program completed the federal consistency review of the Ala Wai Canal flood reduction project in April 2016. The review covered the "Tentatively Selected Plan" as identified in the Draft Feasibility Study with Integrated Environmental Impact Statement (August 2015), which was submitted in support of the consistency determination. The review involved requirements for conditional concurrences specified in 15 CFR § 930.4(a),(1) through (3).

Any changes or a new preferred alternative plan for flood mitigate, watershed basin inundation controls, or promotion of water quality may necessitate further federal consistency consideration by our office.

3. Public Participation and Inclusion
Pursuant to HRS § 205A-2(c)(8) Public Participation; it is vital that the USACE and those involved with the GRR and Feasibility Study engage stakeholders, community groups, and the public in an impactful and meaningful way. OPSD concurs that incorporation of stakeholder input regarding the complex management of the Ala Wai Watershed would be beneficial to the upcoming environmental assessment.

If you have any questions or concerns regarding this comment letter, please contact Joshua Hekekia of our CZM Program at (808) 587-2845; or Debra Mendes at (808) 587-2840 on CZMA federal consistency matters.

Mahalo,

Mary Alice Evans

Mary Alice Evans
Director

Enclosure(s)

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DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
DEREK J. CHOW
ROSS M. HIGASHI
EDWIN H. SNIFFEN

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
DIR 0821
HWY-PS 2.6619

October 13, 2021

VIA EMAIL: marc.a.glowczewski@usace.army.mil

Mr. Marc Glowczewski
Chief
Planning and Environmental Branch
Department of the Army
1000 Liberty Avenue
Pittsburgh, Pennsylvania 15222-4186

Dear Mr. Glowczewski:

Subject: Request for Comments for Pre-Assessment Consultation
General Reevaluation Report
Honolulu, Oahu, Hawaii
Tax Map Key Nos.: Various and including (1) 2-3-034: 000, 2-3-036: 000 and 2-7-036: 000

Thank you for your letter dated August 9, 2021, requesting for our comments for your General Reevaluation Report (GRR) pursuant to an upcoming preparation of a National Environmental Policy Act and additional environmental documents. The purpose of the report is to study alternatives and analyze potential effects for the Ala Wai Watershed. The GRR study was authorized due to escalating costs and lack of public support for the authorized plan recommended for implementation in a previous 2020 Final Environmental Impact Statement.

The on-going studies for the Ala Wai Watershed relating to flood risk assessment encompasses areas such as Makiki, Manoa, and Palolo Streams that drains into the 2-mile long Ala Wai Canal. A variety of flood management measures will include both structural and non-structural improvements. As an early consultation, there are no exhibits included; therefore, we are unable to determine specific State facilities that will be potentially impacted at this time.

The Hawaii Department of Transportation (HDOT) has the following comments:

1. The following discussions should be provided in the various environmental documents.

    a. A full evaluation is required on whether the proposed improvements and flooding events will have any local impacts to the nearby State highway facilities.

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2. In general, the bridges which the HDOT owns, would be affected by some of the basins which are the Interstate H-1 Freeway, King Street, Kapiolani Overpass, and the Old Waialae Road Bridges over Manoa-Palolo Stream.

    a. In the event there are increases in flows or velocities at the HDOT bridges, the HDOT would recommend mitigation to decrease the risk of erosion/scour and reduce overtopping potential at our bridge structures at no cost to the State.

3. A discussion of future timelines/phasing should also be included in the study.

4. No additional discharge of surface water run-off onto the State highway facilities right-of-way is permitted. This includes the use of the existing State drainage culverts and channels. All additional stormwater run-off shall be managed and mitigated.

If you have any questions, please contact Jeyan Thirugnanam, Systems Planning Engineer, Highways Division, Planning Branch at (808) 587-6336 or by email at jeyan.thirugnanam@hawaii.gov. Please reference file review number PS 2021-152.

Sincerely,

JADE T. BUTAY
Director of Transportation

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1.6 Scoping Public Meeting

Two virtual workshops were held in order to engage with the public on problems, opportunities, and potential solutions for the Ala Wai FRM study. The first virtual workshop was held on November 10, 2021, from 5:00 p.m. to 8:00 p.m. Hawaiian Standard Time (HST). The second virtual workshop was held on November 13, 2021, from 1:00 p.m. to 4:00 p.m. HST. Slides presented during these meetings as well as recordings of the workshop are available in their entirety at https://www.honolulu.gov/alawai/public-engagement.html. These workshops fulfilled the obligation of a scoping public meeting.

1.7 Additional Public Engagement

On January 20, 2022, from 12 p.m. to 1:00 p.m. HST a virtual meeting was held to update stakeholders on the public engagement strategy, path forward, and the study schedule. Slides presented during this meeting as well as the recording of the virtual meeting are available in their entirety at https://www.honolulu.gov/alawai/public-engagement.html.

The next four virtual workshops that were held between April 1, 2022, and April 22, 2022, were mini workshops to gather focused input on specific problems, opportunities, and solutions for the sub-watershed within the Ala Wai watershed. The first virtual workshop held on April 1, 202,2 from 12 to 1:10 p.m. HST focused on the Makiki and Palolo sub-watershed. The second virtual workshop held on April 8, 2022, from 12 to 1:10 p.m. HST focused on the Manoa sub-watershed. The third virtual workshop held on April 14, 2022, from 12 to 1:10 p.m. HST focused on the Ala Wai Canal and Lower watershed. Lastly, the fourth virtual workshop held on April 22, 2022, from 12 to 1:10 p.m. allowed an opportunity for additional discussion and a question-and-answer session. Slides presented during these virtual workshops, summary notes, as well as the recordings of the workshops are available in their entirety at https://www.honolulu.gov/alawai/public-engagement.html.

Two workshops were held in July 2022 to present the initial array of alternative plans to the public and receive feedback on the proposed initial array. The first workshop on July 26, 2022, was virtual and was held from 5:30 to 8:30 p.m. HST. The second workshop on July 28, 2022, was in-person and was held from 5:30 to 8:30 p.m. HST. Slides presented during these two workshops, summary notes, as well as the recordings of the workshops are available in their entirety at https://www.honolulu.gov/alawai/public-engagement.html.

On December 13, 2022, a virtual workshop was held to update the public on the development of the initial array of alternative plans presented in July. Slides presented during this workshop as well as the recording of the workshop are available in their entirety as https://www.honolulu.gov/alawai/public-engagement.html.

1.8 Release of Notice of Intent

As described earlier, the type of environmental document that would accompany the General Reevaluation Report for the Ala Wai Canal study was unknown at the early stages since it was still unknown if the project would have any adverse significant and unavoidable impacts to the human environment. Following feedback from scoping and public meetings/workshops held between November 10, 2021, and December 13, 2022, the decision was made that a Supplemental Environmental Impact Statement should be prepared to accompany the General Reevaluation Report. When an Environmental Impact Statement is triggered, there are certain requirements that must be fulfilled by the action agency. As discussed above under Section 1.2, scoping is required for an environmental impact statement even though scoping had been

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conducted when the document was assumed to be an environmental assessment. Therefore, scoping requirements under CFR 43 § 46.235, had already been met. However, in addition to scoping requirements, an Environmental Impact Statement also requires the publication of a Notice of Intent in the Federal Register. The Notice of Intent is considered the start of the scoping process and has a 30-day public comment period associated with it. In addition, new NEPA regulations now require that the decision document associated with an EIS (i.e., Record of Decision) be signed within two-years of publication of the Notice of Intent to prepare an EIS. The switching of the document from an environmental assessment to an environmental impact statement essentially in the middle of the feasibility phase created some challenges because of requirements for when an EIS is triggered as well as timing on when an NOI can be published.

Therefore, although scoping had for the project had occurred between August and November 2021, the need to publish the NOI now that an EIS was being pursued prompted another scoping period in the middle of the feasibility phase. Therefore, the NOI was published in the Federal Register on February 22, 2023. The second 30-day scoping period prompted by the publication of the NOI was originally set to occur from February 22, 2023, through March 24, 2023.

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1.9 Notice of Intent

Grade level or pay band equivalent	Level of education
GS–01 or Pay Band Equivalent	Enrollment in a high school diploma or General Education Diploma (GED) program.
GS–02 or Pay Band Equivalent	Completion of high school or GED diploma.
GS–03 or Pay Band Equivalent	Completion of 1 full academic year of post-high school study.
GS–04 or Pay Band Equivalent	Completion of 2 full academic years of post-high school study or an associate's degree.
GS–05 or Pay Band Equivalent	Completion of 4 academic years of post-high school study leading to a bachelor's or equivalent degree.
GS–07 or Pay Band Equivalent	Completion of 1 full academic year of graduate level education; or Eligibility under the Superior Academic Achievement Provision and completion of a bachelor's degree.
GS–09 or Pay Band Equivalent	Completion of 2 academic years of graduate level education, or a master's degree or equivalent graduate degree.
GS–11 or Pay Band Equivalent	For research positions, completion of all requirements for a master's or equivalent graduate degree. For non-research positions, completion of all requirements for a PhD or equivalent degree.

Appointments may be at the highest grade or pay band for which the participant is qualified. One full academic year of undergraduate; graduate; technical or high school education is the number of credit hours determined by the college, university or school to represent one year of full-time study. The high school curriculum must be approved by a State or local governing body. All education beyond the high school level must be accredited by an accrediting body or organization recognized by the U.S. Department of Education.

Special Provisions/or Students With Previous Related Education or Experience

Previous education and/or experience may be evaluated to determine the highest grade Level or pay band for which the student is qualified.

Dated: February 15, 2023.

Aaron T. Siegel,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 2023–03601 Filed 2–21–23; 8:45 am]

BILLING CODE 5001–06–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare a General Reevaluation Report/Supplemental Environmental Impact Statement for the Ala Wai Canal Flood Risk Management Study, Honolulu, HI

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: In accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, and pursuant to the Hawaii Revised Statutes (HRS) Chapter 343 (Hawaii Environmental Policy Act (HEPA)), the Pittsburgh District, U.S. Army Corps of Engineers (Corps) is preparing a draft General Reevaluation Report/Supplemental Environmental Impact Statement (GRR/SEIS) to evaluate the opportunities to reduce the risk to life, safety and economic damages from flooding throughout the Ala Wai Watershed in Oahu, Hawaii. The Ala Wai Canal Flood Risk Management Study was authorized under Section 209 of the Flood Control Act of 1962. The study was completed in 2017 and resulted in a recommendation that was subsequently authorized for construction under Section 1401 of the Water Resources Development Act of 2018 (Authorized Project). The purpose of the GRR/SEIS is to reevaluate the Authorized Project and either confirm the Authorized Project or make a new recommendation that will include modifications to the Authorized Project. The non-Federal sponsor for this study is the City and County of Honolulu.

DATES: To ensure consideration, all comments concerning the scope of the GRR/SEIS, potential alternatives, and identification of relevant information and studies must be received by March 24, 2023.

ADDRESSES: You may submit comments related to the GRR/SEIS by any of the following methods:

- *Website: https://www.honolulu.gov/alawai/contact.html.*
- *Email: alawai@honolulu.gov.*
- *Mail:* U.S. Army Corps of Engineers, Honolulu District, 230 Otake St. (Attn: POH–PPC, Ala Wai), Fort Shafter, HI 96858–5440.

FOR FURTHER INFORMATION CONTACT: For further information about this project, please visit *https://www.honolulu.gov/alawai.* You may also contact Shawna Herleth-King at 312–846–5407 or by email at: *shawna.s.herleth-king@usace.army.mil.*

SUPPLEMENTARY INFORMATION:

1. *Background:* The Corps-Hnnnlulu District received the authority to conduct the Ala Wai Canal Flood Risk Management Study under Section 209 of the Flood Control Act of 1962 (Public Law 84–874). The feasibility study's recommended plan consisted of six in-stream debris and detention basins of varying height in the upper reaches of the watershed, one standalone debris catchment structure, three multi-purpose detention basins, floodwalls along the Ala Wai Canal averaging four feet in height and an earthen levee at the perimeter of an adjacent golf course averaging seven feet in height, two pump stations to reduce the threat of interior flooding, and a flood warning system. The feasibility study determined the technical, economic, environmental, and social feasibility of the recommended plan to reduce flood risk within the Ala Wai Canal watershed of Honolulu, Hawaii.

Section 1401 of the Water Resources Development Act of 2018 (Public Law 115–270) authorized construction of the Ala Wai Canal Flood Risk Management Project, as described in the Chief's Report, (*https://www.poh.usace.army.mil/Portals/10/docs/Civil%20Works%20Sponsor%20Letters/Tab%201%20Chiefs%20Report%20Ala%20Wai%20Chiefs%20Report%20SIGNED%20(003).pdf?ver=2018-09-14-171850-833*), dated December 21, 2017, and the *Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii, Feasibility Study with Integrated Environmental Impact Statement,* dated May 2017. The **Federal Register** notice (82 FR 24325, May 26, 2017) for the EIS being supplemented is available at *https://www.govinfo.gov/content/pkg/FR-2017-05-26/pdf/2017-10719.pdf.* The record

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

of decision (ROD) was signed on September 18, 2018, initiating the next phase of the study, Preconstruction Engineering and Design (PED). In 2020, an Engineering Documentation Report (EDR) provided the technical basis for modifications necessary to the Authorized Project. Subsequent analysis found that the modifications in the 2020 EDR were not cost effective and lacked the economic justification necessary for continued federal involvement. Acknowledging the need to reduce the risk to life, safety and economic damages from flooding throughout the Ala Wai Watershed in Oahu, Hawaii, the Corps is currently reevaluating the previously completed Ala Wai Canal Flood Risk Management Study in a GRR, using current planning criteria and policies. Since the GRR is reevaluating alternatives and could result in a new recommendation, NEPA documentation for the Ala Wai Canal Flood Risk Management Project will be updated.

2. *Proposed Action:* The project is undergoing a GRR to (1) redefine the flood problems and risks in the Ala Wai Watershed by updating hydrology, physical, biological, and socioeconomic conditions; (2) reevaluate alternatives for reducing flood damages in the area; and (3) reaffirm the Federal interest by recommending a plan that is economically feasible. The results of this study will be presented in the GRR/SEIS. The formulation and evaluation of alternatives, benefits and costs, and implementation requirements will be presented in the GRR/SEIS.

3. *Alternatives:* A number of project alternatives will be evaluated in the GRR/SEIS. In addition to the No Action alternative, other potential alternatives to reduce flood damages include a combination of the following components: Makiki District Park detention basin, Manoa Valley District Park detention basin, Ala Wai Golf Course detention basin, Kaimuki High School berm/floodwall, Kanaha floodwall, Woodlawn Bridge floodwall, Koali Road floodwall, and Ala Wai Canal floodwall.

4. *Scoping/Public Participation:* The GRR/SEIS will be coordinated with Federal, State, and local government agencies; Native Hawaiian organizations; local stakeholders; special interest groups; and any other interested individuals and organizations. A 30-day scoping period for Federal, State, local agencies, and non-governmental organizations was held between August 9, 2021, through September 9, 2021, when the environmental document accompanying the GRR was anticipated to be a supplemental environmental assessment. The Corps held a public meeting to discuss the scope of the draft GRR and accompanying environmental documentation on November 10 and November 13, 2021. The virtual meeting dates and times were advertised in advance on the City and County of Honolulu's Ala Wai Study Flood Risk Management website (*https://www.honolulu.gov/alawai/public-engagement.html*). The purpose of these meetings was to involve local stakeholders and the public early in the study process. The meetings collected public input regarding the study scope, historic and current problems, and potential opportunities. Based on public feedback, additional virtual workshops/meetings were incorporated into the public engagement strategy for the study. To date, additional public engagement opportunities have occurred via virtual and/or in-person workshops/meetings held on January 20, 2022, April 1, 2022, April 8, 2022, April 14, 2022, April 22, 2022, July 26, 2022, July 28, 2022, and December 13, 2022.

Based on feedback from the public and the non-Federal sponsor, the environmental document being prepared to accompany the GRR is now anticipated to be a SEIS. Therefore, this notice of intent to prepare a GRR/SEIS is initiating a new 30-day public scoping period. Due to public workshops and meetings that have already occurred, no additional scoping meetings are planned at this time. All public comments received to date regarding the GRR/SEIS, either verbally or in writing, during prior meetings, workshops, and scoping periods will be considered by the Corps in the GRR/SEIS.

5. *Anticipated Impacts, Permits, and Authorization:* The GRR/SEIS will analyze the full range of impacts, both beneficial and negative, of the alternatives. Potentially significant issues to be analyzed include impacts to water quality, biological resources, endangered and threatened species and their habitats, cultural resources, and visual resources. Other impacts that will be analyzed include geology, seismicity, and soils; surface water resources; hydrology and hydraulics; land use; recreation; hazardous and toxic waste; air quality; noise; traffic and transportation; public health and safety; public services and utilities; socioeconomics; and environmental justice. Anticipated permits and authorizations include water quality certification and Coastal Zone Consistency Determination. In addition, many other Federal, State, and local authorizations will be required for the Project. Applicable Federal laws include NEPA, the Endangered Species Act, Fish and Wildlife Coordination Act, Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act, Coastal Zone Management Act, National Historic Preservation Act, and the Clean Water Act.

6. *Public Comment Availability:* Comments received in response to this solicitation, including names and addresses of those who comment, will be part of the public record. Comments submitted anonymously will be accepted and considered. Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

7. *Study Schedule:* The Draft GRR/SEIS is currently estimated to be available to the public in Summer 2023, with a 45-day public review and comment period following release of the draft document.

Kimberly A. Peeples,

Brigadier General, U.S. Army, Commander, Great Lakes and Ohio River Division.

[FR Doc. 2023–03622 Filed 2–21–23; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF EDUCATION

[Docket ID ED—2023—OPE—0029]

Request for Information Regarding First Amendment and Free Inquiry Related Grant Conditions

AGENCY: Office of Postsecondary Education, U.S. Department of Education

ACTION: Request for information.

SUMMARY: The U.S. Department of Education (Department) is requesting information in the form of written comments that may include information, research, and other input from the public on how regulations adding material conditions relating to First Amendment freedoms and free inquiry to Department grants have affected or are reasonably expected to affect decisions surrounding First Amendment and free speech-related litigation in Federal and State court and institutional policies on freedom of speech. The Office of Postsecondary

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1.10 Extension of NOI Public Comment Period

Due to public feedback, the 30-day public comment period prompted by the publication of the NOI was extended from an original end date of March 24, 2023, to May 8, 2023.

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1.11 Notice of Intent Extension

include changes so minor (*e.g.*, reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates (with the exception of reducing the type or amount of take).

(2) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

Upon review of the request for renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings in the initial IHA remain valid.

Dated: March 20, 2023.

Kimberly Damon-Randall,

Director, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. 2023–06006 Filed 3–22–23; 8:45 am]

BILLING CODE 3510–22–P

COMMITTEE FOR PURCHASE FROM PEOPLE WHO ARE BLIND OR SEVERELY DISABLED

Procurement List; Change

AGENCY: Committee for Purchase From People Who Are Blind or Severely Disabled.

ACTION: Change to the Procurement List.

SUMMARY: This action changes service additions to the Procurement List that are furnished by nonprofit agencies employing persons who are blind or have other severe disabilities.

DATES: *Comments must be received on or before:* April 21, 2023.

ADDRESSES: Committee for Purchase From People Who Are Blind or Severely Disabled, 355 E Street SW, Washington, DC 20024.

FOR FURTHER INFORMATION CONTACT: Michael R. Jurkowski, Telephone: (703) 785–6404, or email *CMTEFedReg@AbilityOne.gov.*

SUPPLEMENTARY INFORMATION:

Additions

If the Committee approves the change to the Procurement List, the entities of the Federal Government identified in this notice will be required to procure the service(s) listed below from nonprofit agencies employing persons who are blind or have other severe disabilities.

Regulatory Flexibility Act Certification

I certify that the following action will not have a significant impact on any small entities. The major factors considered for this certification were:

1. The action did not result in any additional reporting, recordkeeping, or other compliance requirements for small entities other than the nonprofit agencies furnishing the services to the Government.
2. The action did result in authorizing nonprofit agencies to furnish the products to the Government.
3. There were no known regulatory alternatives which would have accomplished the objectives of the Javits-Wagner-O'Day Act (41 U.S.C. 8501–8506) in connection with the products added to the Procurement List.

End of Certification

The following is the intended change to the service currently on the Procurement List:

Service(s)

Service Type: Facilities Maintenance Services

Mandatory for: U.S. Army, Department of Public Works, Fort Knox, KY

The Committee for Purchase From People Who Are Blind or Severely Disabled (Committee), is announcing that Skookum Contract Services and Professional Contract Services, Inc. were recommended to the Committee to serve as mandatory sources for the Total Facilities Maintenance (TFM) Pilot Project at Ft. Knox, KY. The short-term goal of this Pilot is to allocate the TFM requirement, utilizing enhanced competitive procedures. The long-term goal is to incorporate lessons learned from the Pilot into the Committee's regulatory and policy framework to promote greater Program transparency, spur innovation, and enhance employment opportunities for blind and other significantly disabled individuals.

The TFM requirement consists of approximately 109,054 acres and 2,326 buildings and covers several functional areas, such as building and structure maintenance, snow and ice removal, landscaping services, utility system maintenance, and others. The current requirement also includes custodial services, which is excluded from the Pilot and will become a separate, stand-alone addition for the currently performing NPA. SourceAmerica is the incumbent TFM contractor, but the follow-on requirement will transition from SourceAmerica to one of the recommended NPAs, using a two-phase evaluation process.

Phase I began mid-January 2023 with SourceAmerica's issuance of an Opportunity Notice, which established the criteria to participate in the competition. After responses were received, SourceAmerica assessed and recommend two NPAs to the Committee for further considerations. If the Committee determines this requirement is suitable for transfer in accordance with 41 CFR 51–2.4, the Committee will authorize one or both NPAs for addition to the Procurement List as mandatory sources, and conclude Phase I. After which, the Committee will publish a final notice formally identifying the NPA(s) authorized to compete in Phase II.

The Phase II evaluation will assess the NPAs on technical capability, past performance, and price. The SourceAmerica Phase II Evaluation Team will assess the NPAs against the stated evaluation factors. The U.S. Army's Installation Management Command and the Army's Mission and Installation Contracting Command will provide technical support to SourceAmerica throughout the Phase II evaluation process. SourceAmerica will select the NPA that can provide the best overall solution to the Army at the conclusion of Phase II.

Michael R. Jurkowski,

Acting Director, Business Operations.

[FR Doc. 2023–05937 Filed 3–22–23; 8:45 am]

BILLING CODE 6353–01–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare a General Reevaluation Report/Supplemental Environmental Impact Statement for the Ala Wai Canal Flood Risk Management Study, Honolulu, HI

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Intent; extension of public comment period.

SUMMARY: The U.S. Army Corps of Engineers, Pittsburgh District, is extending the public comment period for the Notice of Intent (NOI) to Prepare a General Reevaluation Report/Supplemental Environmental Impact Statement for the Ala Wai Canal Flood Risk Management Study, Honolulu, HI. The NOI was published in the **Federal Register** on Wednesday, February 22, 2023. The public comment period for the NOI was originally scheduled to end on Friday, March 24, 2023. The U.S. Army Corps of Engineers is extending the public comment period by 45 days and will consider comments received through Monday, May 8, 2023.

DATES: The deadline for receipt of comments on the NOI published in the **Federal Register** on February 22, 2023 (88 FR 10880) is extended to May 8, 2023.

ADDRESSES: You may submit comments related to development of the General Reevaluation Report/Supplemental Environmental Impact Statement by any of the following methods:

- *Website: https://www.honolulu.gov/alawai/contact.html.*

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- *Email: alawai@honolulu.gov.*
- *Mail:* U.S. Army Corps of Engineers, Honolulu District, 230 Otake St. (Attn: POH–PPC, Ala Wai), Fort Shafter, HI 96858–5440.

FOR FURTHER INFORMATION CONTACT: For further information about this project, please visit *https://www.honolulu.gov/alawai.* You may also contact Shawna Herleth-King at 312–846–5407 or by email at: *shawna.s.herleth-king@usace.army.mil.*

Kimberly A. Peeples,

Brigadier General, U.S. Army, Commander, Great Lakes and Ohio River Division.

[FR Doc. 2023–05981 Filed 3–22–23; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Navy

Certificate of Alternate Compliance for USS NANTUCKET (LCS 27)

AGENCY: Department of the Navy (DoN), Department of Defense (DoD).

ACTION: Notice of issuance of Certificate of Alternate Compliance.

SUMMARY: The U.S. Navy hereby announces that a Certificate of Alternate Compliance has been issued for USS NANTUCKET (LCS 27). Due to the special construction and purpose of this vessel, the Admiralty Counsel of the Navy has determined it is a vessel of the Navy which, due to its special construction and purpose, cannot comply fully with the navigation lights provisions of the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS) without interfering with its special function as a naval ship. The intended effect of this notice is to warn mariners in waters where 72 COLREGS apply.

DATES: This Certificate of Alternate Compliance is effective March 23, 2023 and is applicable beginning March 15, 2023.

FOR FURTHER INFORMATION CONTACT: Lieutenant Commander Joel White, JAGC, U.S. Navy, Admiralty Attorney, Office of the Judge Advocate General, Admiralty and Claims Division (Code 15A), 1322 Patterson Ave. SE, Suite 3000, Washington Navy Yard, DC 20374–5066, 619–553–0356, or *admiralty@navy.mil.*

SUPPLEMENTARY INFORMATION: Background and Purpose. Executive Order (E.O.) 11964 of January 19, 1977 and 33 U.S.C. 1605 provide that the requirements of 72 COLREGS as to the number, position, range, or arc of visibility of lights or shapes, as well as to the disposition and characteristics of sound-signaling appliances, shall not apply to a vessel or class of vessels of the Navy where the Secretary of the Navy shall find and certify that, by reason of special construction or purpose, it is not possible for such vessel(s) to comply fully with the provisions without interfering with the special function of the vessel(s). Notice of issuance of a Certificate of Alternate Compliance must be made in the **Federal Register**.

In accordance with 33 U.S.C. 1605, the Admiralty Counsel of the Navy, under authority delegated by the Secretary of the Navy, hereby finds and certifies that USS NANTUCKET (LCS 27) is a vessel of special construction or purpose, and that, with respect to the position of the following navigational lights, it is not possible to comply fully with the requirements of the provisions enumerated in the 72 COLREGS without interfering with the special function of the vessel:

Annex I, paragraph 2(a)(i), pertaining to the vertical position of the forward masthead light; Annex I, paragraph 3(a), pertaining to the horizontal position of the forward masthead light; and Annex I, paragraph 3(a), pertaining to the horizontal separation between the forward and aft masthead lights.

The Admiralty Counsel of the Navy further finds and certifies that these navigational lights are in closest possible compliance with the applicable provision of the 72 COLREGS.

Authority: 33 U.S.C. 1605(c), E.O. 11964.

Dated: March 20, 2023.

A.R. Holt,

Lieutenant Commander, Judge Advocate General's Corps, U.S. Navy, Federal Register Liaison Officer.

[FR Doc. 2023–05909 Filed 3–22–23; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF EDUCATION

President's Board of Advisors on Historically Black Colleges and Universities

AGENCY: U.S. Department of Education, President's Board of Advisors on Historically Black Colleges and Universities, Office of Secretary, U.S. Department of Education.

ACTION: Announcement of an open meeting.

SUMMARY: This notice sets forth the agenda for the April 5, 2023, hybrid meeting of the President's Board of Advisors on Historically Black Colleges and Universities (Board) and provides information to members of the public about how to attend the meeting, request to make oral comments at the meeting, and submit written comments pertaining to the work of the Board.

DATES: The Board meeting will be held on April 5, 2023 from 10 a.m. to 4 p.m. E.D.T. on the campus of Norfolk State University, 700 Park Avenue, Norfolk, Virginia 23504 in the Norfolk State University Student Center, Dorothy B. Brothers Auditorium, Room 149. The public may also join the meeting virtually at *https://ems8.intellor.com/login/847260,* join the Zoom event and follow the prompts to connect audio by computer or utilize the "call me" feature for audio by telephone.

FOR FURTHER INFORMATION CONTACT: Sedika Franklin, Associate Director/Designated Federal Official, U.S. Department of Education, White House Initiative on Historically Black Colleges and Universities, 400 Maryland Avenue SW, Washington, DC 20204; telephone: (202) 453–5634 or (202) 453–5630, or email *sedika.franklin@ed.gov.*

SUPPLEMENTARY INFORMATION:

The Board's Statutory Authority and Function: The Board is established by 20 U.S.C. 1063e (the HBCUs Partners Act) and Executive Order 14041 (September 3, 2021) and is continued by Executive Order 14048 (September 30, 2021). The Board is also governed by the provisions of 5 U.S.C. Chapter 10 (Federal Advisory Committees), which sets forth standards for the formation and use of advisory committees. The purpose of the Board is to advise the President, through the White House Initiative on Historically Black Colleges and Universities (Initiative), on all matters pertaining to strengthening the educational capacity of Historically Black Colleges and Universities (HBCUs).

The Board shall advise the President in the following areas: (i) improving the identity, visibility, and distinctive capabilities and overall competitiveness of HBCUs; (ii) engaging the philanthropic, business, government, military, homeland-security, and education communities in a national dialogue regarding new HBCU programs and initiatives; (iii) improving the ability of HBCUs to remain fiscally secure institutions that can assist the Nation in achieving its educational goals and in advancing the interests of all Americans; (iv) elevating the public awareness of, and fostering appreciation of, HBCUs; (v) encouraging public-private investments in HBCUs; and improving government-wide strategic planning related to HBCU competitiveness to align Federal

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1.12 Hawaii Environmental Protection Act

The SEIS being prepared for the General Reevaluation Report as required by NEPA will also be a joint Hawaii Environmental Protection Act (HEPA) as well. Like a NOI, HEPA requires the submittal of an EIS Preparation Notice (EISPN) to OEQC for publication in *The Environmental Notice*. The EISPN, like the NOI, undergoes a 30-day comment period. The consultation process of the EISPN affords agencies, organizations, and individuals an opportunity to request to become a consulted party in the preparation of an EIS. The EISPN for the General Reevaluation Report was submitted to OEQC and was published in the April 8, 2023, The Environmental Notice. Comments related to the EISPN were accepted between April 8, 2023, and May 8, 2023, although comments outside of this period have also been accepted by the Ala Wai Project Delivery Team and taken into consideration in the development of the GRR and SEIS. A virtual EIS Public Scoping Meeting as required by HEPA was held on Monday, April 24, 2023, from 5:30 to 6:45 p.m. HST.

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1.13 EISPN

April 8, 2023 — The Environmental Notice

O'AHU EAs/EISs

Ala Wai Canal Flood Risk Management Project--Supplemental Determination and EIS Preparation Notice

HRS §343-5(a) Trigger	(1) Propose the use of state or county lands or the use of state or county funds (5) Propose any use within the Waikīkī area of O'ahu
District(s)	Honolulu
TMK(s)	Various TMKs in Zone 2, Sections 3-4 and Sections 6-9 (see document)
Permit(s)	Numerous (see document)
Proposing/ Determining Agency	City and County of Honolulu, Department of Design and Construction Haku Milles, (808) 768-8480, Dominic.Milles@Honolulu.gov 650 South King St, 11th Floor, Honolulu, HI 96813
Accepting Authority	Mayor - City and County of Honolulu Rick Blangiardi, (808) 768-4141, alawai@honolulu.gov 530 South King St. Rm 300, Honolulu, HI 96813
Consultant	N/A
Status	The Accepting Authority has determined that a Supplemental EIS is required, and a 30-day public review and scoping period begins with the publication of this EIS Preparation Notice. Comments are due by May 8, 2023. Please click on the title link above to read the document, then send comments to the accepting authority at alawai@honolulu.gov. A virtual EIS Public Scoping meeting will be held online on Monday, April 24, 2023 from 5:30-6:45 pm; information about the project and participating in the scoping meeting will be available by April 12 at the project website (https://www.honolulu.gov/alawai)

The City and County of Honolulu and U.S. Army Corps of Engineers (USACE) are preparing a General Reevaluation Report / Supplemental Environmental Impact Statement (GRR/SEIS) to reevaluate the effects potential rainfall and flood events may have on the Ala Wai Watershed on O'ahu, Hawai'i. This project includes re-evaluations of ways to improve public health and safety, and opportunities that can reduce economic damages.

The original Ala Wai Canal Flood Risk Management Study was completed in 2017 and resulted in a recommendation that was subsequently authorized for construction under Section 1401 of the Water Resources Development Act of 2018 (Authorized Project). The purpose of the GRR/SEIS is to reevaluate the Authorized Project and either confirm original recommendations or provide new or modified Authorized Project recommendations.

New Waimānalo Health Center Facility--Final EA (FONSI)

HRS §343-5(a) Trigger	(1) Propose the use of state or county lands or the use of state or county funds
District(s)	Ko'olaupoko
TMK(s)	(1) 4-1-009:279
Permit(s)	Numerous (see document)
Approving Agency	State of Hawai'i, Department of Land and Natural Resources Barry Cheung, (808) 587-0430, barry.w.cheung@hawaii.gov PO Box 621, Honolulu, HI 96809
Applicant	Waimānalo Health Center; 41-1347 Kalaniana'ole Highway, Waimānalo, HI 96795 Guy Bowker, (808) 954-7121, GBowker@waimanalohealth.org
Consultant	The Limtiaco Consulting Group; 1622 Kanakanui Street, Honolulu, HI 96817 Claire Oshiro, (808) 596-7790, claire@tlcghawaii.com
Status	Finding of No Significant Impact (FONSI) determination

Waimānalo Health Center (WHC) is proposing a new, one-story health care facility to replace existing health care facilities on the project site. In 2015, the Department of Land and Natural Resources awarded a 65-year lease to the Applicant. The new facility will house the programs and services that WHC currently provides at the project site. WHC's project includes improvements to site infrastructure and the reconfiguration of the parking lot to increase patient parking space. Tree removal will occur to allow equipment to access and demolish old buildings. WHC intends to operate and deliver services to its patients during the various phases of demolition and construction.

Sustainable building design concepts will be utilized in the design and construction of the new facility. The recent pandemic provided opportunities to adjust waiting and gathering areas to achieve safe distancing requirements; the design of the proposed facility will incorporate outdoor space considerations.

5

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1.14 EISPN Virtual Public Meeting

As mentioned in the previous section, a virtual EIS Public Scoping Meeting was required by HEPA was held on April 24, 2023, from 5:30 to 6:45 p.m. HST. Slides presented during this virtual meeting as well as the recording of the meeting are available in their entirety at https://www.honolulu.gov/alawai/public-engagement.html.

1.15 NOI and EISPN Comments Received

From: Kawashima, Melvia
Sent: Wednesday, March 1, 2023 8:08:54 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Kawashima, Melvia
Subject: Ala Wai Contact Form

First Name melvia
Last Name kawashima
Contact Phone Number (808)768-5057
Contact Email Address melvia.kawashima@honolulu.gov
Contact Mailing Address 1015Wilder Ave. #1005 Message is there an online meeting today? 3/1/23? Please let us know when next steps are scheduled. Thank you.
Melvia from Councilmember Calvin Say's office Please enter the security code displayed in the image

IP: 172.31.63.225

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: David Kimo Frankel
Sent: Saturday, March 11, 2023 2:35:44 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Draft Supplemental EIS for Ala Wai Canal Flood Risk Management

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

The U.S. Army Corps of Engineers's Supplemental Environmental Impact Statement should disclose the data and the assumptions that were relied upon in rejecting management of the watershed to reduce storm runoff volumes. USACE has repeatedly claimed that management of the forest would not sufficiently reduce runoff from larger storm events, but has refused to reveal (a) how much runoff could be reduced through better management of the forest and (b) the assumptions and data that USACE has relied upon to reach its conclusion. Many studies have revealed the benefits of diverse, native forest compared to forests dominated by alien species.

The SEIS should also disclose the impact of debris coming down from the watershed (from albizia and other non-native species) and blocking both streams and the mitigation measures. How will tree branches clog detention basins? How will tree branches clog the area that water flows (under bridges, through culverts etc.)? How does clogging affect the modeling? How does USACE plan to address the massive amounts of debris that will flow within the streams?

USACE should disclose what will happen to the waters retained on the mauka side of the Ala Wai canal that currently flow makai, but which would be blocked by (a) the walls and (b) higher profile of water in the Ala Wai canal that is raised by the wall on the makai side of the Ala Wai canal. How much more water will flood McCully/Moiliili with the walls versus without them.

Has USACE looked at the alternative of getting Waikiki buildings to move vulnerable elements (such as generators) to higher floors?

What threatens Waikiki more, temporary flooding from rare storm events or long-term flooding from sea level rise?

Finally, USACE should disclose the assumptions and data behind its economic modeling of the damage to Waikiki from flooding. Are the calculations based on the loss of revenue generated by tourist visits, or just damage to buildings themselves? Which buildings does USACE expect will be damaged? Are those buildings currently insured by flood insurance?

From: Teri Skillman
Sent: Sunday, March 12, 2023 12:19:37 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Sidney Lynch
Subject: Hawaii – Supplemental Environmental Impact Statement (SEIS) for the Ala Wai Canal Flood Risk Management Study in Honolulu.

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

As a paddler and the former President of the Friends of Kamehameha Canoe Club located on the Ala Wai at the McCully Bridge, I am distressed the this issue with USACE continues without transparency and lack of LISTENING to community input. Are they so desparate for the funds that they will do anything to push the project forward?

It is very clear from the wording that USACE has notified the unions and is seeking their support to push the supplement through. This notice does not appear on either the city or USACE website nor was it sent out on the email list that is used to notify the public of the zoom meetings.

If USACE is going to do another SEIS, these are some questions that MUST be answered:

* Disclose the data and the assumptions that were relied upon in rejecting management of the watershed to reduce storm runoff volumes. USACE still has not revealed how much runoff could be reduced by better forest management practices.
* SEIS should disclose impact of debris from watershed on mitigation measures.
* What will happen to waters retained on mauka side of Ala Wai canal which would be impeded by planned walls?
* How much more water will flood McCully/Moilili with walls versus without walls?
* What about following the 2015 city study that states buildings in Waikiki have to move their infrastructure up to avoid sea level rise? Is USACE recommending this? How would this affect any flood plans?
* What is economic modeling based on? Loss to infrastructure? Loss to tourism? Which buildings will be damaged? Do they have flood insurance?

This action is irresonsible, lacks transparency, and has NOT involved the community that will be affected. There is clearly political maneuvering behind the scenes. This needs to stop.

Mahalo for receiving my testimony. Please be responsible to your constituents, the home owners and tax payers of Honolulu.

Teri Skillman
Email: teriskillman77@gmail.com<mailto:teriskillman77@gmail.com>

From: Hotmail
Sent: Monday, March 13, 2023 11:42:56 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: USACE planning Supplemental EIS for Ala Wai

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha.

I am writing to convey my disappointment with the push of this project to the unions.

As an affected party, I DO NOT SUPPORT this project.

Basins in the upper reaches of the watershed pose a serious danger to my property and family. Myself and members of my community have shared our concerns with this part of the project since we were first made aware of it by our neighborhood board. Since then, this project ,as it was incepted, is still being pushed with disregard to those who will be daily and directly impacted by construction of the basins in our community.

Particularly, I am concerned with the elevated danger the upper basins pose to my property due to high water levels and debris. I have lived in upper Palolo for over 40 years along Palolo stream. Every time it rains in the back of the valley, water levels increase significantly in the stream in my backyard from 1 foot to over 4 feet. This is with the free flow of water and without the basin. The natural movement of the water over the years has been significant as I have seen boulders the size of cars moved down river. An upper basin will dramatically change the dynamics of water flow, volume, and speed. As my home and property front the stream, I am extremely concerned for my family's safety. I can't help but be reminded of the devastation caused by Kaloko damn and what that could mean for my community in upper Palolo and for those downstream of me. I am at peace in my home knowing that the natural flow of the stream has kept my family safe for decades.

I encourage future planning to be implemented in Waikiki and not upstream where the people of the island live. Local peoples safety, in the affected communities, will be affected daily by this project. Whereas, Waikiki, built on swamp lands and having always had water issues, will not have this dangerous and intrusive construction in their backyards. I find that huge disparity extremely upsetting as the quality of life for local people are being sacrificed for peace of mind for Waikiki. We all need to feel safe and secure in our homes.

If a basin needs to be constructed, build it on city property downstream at the Ala Wai golf course, or in the city parks.

Thank you for the opportunity to share my concerns and for your thoughtful consideration of the impact this project has on the local community.

With appreciation,

Lise Vaughan-Sekona

From: Gary Weller
Sent: Wednesday, March 15, 2023 10:40:23 AM (UTC-10:00) Hawaii
To: alanakaoNB@gmail.com; Josiah Akau; Amber Wong; Mele Kalama-Kingma; kelliann.hawaii@gmail.com; David Laeha; Jade Lau; Levani L; Carol Miyashiro; Kate Righter; Kathy Thurston; Claudine Tomasa; Steve Trecker; Dan Vermillion; Gary Weller; Jonathan White; Donna Wong; Jeff Zuckernick
Subject: 'Forever Chemicals' Have Been Found In Hawaii's Environment. Now What?

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Blockedhttps://www.civilbeat.org/2023/03/forever-chemicals-have-been-found-in-hawaiis-environment-now-what/

Now what? Water, land, fish, people, baby, and livestock, maybe Air, time to go to Mars?
--
[Blockedhttps://ci3.googleusercontent.com/mail-sig/AIorK4zrT7ke0VzwYTXigLjj12GC3wnjxLM5TUO-e7GRLnghZNti-e6cSFEGl3slrz1CRevhYPRL5rv5Pw9BX2J5Jub-lbEfvqu1bBjsYCKO0g]
Kailua Neighborhood Board
Gary E. Weller
221 Iliaina Street Kailua, Hawaii 96734 USA
Work:808-253-0675
Fax:808-2549693
Cell:808-203-8217

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From: Tsugawa, Greg
Sent: Tuesday, March 21, 2023 10:30:26 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Ala Wai Canal Flood Risk Management Study - Notice of Intent

Dear Ms. Herleth-King:

Please see the attached letter from the City and County of Honolulu's Department of Transportation Services regarding the Ala Wai Canal Flood Risk Management Study - Notice of Intent. Let us know if you have any questions.

Thank you.

Sincerely,
Greg Tsugawa
City and County of Honolulu
Department of Transportation Services
Regional Planning Branch

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
711 KAPIOLANI BOULEVARD, SUITE 1600
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

RICK BLANGIARDI
MAYOR

J. ROGER MORTON
DIRECTOR

JON Y. NOUCHI
DEPUTY DIRECTOR

TP2/23-899008

March 24, 2023

SENT VIA EMAIL

Ms. Shawna Herleth-King, Project Manager
U.S. Army Corps of Engineers
Honolulu District
alawai@honolulu.gov

Attention: POH-PPC, Ala Wai

Dear Ms. Herleth-King:

SUBJECT: Notice of Intent To Prepare a General Reevaluation Report/Supplemental Environmental Impact Statement for the Ala Wai Canal Flood Risk Management Study, Honolulu, Hawaii

The Department of Transportation Services (DTS) is actively coordinating with the U.S. Army Corps of Engineers (USACE) on the Ala Wai Flood Risk Management Study (Study). The DTS' representative attends weekly Study coordination meetings with the USACE, participates in the USACE's Study public meetings, and coordinates the DTS' communications and projects with the USACE.

The DTS currently has two ongoing projects in the Study area, (1) the Ala Wai Boulevard Complete Streets Project, located between Kapahulu and Kalakaua Avenues, and (2) the Ala Wai Bridge Project, spanning the Ala Wai Canal at Kalaimoku Street. The USACE must ensure ongoing coordination between the DTS projects and the Study's flood risk management measures.

Should you have any questions, please contact Greg Tsugawa, of my staff, at (808) 768-6683.

Very truly yours,

J. Roger Morton
Director

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Denny, Janel
Sent: Wednesday, March 22, 2023 9:10:02 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Say, Calvin; Milles, Haku
Subject: Ala Wai NOI

Aloha,

Councilmember Say met with a couple of concerned residents re: the lack of public outreach for the NOI public comment period. I wanted to confirm that the information on the extension of the public comment period is accurate and have a couple additional questions:

1. If the public comment period extends through May, does that move the expected SEIS publication past summer 2023, and if so, what is the new ETA?

2. After the 45-day comment period on the GRR/SEIS, what is the timeline that follows and which agencies are involved in decision making moving forward from there?

Extended public comment period for Notice of Intent to prepare an Environmental Impact Statement

We have published a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) in the Federal Register, here:

Blockedhttps://www.federalregister.gov/documents/2023/02/22/2023-03622/notice-of-intent-to-prepare-a-general-reevaluation-reportsupplemental-environmental-impact-statement

The Federal Register currently states that the public comment period for this NOI closes on March 24th. However, we will continue to accept public comments through May 8 via the following channels:
o Website:
Blockedhttps://www.honolulu.gov/alawai/contact.html<Blockedhttps://www.honolulu.gov/alawai/contact.html>.
o Email: alawai@honolulu.gov<mailto:alawai@honolulu.gov>.
o Mail: U.S. Army Corps of Engineers, Honolulu District, 230 Otake St. (Attn: POH-PPC, Ala Wai), Fort Shafter, HI 96858-5440.

For more information on this process, please click here: Ala Wai Notice of Intent Information<Blockedhttps://www.honolulu.gov/cms-ddc-menu/site-ddc-sitearticles/52696-ala-wai-notice-of-intent.html>

Mahalo,

Janel Denny | Sr. Advisor
Office of Councilmember Calvin K.Y. Say
Honolulu City Council, District 5
OFFICE 808.768.5055 | EMAIL janel.denny@honolulu.gov

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From: Laura Ruby
Sent: Wednesday, March 22, 2023 3:25:05 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Please modify the Ala Wai Flood Control Project

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

The Project planning is not acceptable as is. Please make a new recommendation that will include modifications to the Authorized Project.

Thank you,
Laura Ruby
366-0847
lruby@hawaii.edu<mailto:lruby@hawaii.edu>

From: sidney
Sent: Wednesday, March 22, 2023 11:48:48 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: sjlkenjoinc@hawaii.rr.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name sidney
Last Name lynch
Contact Phone Number (808)841-8282
Contact Email Address sjlkenjoinc@hawaii.rr.com
Contact Mailing Address 524 Kalihi Street Message Do not adopt the original Ala Wai flood control plan. Willing to consider alternatives under the current study. However the manner in which this intent to seek an SEIS brings into question the communication and transparency on the part of USACE and the city of Honolulu.
Please enter the security code displayed in the image

IP: 66.8.251.177

From: Sean
Sent: Wednesday, March 22, 2023 12:16:53 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: seanscanlanphd@yahoo.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Sean
Last Name Scanlan
Contact Phone Number (808)277-7577
Contact Email Address seanscanlanphd@yahoo.com
Contact Mailing Address 2625 Ipulei Pl.
Message Please tell me the upper valley catchments are not still in the plans to be considered here. The design flaws (e.g., sidewall erosion, topping/flooding adjacent homes, debris management) were apparent early on.
Please enter the security code displayed in the image

IP: 8.17.145.254

From: Sidney
Sent: Wednesday, March 22, 2023 5:43:28 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: SEIS

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

The manner in which the notification of USACE's intent to do a Supplemental Environmental Impact Statement (SEIS) was done once again showcases the disregard for the general public that was a main complaint in the earlier project. After many asks to USACE when this new study started, an email list was developed on the alawai.gov site for the public to sign up for notifications about meetings and other developments in the study. Yet the notice of filing for an SEIS did not get sent out.

Instead, the public was left to find out about it thru a letter that was sent out to union members encouraging them to write in to support this project because it will create jobs. It was only by chance that the public was forwarded this letter and thus found out about the project. Though unknown how the unions found out, taking the high road we can hope they found out thru a service which monitors the federal register rather than suspecting USACE sent them the notice urging them to support the study. But once again USACE has broken the trust it has so carefully been working on these past two years to build up with it's zoom meetings.

This intent to prepare an SEIS states that it will either reconfirm the original project – which the public thought had been taken out of consideration – or make a new recommendation. The thought of the original project being resurrected is mind boggling as for the past two years the public on the zoom meetings has been assured that it would not be.

USACE has stated that it will announce it's hybrid plan in June or July. Why is an SEIS being started ahead of that announcement? No attempt to explain to the public the process or reasoning has been made.

Until recently there was not even a notice on the alawai.gov site about this intent to file. Now there is a link with a notice the initial date of May 24 to submit testimony has been pushed back to May 8.

There is certainly now time for USACE to schedule a zoom or have the DDP hold an in person meeting with the public to explain what is going on and thus be able to submit informed testimony.

Mahalo,

Sidney Lynch

President

Protect Our Ala Wai Watersheds

HOUSE OF REPRESENTATIVES

STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

March 22, 2023

US Army Corps of Engineers
Honolulu District Public Affairs
230 Otake Street
Attn: POH-PPC, Ala Wai
Fort Shafter, HI 96858-5440

To Whom It May Concern,

Thank you for the opportunity to provide comments related to the General Reevaluation Report/Supplemental Environmental Impact Statement (GRR/SEIS) for the Ala Wai Canal Flood Risk Management Study, Honolulu, HI. I would like to express my concerns regarding the evaluation of the Mānoa Valley District Park detention basin listed as a project alternative in the GRR/SEIS.

The Mānoa Valley District Park is the second most used city park on Oahu, used by hundreds of Mānoa residents on a daily basis. On weekends, hundreds more citizens from outside the district use the park for a myriad of events; sports activities, senior citizen programs, open markets, and community gardening. Placing a detention basin with a six-foot high berm or excavation of the ground six-feet deep would create serious safety concerns for park users.

The Mānoa Neighborhood Board recently adopted a resolution opposing any flood control plan that requires the construction of a detention basin at Mānoa Valley District Park. I urge the USACE to carefully evaluate the safety and social impact on the community at large and address the potential flooding issue without the use of the park.

Alternative 2B.3, the Conveyance Plan, would seem to address the flooding problem in Mānoa without touching the park. The removal of albizia and non-native species which clog the streams and better routine removal of vegetation in Mānoa Stream, in addition to the conveyance method, may adequately protect Mānoa Valley residents and property in the event of a twenty-five-year to fifty-year storm.

Representative Andrew Takuya Garrett
District 22 - Mānoa/Tantalus/McCully-Mō'ili'ili
Hawaii State Capitol, Room 323 – Honolulu, Hawaii 96813
Phone: (808) 586-8475
E-Mail: repgarrett@capitol.hawaii.gov

Thank you for the opportunity to provide comments and weigh in on the GRR/SEIS for the Ala Wai Canal Flood Risk Management Study. Please feel free to contact me to arrange further discussion of the project or to connect with our Mānoa community.

Sincerely,

Andrew Takuya Garrett
State Representative, District 22

Enclosure: Mānoa Neighborhood Board No. 7 Resolution

cc: Mr. Kama Hopkins, Chair, Mānoa Neighborhood Board No. 7

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

MĀNOA NEIGHBORHOOD BOARD NO. 7
NEIGHBORHOOD COMMISSION • 530 SOUTH KING STREET ROOM 406 • HONOLULU, HAWAII, 96813
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET: http://www.honolulu.gov

RESOLUTION OPPOSING ANY FLOOD CONTROL PLAN THAT REQUIRES THE CONSTRUCTION OF A DETENTION BASIN AT MANOA VALLEY DISTRICT PARK

Mānoa Neighborhood Board No. 7
February 1, 2023

WHEREAS, the Ala Wai Watershed is an area of Honolulu that is an ahupua'a, from the mountains to the sea, in this case, from the Ko'olau ridge line to the ocean from Kaka'ako to Diamond Head and encompasses Makiki, Mānoa, and Pālolo Valleys; and

WHEREAS, in the Fall of 2018 Congress appropriated funds for the construction of the Ala Wai Flood Risk Management Project ("Project") to be supervised by the United States Army Corps of Engineers ("Army Corps"); and

WHEREAS, this Board passed two resolutions concerning the Project, the first in February 2019 asking that the Project be put on hold, and the second in December of 2020 requesting that the Army Corps seriously consider alternatives to its second version of the Project; and

WHEREAS, since neither the first nor the second version of the Project survived scrutiny, in November of 2021 the Army Corps embarked on a process to develop a scaled-down Project, one geared toward a twenty-five-year flood instead of a 100-year flood, this third version being labeled the Ala Wai Flood Risk Management General Reevaluation Study (GR) and for which the Army Corps is receiving up to $3 million in Federal funds; and

WHEREAS, the Army Corps held meetings and workshops as part of this GR in January, April, July, and December of 2022; and

WHEREAS, as of December 2022 there are four Alternatives (one Alternative is to do nothing) that have survived the screening process; and

WHEREAS, some measures may be found in more than one Alternative; and

WHEREAS, one feature of two of the three remaining Alternatives—Alternative 1, the Storage Plan, and Alternative 5, the Hybrid Plan--is a detention basin on the grounds of Mānoa Valley District Park; and

WHEREAS, the one plan without the Mānoa Valley District Park detention basin is Alternative 2B, the Conveyance (using Floodwalls) Plan, which has floodwalls at Kahana, Woodlawn Bridge, Koali Road, and the Ala Wai Canal, a detention basin at Makiki District Park, and pumps and flap gates; and

WHEREAS, at the December 2022 meeting, an Army Corps representative stated that the Mānoa Valley District Park detention basin could consist of a six-foot high earthen berm or excavation of the Park six feet deep or any combination of wall and excavation; and

WHEREAS, this detention basin would be constructed with one berm along Mānoa Stream ma kai of Kahaloa St. and then one berm parallel to Lowrey Ave. between the park and a row of residences; and

WHEREAS, the Mānoa Valley District Park is used by hundreds of Mānoa residents on a daily basis; and

WHEREAS, two baseball fields could potentially be in the excavated area; and

WHEREAS, residents along Lowrey Ave. could potentially have their backyard view of the Park obstructed by a six-foot berm; and

WHEREAS, on several occasions this Board has invited the Army Corps to make a presentation to the Board concerning the Mānoa Valley District Park detention basin; and

WHEREAS, the Army Corps has neither replied to this Board's requests nor made a presentation; and

WHEREAS, the Army Corps plans to release a Draft Report in May or June of this year and is soliciting comments during this period on its proposed alternative plans; now therefore,

BE IT RESOLVED that the Mānoa Neighborhood Board no. 7 urges the Army Corps to select a plan for Ala Wai flood control that does not involve the construction of a detention basin at Mānoa Valley District Park; and

BE IT FURTHER RESOLVED that copies of this resolution be sent to the Governor and Lieutenant Governor of the State of Hawai'i; to Senators Brian Schatz and Mazie Hirono; to Congressional Representatives Ed Case and Jill Tokuda; to the United States Army Corps of Engineers; to each member of the Hawai'i State Legislature; to the Mayor of the City and County of Honolulu; to the City's Department of Design and Construction; and to each member of the Honolulu City Council.

The Manoa Neighborhood Board No. 7 PASSED this resolution
By UNANIMOUS vote of 15-0-0
at the Wednesday, February 1, 2023 Regular Meeting.

Submitted by: Jeremy K. Hopkins
Jeremy "Kama" Hopkins, Board Chair

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Christopher Tipton
Sent: Thursday, March 23, 2023 2:44:55 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: NOI Comment

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

I think an Environmental Assessment for the Ala Wai flood project would be sufficient. Please don't let NIMBYs, especially those with large personal financial interests, prevent the Corps from building this vital flood-protection project.

Regards,

Chris Tipton

From: Jason DeMarco
Sent: Thursday, March 23, 2023 1:24:42 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Ala Wai EIS Comment

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

To whom it may concern,

The submit formal comment feature on the federal register website is not functional and indicated email as a viable way to submit comment.

Comments:

Sufficient study and investigation has been conducted of the flood risks. Dialogue and alternative solutions are what is called for. If the GRR/SEIS is the best vehicle for this, then proceed. My concern is it is wasting tax dollars on more investigations and paperwork when engineered solutions in dialogue with the community is what's needed. An EA should be sufficient to proceed.

Thank you,

Jason DeMarco, AIA, LEED AP BD+C
Partner
POLYLINE Architecture + Urbanism
856 Ilaniwai St, Suite 201 Honolulu, HI 96813
808.203.0026 Blockedwww.polyline.design<Blockedhttp://www.polyline.design>

From: Elton Fukumoto
Sent: Friday, March 24, 2023 10:01:42 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Comments concerning an SEIS for the Ala Wai project

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

I have attached comments concerning a possible SEIS for the Ala Wai Flood Risk Management Project.

Thank you.

Elton Fukumoto
Manoa Resident

United States Army Corps of Engineers
City and County of Honolulu
Department of Design and Construction

Dear Sir or Madam:

I am providing comments on the proposed flood control measures in the Ala Wai watershed during this 30-day scoping period for the draft Supplemental Environmental Impact Statement (SEIS) as set out in the *Federal Register* on February 22, 2023.

First, I think that the so-called Authorized Project, which is a combination of the first two versions, should not be the version selected because it is not within the original budget and does not do what it was supposed to do with respect to flood control. Second, my main point about the alternatives you are considering is that you should not construct a detention basin on the grounds of Manoa Valley District Park.

I wish we knew more about the height of the berms or depth of excavation planned, but since you have not provided any details about these features, I can only conclude at this time that any construction on Park grounds would be unwelcome.

Because hundreds of Manoa residents use the Park every day, this flood control measure will make the project overall quite unpopular. And not only with Manoa residents since people from outside the Valley use the Park on weekends.

Because flood control for Manoa is needed, please consider giving priority to your Conveyance Plan, perhaps with albizia control and better stream maintenance added. You know, much of the flooding can be lessened as long as the channels under the bridges are not clogged with albizia debris. In the old days, the City would position a crane on the Lowrey Ave. bridge to prevent debris build up at that point.

Thank you for taking comments.

Sincerely,

Elton Fukumoto
Manoa resident

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Elizabeth
Sent: Monday, March 27, 2023 12:49:56 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: ekieszkowski@staradvertiser.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Elizabeth
Last Name Kieszkowski
Contact Phone Number (808)745-5710
Contact Email Address ekieszkowski@staradvertiser.com
Contact Mailing Address 1212 Nuuanu Ave. Apt. 2412 Honolulu HI 96817 Message Please send me all updates on public meetings, EIS progress and decision-making steps completed.
Please enter the security code displayed in the image

IP: 72.253.193.32

From: tim hahn
Sent: Monday, March 27, 2023 12:05:35 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Canal Project

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha, I have not been following the project as actively I would prefer, but I am aware of some of the solutions which seem to make much sense but are being rejected. For example, having a second outlet for the canal towards Diamond Head as originally planned, in my opinion, has great potential. It would not only to increase the outflow but increase the recreational aspect and speed up the cleanliness of the canal. I understand that the reason it is being ruled out is because it will not help with outflow; how is this true? I live near the diamond head end of the canal, and I would like to see it flow out through our direction.

v/r

Tim

From: Donna
Sent: Friday, March 31, 2023 1:40:38 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: donnalching@icloud.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Donna
Last Name Ching
Contact Phone Number (808)384-4070
Contact Email Address donnalching@icloud.com
Contact Mailing Address 2212 Wilder Avenue, Apt.A Message I'd like to be included on any and all distributed information as well as opportunities to comment and testify at hearings for this project.
Please enter the security code displayed in the image

IP: 141.239.120.193

From: DONNA CHING
Sent: Friday, March 31, 2023 2:16:05 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Sen. Carol Fukunaga; Andrew Garrett; Say, Calvin; Kama Hopkins; alethea Rebman; Moku, Samuel
Subject: Public Comment on Ala Wai flood control - deadline for comment May 8, 2023

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Here's a novel idea -- Waikiki's problems are solved IN WAIKIKI.

Why are we trying to fight nature? Use former wetlands like the vast Ala Wai golf course to handle 50 and 100 year floods. Let the hotels and condos, which should have never been built on wetlands in the first place, help fund modifications to channel/control floodwater and golf course repairs needed when damage occurs.

We can also:

1. reduce stormwater when it hits the ground by using the building code to compel commercial and residential properties to pave ALL flat surfaces with permeable materials.
2. tax property owners for every square foot of excessive impermeable lot coverage (e.g., the 2019 code requirement of 25% should be retroactive to ALL commercial and residential properties).
3. use Stormwater tax and fine revenues to fund permeable roadways and incentives/rebates for homeowners to capture rainwater as they are able.
4. dredge and maintain the Ala Wai so that it works optimally
5. install low energy-use impellers to draw water down the Alawai and increase flow

Two of the truly terrible ideas I've heard bandied about include sacrificing the Pal Eldredge baseball complex at Manoa district park for a retention basin (and another one in Palolo). Or, almost as bad, cutting through Kapiolani Park Trust land to create a second outflow near Kapahulu.

Please consider that in essence, Waikiki landowners are hoping to place the cost of their investment risk on the backs of mauka neighborhoods. The folks in Manoa and Palolo should not bear costs that belong to condo and hotel owners. I am STRONGLY against any part of Manoa district park being taken for the purpose of solving the problems at the Ala Wai/Waikiki.

Mahalo,
Donna L. Ching
Wilder Avenue
808-384-4070

From: Daniel Dinell
Sent: Monday, April 10, 2023 4:09:45 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Milles, Haku
Subject: Supplemental Environmental Impact Statement Preparation Notice (EISPN) For the Proposed Ala Wai Canal Flood Risk Management Project

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Please see the attached. Mahalo.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

DANIEL DINELL

3562 Akaka Place • Honolulu, Hawaii 96822
(808) 321-8905 • dinellconsultingllc@gmail.com

April 10, 2023

City and County of Honolulu, Department of Design and Construction
Attn: Haku Milles, (808) 768-8480, Dominic.Milles@Honolulu.gov
650 South King St, 11th Floor
Honolulu, HI 96813

RE: Ala Wai Canal Flood Risk Management Project--Supplemental Determination and EIS Preparation Notice

Thank you for the opportunity to provide comments regarding the above project.

A detention basin was incorporated in US Army Corps of Engineers (USACE) plans for a portion of the Chinese Cemetery property in Mānoa, but according to a local newspaper article, eliminated. The USACE previously noted regarding this site: *"The intent of this proposed retention basin was to capture flood waters from mauka areas of Manoa that would normally be channeled through Woodlawn Ditch. The water would be retained for a time and gradually released into Woodlawn Ditch which connects with Manoa Stream south of the Proposed Project Site. This would reduce the chance that flood waters from mauka Manoa would overwhelm Manoa Stream and eventually the downstream Ala Wai Canal."*

There are new developments since the USACE purported eliminated this site from its plan. First, the original 2017 USACE plan evaluated a much smaller footprint for the detention basin as to what could now be possible given the landowner's (Lin Yee Chung Association or LYCA) desire to remove the existing structures in search of higher recurring lease revenues. Second, the USACE could also evaluate rerouting East Manoa Road (see attached) since access to these homes would no longer be required. The City/USACE could lease the property from the LYCA. Without factor in rent increases, $15,000/month would total $11.7 million over 65 years – a pittance for the protection provided by such a facility and a great investment. While a lease model may not be the City's or USACE's desired landholding mechanism, the fact that LYCA is a nonprofit with a narrow purpose to maintain the cemetery, fee simple acquisition of the property would not be necessary. A discussion should at least take place to see if a meeting of the minds would result.

I suggest that elimination of this detention basin be reevaluated and a newer, larger, detention basin that would improve public health and safety, while reducing economic damages be considered as part of the EISPN. Working with the City, an even larger detention basin/park that will protect thousands of people downstream from catastrophic property and personal life damage while providing a stable revenue stream to the landowner. A win-win-win.

Aloha,

Daniel Dinell

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Think Big with Green Infrastructure:
- Reroute East Moana Rd, rip up existing pavement, build landscape berms (yellow line), add trees, walking paths, create a new park
- Results in better traffic flow, calmed, yet reduces emissions by removing stop signs; reallocate public roadway for people, not cars
- During heavy rains the yellow bounded area serves as a retention basin

Activation:
- Existing cemetery building mixed use for yoga, adult classes, youth, etc. by, and for, community
- Wooden adventure playground (like Higashihara Park on Hawaii island, picture below) at new Lin Yee Chung Park with limited vehicular parking to encourage biking/walking and neighborhood interaction

Result: protects and serves many, many thousand more people.

From: Robert Fox
Sent: Tuesday, April 11, 2023 7:46:56 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Manoa Stream and Palolo Stream flood control

From the Desk of Robert E. Fox
2022 University Ave.
Honolulu, HI 96822

Dear Sirs and Madams:

I am deeply concerned about your plans for the Manoa and Palolo Stream flood abatement program. I urge you to look into the **Friends of the Los Angeles River**, to get more information on the effects of cementing up the stream beds.
Los Angeles made that mistake in a bid to stop the flooding down the LA River and the San Gabriel River. We may have stopped a flood once upon a time, but the greater effect was the destruction of a habitat, the removal of permeable soil for the rainwater, and the waste of billions of gallons of water for drought stricken California. The consequences of Cement lined Sterile Rivers in the State of California are almost too gruesome to state. Gone are the birds, the insects, the small woodland creatures, but if you are concerned about flooding then gone are any control mechanisms at all regarding flooding. The accumulation of debris from human waste, litter, sewer systems etc. has made the Los Angeles River a cesspool of disease and contagion for all adjacent cities along its banks. The effect of the cement has been severe in many other ways. Homeless folks seem to think a cement bed is better than a weed patch, so the sides of the Los Angeles River are lined with homeless encampments. Their added debris only increases the stench and the pollution affecting the minimalized stream. When it really does rain, then people are washed along with the flow. If one wants to be capitalistic about the LA River, all land adjacent to and all Cities lining the River have almost no land value. That is impressive as the value of land in California is very high. As a real estate broker, I will not take a listing anywhere near the Rivers. There is little if any upward value growth, as the impact of the stench degrades any worth of land. The end of the La River and the San Gabriel River is Long Beach, CA, where I have participated in the community as Executive Director of the Council of Neighborhood Organizations for years. In an attempt to stop the litter, and I mean real litter like metal pipes, Styrofoam boxes, cardboard debris, shingles, glass bottles etc. the City of Long Beach spent a fortune on a floating Berm to try to gather this debris before it entered the sea. Unfortunately the power of the debris broke the berms created, and we are still having garbage flow into the ocean from the cemented rivers of LA.

Even now we are discovering that our aquifers on Oahu have been depleted and compromised. God forbid we should get into a conversation about the Halawa Aquifer. Instead of preventing the paving over of entire lots, the City sat back and watched the wholesale cementing of Monster Home Lots. That lack of enforcement has caused immense flooding throughout the neighborhoods. I live next door to a Monster Home in lower Manoa, and every time it has rained this year, we have rivers 8 inches or higher coming off one lot into Maile Way to an extent so overwhelming that the street drainage sewers cannot handle the load. Properties downstream from these Monster homes have their yards flooded out.

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Now let's talk about Manoa Stream. We have never been conscious of the impact of our building upon that stream. The bridge which spans Woodlawn Drive is too low, and in heavy rains clogs up with debris, branches, and trees and garbage, overflowing into adjacent parking lots and grassy yards. No one thought that stream would get that high, but it did. Also in a major flood, the stream inundated the Hamilton Library on the Campus of the University of Hawaii Manoa. Clearly, we need a working solution to flooding.

I presume that with climate change the jet stream is also changing. We are seeing that effect even now with Atmospheric Rivers pounding California, Arizona and Colorado. These will only increase in severity. It is too late to turn back the clock of time. We now have to deal with what humankind has created. There are consequences to everything we do.
Therefore, in looking at the Manoa Stream and the Palolo Stream, I hope you realize that using an outmoded technique of cementing up the sides or cementing a catch basin is not the right solution. We have done that and it has failed.
It is my understanding that a more natural solution works better. The main reason for flooding is the lack of "retention" of the soil. In Manoa we have a very invasive species of trees. Albizia, which are growing along the streambed. Perhaps we should look into our environmental "handbook" and select trees which are native that are conditioned by evolution to have long "gripping" root systems. Clearly the islands have had trees for a million years. We need to see which trees we can plant which are natural to the streams of the islands. Clear-cutting the forests during the Sandalwood Boom of the 1800s created the conditions for the massive flooding which were endemic to Oahu in that Century. It was due to this clearcut flooding that Kamehameha III created the first zoning of the islands, The Great Mahele 1845 through 1855, which created dedicated farm/agricultural land, and dedicated watershed land. These were not capricious designations. They were deemed necessary for the survival of the people. They had learned the lesson of allowing the greed of sandalwood merchants to destroy the natural habitat of Hawaii. At one point the entire island of Oahu was clear cut in search of Sandalwood, Acacia. Let us not make a similar mistake now. We may need to remove the invasive Albizia Trees and any other bush which is not native in order to "reline the streams" with appropriate flood containing and mitigating plant life.
I believe a comprehensive cleaning, litter pick up and selective replanting of the sides of the Manoa stream is the major component for the solution of destructive flooding. Catch basins made of natural materials makes sense. Banks of watergrass which we can easily see in Kailua in the marsh land, may better prevent erosion and the acceleration of the speed of water during a downpour. Cement will only increase the speed of water, and will shoot it out to do more damage. I believe a manmade system of banking, flow alteration, and stepped buffering with plantings appropriate to the region is a far more sustainable method of flood control. Also using such a natural filtration system will minimize the mudflow and the contamination of the Ala Wai Canal. I suppose what I am proposing is a natural "Netting" in a natural catch basin system of many smaller, angled, stepped tiers as the stream approaches the Ala Wai will be a more sustainable and practical solution.
The added benefit is the replenishment of the aquifer of Manoa and Palolo areas. The entire Waikiki Ahupua'a can be protected for water replenishment and flood directing given some good old fashioned Hawaiian gardening techniques.

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When in doubt, just look at Hawaiian methods of the past. Generally, they worked far better than our "happy go lucky" cement over paradise methodology. I implore you to look deeper into this methodology so that we can preserve the land and the native habitat while preventing further flood damage.
I would like to propose a community design element meeting where at members of the public, including our Native Hawaiian elders, that can discuss the options and possibilities of this Manoa Stream and Palolo Stream flood abatement plan.
You may find that the wisdom of "old folks" is deep and compelling. Generational wisdom has been passed down despite the restrictions and prohibitions of the Church for ages. Let us not step forward without giving reverence to our Kapuna who have more knowledge of the land than any of you.

Much aloha
Robert E. Fox

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Brenda
Sent: Wednesday, April 12, 2023 6:32:59 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: brendaglam@gmail.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Brenda
Last Name Lam
Contact Phone Number (___)___-8___
Contact Email Address brendaglam@gmail.com
Contact Mailing Address 2512 , Manoa Rd
Message I object to using Manoa park for detention basin Please enter the security code displayed in the image

From: Norma Freeman
Sent: Friday, April 14, 2023 4:05:56 PM (UTC-10:00) Hawaii
To: Ala Wai; shawna.s.herleth-king@usace.army.mil
Cc: Sen. Carol Fukunaga
Subject: Ala Wai Flood Mitigation Project SEIS

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

ATTN: alawai@honolulu.gov<mailto:alawai@honolulu.gov> and Shawna Herleth-King,

The attached comments from State legislators Fukunaga, Belatti, Garrett, Ihara, Nishimoto, Sayama, Moriwaki, Saiki and Tam are submitted in response to the USACE request for comments on the Supplemental EIS (February 22, 2023 and extended on March 23, 2023).

Please contact Senator Fukunaga at senfukunaga@capitol.hawaii.gov<mailto:senfukunaga@capitol.hawaii.gov> or Office Manager Norma Freeman (808) 586-6460 if you have additional questions.

Mahalo,
Norma Freeman
Office Manager
Senate District 11, Senator Carol
Fukunaga<Blockedhttps://www.capitol.hawaii.gov/legislature/memberpage.aspx?member=168&year=2023>
Mānoa, Makiki/Punchbowl, Tantalus and Papakōlea Hawaii State Capitol, Room 216
Phone: 808-586-6460
Email: n.freeman@capitol.hawaii.gov<mailto:n.freeman@capitol.hawaii.gov>

HAWAIʻI STATE LEGISLATURE
Ka ʻAhaʻōlelo Mokuʻāina ʻŌ Hawaiʻi

STATE CAPITOL
415 SOUTH BERETANIA STREET
HONOLULU, HAWAIʻI 96813

April 12, 2023

Shawna Herleth-King
U.S. Army Corps of Engineers,
Honolulu District
230 Otake Street (Attn: POH-PPC, Ala Wai)
Fort Shafter, HI 96858-5440

Dear Ms. Herleth-King,

We are submitting comments on the *Supplemental Environmental Impact Statement for the Ala Wai Canal Flood Risk Management Study* on behalf of our constituents in Manoa, Makiki, Ala Moana, McCully-Moʻiliʻili, Kaimuki, Palolo, Kapahulu and Waikiki.

Many of them were largely unaware of the original Notice of Intent published in the Federal Register on February 22, 2023 that sought comments that were due by March 24, 2023.

We appreciate the extension of the comment period to May 8, 2023 (a new NOI was published in the Federal Register on March 23, 2023). However, the short lead-time between online posting of the proposed USACE-City plan on April 17, 2024 for discussion at the April 24, 2023 community forum minimizes the ability of neighbors and residents within the region to respond to the proposed plan and identify concerns about specific projects under the planned Supplemental Environmental Study being drafted for comment and review in Summer 2023.

We are especially concerned about the lack of outreach by the U.S. Army Corps of Engineers and City Dept. of Design and Construction into communities in which flood mitigation features may be proposed to be located (e.g., detention basins, berms around schools, floodwalls, pumps and nonstructural measures). These types of features were identified on Page 11 of the "Ala Wai Plan Formulation Tracker" and in the "Federal Register Alert" issued on February 22, 2023; *copies attached*).

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The Alert notified potential construction bidders and contractors in Hawaii of the project and encouraged them to submit comments on the project, which was described as a potential combination of (1) the Makiki District Park detention basin; (2) the Manoa Valley District Park detention basin; (3) the Ala Wai Golf Course detention basin; (4) the Kaimuki High School berm/floodwall; (5) the Kanaha floodwall; (6) the Woodlawn Bridge floodwall; (7) the Koali Road floodwall; and the (8) the Ala Wai Canal floodwall.

As you may be aware, the Ala Wai Canal Flood Risk Management Study completed in 2017 (authorized under Section 209 of the Flood Control Act of 1962) generated considerable community opposition over proposed USACE actions that impacted existing neighborhoods without adequate opportunities for review, comment and modifications.

We therefore encourage USACE and City agencies to provide written responses to questions from Ala Wai flood risk mitigation project participants that were submitted before the earlier March 24, 2023 deadline:

1. The USACE Supplemental Environmental Impact Statement should disclose the data and the assumptions that were relied upon in rejecting management of the watershed to reduce storm runoff volumes. USACE has repeatedly stated that management of the forest would not sufficiently reduce runoff from larger storm events; however, the agency has not revealed (a) how much runoff could be reduced through better management of the forest and (b) the assumptions and data that USACE has relied upon to reach its conclusion.
2. The SEIS should disclose the impact of debris coming from the upper watershed (e.g., from albizia and other non-native species) that can block streams and what mitigation measures should be undertaken. How will tree branches clog detention basins? How will tree branches clog areas through which water flows (under bridges, through culverts etc.)? How does clogging of waterways affect the modeling? How does USACE plan to address the massive amounts of debris that are likely to flow within the streams?
3. USACE should disclose what would happen to stormwater retained on the *mauka* side of the Ala Wai Canal that currently flow to the ocean, which would be blocked by proposed walls on the *mauka* side of the Ala Wai Canal and (b) a higher level of water in the Ala Wai Canal that occurs with the wall on the *makai* side of the Ala Wai Canal. How much

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more water could flood the McCully/Mo'ili'ili region with the walls in place versus without them?

4. Has USACE evaluated the alternative of having Waikiki buildings move vulnerable elements (e.g., such as generators) to higher floors?
5. What is the greater threat to Waikiki: temporary flooding from infrequent storm events or long-term flooding from sea level rise?
6. USACE should disclose the assumptions and data behind its economic modeling of the flooding damage to Waikiki. Are the calculations based on the loss of revenue generated by tourist visits, or through damage to buildings themselves? Which buildings does USACE expect will be damaged? Are those buildings currently insured by flood insurance?

Thank you for the opportunity to submit comments regarding the process for the Supplemental EIS for the Ala Wai Canal Flood Risk Management Study.

Sincerely,

Carol Fukunaga
Senate District 11

Della Au Belatti
House District 26

Andrew Takuya Garrett
House District 22

Les Ihara, Jr.
Senate District 10

Scott Nishimoto
House District 23

Jackson Sayama
House District 21

Sharon Moriwaki
Senate District 12

Speaker Scott Saiki
House District 25

Adrian Tam
House District 24

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Ala Wai Plan Formulation Tracker

Updated December 2022

ALTERNATIVE 5 - HYBRID PLAN

STATUS: Retained in the Final Array of Alternatives (Alternative 5.4).

MEASURES	ALTERNATIVE 5.1	JUSTIFICATION FOR INITIAL INCLUSION	ALTERNATIVE 5.2	JUSTIFICATION FOR CHANGE	ALTERNATIVE 5.3	JUSTIFICATION FOR CHANGE	ALTERNATIVE 5.4	JUSTIFICATION FOR CHANGE
Manoa Valley District Park Detention	✓	Cornerstone. Reduce flood risk using various cornerstones from other plans.	✓		✓		✓	
Woodlawn Drive Bypass	✓	Cornerstone. Reduce flood risk using various cornerstones from other plans.	✓		✓			Measure screened due to lack of effectiveness in water surface elevations in Lower Manoa.
Ala Wai Canal Floodwall	✓	Cornerstone. Reduce flood risk using various cornerstones from other plans.	✓		✓		✓	
Woodlawn Bridge Floodwall	✓	Reduce overbank flooding from the Manoa stream. Reduce severe inundation in Manoa subbasin.	✓		✓		✓	
Kaali Road Floodwall	✓	Reduce impacts from peak flows around Manoa-Palolo confluence.	✓		✓		✓	
Makiki District Park Detention	✓	Increase storage to reduce flood risk in Makiki subbasin.	✓		✓		✓	
Kanaha Floodwall	✓	The Kanaha Floodwall works in conjunction with the Makiki District Park Detention to reduce flood risk in the Makiki subbasin.	✓		✓		✓	
Palolo Channel Modification	✓	Reduce overbank flooding from the Palolo stream.		Measure screened due to lack of effectiveness in reducing water surface elevations in Palolo.				
Pikoi Bypass			✓	Potential opportunity identified to reduce flood risk in Makiki subbasin.		Screened out due to lack of effectiveness in reducing water surface elevations.		
Ala Wai Golf Course Detention			✓	Potential opportunity identified to reduce flood risk using detention in conjunction with floodwalls.	✓		✓	
Dredge Ala Wai Canal			✓	Potential opportunity to reduce flood risk in lower watershed. Compliments Ala Wai Canal floodwall.		Measure screened due analyses showing high cost in addition to environmental concerns and wall stability concerns.		
Woodlawn Channel Modification					✓	Opportunity to implement this measure instead of Woodlawn Drive Bypass.		Measure screened due to lack of effectiveness in reducing water surface elevations in Lower Manoa.
Pumps/other structures (flap gates)	✓	Minimum facility needed for design.	✓		✓		✓	
Nonstructural to reduce residual risk	✓	Can be used in lieu of structural measures.	✓		✓		✓	

11

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FEDERAL REGISTER ALERT©
February 22, 2023

Agency:
U.S. Army Corps of Engineers (USACE).

Subject:
Hawaii – Supplemental Environmental Impact Statement (SEIS) for the Ala Wai Canal Flood Risk Management Study in Honolulu.

Action:
Notice of intent.

Summary
The U.S. Army Corps of Engineers (USACE) announced its intent to prepare a Supplemental Environmental Impact Statement (SEIS) in connection with the Ala Wai Canal Flood Risk Management Study (Study) on Oahu near Honolulu, Hawaii. Acknowledging the need to reduce the risk to life, safety, and economic damages from flooding throughout the Ala Wai Watershed in Oahu, Hawaii, the USACE is reevaluating the Study, which was completed in 2017. The Study's recommended plan consisted of: (1) six in-stream debris and detention basins of varying height in the upper reaches of the watershed; (2) one standalone debris catching structure; (3) three multi-purpose detention basins; (4) floodwalls along the Ala Wai Canal averaging four feet in height and an earthen levee at the perimeter of an adjacent golf course averaging seven feet in height; (5) two pump stations to reduce the threat of interior flooding; and (6) a flood warning system. Per this notice, potential alternatives to reduce flood damages that will be considered under this planned SEIS include a combination of: (1) the Makiki District Park detention basin; (2) the Manoa Valley District Park detention basin; (3) the Ala Wai Golf Course detention basin; (4) the Kaimuki High School berm/floodwall; (5) the Kanaha floodwall; (6) the Woodlawn Bridge floodwall; (7) the Koali Road floodwall; and (8) the Ala Wai Canal floodwall.

Deadline:
Comments are due by March 24, 2023 and can be submitted by email to alawai@honolulu.gov. A Draft Supplemental EIS is expected to be available for review and comment in Summer 2023.

Relevance:
This project could create work opportunities for your members and contractors in Hawaii if it continues to proceed as planned.

Recommended Action:
Inform your members and contractor partners in Hawaii that the USACE has issued this notice and determine if your union will submit comments.

Agency Contact:
Shawna Herleth-King, USACE at (312) 846 – 5407 or shawna.s.herleth-king@usace.army.mil.

To Discuss Further:
Contact Andrew Siff at (202) 457 – 7756.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Mahealani
Sent: Monday, April 17, 2023 10:54:56 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Maunalaha808@gmail.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Mahealani
Last Name Kaawa
Contact Phone Number (808)222-7323
Contact Email Address Maunalaha808@gmail.com
Contact Mailing Address
Message Latest updates to this project. Mahalo Please enter the security code displayed in the image

IP: 166.196.68.119

From: David Kimo Frankel
Sent: Tuesday, April 18, 2023 9:37:01 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Scoping for Draft Supplemental EIS for Ala Wai Canal Flood Risk Management

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

This is a follow up comment as you begin drafting the supplemental EIS for the Ala Wai Canal Flood Risk Management Study.

You have prematurely concluded that the construction of six foot high walls along the Ala Wai Canal, as well as in other areas, constitute a minimal impactful to environmental resources. Please consider the impact to viewplanes. Views are going to be adversely affected for anyone walking mauka along any of the streets perpendicular to the Ala Wai Canal. The same is true for anyone walking or driving along Ala Wai Boulevard. Any honest assessment of visual impacts will recognize that the walls will have a significant adverse impact on visual resources.

> On Mar 11, 2023, at 2:35 PM, David Kimo Frankel <davidkimofrankel@gmail.com> wrote:
>
> The U.S. Army Corps of Engineers's Supplemental Environmental Impact Statement should disclose the data and the assumptions that were relied upon in rejecting management of the watershed to reduce storm runoff volumes. USACE has repeatedly claimed that management of the forest would not sufficiently reduce runoff from larger storm events, but has refused to reveal (a) how much runoff could be reduced through better management of the forest and (b) the assumptions and data that USACE has relied upon to reach its conclusion. Many studies have revealed the benefits of diverse, native forest compared to forests dominated by alien species.
>
> The SEIS should also disclose the impact of debris coming down from the watershed (from albizia and other non-native species) and blocking both streams and the mitigation measures. How will tree branches clog detention basins? How will tree branches clog the area that water flows (under bridges, through culverts etc.)? How does clogging affect the modeling? How does USACE plan to address the massive amounts of debris that will flow within the streams?
>
> USACE should disclose what will happen to the waters retained on the mauka side of the Ala Wai canal that currently flow makai, but which would be blocked by (a) the walls and (b) higher profile of water in the Ala Wai canal that is raised by the wall on the makai side of the Ala Wai canal. How much more water will flood McCully/Moiliili with the walls versus without them.
>
> Has USACE looked at the alternative of getting Waikiki buildings to move vulnerable elements (such as generators) to higher floors?
>
> What threatens Waikiki more, temporary flooding from rare storm events or long-term flooding from sea level rise?
>
> Finally, USACE should disclose the assumptions and data behind its economic modeling of the damage to Waikiki from flooding. Are the calculations based on the loss of revenue generated by tourist visits, or just damage to buildings themselves? Which buildings does USACE expect will be damaged? Are those buildings currently insured by flood insurance?

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From: Tylenda, Donald (SKYUS)
Sent: Wednesday, April 19, 2023 9:00:45 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Ala Wei Canal - Honolulu

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Dear GR Study Team

If possible, would like to learn more about this project.
Is there a PM contact that can share some preliminary design discussions about foundation & columns for the debris reduction areas?

Appreciate the assistance,

Regards,

Don Tylenda
Business Development

Nucor Skyline
Cell: 916.806.4126
donald.tylenda@nucorskyline.com<mailto:donald.tylenda@nucorskyline.com>

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[cid:image006.png@01D972B6.9BFA8080] <Blockedhttps://www.youtube.com/user/skylinesteelllc>

From: Lori
Sent: Wednesday, April 19, 2023 9:56:44 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Loriciocco@yahoo.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Lori
Last Name Anderson
Contact Phone Number (808)744-7965
Contact Email Address Loriciocco@yahoo.com
Contact Mailing Address 2345 Ala Wai Blvd #1708 Message I have read the plans and just want you to know that I, like many of my neighbors, are totally against a flood wall along the Ala Wai canal! This is a peaceful and nice place we like to go, walk, sit and relax. A wall would take this all away! It would be ugly and totally change the appearance. And this all "just in case it floods in 20 to 50 years"? No thank you!
Please enter the security code displayed in the image

IP: 98.155.197.90

From: Kyle
Sent: Thursday, April 20, 2023 3:14:17 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: kyle_arakaki@hotmail.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Kyle
Last Name Arakaki
Contact Phone Number (808)218-0805
Contact Email Address kyle_arakaki@hotmail.com
Contact Mailing Address 2641 Nahaku Place Message My house sits along the bank of the Manoa-Palolo drainage canal; across from the Kaimuki HS football field. For Alternative 2B and 5, how high would the flood walls be, and where would it be situated? I definitely don't want a wall in my backyard or blocking my view of Diamond Head.
Please enter the security code displayed in the image

IP: 128.171.144.96

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Winston Welch
Sent: Friday, April 21, 2023 12:37:16 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: earl.t.vaughan@usace.army.mil; Sidney; Winston Welch
Subject: NOI for USACE Ala Wai project--The Outdoor Circle request for Full EIS

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Dear USACE Project Coordinators,

The Outdoor Circle agrees that the USACE Ala Wai Flood Control Project latest proposal for a Full EIS is required by interested parties and the complexity of the project. We fully support this.

We also request that the City and USACE fully commit to attend each affected neighborhood board to explain that residents need to submit even a letter like this one, and also to follow the process as it continues to unfold. Not doing so is poor judgement and will inevitably backfire. Find the resources to do this to actually authentically inform, educate, engage and commit to feedback on this mega project.

We remain a committed partner in this process and thank you for your kind help in making this as successful as possible from the community's perspective, which requires a robust, sustained and deep-reaching involvement.

Kind regards,

Winston Welch
Executive Director

The Outdoor Circle
1314 South King Street, Suite #306
Honolulu, HI 96814
808-593-0300 office
808-285-5442 cell
winston@outdoorcircle.org<mailto:winston@outdoorcircle.org>
Blockedwww.outdoorcircle.org<Blockedhttp://www.outdoorcircle.org/>
facebook.com/TheOutdoorCircle<Blockedhttps://www.facebook.com/TheOutdoorCircle>

Keeping Hawaii Clean, Green
and Beautiful since 1912

From: David Kimo Frankel
Sent: Sunday, April 23, 2023 1:27:52 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Re: Scoping for Draft Supplemental EIS for Ala Wai Canal Flood Risk Management

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This is my third comment for consideration in drafting the supplemental EIS for the Ala Wai Canal Flood Risk Management Study.

One issue that the Army Corps needs to more thoroughly consider is how sea level rise will undermine the effectiveness of the walls bordering Ala Wai Boulevard. The website Blockedhttps://www.pacioos.hawaii.edu/king-tides/map.html includes photographs that show the effect of king tides on Waikiki. Today's king high tides will be the sea level in the next decade or two. Water will flow into Waikiki from the makai side of the Ala Wai Canal. Imagine what it will look like when it is raining too. Here are some photographs from that website:

[kingtides_201705261748_spljfh.jpeg]
date: May 26, 2017 5:48 PM
photographer: Shellie Habel
lat, lon: 21.2829, -157.8350 (dm)(dms)
island(s): O'ahu
location: Intersection of Kalia Rd. and Paoa Pl fronting Hawaiian Hilton Village
comments: Water coming out of storm drains. Water was salty
impact: n/a
photo ID: 1327

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

[kingtides_201705261748_w7QQe6.jpeg]
date: May 26, 2017 5:48 PM
photographer: Shellie Habel
lat, lon: 21.2829, -157.8350 (dm)(dms)
island(s): O‘ahu
location: Intersection of Kalia Rd. and Paoa Pl fronting Hawaiian Hilton Village
comments: Water coming out of storm drains. Water was salty
impact: n/a
photo ID: 1326

[kingtides_201606051646_vNSghp.jpeg]
date: June 5, 2016 4:46 PM
photographer: Matthew Gonser
lat, lon: 21.2793, -157.8327 (dm)(dms)
island(s): O‘ahu
location: Kalia Road at Saratoga
comments: High tide. Water coming up and out storm drain
impact: n/a
photo ID: 162

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

[kingtides_202207131630_1khcjpwq.jpeg]
date: July 13, 2022 4:30 PM
photographer: Melanie Lander
lat, lon: 21.2791, -157.8327 (dm)(dms)
island(s): Oʻahu
location: Kailia Road adjacent to sidewalk
comments: Sand and water were traveling from the ocean through the stormdrain and out into the street
impact: drainage
photo ID: 3820

Walls on the ma kai side of the Ala Wai Canal will not protect Waikiki. Waikiki was originally a wetland. It will become a wetland again one day.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Karin Lynn
Sent: Sunday, April 23, 2023 4:39:21 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Karin Lynn
Subject: ALA WAI FLOOD CONTROL PROJECT / ALANAIO STREAM COMPONENT

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Dear Ala Wai Team,

I am an owner at the Marco Polo condominiums at the foot of Isenberg St. Situated as we are on the canal, there are likely to be great impacts by this project on our residents, buildings, and grounds, but my personal biggest concern about the planning relates to handling of the Alanaio Stream (aka Hausten Ditch). The stream flows directly between and around our residential building and parking structure, and I have yet to see anything specific about how that stream will be integrated into the project to prevent flooding our entire property. If floodwalls are necessary around the canal and the nearby Pālolo / Mānoa Stream, what's to keep the mountain floodwaters from diverting down a free-flowing stream / flood channel (which I think is why Hausten Ditch was cleared out a couple of years ago) and backing up in stream and over its banks when they reach the canal?

Hopefully that's in the mix, but I am anxious to be assured that this waterway is being looked at closely, since it affects not only our building but all of the homes along the stream above us.

Mahalo for your consideration; I look forward to a reply (and will be attending the virtual meeting tomorrow).
Karin Lynn
2333 Kapiolani Blvd., #2708
Honolulu 96826
571-221-0657
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From: Stephen Harris
Sent: Sunday, April 23, 2023 1:20:38 PM (UTC-10:00) Hawaii
To: Merriam, Eric R CIV USARMY CELRP (USA); Philbin, Kelley A CIV USARMY CELRN (USA); Henshaw, Susan H CIV USARMY CELRE (USA); Acpal, Cindy M CIV USARMY CEPOH (USA); Holmes, Monique M CIV USARMY CEPOH (USA); Goo, Justin A CIV USARMY CEPOH (USA); Ala Wai
Cc: Stephen Harris
Subject: Ala Wai Canal - Proposed substitution for 14/8/6 feet flood walls that the public will love!

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Hello,

I am the Area Manager for a flood barrier manufacturer called FloodBreak. We are a Houston-based design and manufacturer of flood barriers. We somehow lost contact and did not get on your design team's radar. Please forgive the late communication.

I would request a substitution of the USACE planned floodwalls with the permanently installed, horizontal popup flood barrier by FloodBreak. There are many benefits to all stakeholders and constituents. See below.

Our barriers are permanently installed at grade, passive and automatic eliminating any dependency for power or people to protect the dry side from floods. We have installed more than 2500 barriers around the world and faced many real world floods. We have a 100% performance track record against real floods. For example more than 50 of installed barriers activated against Hurricane Harvey, with all barriers working exactly as designed.

Our FreeView Barrier is designed for very long reaches 1000'+. With multiple panels we can easily protect a mile of length.

USACE Reference
Our first project was installed working with the USACE in the midwest. The barrier was 605' long and 4' high. See the two pictures below. The benefit to the FreeView Barrier for the Ala Wai Canal would be:

- Would provide proven, world class flood protection
- Could be activated totally passively based on hydrostatic pressure (no power or people) or with optional hydraulic lift on demand
- Barrier is horizontal at grade and allows 100% view of the water and surroundings (barrier is a surface grade)
- Barrier is horizontal at grade and allows access to the water (no walls or obstacles)
- Can be a walking, bike and vehicle path embedded in canal bank or cantilevered over water
- Can be designed for as long and as high as desired (very scalable - multiple 1000' sections for up to a mile long and up to 14 feet high)

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FreeView Flood Barrier – 605' x 4'

FloodBreak
REVOLUTIONARY FLOOD CONTROL

FreeView Flood Barrier – USACE Levee

- FreeView™ Flood Barrier selected to extend section of USACE levee.
- Addressed community backlash about blocked views and access. Will serve as a walk path that ties into the pedestrian bridge.
- A win for the city - eliminating need for city personnel to mobilize & manually deploy flood logs, set on top of a permanent floodwall.

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FloodBreak
REVOLUTIONARY FLOOD CONTROL

See the video of passive automatic float test of barrier:
Blockedhttps://www.dropbox.com/s/i9lvk7tn5y9kuir/FloodBreak-Indy%20FreeView%20project%20-%20R1%20copy%202.mp4?dl=0

Additional References ==========
Two additional 1000+ FreeView barriers are at 60% design by AECOM for Valley Water in the south San Francisco Bay area and will go to bid / construction 2024. Additional FreeView barriers are in the design stage in the New York / New Jersey area.

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Another Major Reference:

Brooklyn Bridge- Montgomery - Coastal Resiliency (BMCR) – NY, NY

lower manhattan coastal resiliency (lmcr) project / nycedc lower concourse park demolition / south battery park (bpcr) resiliency

The BMCR Project is an integrated coastal protection initiative part of the overall LMCR Project aimed at reducing flood risk due to coastal storms and sea level rise in Lower Manhattan.

The BMCR Project spans the Lower Manhattan coast from Montgomery Street to the northern end of Brooklyn Bridge and seeks to improve access to the waterfront and enhance public spaces in the community.

This project involves the installation of 193 flood gates, 186 of which are Floodbreak auto-passive flood barriers.
In addition, there will be wall construction at the same heigh as the flood gates, micropile installation, jet grouting, landscape – hard/softscape work, bike lane construction, & public amenities all across roughly four hundred thousand square feet of Manhattan.

Contractor: AECOM
Owner: NYCEDC

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The above release was an early release by the contractor awarded the BMCR Project (partial perimeter around Manhattan NYC).
The 70' x 13' barrier below was the first of 90+ FloodBreak barriers planned to reach more than a mile, that will be installed to provide the Post Sandy Coastal Resiliency NY Mitigation. The pictures and the video below was the demonstration of the barriers that will be installed witnessed by the project Stakeholders to kick off the project with FloodBreak.

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From: Dave Kelley
Sent: Monday, April 24, 2023 10:14:08 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: all the trash coming down the canals.

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They built the alawi canal in 1921 and had no maintenance for the streams that dump into the canal why has this gone on for so long..

Dave Kelley, 1.808.282.1977

From: Ricardo Lopez
Sent: Monday, April 24, 2023 3:21:43 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: NOI

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Aloha,

I suggest cleaning only the Ala Wai canal and forget about building the wall they are considering. Restore the canal from its original depth and make sure it's always clean of debris after a storm

Mahalo
Ricardo Lopez
Ala Wai Resident

Sent from my iPad

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Lawrence Li
Sent: Thursday, April 27, 2023 11:21:01 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Ala Wai Flood Risk Management comments

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Thank you for posting recordings and resources that allowed me to catch-up with this project.

As a resident in the inundation area and own property at 400 Hobron Ln. adjacent to Ala Wai Canal, this matter is very personal to me. My family is deeply concerned about the our personal safety, protecting property, community, and our state economy. We are also thinking about the long-term impact on future generations.

I have lived in various cities with water-related issues and have seen first-hand the consequences of inadequate flood protection. I agree with the hybrid alternative and believe that measures such as the Ala Wai Canal Floodwall and golf course detention basin are necessary. I also support the use of social vulnerability in evaluating alternatives.

For next steps, I support further development of non-structural and nature-based infrastructure, including daylighting streams and permeable pavement. I would love to see the golf course changed to improve its performance as a detention basin and restored to wetlands for public enjoyment. I also support additional consideration of storage-based solutions in Ala Moana Park.

I highly recommend enhancing aesthetics, experiences, recreation, mobility and public safety in this project due to their significant impact on economic investments. Coordination with streetscape projects such as the Ala Wai Streetscape Plan is also recommended.

Thank you for considering my comments.

Sincerely,
Lawrence Li
400 Hobron Ln Apt 2407

From: Vernelle Oku
Sent: Thursday, April 27, 2023 7:05:49 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: ReEvaluation AlaWai EIS

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Dear Ala Wai FRM,

I would like to make a personal comment and request concerning the Ala Wai. I live in Manoa, right next to the Manoa Chinese Cemetery's proposed site for Manoa Banyan Court Apartment Buildings. During the 2004 flood that destroyed houses and put cars in trees, knee-high muddy water rushed into my residence while my daughter (who was 9 years old at the time) had a sleepover.

I'm very concerned the Ala Wai Flood Risk Management team is not actively opposing the Manoa Banyan Court project and that the solutions it has been suggesting have been so large and invasive to the environment. Is there a way that the excess flood water can be used for the good of the community?

Thank you for your help!

Kind Regards,
Vernelle Oku

Sent from my iPhone

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From: Steven Tran
Sent: Friday, April 28, 2023 2:15:12 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Feedback/Concerns on Alawai Flood Risk management update presentation

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Hello and thank you for the presentation

We are family owners and developers across Fern street which is about two blocks north of the Ala wai near the McCully area. Currently we are working on developing a Bill 7 affordable housing project to help address the housing crisis in Urban Honolulu.

We appreciate these Ala wai flood solutions you presented as clearly the flood would impact our developments.

We are also supportive of Alternative 5 (hybrid with Ala wai flood walls) and the golf course used as an emergency Detention Pond.

We have a few concerns:

* You mention non structural changes that owners maybe impacted. We are currently already at record high building cost to develop the bill 7 project but further cost for us to develop or change designs may have an impact on our project costs not to mention delay in approval of building permits from DPP. We also have existing multifamily units that are not to be developed on Fern street and concerned about the costs of the non structural requirements on the older buildings and whether it can be somewhat subsidized if it is really necessary
* Our Bill 7 Affordable housing project on fern street was developed as a result of the Ala Pono bridge project that is to connect McCully to Waikiki providing affordable housing renters access to Waikiki without need for car and as a result reduced our parking spaces on the development plans. We would strongly propose that Ala Pono bridge project not be impacted as a result of the Ala wai flood walls. If the Floodwalls do impact Ala pono we suggest they projects complement each other in some way.

Please do keep us informed of further developments Best Regards,

Steve Tran

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From: Robert Fox
Sent: Sunday, April 30, 2023 5:10:51 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Ala Wai Flood Plan Problems and solutions

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I am making this statement before May 8th, in order to have standing.
I do hope you actually read this.
Since you obviously have not read the previous team's reports, nor delved into any of the history of our island, I thought this might be helpful.

There are reasons why we had a flood in 2006.
I do also suggest you analyze the possible shifting of the jet stream as this will have a rather substantial impact not only on Hawaii but the mainland.
Clearly, California is just now realizing this global phenomenon.
Sincerely,
Robert E. Fox
2022 University Ave.
Honolulu, HI 96822
808-256-1071
rfoxent@gmail.com<mailto:rfoxent@gmail.com>

From the Desk of Robert E. Fox
2022 University Ave.
Honolulu, HI 96822
808-256-1071

Regarding the Ala Wai Flood Mitigation Project
For Government Consideration

The current amended EIS for the Ala Wai Flood plan does not reference the previous plans at all and thus dismisses all "findings" from the original 2015 declarations. Is this intentional or is this a case of lack of experience by the new "Team"? The data collected by the Army Corps of Engineers is unscientific in so much as they have mixed verbal historical testimony with detailed Atmospheric, water and flood data as has been collected since 2006. The conclusions are, therefore, suspect due to the methodology used. None of the "Data" contains any historic records before 2006, as if this island has not existed before that date. Certainly we have had rain events throughout the history of Oahu, but none of that historic record informs the Army Corps of Engineers. I put this forward, as there is a distinct and noticeable lack of major flooding before 1960 for the entire history of Oahu. Perhaps we can attribute that to several factors, not the least of which is the rapid building of structures with no regarding to the retention of permeable soil from the 1960s forward. Waikiki is the most obvious mass construction area, but this does not affect the new paradigm for flooding from the Manoa and Palolo. It might be advantageous to look at the construction which has occurred in both valleys as well as Moilili in order to discover what is different now from what existed before. The most obvious example is the Regency Tower's construction on Date Street. That one construction interrupted the natural system of flood abatement on Oahu.

There are no data points which adequately define a 100-year flood, a 50-year flood, a 10-year flood or any timed flood event within this proposal. These definitive items are metaphorically grabbed out of a bag of nonsense.
The collection of information does not specify causative factors for the flooding which has occurred. The data shows the aftereffects of the flooding but has no causative agents or situations which are imperative to form a correct solution to the observed effects of flooding.

The Army Corps of Engineers has changed "Teams of Experts" over and over, each new team has been untrained or not well informed in the previous work done, and with limited experience, if any, in island geography and atmospheric conditions attributable to island topography and the pushback from the local community. Every time the community tries to interact with the Army Corps of Engineers we are faced with polite deflection and misdirection, without any clear answers. The lack of a real engineer (Kelly) at the last WebEx meeting was indicative of the low esteem the Army Corps holds the Communities of Hawaii. The Army Corps knew that Kelly was on leave and would not be able to attend this confab. That shows the lack of real honesty by this new team in dealing with the public. This refusal to engage in a serious and meaningful manner shows lack of intent to find mutually agreed upon solutions. With a cut off date of May

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8th for public input, it is nigh on to impossible for the community to arouse the local population to this threat potential.

There have been many suggested maps over the years from 2015 to the present, each of which would only be consistent if they each depend upon a different set of data points in order to create such differing solutions. If there is only one set of data, then the resultant strategies would be within a very slim parameter of variation.
From 11 watershed walls, to only 2 watershed walls, and then two huge catch basins with 6-foot walls along both sides of the Ala Wai cannot be concluded from the same data set. In court this will be shown to be specious at best.

- The five factors which guide any solution for possible flooding on a sizable scale are Velocity (of water) Volume (of water), Vortex, (directional flow) Viscosity (texture and content of water flow) and Duration of flow and water.
- The Velocity can be determined by the elevation and slope and soil permeability. The Volume can be calculated by measurement of rain fall.
- The Vortex can be measured or manipulated by walls, berms, barriers, and the size of impediments(bridges or debris)
- Viscosity can be mapped and measured by condition of stream bed, (undergrowth, Albizia sprouts, permeability of soils adjacent to flow etc. Also the inclusion of mud flow from saturated soils would impact viscosity.
- Duration is a matter of measured time of rainfall and storm event permeability of soil and all lingering drainage issues after the causative effect.

Given these parameters, we should look at the actual Manoa and Palolo Streams, the Manoa ditch by the Chinese Cemetery and the Makiki ditch. There exist bridges which will be barriers in a flood condition.
We have curvature of the stream beds, (S curves, etc.) which hinder flow and create volume back-ups, we have high containment walls already in place which may be problematic at the Woodlawn Terrace Bridge.
We have a present Built in convergence of the Palolo Stream into the Manoa Stream at right angles which serves as a "stop flow" action upon descending water from the Manoa Watershed. Once below the 150-foot elevation at the Palolo Manoa convergence the angle of the flow degrades (levels out) and thus slows the velocity of the water, reaching the Ala Wai Canal at a horizontal level with minimal velocity except for volume pressing from behind.
The Ala Wai serves as a level no flow holding tank for any additional water as the only access to the ocean is at the canal opening at Magic Island.
The purpose of the Ala Wai was to drain the swamp which was Waikiki through parts of Kapiolani Park. During the time of the King, Makee Island existed in what today is the area of the zoo and bandstand in Kapiolani Park. After the flat canal of the Ala Wai was created, those marsh lands, tidal pools and islands disappeared forever. Since the purpose of the canal was to drain the water from the area of Waikiki, no slope was engineered in its construction. Ala Wai is a flat bottomed holding area for water, which has been dredged several times due to the silt which comes down from the streams.

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Currently there is a huge project to clarify the waters of the Ala Wai so as to restore its aquatic life and water quality. For years the residents of Waikiki and Moilili fished from the sides of the Ala Wai and from the bridges that spanned it. Eventually the quality of fish deteriorated until the last species was so contaminated that no one would dare eat them. I can assure you that what few Talapia still exist in the Ala Wai are not safe for consumption. Currently we have a program of tossing earthen/bacteriological balls in the waters to clarify the water. Progress is being made to restore it back to its original clarity.

Unless one wants to use gigantic pumps, the current proposed plans do not generate enough natural gravitational flow to affect the drainage to the sea as is needed via the Ala Wai. No silt abatement nor mitigation has been included in this plan. Due to this fact, the Army corps of Engineers has falsely concluded that 6 foot retaining walls are needed along the Ala Wai Canal, as they have not realized the actual issue is a flow velocity problem existing due to lack of slope and elevation.

Consequences economically will be catastrophic for Waikiki if this current 6-foot wall plan is adopted. This superb Tourist destination will be highly impacted by the removal of over 200 mature palm trees along the Ala Wai, the raising of a sidewalk by three feet with an additional 3 feet of wall, removing any scenic beauty regarding the natural landscape of the Ala Wai, or the mountains in the distance.
To remind this body, we made strict rules about Billboards years ago to preserve the natural beauty of the State. So, taking the beauty of Hawaii into consideration is not a frivolous act, but a substantive act with economic impact. As we formed the Outdoor Circle to protect the mature trees of Honolulu so we must act with caution in this project to preserve the mature landscapes of Moilili, Manoa and Palolo. Also the winds which come from the mountains at 3 PM every single day into Waikiki will be stopped by these proposed 6 foot walls. These constant winds keep the heat of Waikiki in check and as a consequence many residents live without air conditioners due to the regular breezes coming into the paved "jungle" of Waikiki. I own property one building away from the Ala Wai Canal in Waikiki on Lewers Street and I can attest to the importance of this daily wind which cools and purifies the air within the dense Cityscape which is Waikiki.

Therefore, we need an altered plan for the flood mitigation efforts from the Manoa Stream and the Palolo Stream which if we succeed may be a template for future flood control projects across the state and region.

We propose that the first line of flood defense is the maintenance of the Streams. The City said they would do this work, but they have failed. We propose a dedicated funding mechanism in the plan to pay the City and County to maintain the stream beds and side walls of all streams from the Koolaus. We currently have dedicated volunteers who trek along the stream beds to remove the invasive Albizia Tree saplings and sprouts. Without this work no matter what we do, we will have a blockade of the streams by the fragile breakage from the Albizia trees. In order to make this a permanent solution, we propose a program to remove the Albizia trees from both sides of the Manoa Valley and the Palolo Valley.

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A little history is important here, which the Army Corps of Engineers does not know about, as they never asked.
During the mid 1800s Oahu was basically denuded of mature trees due to over grazing of cattle and the intense cutting of the forest by merchant crews to harvest our sandalwood trees. Rather than culling out the sandalwood, they clear cut the mountains and dragged the trees down the slopes to waiting ships. A result of this clear cut was the importation of red wood from the Pacific Northwest for building on Oahu. Large trunks of trees were dragged behind great ocean liners to the Hawaiian islands. From this practice many of our homes were constructed with what came to be known as "salted redwood". The voyage over allowed seasalt to penitrate the trunks of the trees, and as such created a termite resistant wood, which is the foundation of many of our historic homes on this island. My home is constructed of salted red wood, and yes, my home is on the historic registry of homes for the State of Hawaii.
Another consequence of this clear-cutting of the forests was the constant threat of mudslides which destroyed many villages and killed many of our Hawaiian People. Due to this danger, in 1848 King Kamehameha III ordered the Great or Grand Mahele. This was the first time in the history of Hawaii that we have any sort of zoning, and more pertinently to most, the creation of privately owned property. Before 1848 all land was owned by the Royal House. In his wisdom to preserve the forests and protect the people, the king dedicated watershed lands. He also dedicated agricultural lands, public lands, and privately held lands, etc.
To reestablish the forests of Oahu, the king sent several ships to the Solomon islands with the specific purpose of bringing the fast growing Albizia trees to Oahu. At the time no one thought about invasive species, but they had a purpose in mind which was to recreate a forest of quick growing and fast multiplying trees across the mountain range. Albizias did that for certain. The trees grow 15 feet per year and spread their seeds up to a mile in every direction. Every homeowner in Manoa or Palolo knows that one must pull out the sproutlings before the tap root establishes itself. Once grown, we can cut the bark down to the ground around the whole tree to kill it, or cut into it with root killer, but once the trees are mature it costs over $10,000.00 per tree to remove them. Clearly this project is something the City and County should take on as stewards of our island. We propose in this plan a general funding for Albizia Removal. It will take approximately 10 years of pulling sprouts after the trees have been removed before we can be assured of relative success.
Now for the structural plan we propose for the mitigation of flooding.

We propose two large 8-10 foot diameter Conduits to be placed at flood stage height on either side of the Woodlawn Terrace Bridge. This requires scooping out the road on either side of the bridge to install these conduits, then recreating the roadways. These large pipes will funnel excess flood water downstream expanding the flow capacity of the Woodlawn Terrace Bridge by at least double to four times capacity. Flood gates may be installed which would be automatically opened upon the rise of flood water flow. During times of no flooding the doors remain closed to keep the interiors clean and unobstructed. The construction of curved cement Brick Block berms on either side of the mauka stream bed directing water to the funnels. (If necessary, cement walls, but graduated bricks with interspersed water grass is more sustainable.) is necessary to contain the flood within the banks of the stream bed. These "walls" would need to be at least 6 feet tall, which is why we suggest green berms so as to

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blend into the nature landscape. The Flow out of these conduits would be more rapid than the flow from under the bridge due to smooth walls and unobstructed pathway. We may extend these conduits along the stream under the land for a good 40 feet to assure no overflooding upon water exit. Common Sense tells us that the conduits should be a different lengths to assist in even distribution of water.

We propose the "straightening of the S curve of the Manoa Stream. All the land is State Owned, so it is an easy proposition. We simply create a large 40 foot straight wide flood stream with high cement 6 to 10 foot brick and water grass berms on either side.
The concept of creating cement brick berms along the stream is to prevent the overflow of the stream into the dell of the university. As long as we plant these berms they will be attractive while serving their purposes. (The Hamilton Library was flooded by the Manoa Stream during a 40 day rain event in 2006) In order to prevent such events in the future, we must determine the low point of the stream above the slope of the hill which meanders into the campus of the University of Hawaii. Once you get to the Korean Institute of the University, the deep gorge of the Manoa stream is sufficient to prevent flood damage. There is a bride at Dole Street but it is high enough that we do not anticipate any flood activity from that. Below are student taro fields and the like,

We propose rebuilding the convergence walls of the Palolo Stream and Manoa Stream in a curve such that the flow from both rivers combine with curved and sloped walls in a compatible 45 degree flow angle creating a merge of velocities. Currently the Palolo Stream enters the Manoa Stream at a 90 degree angle.

We propose at the convergence of the Manoa Palolo Streams the installation at flood level height 8- 10 foot wide conduits, which will run underground to the sea maintaining the 150 foot drop slope which will, without pump mechanism, maintain a velocity of flow as it is disposed at least 8 feet deep under the water line These conduits would be installed along the streams course curving into the Ala Wai Canal without break straight through to the ocean at Magic Island. These conduits would be implaced beneath the Ala Wai Canal and run at least a football's field length beyond the entrance of the Ala Wai This method will also use the flood gate mechanism at the beginning and end of the conduits with accessory pump stations at the entrance and end of the enclosures. We certainly know how to do this work, as we had to replace all the sewer lines in Waikiki several years ago, to accommodate the "load". During that project we lined up the 8 foot wide ABS piping in the Ala Wai awaiting use.
Why are we suggesting the use of conduits.
For one reason they represent the expansion of the flow load by double in not more for the water flow, and we can arrange them to conform to the slope required to maintain the flow velocity required to empty into the sea. If we do not use this method, the water coming from the streams will merely inundate the Ala Wai which is level, and not have any directed velocity to go anywhere. (This is why the Army Corps of Engineers wanted to build 6 foot walls along the Ala Wai.) Their conclusions were correct, but they did not explore other options to create a more feasible outcome with less impact upon the environment or the economy of Oahu.

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As an historic aside, there used to be caves from the Manoa stream which angled through Moilili channeling pure springs up into Queen Kaahumanu's Summer house on Hausten Street. This system of underground caves prevented flooding in the lower Ahupua'a of Waikiki. With the construction of the Regency Tower, with the lack of knowledge of the engineers, 30 thousand tons of cement were dumped to solidify a foundation for that building, forever blocking the cave system and stopping the natural springs on Hausten. When that disaster happened, the springs of Hausten street were destroyed and the extensive ponds were cemented to hold water. A sad substitute for fresh spring water. Without removal of the Regency Tower, the natural cave system flood control cannot be restored, but the conduits proposed can mirror the effect of that natural system to the benefit of all.
We propose NO 6-foot walls along the Ala Wai or elsewhere, as they are not needed and constitute a visual blight, and economic detriment and a structurally unsound method without real use, and continued Blot upon the island of Oahu.

We also oppose the proposed catch basins at Manoa Valley Park and to the Ala Wai Golf Course. Catch Basins only protect the land below them. If we remediate the issue of flooding we will not need to "Protect" the Ala Wai Canal. If we use high berms along the stream bed of Manoa, we will not be exposing the low lying areas of the University to flooding. Thus the purpose of the catch basins is removed. No land will need to be eminently domained, no one loses their homes, and we all work together cooperatively in a shared solution.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Yamato
Sent: Wednesday, May 3, 2023 6:52:31 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Flood plan wall opposition

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

I would like to voice my opinion that I am against the 6ft wall surrounding the Ala Wai as the final flood mitigation solution. There must be a better way to retain the beauty yet improve the functionality of the canal. I understand you are directed by Congress to only consider flood mitigation. Are esthetics and daily impact on community comfort metrics in your consideration? I walk and bike next to the Ala Wai on a daily basis and no longer being able to see the waterway while next to it will be tremendously disheartening and substantially impact the feel of the area. I understand you will be having a community meeting on May 15. Can you please let me and news outlets know the time and place of the meeting?

Thank you,
Yamato Sasaki

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Kristin
Sent: Wednesday, May 3, 2023 7:57:02 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: mcandrew@hawaii.edu
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Kristin
Last Name McAndrews
Contact Phone Number (808)554-6196
Contact Email Address mcandrew@hawaii.edu
Contact Mailing Address 3504 Alani Drive Honolulu HI 96822 Message I do not support the idea of retainment walls to mitigate flooding in the ahupuaha of Waikiki. It doesn't make sense. Six foot walls around the Ala Wai? What about mitigating flooding around the University of Hawai`i? the university could use some retaining walls around buildings. What about the consideration of mitigating rising ocean levels, which is imminent. In addition, the Army Corps of Engineers still would need to work with other entities (the State of Hawaii and the Manoa Banyan Court Project) who propose to widen Manoa Stream and to build on top of Woodlawn Ditch. Those efforts should be worthy of investigation as they will change the environment of all of Manoa Valley and into Waikiki. I would also like to complain a bit about the lack of communication with homeowners who are directly impacted by this project. Why hasn't USACE and the City and County of Honolulu ever sent anything to homeowners who will be affected? Don't these agencies have an ethical responsibility? Apparently not.
Please enter the security code displayed in the image

IP: 98.151.65.131

From: Tsugawa, Greg
Sent: Wednesday, May 3, 2023 11:01:37 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Ala Wai Canal Flood Risk Management Project Supplemental Determination and EIS Preparation Notice

Hello:

The City and County of Honolulu's Department of Transportation Services will be submitting comments on the Ala Wai Canal Flood Risk Management Project Supplemental Determination and EIS Preparation Notice, and we're currently obtaining our Director's signature on the final response. Please see our attached draft response, which should be substantially similar to the final version; we'll send you the final response when available.

Thank you.

Sincerely,
Greg Tsugawa
City and County of Honolulu
Department of Transportation Services
Regional Planning Branch

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
711 KAPIOLANI BOULEVARD, SUITE 1600
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

RICK BLANGIARDI
MAYOR

J. ROGER MORTON
DIRECTOR

JON Y. NOUCHI
DEPUTY DIRECTOR

4/23-XXXXXX

May xx, 2023

MEMORANDUM

TO: Haku Milles, Director
Department of Design and Construction (DDC)

FROM: J. Roger Morton, Director
Department of Transportation Services (DTS)

SUBJECT: Ala Wai Canal Flood Risk Management Project Supplemental Determination and Environmental Impact Statement Preparation Notice

Thank you for the opportunity to provide written comments regarding the Ala Wai Canal Flood Risk Management Project Supplemental Determination and Environmental Impact Statement Preparation Notice. We have the following comments.

1. Project coordination.

    i. The DTS is actively coordinating with the United States Army Corps of Engineers (USACE) and the DDC on the Ala Wai Flood Risk Management Study (Study). A DTS representative will continue to be available to attend weekly Study coordination meetings with the Study's team, participate in the Study's public meetings, and coordinate the DTS' communications and projects with the Study.

    ii. The DTS currently has two ongoing projects in the Study area, (1) the Ala Wai Boulevard Complete Streets Project, located between Kapahulu and Kalakaua Avenues, and (2) the Ala Wai Bridge Project, spanning the Ala Wai Canal at Kalaimoku Street. The Study must ensure ongoing coordination between the DTS projects and the Study's flood risk management measures.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

iii. The DTS further encourages the DDC and the Study, to the extent feasible, to integrate active transportation resources into the project that compliment DTS' ongoing projects and provide mobility.

2. Street Usage Permit. A street usage permit from the DTS should be obtained for any construction-related work that may require the temporary closure of any traffic lane, sidewalk, bicycle lane, or pedestrian mall on a City and County of Honolulu street.

3. Bus Stops. Numerous bus stops are located within the Study area. Please coordinate any bus stop impacts/changes with DTS – Transportation Mobility Division (TMD). Contact DTS-TMD at TheBusStop@honolulu.gov

4. Neighborhood Impacts. The area representatives, neighborhood board, as well as the area guests, businesses, emergency personnel (fire, ambulance, and police), Oahu Transit Services, Inc. (TheBus and TheHandi-Van), etc., should be kept apprised of the details and status throughout the project and the impacts that the project may have on the adjoining local street area network.

5. Disability and Communication Access Board (DCAB). Project plans (vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, etc.) should be reviewed and approved by DCAB to ensure full compliance with Americans with Disabilities Act requirements.

Should you have any questions, please contact Greg Tsugawa, of my staff, at (808) 768-6683.

sw (Greg Tsugawa)
"\\dtsfp1\dts\TPD_Review\XXXXXX Ala Wai Flood Control Project SEISPN\TEMPLATE\Response Letter - Ala Wai Flood Control Project SEISPN (XXXXXX).docx"

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Dave Watase
Sent: Wednesday, May 3, 2023 5:30:45 PM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Dave Watase's Public Comment #1 - Flood gate and pump

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Project.

I am OPPOSED to the United States Army Corps of Engineers (USACE) plan to perform a Supplemental Environmental Impact Statement (SEIS) because it builds upon a flawed and outdated FEIS.

For the General Reevaluation Report, the USACE told us that the Ala Wai Flood Project began in 1998 and that all the community comments over the years will not be lost and taken into consideration. I for one have read all of the reports including the Ala Wai Management Implementation Plan April 1998, Ala Wai Watershed Analysis Final Report July 2003, USACE Manoa Stream Hydrology and Hydraulics Study October 2004, Manoa Technical Study Summary Final November 2008, Final Hydrology Report Ala Wai Watershed Project December 2008, 2015 Draft Environmental Impact Statement, 2017 Final Environmental Impact Statement, 2019 Engineering Documentation Report, The OceanIt SWIFT Report 2019, and I've attended nearly all USACE, OceanIt, City Council publicly held meetings since September 2015. I believe a significant amount of public comments were ignored. I don't believe anyone from the USACE has read through the material above with a critical eye. If that was done by any competent person the flaws and failures in the FEIS would have been noted and we wouldn't be again going in the wrong direction.

The concept of a flood gate and pump should be FURTHER EXPLORED because:

1. The concept of a flood gate and pump would eliminate the need for high walls around the Ala Wai Canal for the 100 year flood, as stated in the FEIS (Appendix H - Value Engineering);
2. The concept of a flood gate and pump mentioned in the FEIS would have a potential cost saving of $130 million and was too easily rejected without debate;
3. The Ala Wai Canal flood walls are susceptible to high tides, tidal surges, and sea level rise and can easily negate the flood protection benefits of the flood wall;
4. The Ala Wai Canal flood walls require 6-8 hours of capping of the interior storm drainage systems;
5. The flood gate and pump concept would preserve and improve our interior storm drainage systems which currently are influenced by high tides, tidal surges, and sea level rise;
6. The flood gate would remain closed should sea level rise occur and could incorporate a lock gate system for recreational users;
7. The flood gate and lock system should be in front of the Ala Moana Blvd. bridge;
8. The flood pump should be located on the Ala Wai Golf Course and transported to the Ala Wai Harbor via underground tunnels;
9. The flood pump inlets would be available from multiple source locations via pipe or tunnels such as (1) the far end of the Ala Wai Canal, (2) Manoa/Palolo Stream confluence, (3) the Ala Wai Golf Course detention basin, (4) incorporated into a modified OceanIt's SWIFT concept for the Manoa and Palolo tunnels;
10. The primary benefit of properly used and properly placed flood pumps are they can move large volumes of flood waters completely bypassing the Ala Wai Canal and can be operated before, during, and after the storm and not just during peak flows and critical times.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Final EIS
Appendix H
Value Engineering
Pg 11 / Pg 19-25

VALUE ENGINEERING TEAM STUDY

SUMMARY OF RECOMMENDATIONS/ACTIONS

No.	Proposals and Comments	Potential Savings	Accepted or Rejected
1	Provide street lighting for new access roads.	-$113,400	Rejected
2	Provide concrete pad in the detention basin for cleaning operation and maintenance.	-$255,114	Rejected
3	Provide a flood gate at the Ala Wai canal exit to the ocean.	**Deleted**	
4	Provide pump station at ocean side of canal located on a structure built above the canal.	-$130,600,350	Rejected
5	Provide sheet pile walls for all vertical walls.	$952,790	Rejected
6	Design detention basins so that fill material is not required to be hauled to site. Balance cut fill.	$4,252,467	Accepted, but deferred to PED
7	Provide gravel access roads in lieu of concrete.	**Deleted**	
8	Provide single generator for multiple pump stations.	**Deleted**	
9	Provide pump station at Kapahulu side of canal and use existing storm drain to discharge to the ocean.	**Deleted**	
10	Revisit using Manoa Park as a multipurpose park to include function as a detention area.	-$2,582,801	Rejected
11	Delete either pump station #1 or pump Station # 2 and use one pump station to handle both drainage areas and pump into canal.	$4,667,625	Accepted, but deferred to PED
12	Provide a fence around the detention basins for safety.	**Comment**	Accepted where deemed appropriate

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CONTROLLED UNCLASSIFIED INFORMATION (CUI)

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: 4 PAGE NO: 1 OF 4

DESCRIPTION: Provide pump station at Ala Wai canal exit to ocean

ORIGINAL DESIGN: There is no previous design

Meaning not considered in this EIS?

PROPOSED DESIGN: In addition to a flood gate (proposal #3), a pump station will be constructed and used in combination with the gate to provide flood risk management. The flood or tidal gate design would consist of a miter gate to cover a 120 ft wide opening built across the canal mouth 300 ft upstream from the Ala Moana Blvd Bridge. The miter gate would consist of 2-65 ft wide by 15 ft tall steel gates with concrete footing at invert -10 ft and top of gate at +5 ft elevation. The side structure on the left bank would be built with not more than 5 ft protruding into the canal (canal is 160 ft wide) while the right bank side structure would be built as part of the pump house sump and stilling basin. Assume the side walls (monoliths) would be 5 foot thick and the foundation slab to be 8 foot thick reinforced concrete. Bottom foundation would be 140 ft by 80 ft in size. Side walls would be 80 ft by 15 ft. The pump house design would be a pump house 400 ft long by 100 ft wide (of which 40 ft extends over/into the canal) with a roof line about 40 ft tall. The pump house would contain 10 pumps each 96-inch axial flow 800hp pumps (MWI pumps model no. NC396P37) plus sump, stilling basin, and other operating equipment. The sump would be located on the upstream end of the pump house upstream of the gate and be built in the canal, about 300 ft long by 40 ft wide, form the footing of the pump house over the canal, and have an invert elevation of -20 ft. Assume the entire sump to be built of reinforced concrete 3 ft thick with steel grates spaced throughout the walls on the canal sides. The stilling basin would be located on the downstream end of the pump house downstream of the gate and be about 100 by 40 ft, invert of -10 ft, about 120 linear ft of reinforced concrete wall 3 ft thick, also with steel grates spaced throughout the walls on the canal sides. The purpose of the stilling basin would be to help reduce turbulence from the pump outtake lines and along with the about 300 ft distance upstream form the Ala Wai Yacht Harbor, have a minimal impact to wave action in the harbor caused by the pumping activity. Next to the pump house, would be a 60 ft by 100 ft back-up generator house (if needed; it may all fit into the pump house). Access road, 15 ft wide, would be from Ala Moana Blvd and from Kalakaua Ave using the existing canal promenade walkway. There is a 75 ft wide access along the right bank (the promenade walkway width between canal and property boundary with Yacht Harbor Towers) and 50 ft wide access on the left bank using the Ala Wai Blvd road. Staging area to use park land at Ala Moana Beach Park. Promenade pedestrian access can be blocked during construction but access along Ala Wai Blvd to Harbor View Plaza building must be maintained.

The operations and timing of the flood pumps and gate are not well explained for review and comment.

ADVANTAGES:

1. Gates to be closed prior to the storm and with pumping provides additional storage within the canal walls prior to the flood peak. In HEC-HMS model, pumping limited only to elevation -5 ft.
2. With optimization of pumping and gate openings during and after the flood peak, this alternative can provide 1% ACE event level of protection and replace all the measures currently part of the TSP (Alt 3a). Alternative would only consist of this one measure. Project impacts would only occur in this one location. No detention basins and floodwalls would be needed.

Hello! No upstream detention basins needed and no concrete floodwalls around the Ala Wai Canal needed. This one measure replaces all measures ... what does that tell you?

15

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Pumps run only before big storms, better locations are available.

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: 4 PAGE NO: 2 OF 5

DESCRIPTION: Provide pump station at Ala Wai canal exit to ocean

DISADVANTAGES:

1. Changes the canal ecosystem during large storm events. By shutting out tidal influence and pumping out canal and then having canal fill with flood runoff (freshwater) before mixing again with ocean water when gates are opened would result in killing of fish species. Although most fish and other aquatic species in canal are mostly invasive species, the rapid mixing of ocean and freshwater would create ecosystem havoc. Some floating runoff debris and dead fish would be released into the small boat harbor even with floating trash boom in place. The rapid mixing would also result in density currents mobilizing bottom sediments into and out of the canal. These sediments could have an impact to the yacht harbor and near ocean environment.
2. Location of pump house near residential apartments (Yacht Harbor Towers) would result in noise issues to residents when pumps are running. Noise abatement in structure is needed.
3. Gate and pump house structures to impact view-plane along canal between Ala Moana Blvd and Kalakaua Ave. ← Better locations available, split locations, near intersect, pipe to mouth
4. Gate and pump house structures to impact recreational uses, canoes, kayaks, and small boats, when gates are closed and pumps are turned on. ← Minimal impact only closed on big storm
5. Gate opening during and after peak flow event may create turbulence or unwanted currents into yacht harbor. ← Minimal impact, controlled opening or wait for stream to refill canal slowly.

JUSTIFICATION:

This proposal meets the functional requirements of the project at a reduced first cost.

MUTUALLY EXCLUSIVE:

N/A

Gates don't have to be reopened until stream water refills the Ala Wai Canal back to sea level or controlled refilling with both stream and ocean waters.

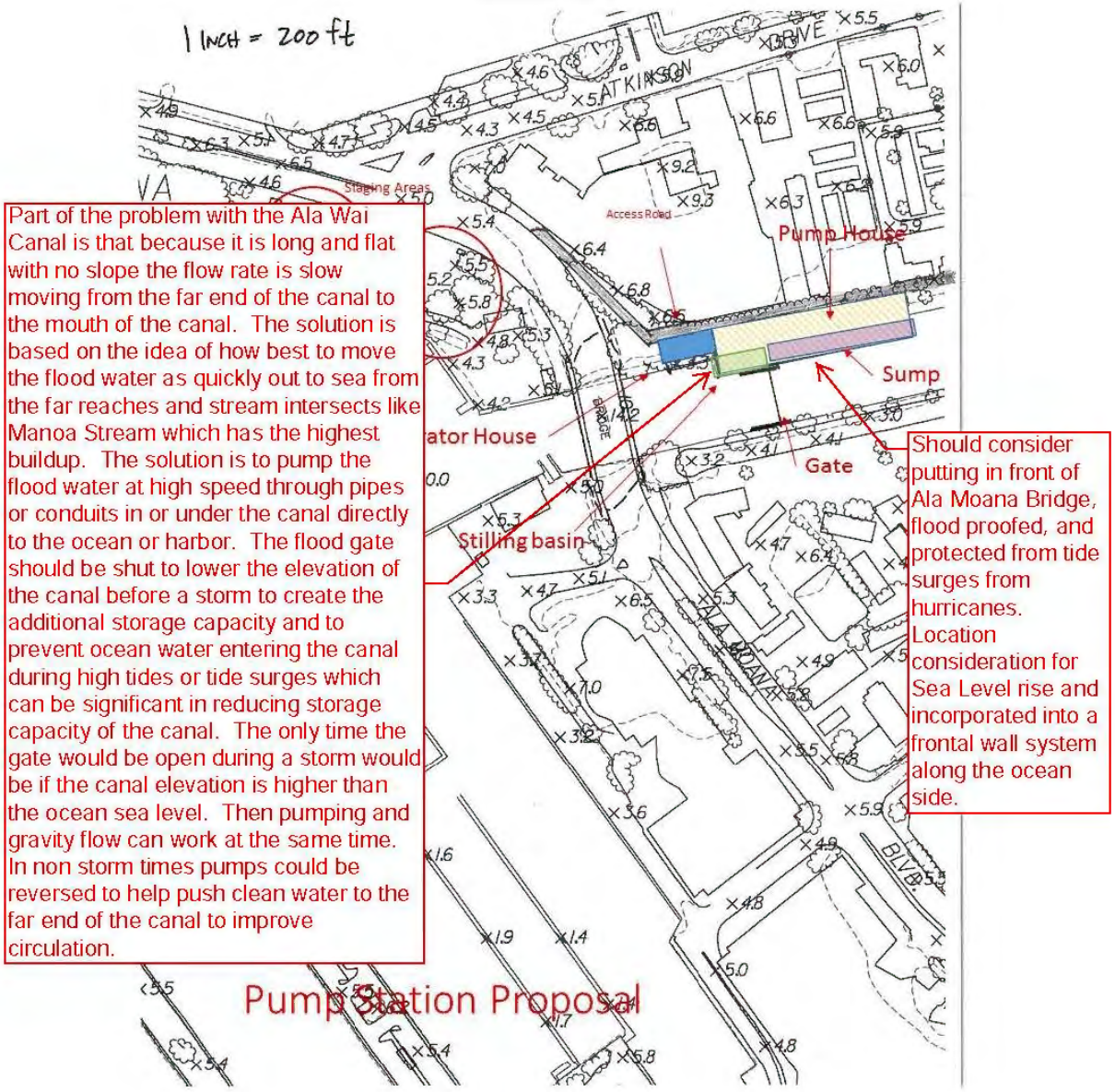
16

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: 4 PAGE NO: 3 OF 5

Drawing No. 1



Part of the problem with the Ala Wai Canal is that because it is long and flat with no slope the flow rate is slow moving from the far end of the canal to the mouth of the canal. The solution is based on the idea of how best to move the flood water as quickly out to sea from the far reaches and stream intersects like Manoa Stream which has the highest buildup. The solution is to pump the flood water at high speed through pipes or conduits in or under the canal directly to the ocean or harbor. The flood gate should be shut to lower the elevation of the canal before a storm to create the additional storage capacity and to prevent ocean water entering the canal during high tides or tide surges which can be significant in reducing storage capacity of the canal. The only time the gate would be open during a storm would be if the canal elevation is higher than the ocean sea level. Then pumping and gravity flow can work at the same time. In non storm times pumps could be reversed to help push clean water to the far end of the canal to improve circulation.

Should consider putting in front of Ala Moana Bridge, flood proofed, and protected from tide surges from hurricanes. Location consideration for Sea Level rise and incorporated into a frontal wall system along the ocean side.

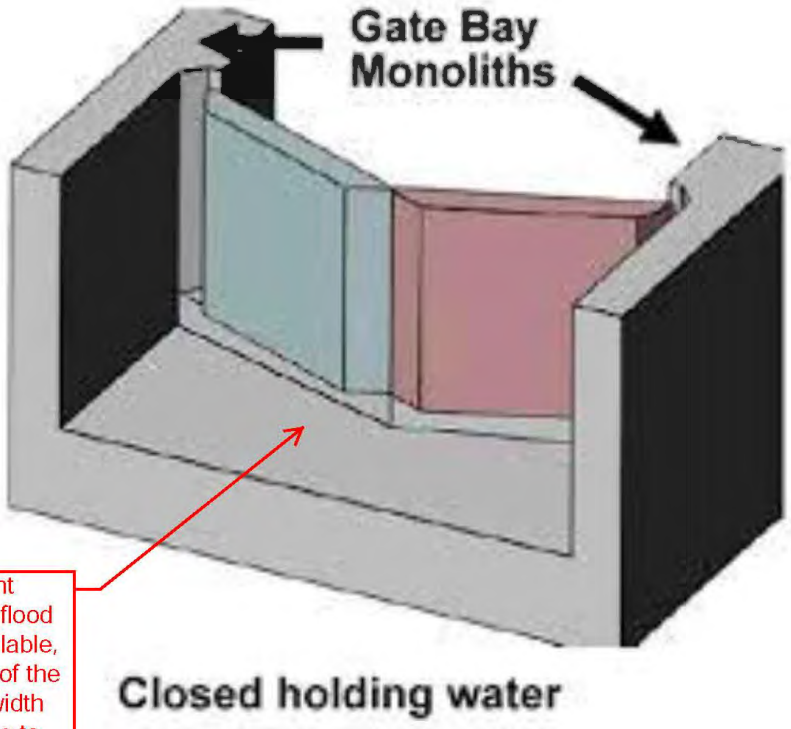
17

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

VALUE ENGINEERING PROPOSAL

PROPOSAL NO: 4 PAGE NO: 4 OF 7

Drawing No. 2



Many different options for a flood gate are available, the because of the pumps, the width does not have to be as wide as the canal.

Miter Gate Drawing

A variant to this design is to use sluice gates instead of miter gates. This would require at least one sluice gate to be 30 feet wide to allow for boat and dredging barge passage. Sluice gates would rise above canal when open and be very tall, sticking at least 16 feet high above the canal, creating a much bigger view-plane problem.

Drop gates, like the London Flood Barrier, could also be used. These gates would rise up from the bottom of the canal when closed.

18

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Heidi
Sent: Thursday, May 4, 2023 5:44:25 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: hithereheidi@gmail.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Heidi
Last Name Schemp
Contact Phone Number (808)635-8300
Contact Email Address hithereheidi@gmail.com
Contact Mailing Address
Message This plan looks way too similar to the Miami plan, 6 foot concrete walls. Miami and the corp agreed to restart that plan. I think we need to do the same.
Please enter the security code displayed in the image

IP: 98.155.102.223

From: cloudia charters
Sent: Thursday, May 4, 2023 10:23:01 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Let's get together

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

We need to protect the residents and financial hub of the state that is Waikiki. Perhaps the quickest method, the 6 ft flood walls, could be attractive & temporary as more comprehensive methods are accomplished over time? Let's be sensible about this and not let the perfect be the enemy of the good enough for now in such a crucial threat situation. Mahalo!

From: aloha.mcguffie@ulumau.com
Sent: Thursday, May 4, 2023 1:28:52 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Waters, Tommy; Mark McGuffie
Subject: RE: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Mahalo for confirming the receipt of my message! I encourage the C&C of Honolulu to stand firm and have nature-based solutions adopted into the USACE plans.

Me ke aloha,

Aloha

Aloha McGuffie
Executive Vice President
Ulumau LLC
4999 Kāhala Avenue
Suite 205
Honolulu, Hawai'i 96816
Cell: +1 (808) 223-1222

E ola ka ʻōlelo Hawaiʻi!

From: Aloha <aloha.mcguffie@ulumau.com>
Sent: Thursday, May 4, 2023 1:23 PM
To: alawai@honolulu.gov
Cc: aloha.mcguffie@ulumau.com
Subject: Ala Wai Contact Form

First Name Aloha
Last Name McGuffie
Contact Phone Number (808)223-1222
Contact Email Address aloha.mcguffie@ulumau.com<mailto:aloha.mcguffie@ulumau.com>
Contact Mailing Address 4999 Kahala Avenue, Suite 205
Message Aloha mai kākou,

It is difficult to comprehend why the USACE neglects to include nature-based solutions starting mauka in the Mānoa and Pālolo Valleys through the Ala Wai Canal to the Pacific Ocean. IUCN (International Union for Conservation of Nature) the largest global organization whose science-based approach to solving devastating impacts to Island Earth, strongly recommends the use of nature-based solutions so society, economies and nature can thrive together! A six foot wall would be another meaningless bandaid on a larger issue and a waste of energy - as they say in Hawai'i, POHŌ! Aloha, Aloha McGuffie

From: Philip Deters
Sent: Thursday, May 4, 2023 1:33:48 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: NOT

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Here is a photo today of Manoa Straeam just mauka of 3181 East Manoa Road. If the streams were regularly cleaned of brush/growth, maybe that would reduce the risk of major damage from flooding would be reduced to an acceptable level.

[cid:814834f4-91e4-4c3f-a334-800be39389b9@honolulu.gov]

From: Karin Lynn
Sent: Thursday, May 4, 2023 1:59:08 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Karin Lynn; Bill Bekemeier; Sumner Lacroix; Laura Ruby; Phil Rosenberg; Michele St. John; Allison Pettersson; Bob Dedely
Subject: SUGGESTIONS: CANAL FLOOD WALLS / NH CULTURAL CONSULTATION / ALA NAIO STREAM

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Dear Ala Wai Team,

Obviously one of the most contentious issues in current plan for the Ala Wai canal flood prevention project is the proposed six foot wall around the canal.

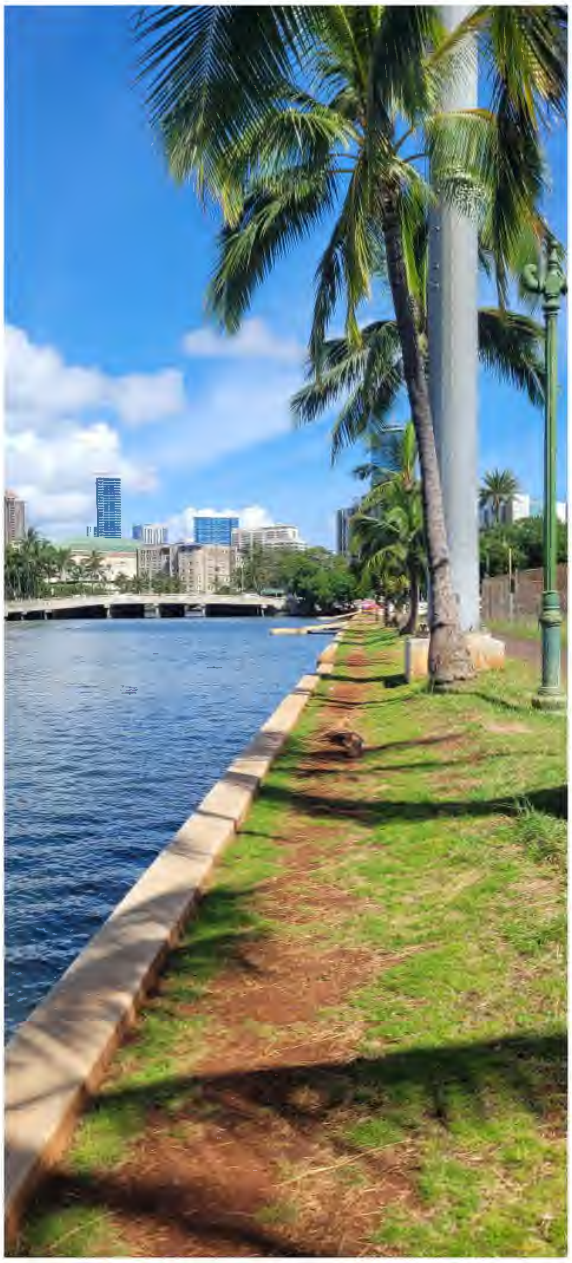
There has been discussion of an elevated berm with walking path to solve some of the "wall issues" issues (at least on the makai side - although I note the mauka side is almost equally frequently used). If a wall is indeed ultimately constructed, please consider constructing it where the current bike path is located (see photos) instead of right next to the canal; the existing palms could then be saved and the bikepath / walkway (which would not be used during a flood anyway) could be relocated between the berm and the (brand new) retaining wall.

Also, during the online public meeting last week there was again discussion about including Native Hawaiian cultural consultation in the planning of the project. It appears that this still has not been done. The Mō'ili'ili (and Waikīkī) areas have been populated by native groups long before the canal was dug, and there is a lot to be learned from the understanding of the natural flooding and wetlands in this region that could be used to advantage.

Finally - I submitted another email regarding consideration of the Ala Naio Stream (AKA Hausten Ditch), but since I have not seen a reply or acknowledgement of receipt I wanted to make sure to mention it again. Discussion of this waterway during the public meeting did not dispel fears of backup and induced flooding in the stream on a scale that would be even worse for upstream properties than it would be if the walls were not constructed. It would be really good to have your engineering people who can address this (and other technical issues) at the next meeting on 15 May.

Mahalo
Karin Lynn
Mō'ili'ili

CONTROLLED UNCLASSIFIED INFORMATION (CUI)



CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Michael
Sent: Thursday, May 4, 2023 4:38:36 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: mikeshibuya@hawaii.rr.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Michael
Last Name Shibuya
Contact Phone Number (808)723-9333
Contact Email Address mikeshibuya@hawaii.rr.com
Contact Mailing Address 3816 Kaimuki Avenue Message By building 6 foot walls around the canal and gold course would not the water be higher than the elevation of Waikiki? At low tide I can see all the drainage pipes coming into the canal from Waikiki...how is the water going to drain if you build up the canal water height?
Please enter the security code displayed in the image

IP: 76.88.175.230

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Subject: FW: NOI - Ala Wai Flood Project - Dave Watase's Public Comment #2 - Concerns with the 2017 Final Environmental Impact Statement - Hydrology and Hydraulic Engineering

Attachments: Pages from Appendix A - H-H.pdf.jpg; Pages from 17 - 7_Final AlaWai_hydrology_Report_081205.pdf.jpg; Appendix A - H-H 30.jpg; Appendix A - H-H 32.jpg; Appendix A - H-H 31.jpg; Appendix A - H-H 34.jpg; 17 - 7_Final AlaWai_hydrology_Report_081205 30.jpg; Appendix A - H-H 58.jpg; Appendix A - H-H 129.jpg; 04 - AppendixB_Economics 10.jpg

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From: Dave Watase
Sent: Thursday, May 4, 2023 8:46:55 PM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Dave Watase's Public Comment #2 - Concerns with the 2017 Final Environmental Impact Statement - Hydrology and Hydraulic Engineering

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Project.

I am OPPOSED to the United States Army Corps of Engineers (USACE) plan to perform a Supplemental Environmental Impact Statement (SEIS) because it builds upon a flawed and an outdated FEIS.

I'd compare the NOI and SEIS to trying to build a bridge on sinking sand. The Hydrology and Hydraulic Engineering is the basis and foundation for which the project is built upon. Having a solid foundation and one that is plumb and square is most important. In this instance the USACE should "do nothing" and start all over because somehow the best alternatives like flood gate and pumps and underground tunnels are being rejected and probably 90% of the community generated measures which involve ecosystem restoration are ignored.

The Hydrology and Hydraulic Engineering data used in the 2017 FEIS was outdated and nearly 10-years old and will be over 15-years old if used for the SEIS. The FEIS Appendix A (temporarily uploaded to my cloud and linked for your convenience, please download 49.4MB) [Blockedhttps://res-h3.public.cdn.office.net/assets/mail/file-icon/png/pdf_16x16.png] Appendix A - H-H.pdf<Blockedhttps://1drv.ms/b/s!AiaSquflq9j6gfJthsAYNrcWyG1lpQ> is nearly identical to the USACE's Final Hydrology Report Ala Wai Watershed Project dated December 2008 (temporarily uploaded to my cloud linked for your convenience, please download 3.5MB) [Blockedhttps://res-h3.public.cdn.office.net/assets/mail/file-icon/png/pdf_16x16.png] 17 - 7_Final AlaWai_hydrology_Report_081205.pdf<Blockedhttps://1drv.ms/b/s!AiaSquflq9j6gfJTEohZGTqH0FQMyg> .

Two of the three significant storms selected to be the basis for calibrating the flood models occurred in 2006 and 2004 only a few years from the date of the report and does not reflect a broad enough range of historic storms for the Ala Wai Canal which is nearly 100 years old. Neither the 2006 and 2004 overtopped the Ala Wai Canal and Waikiki had zero property damage. These two storms are not considered historically large storms over the past 100-years and only stand out because both of these storms caused notable property damage to areas exclusively above the Ala Wai Canal.

1

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

The December 30, 2006 storm was not significant in size did not top the Ala Wai Canal but was preceded 40-days of straight rain which had saturated the ground causing immediate runoff. Since historic data is not collected on ground saturation levels and the methodologies do not incorporate a ground water saturation coefficient it does not make sense why this typical storm was selected.

The October 30, 2004 storm did not top the Ala Wai Canal, however caused $85 million in property damage. The storm was estimated to be a 20-year storm and the flood damage can be directly attributable to poor maintenance of the stream near the Woodlawn bridge. The original 1974 Woodlawn bridge drawing has design capacity of 8,300 cfs. Silt buildup had reduced the capacity in half and debris blocked an additional 25% of the capacity allowing only 25% of the designed capacity to pass through and approximately 2,000 cfs overflowed down to the University of Hawaii.

As a resident within the Ala Wai Watershed, I can attest to the development changes to our watershed since 2008. The high cost of housing has pushed many homeowners to CPR and ADU options expanding the hard surfaces on their properties, investors have bought properties and built "monster homes" with up to 10-bedroom 10-bath homes and paved the whole property with concrete. Waikiki has seen many new hotels and the complete teardown and rebuild hotel projects. The Ala Moana and Kakaako area has experienced a huge influx of luxury condo developments. These all impact the runoff coefficients and it is clear that the data is deficient and not up to date.

Example 1: The next two exhibits "USACE's FEIS Appendix A, page 53 of 435" and "USACE's Final Hydrology Report Ala Wai Watershed Project dated December 2008, page 49 of 119" will display that the sub-basin analysis has not been updated and both are exactly the same. This is independent from the rainfall and flow gauge data from the selected storms.

USACE's FEIS Appendix A, page 53 of 435

[cid:80ed7c47-3d65-4f5e-b798-8a2abfab55e9]

USACE's Final Hydrology Report Ala Wai Watershed Project dated December 2008, page 49 of 119 [cid:32407a42-8bcb-4bad-839d-7f5213adf567]

Example 2: The next two exhibits "USACE's FEIS Appendix A, page 34 of 435" and "USACE's Final Hydrology Report Ala Wai Watershed Project dated December 2008, page 30 of 119" will serve as proof that the data was not updated by examining the number of annual peaks available for analysis. In the case of the FEIS Final Hydrology Report page dated 2/11/2017 the mention of "to present" relating to the collected stream gauges data is not current as it is identical to the December 2008 report. The total number of annual peak figure would be higher each year for each location from 2008.

USACE's FEIS Appendix A, page 34 of 435

[cid:e306b9e6-04e1-4a41-84ec-9411af31208e]

USACE's Final Hydrology Report Ala Wai Watershed Project dated December 2008, page 30 of 119

[cid:cb0160a7-bbe8-47e2-a63a-a41da5465b68]

The methodology used to formulate the hydrology models for the FEIS are best fit for flat areas and do not account areas like Manoa and Palolo with steep ridgelines thousands of feet in height that potentially act as sails to capture stormwater at angles. The surface area of theses ridgelines can quadruple the 2-dimensional surface area. The FEIS disclaims this fact by stating "The Thiessen Polygon Method does not account for orthographic rainfall effect in mountain areas." It's no wonder the flood modeling doesn't resemble anything in the Ala Wai Canal's 100 year history.

2

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

USACE's FEIS Appendix A, page 58 of 435

[cid:dc8127f6-6132-4bb1-a58b-35382a133c85]

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Clearly, the FEIS is not based on rocket science because if NASA was told to predict the location that the Apollo space capsule will land in the Pacific Ocean and one methodology predicted near Japan and the other methodology predicted off the coast of California and NASA picked the middle point. I definitely would not jump in on the spaceship for a ride. That is the analogy I use to demonstrate Final Hydrology and Hydraulics Report for the FEIS. If you look at the figure below which has the Final discharge values for several locations, as an example for the mouth of the Ala Wai Canal the Final flow discharge is 19,500 CFS. It is derived by averaging several methodologies ranging from 17,700 CFS to 28,200 CFS. This tells me that none of the methodologies are rocket science and no one methodology can accurately compute the flow discharge for a given rated storm and the results are not certain.

USACE's FEIS Appendix A, page 129 of 435

[cid:0b75099e-f3d9-4c83-a7ab-b1479bfc24ed]

There is a lack rainfall gauges and locations of convenience and not optimum locations, some too close together, The St. Louis Heights ridgeline has nothing and missing are data from the highest points in the Manoa Valley sub-watershed. The sub-basins without coverage used interpolation results from triangulation using locations outside the Ala Wai Watershed. This interpolation severely weakens the accuracy of the data being used in each sub-basin and skews the flood modeling to be unrealistic to which design measures and flood damage figures are generated.

USACE's FEIS Appendix A, page 30 of 435

[cid:7a51b34a-8aca-411f-b789-c085bd59d273]

Annual rainfall data should not play a part in generating flood modeling for significantly large meteorological events like the 100-year flood. Why? Because every Ala Wai Watershed resident understands that the 1% or 2% chance storm will most likely be a downgraded hurricane, have high winds, generate tide surges, and blanket rain (mostly uniform downpour) our little Ala Wai Watershed which only around 8 miles long. It is totally unrealistic to assume that Waikiki and the lower portions of the watershed like Kapahulu, Moiliili, McCully, Lower Makiki, and Ala Moana will have less rainfall than the upper portions of the watershed and can survive a significantly large storm for several hours with the interior stormwater drainage system shut closed for several hours. We are not trying to protect from a passing storm cloud but downgraded hurricane that can park itself over our whole island for a significant time. The USACE's Ala Wai Canal flood wall measure will cause and result in severe flooding and property damage.

USACE's FEIS Appendix A, page 31 of 435

[cid:c7696e31-923f-4bcc-b62a-78f92203a8cf]
The chart below lists the Rain Gages used to collect raw data used to generate the flood modeling for the Ala Wai Flood Project. It doesn't matter if you have a mega-million dollar supercomputer with the latest state of the art flood modeling software the results are only as good as the data you feed into it. Out of the 13 rain gauges used, 2 of them are outside the Ala Wai Watershed, and only 7 of them have real time recording. I think we all understand that 10" of rain in an hour and 10" of rain in a day can result in a significant difference in peak stream flows and critical times for a given location along the path to the ocean.

3

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

The USACE selected 3 significant storms to calibrate the modeling for the FEIS. The December 1967 flood is the only storm selected that barely overtopped the Ala Wai Canal near the Manoa Stream confluence causing $10,000 (1964 dollars) of recorded property damage and for the most part Waikiki was left untouched and other portions of the Ala Wai Canal fine. The question is what real-time rainfall data is available to support the December 1964 storm. The Lyon Arboretum began in 1975 and the Kanewai Field began in 1999. So, the most significant storm that the USACE is using to generate flood modeling in their Hydrology report and updated HEC-RAS (2020 EDR) modeling really has no real-time recording from the largest sub-watershed of Manoa Valley. Additionally, H-1 Kapiolani began in 2005 also could not be used for the December 1964 storm resulting in only 4 real-time rain gauges for input data of which one is outside the watershed (Waikiki Zoo).

It should also be noted that the other 2 storms in 2004 and 2006 used to calibrate the modeling for the FEIS also lack real-time rain gauge data. H-1 Kapiolani gage which began in 2005 would not be applicable for the October 30, 2004 storm and Pukele Stream gage which stopped in 2005 would not be applicable for the November 31, 2006 storms.

Additional concerns are the validity of the recorded data because it involves 3 independent operators (National Weather Service, US Geological Survey, and Board of Water Supply). Questions abound on whether there are consistent and uniform policies and standards to ensure accurate data collection, the precision of the measurement equipment, the precautions taken to calibrate and certify the equipment, and checks and balances to ensure that the data is not compromised, corrupt, or deficient. It should be noted that disclosures are made throughout the hydrology report admitting the lack of reliable data and that is generally the norm.

However, that being the norm in itself does not justify or make it acceptable for the USACE to promote erroneous flood modeling representation which instigate fear in the population. It is negligent for the USACE to make statements that the FEIS is "estimated to be 99.9 percent reliable in protecting parts of Honolulu, Hawaii, from a flood which has a 1 percent chance of occurrence in any given year" and then a few year later negated the statement by the release of the Engineering Documentation Report dated July 2020 (EDR). The EDR disclosed that over half of the design elements of the project to fail based on updated flood models and were not economically justified and feasible. Good news to the community! The EDR made a significant shift in design elements from one primarily of detention to one of conveyance for the upper watershed which in itself should deem the FEIS as faulty or incomplete and void any attempt to update the project via SEIS. You have to ask yourself what going on because the EDR states a cost of $376 million in July 2020 and in January 2021 ballooned to over $651 million is cost.

USACE's FEIS Appendix A, page 32 of 435

[cid:c18bd555-f8c8-4913-969e-c25f44cfd787]

The 2015 Draft EIS and 2017 Final EIS mention that flood models were created for as small as the 2-year flood however no is not included in the FEIS. The lowest flood modeling found is shown below which has the 5-year (20% chance - Pink) and 500-year (.2% chance - Lt. Blue) which were generated using the 3 selected storms for calibration. A 1-year flood should have a 100% chance of occurring in any given year and my understanding it should resemble a flood that someone experiences once every single year and so forth for the 2-year, 5-year, 10-year, 20-year, 50-year, 100-year, 200-year, and 500-year flood. For most of us, we will experience a 50-year flood in our lifetime and a few will experience a 100-year flood in their lifetime.

Even a 7th grade science experiment requires making a hypothesis or prediction. Generally speaking, if things go wrong there are tell tail signs. The USACE flood 5-year flood model in PINK as shown in the figure below has never happened (tell tail sign). The biggest flood in the history of the Ala Wai Canal (100 years) occurred in December 1967 when I was in 3rd grade at Hokulani Elementary School and the overtopping of the Ala Wai Canal was limited to an area near Manoa Stream confluence.

4

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Now common sense would say that if historic data were properly used to create flood modeling that it should resemble similar past rated storms. A previously rated 100-year flood could be downgraded in the future if the same magnitude storm occurs more frequently. Climate change may increase the frequency of larger storms and flood modeling should constantly be updated as new data becomes available.

USACE's 2015 Draft EIS Appendix B - Economics, page 10 of 81

[cid:8ec921fc-72c7-49c0-ad2a-941b65cff605]

Should the USACE have any question, I'd be happy to meet with your Project Team.

Mahalo,
Dave Watase
c. 808.728.0759

Calculation of Composite Curve Numbers for Ala Wai Watershed

Sum of WS_Acre		New HydroGrp HSG (All D and blank to C)				Curve Number			Area x CN			Composite
SUB-BASIN	LAND USE	A	B	C	Total	A	B	C	A	B	C	CN
A1	Bare Land	0.0	3.1	1.8	5.0	72	82	87	0.0	253.0	89.8	
	Evergreen Forest	0.5	0.2	0.6	30	55	70	13.6	11.2	11.2		
	Grassland	3.2	4.7	4.4	12.3	39	61	74	126.4	287.4	323.2	
	High Intensity Developed	13.9	73.8	34.6	122.3	89	92	94	1240.5	6791.8	3249.2	
	Low Intensity Developed	62.6	55.4	22.6	140.7	77	85	90	4821.2	4710.6	2036.1	
	Scrub/Shrub	2.1	3.2	3.4	8.7	30	48	65	63.4	152.5	222.4	
A1 Total		83.3	140.4	66.2	289.9	A1 Composite CN						84
A2	Bare Land		1.6	6.1	7.7	72	82	87	0.0	132.6	527.6	
	Cultivated Land			0.2	0.2	77	86	91	0.0	0.0	20.2	
	Evergreen Forest		0.1	0.4	0.6	30	55	70	0.0	6.9	30.8	
	Grassland		4.1	12.5	16.6	39	61	74	0.0	250.9	926.5	
	High Intensity Developed		106.5	109.9	216.4	89	92	94	0.0	9799.5	10327.7	
	Low Intensity Developed		13.0	19.8	32.8	77	85	90	0.0	1105.8	1781.7	
	Scrub/Shrub		2.1	7.2	9.2	30	48	65	0.0	99.5	465.2	
	Water		0.1	15.1	15.1	98	98	98	0.0	8.0	1476.0	
A2 Total			127.5	171.1	298.7	A2 Composite CN						90
A3	Bare Land		1.9	0.0	1.9	72	82	87	0.0	157.9	0.0	
	Evergreen Forest		0.2	0.0	0.2	30	55	70	0.0	12.2	0.0	
	Grassland		5.6	0.0	5.6	39	61	74	0.0	342.0	0.0	
	High Intensity Developed		143.8	0.0	143.8	89	92	94	0.0	13229.4	0.0	
	Low Intensity Developed		38.5	0.0	38.5	77	85	90	0.0	3276.0	0.0	
	Scrub/Shrub		3.8	0.0	3.8	30	48	65	0.0	183.9	0.0	
A3 Total			193.9	0.0	193.9	A3 Composite CN						89
A4	Bare Land		3.0	0.9	3.9	72	82	87	0.0	244.7	79.4	
	Evergreen Forest		0.2	0.1	0.2	30	55	70	0.0	8.8	4.4	
	Grassland		23.6	6.0	29.6	39	61	74	0.0	1440.7	441.8	
	High Intensity Developed		122.7	5.0	127.8	89	92	94	0.0	11290.6	472.8	
	Low Intensity Developed		29.1	7.6	36.8	77	85	90	0.0	2477.6	685.8	
	Scrub/Shrub		7.9	6.5	14.3	30	48	65	0.0	378.5	419.3	
	Water		0.2	3.6	3.8	98	98	98	0.0	18.0	349.9	
A4 Total			186.7	29.6	216.3	A4 Composite CN						85
A5	Bare Land		1.2	0.2	1.4	72	82	87	0.0	98.4	19.3	
	Evergreen Forest		0.2	0.0	0.2	30	55	70	0.0	12.2	0.0	
	Grassland		12.2	2.2	14.5	39	61	74	0.0	745.9	165.1	
	High Intensity Developed		131.9	0.8	132.7	89	92	94	0.0	12138.5	72.6	
	Low Intensity Developed		48.7	4.7	53.4	77	85	90	0.0	4140.4	422.9	
	Scrub/Shrub		0.9	0.6	1.5	30	48	65	0.0	43.8	38.8	
	Water			0.4	0.4	98	98	98	0.0	0.0	38.4	
A5 Total			195.2	8.9	204.1	A5 Composite CN						88
A6	Bare Land		2.7	5.0	7.7	72	82	87	0.0	223.0	437.4	
	Evergreen Forest			0.5	0.5	30	55	70	0.0	0.0	32.1	
	Grassland		52.8	18.6	71.3	39	61	74	0.0	3219.5	1372.7	
	High Intensity Developed			5.1	5.1	89	92	94	0.0	0.0	478.9	
	Low Intensity Developed		0.1	3.1	3.1	77	85	90	0.0	5.9	275.9	
	Scrub/Shrub		4.5	15.0	19.5	30	48	65	0.0	215.9	977.5	
	Water		1.2	17.5	18.7	98	98	98	0.0	116.1	1714.1	
A6 Total			61.2	64.7	126.0	A6 Composite CN						72
A7	Bare Land		1.5	2.5	3.9	72	82	87	0.0	120.8	214.5	
	Evergreen Forest		2.0	0.1	2.1	30	55	70	0.0	111.6	4.2	
	Grassland	0.2	12.8	1.1	14.1	39	61	74	7.7	783.5	79.1	
	High Intensity Developed	0.0	238.4	3.8	242.3	89	92	94	3.5	21935.1	361.6	
	Low Intensity Developed	0.3	67.2	10.3	77.9	77	85	90	25.4	5715.0	928.2	
	Scrub/Shrub	0.8	15.5	38.1	54.4	30	48	65	24.3	744.6	2478.1	
	Water		0.0	2.2	2.2	98	98	98	0.0	0.3	211.5	
A7 Total		1.4	337.5	58.0	396.9	A7 Composite CN						85
A8	Bare Land			0.1	0.1	72	82	87	0.0	0.0	12.4	
	Grassland		0.1	0.4	0.6	39	61	74	0.0	8.7	32.9	
	High Intensity Developed		28.8	37.8	66.6	89	92	94	0.0	2647.5	3556.8	
	Low Intensity Developed		1.4	3.0	4.4	77	85	90	0.0	120.1	271.4	
	Scrub/Shrub		0.7	2.4	3.1	30	48	65	0.0	32.6	159.0	
	Water			4.3	4.3	98	98	98	0.0	0.0	424.2	
A8 Total			31.0	48.2	79.2	A8 Composite CN						92
K1	Evergreen Forest	268.5	1.4	66.9	336.8	30	55	70	8056.1	75.6	4681.3	
	Grassland	3.3		1.4	4.8	39	61	74	129.7	0.0	106.4	
	Low Intensity Developed	30.9	0.0	3.9	34.9	77	85	90	2382.0	0.7	354.0	
	Scrub/Shrub	216.6		48.9	265.5	30	48	65	6499.0	0.0	3178.2	
K1 Total		519.4	1.4	121.1	642.0	K1 Composite CN						40
K2	Bare Land	0.7		0.4	1.1	72	82	87	48.0	0.0	38.7	
	Evergreen Forest	97.2		51.4	148.6	30	55	70	2917.0	0.0	3595.5	
	Grassland	89.3	0.5	19.5	89.3	39	61	74	2702.8	27.6	1443.9	
	High Intensity Developed	34.4	29.8	14.5	78.7	89	92	94	3062.2	2742.4	1363.0	
	Low Intensity Developed	103.2	10.2	43.3	156.7	77	85	90	7949.2	863.6	3901.4	
	Scrub/Shrub	47.3	0.0	22.5	69.8	30	48	65	1419.1	1.1	1461.9	
K2 Total		352.2	40.4	151.7	544.3	K2 Composite CN						62

Table 4-3. Calculation of Composite Curve Numbers for Ala Wai Watershed

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Calculation of Composite Curve Numbers for Ala Wai Watershed

Sum of WS_Acre		New HydroGrp HSG (All D and blank to C)				Curve Number			Area x CN			Composite
SUB-BASIN	LAND USE	A	B	C	Total	A	B	C	A	B	C	CN
A1	Bare Land	0.0	3.1	1.0	5.0	72	82	87	0.0	253.0	89.8	
	Evergreen Forest		0.2	0.2	0.8	30	55	70	13.8	11.2	11.2	
	Grassland	3.2	4.7	4.4	12.3	39	61	74	126.4	287.4	323.2	
	High Intensity Developed		73.8	34.8	122.5	89	92	94	1240.5	6791.8	3249.2	
	Low Intensity Developed	62.6	55.4	22.6	140.7	77	85	90	4821.2	4710.6	2036.1	
	Scrub/Shrub		3.2	3.4	6.7	30	48	65	83.9	154.5	222.4	
A1 Total		83.3	140.4	66.2	289.9	A1 Composite CN						84
A2	Bare Land		3.8	4.1	7.7	72	82	87	0.0	132.8	527.6	
	Cultivated Land			0.2	0.2	77	86	91	0.0	0.0	20.2	
	Evergreen Forest		0.1	0.4	0.8	30	55	70	0.0	6.6	30.8	
	Grassland		4.1	12.5	16.6	39	61	74	0.0	250.9	926.5	
	High Intensity Developed		106.5	109.9	216.4	89	92	94	0.0	9799.5	10327.7	
	Low Intensity Developed		13.0	19.8	32.8	77	85	90	0.0	1105.8	1781.7	
	Scrub/Shrub		2.1	7.2	9.2	30	48	65	0.0	99.5	465.2	
	Water		0.1	15.1	15.1	98	98	98	0.0	8.0	1476.0	
A2 Total			127.5	171.1	298.7	A2 Composite CN						90
A3	Bare Land		1.9	0.0	1.9	72	82	87	0.0	157.9	0.0	
	Evergreen Forest		0.2	0.0	0.2	30	55	70	0.0	11.2	0.0	
	Grassland		5.6	0.0	5.6	39	61	74	0.0	342.0	0.0	
	High Intensity Developed		143.8	0.0	143.8	89	92	94	0.0	13229.4	0.0	
	Low Intensity Developed		38.5	0.0	38.5	77	85	90	0.0	3276.0	0.0	
	Scrub/Shrub		3.8	0.0	3.8	30	48	65	0.0	183.9	0.0	
A3 Total			193.9	0.0	193.9	A3 Composite CN						89
A4	Bare Land		3.0	0.9	3.9	72	82	87	0.0	344.7	79.4	
	Evergreen Forest		0.2	0.1	0.2	30	55	70	0.0	8.8	4.4	
	Grassland		23.6	6.8	29.6	39	61	74	0.0	1440.7	441.8	
	High Intensity Developed		122.7	5.0	127.8	89	92	94	0.0	11290.6	472.8	
	Low Intensity Developed		25.1	7.6	28.6	77	85	90	0.0	2477.6	685.8	
	Scrub/Shrub		7.9	6.5	14.3	30	48	65	0.0	378.5	419.3	
	Water		0.2	3.6	3.8	98	98	98	0.0	16.5	349.9	
A4 Total			186.7	29.6	216.3	A4 Composite CN						85
A5	Bare Land		1.2	0.2	1.4	72	82	87	0.0	68.4	19.3	
	Evergreen Forest		0.2	0.0	0.2	30	55	70	0.0	12.2	0.0	
	Grassland		12.2	2.2	14.5	39	61	74	0.0	745.9	165.1	
	High Intensity Developed		131.9	0.8	132.7	89	92	94	0.0	12138.5	72.6	
	Low Intensity Developed		46.7	4.7	53.4	77	85	90	0.0	4140.6	422.9	
	Scrub/Shrub		0.9	0.6	1.5	30	48	65	0.0	43.8	38.8	
	Water			0.4	0.4	98	98	98	0.0	0.0	38.8	
A5 Total			195.2	8.9	204.1	A5 Composite CN						88
A6	Bare Land		2.7	5.0	7.7	72	82	87	0.0	233.0	437.4	
	Evergreen Forest			0.5	0.5	30	55	70	0.0	0.0	32.1	
	Grassland		52.8	18.6	71.3	39	61	74	0.0	3219.5	1372.7	
	High Intensity Developed			5.1	5.1	89	92	94	0.0	0.0	478.9	
	Low Intensity Developed		0.1	3.1	3.1	77	85	90	0.0	5.8	275.9	
	Scrub/Shrub		4.5	15.0	19.5	30	48	65	0.0	215.9	977.5	
	Water		1.2	17.5	18.7	98	98	98	0.0	16.1	1714.1	
A6 Total			61.2	64.7	126.0	A6 Composite CN						72
A7	Bare Land		1.0	2.8	3.9	72	82	87	0.0	130.0	214.5	
	Evergreen Forest		2.0	0.1	2.1	30	55	70	0.0	111.6	4.2	
	Grassland		13.6	1.1	14.1	39	61	74	7.7	784.5	79.1	
	High Intensity Developed	0.0	238.4	3.8	242.3	89	92	94	3.5	21935.1	361.6	
	Low Intensity Developed		97.2	10.8	77.9	77	85	90	25.4	5716.0	928.2	
	Scrub/Shrub	0.8	15.5	38.1	54.4	30	48	65	24.3	744.6	2478.1	
	Water		0.0	2.2	2.2	98	98	98	0.0	0.3	211.5	
A7 Total		1.4	337.5	58.0	396.9	A7 Composite CN						85
A8	Bare Land				0.1	72	82	87	0.0	0.0	12.4	
	Grassland		0.1	0.4	0.6	39	61	74	0.0	8.7	32.9	
	High Intensity Developed		28.8	37.8	66.6	89	92	94	0.0	2647.8	3225.8	
	Low Intensity Developed		1.4	3.0	4.4	77	85	90	0.0	120.1	271.4	
	Scrub/Shrub		0.7	2.4	2.1	30	48	65	0.0	33.0	150.0	
	Water			4.3	4.3	98	98	98	0.0	0.0	424.2	
A8 Total			31.0	48.2	79.2	A8 Composite CN						82
K1	Evergreen Forest	268.5	1.4	66.9	336.8	30	55	70	8056.1	75.6	4681.3	
	Grassland	8.3			4.8	30	61	74	139.7	0.0	105.4	
	Low Intensity Developed	30.9	0.0	3.9	34.9	77	85	90	2382.0	0.7	354.0	
	Scrub/Shrub	216.8		48.8	265.5	30	48	65	6499.0	0.0	3175.2	
K1 Total		519.4	1.4	121.1	642.0	K1 Composite CN						40
K2	Bare Land			0.4	1.1	72	82	87	46.0	0.0	35.7	
	Evergreen Forest	97.2		51.4	148.6	30	55	70	2917.0	0.0	3595.5	
	Grassland	66.3	0.5	19.5	68.3	39	61	74	2702.9	27.6	1443.9	
	High Intensity Developed	34.4	29.8	14.5	78.7	89	92	94	3062.2	2742.4	1363.0	
	Low Intensity Developed	109.2	10.2	42.3	156.7	77	85	90	7949.2	863.6	3601.4	
	Scrub/Shrub	47.3	0.0	22.5	69.8	30	48	65	1419.1	1.1	1461.9	
K2 Total		352.2	40.4	151.7	544.3	K2 Composite CN						61

Table 4-3. Calculation of Composite Curve Numbers for Ala Wai Watershed

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

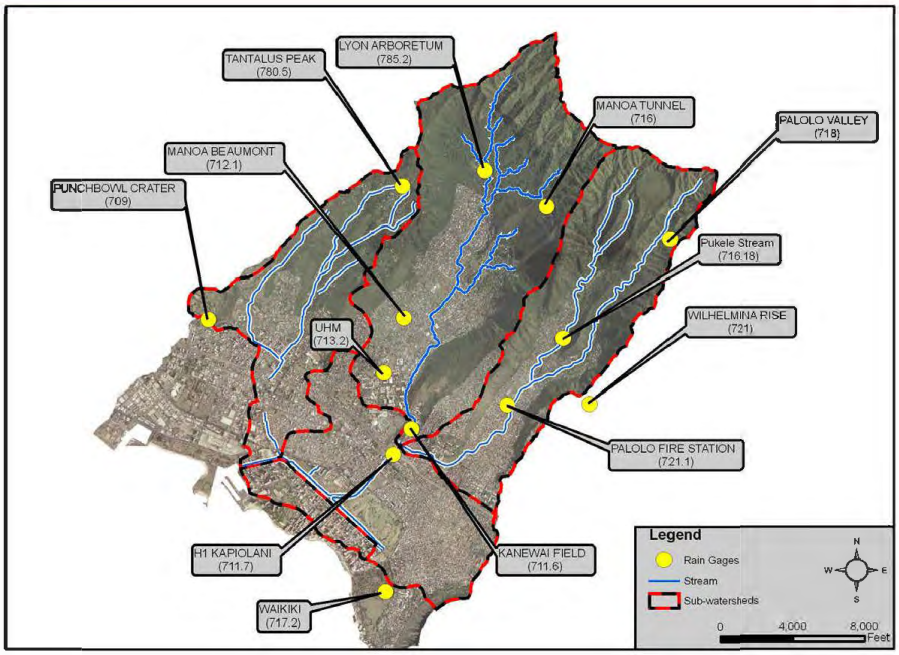

Figure 3-1. Ala Wai Watershed Rain Gages Used by Identification Number

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

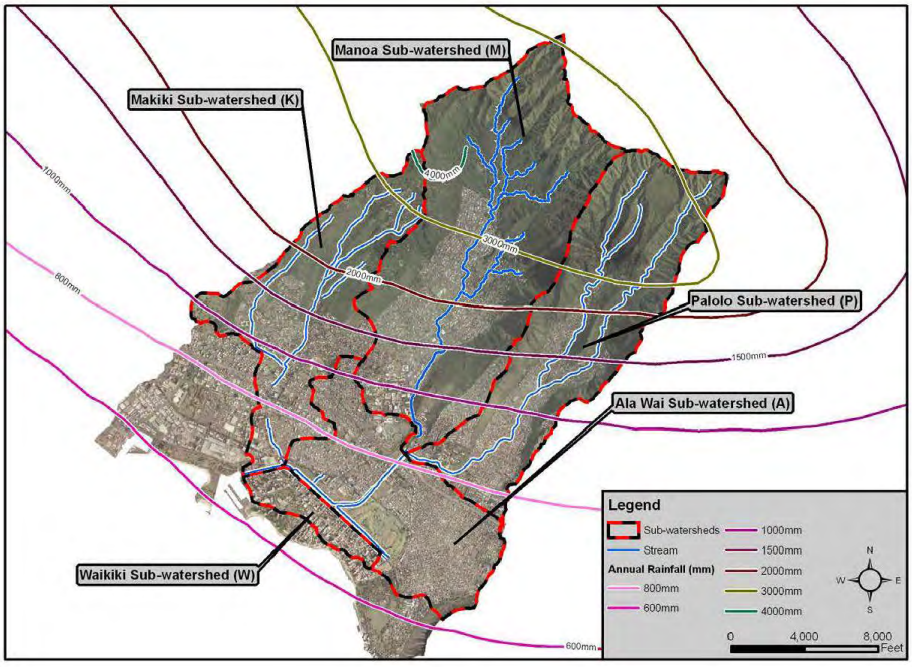

Figure 3-2. Annual Rainfall Distribution for Ala Wai Watershed by Major Sub-watershed

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Characteristics of Rain Gages Used

Name	ID	Latitude	Longitude	Elevation (ft)	Records	Real-time recording†	Daily recording*	Operator
Lyon Arboretum	785.2	21°20'08"	157°48'12"	500	1975– Present	√		NWS
Mānoa Tunnel	716	21°19'48"	157°47'36"	650	1927– Present		√	BWS
Kānewai Field	711.6	21°17'47"	157°48'56"	38	1999– Present	√		USGS
Mānoa Beaumont	712.1	21°18' 48"	157°49'00"	200	1947– Present		√	Private
UHM	713.2	21°18'18"	157°49'12"	120	1952– Present		√	UH
Pālolo Fire Stn.	721.1	21°18'00"	157°48'00"	190	1950– Present	√		NWS
Pālolo Tunnel	718	21°20'00"	157°49'00"	995	1926– Present	√		BWS
H-1 Kapiolani	711.7	21°17'22"	157°48'56"	20	2005– Present	√		USGS
Punchbowl Crater	709	21°18'48"	157°50'54"	355	1950– Present		√	NWS
Waikīkī Zoo	717.2	21°16'00"	157°49'00"	5	1957– Present	√		NWS
Wilhelmina Rise	721	21°18' 00"	157°47'12"	1100	1927– Present		√	BWS
Pūkele Stream	716.18	21°18'36"	157°47'27"	345	1927– 2005	√		USGS
Tantalus Peak	780.5	21°20'00"	157°49'00"	1665	1927– Present		√	BWS

Table 3-1. Characteristics of Rain Gages Used.

† Real-time recording is by time intervals of 15 minutes. *Daily recording is 24-hour period

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Characteristics of Stream Gages Used									
Gage Location	Waihī	Waiakeakua	Lowrey	Kānewai	Pūkele	Waiʻōmaʻo	Pālolo	Makiki	Mānoa-Pālolo
Gage Number	16238500	16240500	16241500	16242500	1624400	16246000	16247000	16238000	16247100
Gage Location, Latitude	21°19'55"	21°19'52"	21°18'53"	21°17'47"	21°18'36"	21°18'34"	21°17'35"	21°17'02"	21°17'24"
Gage Location, Longitude	157°48'12"	157°48'08"	157°48'41"	157°48'56"	157°47'27"	157°47'11"	157°48'25"	157°50'22"	157°49'17"
Gage Elevation (ft)	289.84	294.5	294.5	38	344.78	373.66	95	10	5
Drainage Area (USGS, mi^2)	1.14	1.06	4.02	5.05	1.18	1.04	3.63	2.23	10.6
Drainage Area (mi^2)	1.19	1.07	4.22	5.643	1.146	1.036	3.62	2.49	10.34
Period of Continuous Record	1913–1983	1913–Present	---	1999–Present	1927–2004	1927–1971	1953–Present	---	1967–Present
Peak Flow Record Only	---	---	2003-2004	---	---	---	---	2003-2004	---
Number of Annual Peaks Available for Analysis	63	88	3	6	59	39	32	2	40

Table 3-2. Characteristics of Stream Gages Used

Characteristics of Stage Gages Used		
Gage Location	Honolulu Harbor	Ala Wai Elementary School
Gage Number	1612340	16247130
Gage Location, Latitude	21° 18.4'	21°17'16"
Gage Location, Longitude	157° 52.0'	157°49'51"
Gage Elevation (ft)	B.M. ELV. 8.06 Feet	5
Period of Continuous Record	1905-present	2003-2004

Table 3-3. Characteristics of Stage Gages Used

Note: B.M. ELV.= Bench Mark Elevation

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Characteristics of Stream Gages Used

Gage Location	Waihī	Waiakeakua	Lowrey	Kānewai	Pūkele	Waiʻōmaʻo	Pālolo	Makiki	Mānoa-Pālolo
Gage Number	16238500	16240500	16241500	16242500	1624400	16246000	16247000	16238000	16247100
Gage Location, Latitude	21°19'55"	21°19'52"	21°18'53"	21°17'47"	21°18'36"	21°18'34"	21°17'35"	21°17'02"	21°17'24"
Gage Location, Longitude	157°48'12"	157°48'08"	157°48'41"	157°48'56"	157°47'27"	157°47'11"	157°48'25"	157°50'22"	157°49'17"
Gage Elevation (ft)	289.84	294.5	294.5	38	344.78	373.66	95	10	5
Drainage Area (USGS, mi^2)	1.14	1.06	4.02	5.05	1.18	1.04	3.63	2.23	10.6
Drainage Area (mi^2)	1.19	1.07	4.22	5.643	1.146	1.036	3.62	2.49	10.34
Period of Continuous Record	1913–1983	1913–Present	---	1999–Present	1927–2004	1927–1971	1953–Present	---	1967–Present
Peak Flow Record Only	---	---	2003-2004	---	---	---	---	2003-2004	---
Number of Annual Peaks Available for Analysis	63	88	3	6	59	39	32	2	40

Table 3-2. Characteristics of Stream Gages Used

Characteristics of Stage Gages Used

Gage Location	Honolulu Harbor	Ala Wai Elementary School
Gage Number	1612340	16247130
Gage Location, Latitude	21° 18.4'	21°17'16"
Gage Location, Longitude	157° 52.0'	157°49'51"
Gage Elevation (ft)	B.M. ELV. 8.06 Feet	5
Period of Continuous Record	1905-present	2003-2004

Table 3-3. Characteristics of Stage Gages Used

Note: B.M. ELV.= Bench Mark Elevation

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

4.4.1 October 2004 Storm Calibration for Mānoa-Pālolo Area

The calibration for the storm of October 30, 2004, was based on the method used in the previous Mānoa Watershed Project hydrologic study. The calibration parameters used for the Mānoa sub-watershed in the Mānoa Watershed Project hydrologic study were used for the HEC-HMS model in the Ala Wai Watershed hydrologic study. The gage weights for sub-basins in Mānoa valley were the same as those used in the Mānoa Watershed Project described earlier. The main task of the calibration for the Ala Wai Watershed hydrologic study focused on the Pālolo sub-watershed and the area downstream of Kānewai Field gage, to the USGS stream gage 16247100. This stream gage is located on Kaimukī High School and had full stream flow records for the event. Gage weights were used for calibration purposes. The Thiessen polygon method was initially applied to determine the gage weight for each sub-basin. Figure 4-5 shows the Thiessen polygons for the October 2004 storm for the Ala Wai Watershed. The Thiessen polygon method does not account for orthographic rainfall effect in mountain areas. After taking into consideration the rainfall pattern, data quality, and storm movement and distribution, the final gage weights and relevant 24-hour rainfall of the October 2004 storm for each sub-basin were determined as shown in Table 4-4. (Note: 'MP' is used to abbreviate the Mānoa-Pālolo area.)

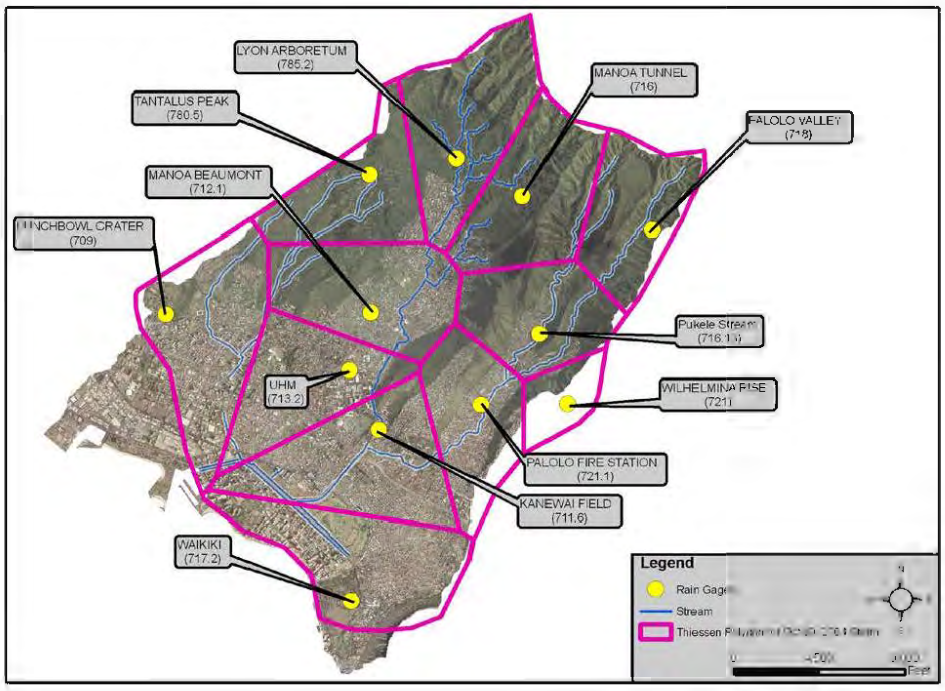

Figure 4-5. Rain Gages and Thiessen Polygons for the October 30, 2004

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Table 5-8: Peak Flow Discharge Values Update -- Continued

Methodology	Peak flow discharge (cfs)							
Return Period (yr)	2	5	10	20	50	100	200	500
Percent Chance Exceedance	50%	20%	10%	5%	2%	1%	0.50%	0.20%
JMP1 (Confluence of Manoa and Palolo Streams, A= 10.04 mi²)								
HEC-HMS (R-73)	4,020	7,170	10,300	12,900	16,100	18,500	20,900	24,400
HEC-HMS (Atlas 14)	*5,400*	*8,620*	*11,400*	*14,300*	*18,600*	*21,900*	*25,700*	*31,200*
Regression (1994)	2,120	4,060	5,760	8,240	10,700	12,700	---	---
Regression (2010)	*1,760*	*3,400*	*4,930*	*7,020*	*8,890*	*11,000*	---	*17,700*
Plate 6	---	---	---	---	---	15,500	---	---
Weighted (2008)	3,210	5,840	8,360	10,900	13,800	15,800	20,900	24,400
Weighted (2016)	*3,840*	*6,380*	*8,630*	*11,200*	*14,400*	*16,800*	*25,700*	*25,400*
FINAL (2008)	3,350	6,000	8,400	10,900	14,100	16,500	18,700	21,800
FINAL	**3,400**	**6,200**	**8,400**	**11,000**	**14,200**	**16,700**	**20,500**	**22,900**
JMP2 (Manoa-Palolo Stream Gage 16247100, A= 10.34 mi²)								
HEC-HMS (R-73)	4,090	7,340	10,500	13,000	16,300	18,700	21,100	24,700
HEC-HMS (Atlas 14)	*5,560*	*8,800*	*11,600*	*14,600*	*19,000*	*22,400*	*26,300*	*31,700*
Regression (1994)	2,110	4,080	5,800	8,320	10,800	12,900	---	---
Regression (2010)	*1,760*	*3,420*	*5,000*	*7,080*	*9,000*	*11,100*	---	*18,000*
Plate 6	---	---	---	---	---	16,000	---	---
FEMA	---	---	12,000	---	19,200	23,000	---	28,500
HEC-SSP	2,883	5,065	6,800	8,670	11,400	13,700	16,200	19,800
Weighted (2008)	3,070	5,520	8,470	9,890	13,900	16,400	18,100	23,200
Weighted (2016)	*3,390*	*5,750*	*8,470*	*9,970*	*13,800*	*16,700*	*19,700*	*22,690*
FINAL (2008)	3,400	6,100	8,500	11,150	14,400	16,800	19,000	22,100
FINAL	**3,600**	**6,400**	**8,600**	**11,200**	**14,500**	**17,000**	**20,900**	**23,200**
JMP3 (Right above the confluence of Manoa-Palolo and Ala Wai Canals, A=10.68 mi²)								
HEC-HMS (R-73)	4,220	7,450	10,700	13,300	16,600	18,900	21,400	24,900
HEC-HMS (Atlas 14)	*5,760*	*9,130*	*12,000*	*15,100*	*19,700*	*23,100*	*27,100*	*32,700*
Regression (2010)	*1,780*	*3,470*	*5,050*	*7,200*	*9,150*	*11,300*	---	*18,400*
Plate 6	---	---	---	---	---	16,500	---	---
Weighted (2008)	4,220	7,450	10,660	13,260	16,560	18,100	21,400	24,900
Weighted (2016)	*4,050*	*6,700*	*9,020*	*11,700*	*15,200*	*17,700*	*27,100*	*26,600*
FINAL (2008)	3,450	6,200	8,700	11,400	14,700	17,100	19,300	22,400
FINAL	**4,000**	**6,700**	**9,000**	**11,700**	**15,000**	**17,500**	**21,500**	**24,000**
Ala Wai Canal (Mouth of Ala Wai Canal, A=16.22 mi²)								
HEC-HMS (R-73)	6,000	10,100	13,400	15,200	16,700	17,700	18,700	20,500
HEC-HMS (Atlas 14)	*8,080*	*12,000*	*14,400*	*16,000*	*17,800*	*19,100*	*20,700*	*22,200*
Plate 6	---	---	---	---	---	22,500	---	---
FEMA	---	---	13,700	---	23,000	28,200	---	36,200
Weighted (2008)	6,000	10,100	13,500	15,200	19,400	22,300	18,700	27,200
Weighted (2016)	*8,080*	*12,000*	*14,100*	*16,000*	*20,000*	*22,900*	*20,700*	*28,200*
FINAL (2008)	6,000	9,500	12,500	15,200	17,500	18,500	19,500	20,500
FINAL	**8,000**	**11,500**	**13,500**	**16,000**	**18,000**	**19,500**	**20,500**	**22,000**

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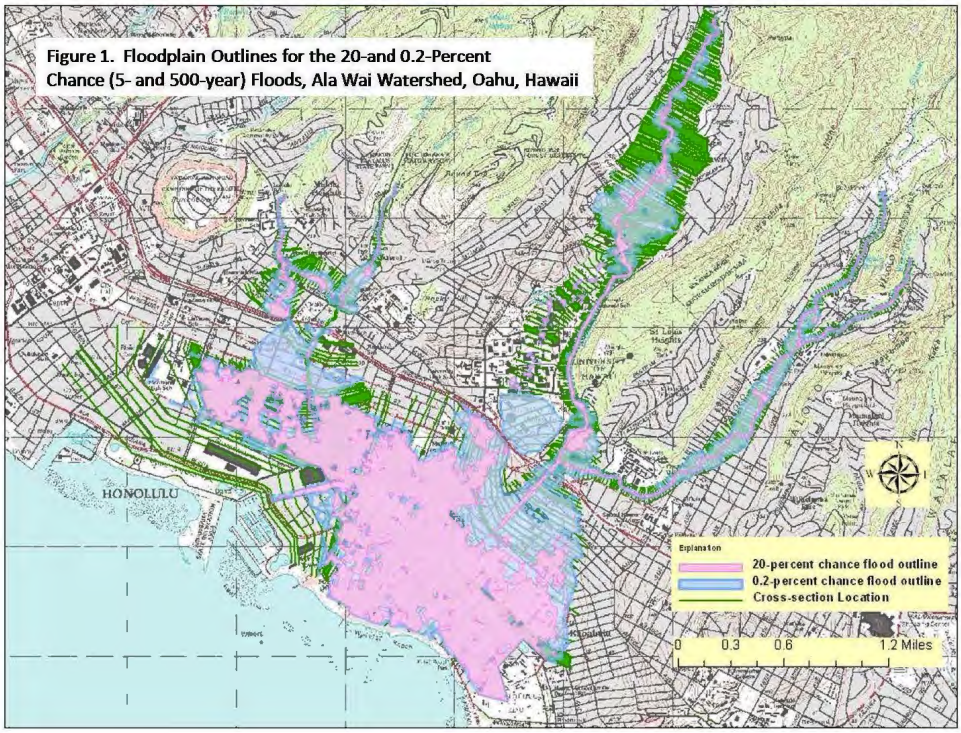

B-2

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Kayla
Sent: Thursday, May 4, 2023 10:08:30 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: Kayla.e.lohman@gmail.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Kayla
Last Name McGowan
Contact Phone Number (0__)___-____
Contact Email Address Kayla.e.lohman@gmail.com
Contact Mailing Address 96701
Message Please continue to consider taking a nature-based approaches and restoring the beauty of Hawaii's ecosystems. From mountain and stream to ocean, our islands were created to thrive. If walls must be raised, ensure they will not be plagued with graffiti and instead covered with murals or mosaics to bring beauty to our community.
Please enter the security code displayed in the image

IP: 98.151.14.92

From: Tsugawa, Greg
Sent: Friday, May 5, 2023 2:59:37 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: RE: Ala Wai Canal Flood Risk Management Project Supplemental Determination and EIS Preparation Notice

Hello:

Please see the DTS' attached final response to the Ala Wai Canal Flood Risk Management Project Supplemental Determination and EIS Preparation Notice, signed by our Director; a physical copy should be arriving at DDC shortly.

Thank you.

Sincerely,
Greg Tsugawa
City and County of Honolulu
Department of Transportation Services
Regional Planning Branch

From: Tsugawa, Greg
Sent: Wednesday, May 3, 2023 11:02 AM
To: Ala Wai <alawai@honolulu.gov>
Subject: Ala Wai Canal Flood Risk Management Project Supplemental Determination and EIS Preparation Notice

Hello:

The City and County of Honolulu's Department of Transportation Services will be submitting comments on the Ala Wai Canal Flood Risk Management Project Supplemental Determination and EIS Preparation Notice, and we're currently obtaining our Director's signature on the final response. Please see our attached draft response, which should be substantially similar to the final version; we'll send you the final response when available.

Thank you.

Sincerely,
Greg Tsugawa
City and County of Honolulu
Department of Transportation Services
Regional Planning Branch

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
711 KAPIOLANI BOULEVARD, SUITE 1600
HONOLULU, HAWAII 96813
Phone: (808) 768-8305 • Fax: (808) 768-4730 • Internet: www.honolulu.gov

RICK BLANGIARDI
MAYOR

J. ROGER MORTON
DIRECTOR

JON Y. NOUCHI
DEPUTY DIRECTOR

TP5/23-902022

May 5, 2023

MEMORANDUM

TO: Haku Milles, P.E., Director
Department of Design and Construction (DDC)

FROM: J. Roger Morton, Director
Department of Transportation Services (DTS)

SUBJECT: Ala Wai Canal Flood Risk Management Project Supplemental Determination and Environmental Impact Statement Preparation Notice

Thank you for the opportunity to provide written comments regarding the Ala Wai Canal Flood Risk Management Project Supplemental Determination and Environmental Impact Statement Preparation Notice. We have the following comments.

1. Project coordination.

   i. The DTS is actively coordinating with the United States Army Corps of Engineers (USACE) and the DDC on the Ala Wai Flood Risk Management Study (Study). A DTS representative will continue to be available to attend weekly Study coordination meetings with the Study's team, participate in the Study's public meetings, and coordinate the DTS' communications and projects with the Study.

   ii. The DTS currently has two ongoing projects in the Study area, (1) the Ala Wai Boulevard Complete Streets Project, located between Kapahulu and Kalakaua avenues, and (2) the Ala Wai Bridge Project, spanning the Ala Wai Canal at Kalaimoku Street. The Study must ensure ongoing coordination between the DTS projects and the Study's flood risk management measures.

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iii. The DTS further encourages the DDC and the Study, to the extent feasible, to integrate active transportation resources into the project that compliment DTS' ongoing projects and provide mobility.

2. Street Usage Permit. A street usage permit from the DTS should be obtained for any construction-related work that may require the temporary closure of any traffic lane, sidewalk, bicycle lane, or pedestrian mall on a City and County of Honolulu street.

3. Bus Stops. Numerous bus stops are located within the Study area. Please coordinate any bus stop impacts/changes with DTS – Transportation Mobility Division (TMD). Contact DTS-TMD at TheBusStop@honolulu.gov

4. Neighborhood Impacts. The area representatives, neighborhood board, as well as the area guests, businesses, emergency personnel (fire, ambulance, and police), Oahu Transit Services, Inc. (TheBus and TheHandi-Van), etc., should be kept apprised of the details and status throughout the project and the impacts that the project may have on the adjoining local street area network.

5. Disability and Communication Access Board (DCAB). Project plans (vehicular and pedestrian circulation, sidewalks, parking and pedestrian pathways, vehicular ingress/egress, etc.) should be reviewed and approved by DCAB to ensure full compliance with Americans with Disabilities Act requirements.

Should you have any questions, please contact Greg Tsugawa, of my staff, at (808) 768-6683.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Dave Watase
Sent: Friday, May 5, 2023 6:17:26 PM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Comment #3 - TUNNELS

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Risk Management Project.

I am OPPOSED to the United States Army Corps of Engineers (USACE) plan to perform a Supplemental Environmental Impact Statement (SEIS) because it builds upon a flawed and outdated FEIS.

I am OPPOSED to the General Reevaluation Study's Prospective Plan elements of an Ala Wai Canal Flood Wall and believe a better alternative is the CONCEPT OF USING TUNNELS that can capture flood waters in the upper watershed and using elevation and head pressure convey the flood waters completely bypassing the Ala Wai Canal. Tunnels are not susceptible to high tides, tide surges from hurricanes, and sea level rise. The upper watershed flood waters that are removed via tunnels do not have to be a dealt with in the lower watershed. Tunnels can be adapted or extended to higher elevations for additional inlet sources, can be designed to have multiple inlets at different elevations.

The Honolulu City Council formed a Permitted Interaction Group which hired OceanIt to develop alternatives to the FEIS. OceanIt's alternative primarily focused on addressing the 100-year flood flows from the upper watershed and did not address the flows from the lower portions of the watershed. OceanIt's plan would have to be used in conjunction with another alternative to address the 100-year flows from the lower watershed.

OceanIt's Report:

* Makiki tunnel 12' diameter has a potential capacity of 2,559 cfs
* Manoa tunnel 12' diameter has a potential capacity of 3,178 cfs
* Palolo tunnel 12' diameter has a potential capacity of 3,150 cfs

Tunnels can be extended and increased in diameter or doubled up. Many factors affecting the flow are elevation and pipe friction which will increases with length. The higher up the watershed the smaller the flows. Flows may not be consistently available and an adjustable inlet weir would provide flexibility. The benefit of tunnels are that all flows are removed out of the equation for the duration of the storm because it completely bypasses the lower watershed and the Ala Wai Canal.

1

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OceanIt's Report:

Manoa and Palolo tunnel has an estimated cost of $262 million (direct and indirect cost) and includes tunnels extending a quarter mile out into the ocean. These tunnels are 12' in diameter and have one inlet. The 12' tunnels transitions to three (3) 6' diameter tunnels going out into the ocean.

Instead of going a quarter of a mile out into the ocean and to avoid potential environmental setbacks, the outlet should be near the Ala Wai Boat Harbor near Magic Island.

Cost saving from the elimination of taking the tunnels out into the ocean will be around $97 million (direct and indirect costs) and should be repurposed for going to the Ala Wai Board Harbor. OceanIt's plan does not include Engineering and Project Management. However, the tunnel engineering designs should be far less complex than building a wall around the Ala Wai Canal to which every foot has to be carefully examined to deal with historic walls, protected trees, utilities, and other unknow factors. Even the project management should be so much more simplified by tunneling underground with less issues to deal with. I'd compare the Ala Wai Flood wall to the RAIL going down Dillingham and verse the tunnel as building the RAIL in on open farmland in Kapolei. Big difference and less chance for change orders and cost increases which government projects are know for. Additional saving may be incurred by combining starter shafts and tunnels. Reusing the starter shafts for a pump station and adding additional tunnels for the flood pump. Tunnels, Flood gate and pump, and the Ala Wai Golf Course detention basin can be built independently and work in conjunction to increase flood protection. Flood pumps via tunnels to the Ala Wai Boat Harbor are not susceptible to high tides, tide surges and sea level rise especially if worked in conjunction with a flood gate. (See diagram below the OceanIt stuff)

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[cid:2291d495-797d-46dc-aa1b-f31a9ecb9b25]

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Jeff Herzog referred this alternative idea as the Octopus Plan where the pumping station on the Ala Wai Golf Course was like the head of the Octopus. In reality, it acts as a centralized switch for both the upper watershed tunnels and lower watershed flood pump. Expansion of the concept would include additional inlet pipes extended to different locations.

Manoa tunnel - RED (gravity flow, multiple inlets, could be switched to be pump assisted) tunnel could be extended to the Manoa District Park (protecting UHM, Lowery Bridge, East Manoa Bridge, and Woodlawn Bridge)

Palolo tunnel - PINK (gravity flow, multiple inlets, could be switched to be pump assisted)

GREEN tunnel (Kanewai Park to feed the Ala Wai Golf Course Detention Basin, inlet 25+ feet MSL, would allow the AWGC berm to be increased in height to have more detention capacity. AWGC is approximately 5 million square feet in area and every foot of storage is approximately 5 million cubic feet of storage. AWGC detention basin can be a series of several detention basins that can be opened up or spilled into the next so as to use as needed for the unexpected. The AWGC detention basin can have an inlet weir below Date Street Bridge which will provide minimal detention storage. If the berms are built higher and flows captured upstream then for bigger storms where increase storage capacity is needed then the weir can be closed and the AWGC would operate above ground level. The first source for detention storage would created by lower the Ala Wai Canal with a flood gate and the AWGC detention basin would be the last used option. The AWGC potentially could hold 40-50 million cubic feet of flood water.

Currently, the General Reevaluation Study, the USACE stated that the AWGC detention basin will hold 300 ac-ft which is about 13 million cubic feet.

Ala Wai Golf Course Flood Pumping Station and switch station - YELLOW - Purpose to bypass the Ala Wai Canal and move flood waters from the Manoa/Palolo Stream confluence to the Ala Wai Boat Harbor. The flood pump in conjunction with a flood gate could lower the canal ahead of a storm to create 20-40 million cubic feet of detention storage. The Ala Wai Golf Course Detention basin

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UPPER WATERSHED:

* Manoa gravity flow tunnel (inlet Manoa District Park, inlet St. Francis, inlet Kanewai Park, Ala Wai Golf Course Switch Center/pumping station, tunnel to Ala Wai Harbor outlet platform);
* Palolo gravity flow tunnel (inlet Palolo Ave. Bridge, inlet Palolo/Manoa Stream confluence, Ala Wai Golf Course Switch Center/pumping station, tunnel to Ala Wai Harbor outlet platform);
* Makiki gravity flow tunnel (inlet Nehoa/Makiki, inlet Nehoa/Pensacola, route under Piikoi to Ala Moana Beach Park, then to Ala Wai Harbor outlet platform);

LOWER WATERSHED:

* FLOOD GATE/LOCK (Ala Moana Boulevard Bridge)
* Worked in conjunction with a flood pump, canal can be lowered before a storm below sea level (2 million cubic feet of storage per 1' canal elevation);
* Instead of building above ground walls for detention storage use existing canal which originally is 25' in depth;
* Would protect and improve existing storm drainage infrastructure capacity by increasing the head pressures which is only 1-2' above high tide;
* Would protect the Ala Wai Canal from tide surges up to the height of the Ala Moana Boulevard Bridge;

3

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- If sea level occurs, the flood gate would remain closed and the Ala Wai Canal could act as a storm water collection basin;
- Recreational users would use the flood lock system;
- Natural flows without a storm are around 1,200 cfs and would have to be pumped all the time;
- In time of storms, anytime the canal elevation is higher than the ocean, the flood gates can be open to utilize the Ala Wai Canal natural drainage in conjunction to a pump;
-
- FLOOD PUMP (located at the Ala Wai Golf Course built on land, underground using the tunnels launch shaft)
  - Inlet at Manoa Stream Confluence;
  - Inlet at Ala Wai Golf Course Detention Basin;
  - Outlet via tunnel to Ala Wai Harbor;
  - Switchable to Manoa tunnel inlet and outlet;
  - Switchable to Palolo tunnel inlet and outlet;
  - Can work in conjunction or independent of the Manoa and Palolo tunnels;

The tunnels could have multiple inlets at different elevations and if an inlet highest up runs low on flow, can be shutdown to refill the tunnels above to build up head pressure (in a similar way as a toilet), and valves can be at additional downstream inlets. The higher up the tunnels extend up the watershed the less volume of flood waters are available to bypass the Ala Wai Canal.

The Ala Wai Canal and lower portions of the watershed are flat and gravity flows in the canal are estimated to be 1-2 feet per second. Obstructions are the Kalakaua Bridge with arched supports limiting the flow capacity of the canal. The solution is to pump the flood waters from the point of highest concentration (Manoa/Palolo Stream confluence) about a mile to the Ala Wai Boat Harbor.

High tides average around 2', King tides 2.7' and intermediate sea level rise 2.7 - 3.2'. Even without sea level rise, a 2' tide surge would provide only a few feet of increased cross-sectional surface area for increase flows at the Ala Wai Canal Harbor. The Ala Wai Canal is about 200' wide so increased outflow from a flood wall is very limiting and even if 5' cross-sectional was gained at high tide. That would provide 1,000 square feet of cross-sectional area times the velocity of the flow and assuming the flows are around 2 feet per second that would only provide 2,000 cfs and the tunnels would outperform the wall. A 4,000 cfs pumping station at the Manoa/Palolo stream confluence via tunnel to the Ala Wai Harbor would outperform the above ground flood walls.

Should you have questions, please do not hesitate to contact me.
Dave Watase
c. 808.728.0759

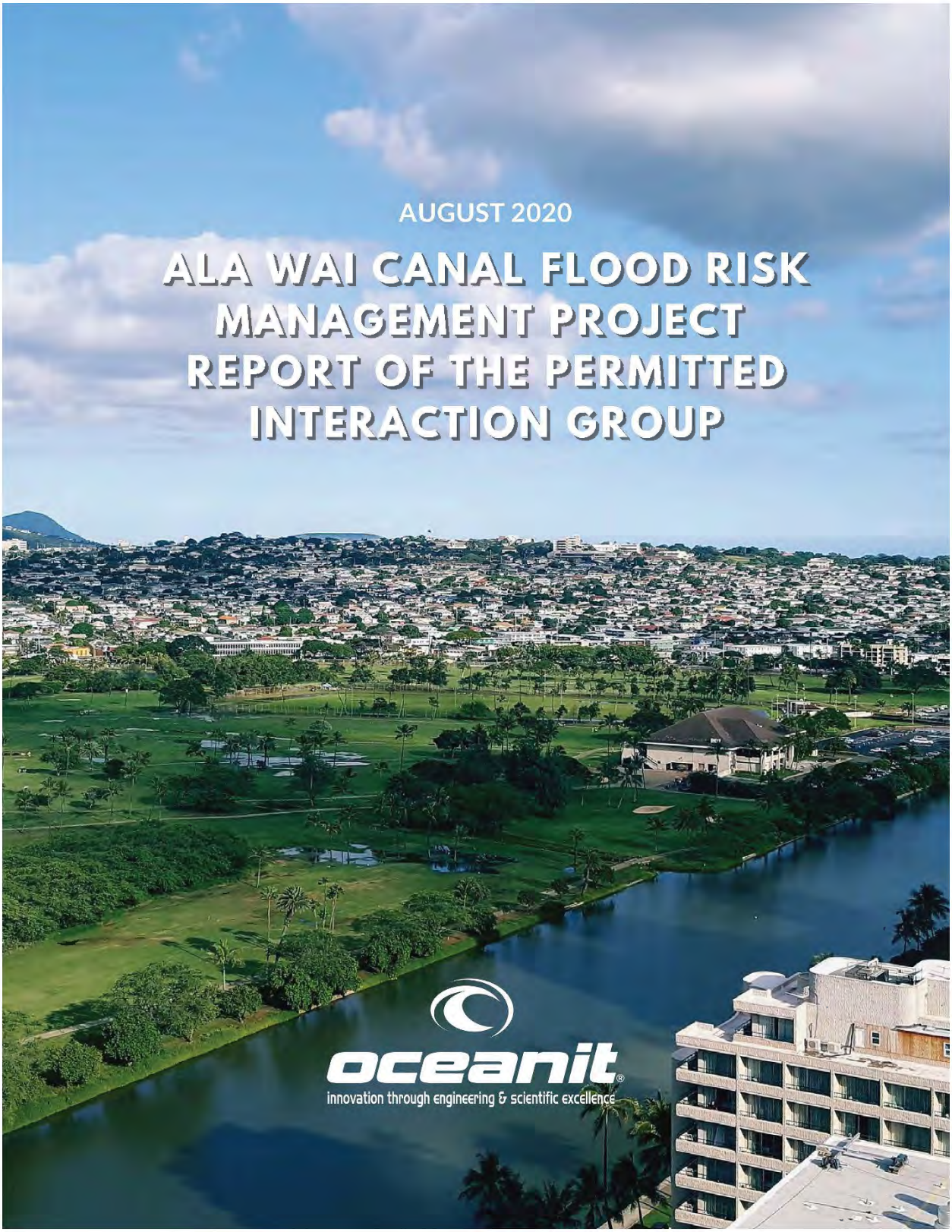

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Figure 4 shows the locations and the approximate traces of the three tunnels.

The watershed consists of many sub-watersheds that drain water from different areas into local drainage channels and finally into the Ala Wai Canal through Makiki, Manoa and Palolo streams. Figure 5 shows the hydrological schematic of the watershed feeding the Ala Wai Canal including contributions from the lower Ala Wai watersheds like Waikiki and Kaimuki.

The left portion shows the Makiki watershed schematic with its reaches identified with a "K." The Manoa schematic is in the center with its reaches identified with a "M." The Palolo schematic is on the right side with its reaches identified with a "P."

The water intake points for the tunnels were selected to optimize the tunnel discharge, by evaluating the elevation of the intake point, tunnel length and the tunnel diameter. The optimum intake points for maximizing discharges are identified in the schematic and are shown in green.

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Makiki Watershed Junction JK-2				
Parameter				
Tunnel Diameter Feet	6	8	10	12
Water head Feet	59	59	59	59
Tunnel Length Feet	9,100	9,100	9,100	9,100
Discharge CFS	403	868	1,574	2,559

Table 1. SWIFT discharge for different tunnel sizes for Makiki Watershed

Manoa Watershed Junction JM-5				
Parameter				
Tunnel Diameter Feet	6	8	10	12
Water head Feet	125	125	125	125
Tunnel Length Feet	12,500	12,500	12,500	12,500
Discharge CFS	501	1,078	1,954	3,178

Table 2. SWIFT discharge for different tunnel sizes for Manoa Watershed

Palolo Watershed Junction JP-3				
Parameter				
Tunnel Diameter Feet	6	8	10	12
Water head Feet	110	110	110	110
Tunnel Length Feet	11,200	11,200	11,200	11,200
Discharge CFS	496	1,068	1,937	3,150

Table 3. SWIFT discharge for different tunnel sizes for Palolo Watershed

The tunnels are designed to discharge directly into the ocean and bypass the lower watershed completely. In order to evaluate the resulting flood reduction impact in the Ala Wai Canal vicinity and Waikiki, Oceanit ran the hydraulic models developed by the USACE with the flow elimination simulated at the tunnel starting points (reflected in Figure 5 above).

Oceanit integrated the tunnel concept into the 100-year event HEC-RAS model without features. Initially, Oceanit experimented with using three 10-foot diameter tunnels located in the upper regions of sub-watershed Makiki, Manoa, and Palolo. With the tunnels, the HEC-RAS modeling results showed an elimination of flooding at the University of Hawaii and a notable reduction of inundation in the lower watershed area. For example, flow depth in the McCully-Mo'ili'ili area was reduced by 0.5 feet on average, and up to 1 foot on the east side of Kalakaua Ave. However, due to the widespread inherently large amount of rainfall from a 100-year storm event, the inundation levels in the lower watershed would still be significant, even with the tunnels.

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alignment corridors are approximately shown in Figure 1, but the outfall locations are not specific in this figure.

Figure 1 – Approximate Manoa Tunnel and Palolo Tunnel Alignment Corridors

In the vicinity of the main shafts near the coast, anticipated subsurface conditions are assumed to be similar to those in the vicinity of the Beachwalk Wastewater Pump Station to Ala Moana Park Sewer project.[1] The subsurface conditions near the shafts, and heading both inland within the lower coastal plain and offshore to the outfalls are assumed to generally consist of a highly complex local geology that includes highly variable deposits due to the mixing and interfingering of coral, coral reef limestone, beach sand, lagoonal deposits, bedded deposits of alluvial silts, sands, and clays carried down from the mountains, and bedded volcanic deposits. The resulting geology can include bedded tuffaceous silts and sands, more recent alluvial deposits with cobbles and boulders, and interbedded coralline deposits and coral reef limestone, overlain by very soft lagoonal deposits. The youngest sediments are the silts and clays deposited in the Ala Wai Canal.

[1] "Geotechnical Investigation Report, Beachwalk Wastewater Pump Station to Ala Moana Park Sewer", Yogi Kwong Engineers, LLC, January 2009.

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FEASIBILITY LEVEL COST ESTIMATES FOR TUNNEL CONSTRUCTION

PRICES BASED ON 9200 LINEAR FEET x 168" DIA. PALOLO TUNNEL (TBM)

6000 LINEAR FEET (MTBM)

TBM TUNNEL AND SHAFT ESTMATES

1.	Labor:	$4,252,500.00
2.	Plant Equipment:	$20,205,450.00
3.	Consumables:	$1,328,400.00
4.	Materials:	$10,302,300.00
5.	Tunnel Subcontracts:	$5,824,320.00

PRICE BASIS FOR PALOLO LAUNCH SHFT 50-0" x 40-0" x 44'-0"

1.	Labor:	$1,477,560.00
2.	Shaft Plant Equipment:	$175,650.00
3.	Consumables:	$31,650.00
4.	Subcontract:	$385,000.00
5.	Temporary Shaft Support Subcontract:	$664,800.00
6.	Ground Treatment for TBM and MTBM Launch	$936,000.00

PRICE BASE FOR PALOLO TBM STARTER TUNNEL 250'-0" x 16'-0" x16'-0"

1.	Labor:	$544,390.00
2.	Plant Equipment:	$186,575.00
3.	Consumables:	$437,650.00
4.	TBM Assembly, Installation, and Launch:	$1,500,000.00

MTBM INSTALLATION-3 x 2000Lf. 84" RCP WITH WET RECOVERY x 3

MARINE INSTALLED COFFER DAMS.

1.	Subcontract estimated quotes:	$36,325,000.00

PRICE BASE FOR PALOLO INTAKE TBM RECOVERY SHAFT

SHAFT DIMENSION- 30'-0" DIAMETER X 47-0" VF

1.	Labor:	$194,320.00
2.	Equipment:	$125,000.00
3.	Consumables:	$13,950.00
4.	Materials:	$330,000.00
5.	TBM Retrieval:	$35,000.00

BARE TOTAL PALOLO INSTALLATION: $82,946,515.00

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PRICES BASED ON 10,500 LINEAR FEET x 168" DIA. MANOA TUNNEL (TBM)

6000 LINEAR FEET (MTBM)

TBM TUNNEL AND SHAFT ESTIMATES

1.	Labor:	$5,348,130.00
2.	Plant Equipment:	$20,814,150.00
3.	Consumables:	$1,496,417.00
4.	Materials:	$11,742,100.00
5.	Tunnel Subcontracts:	$6,498,440.00

PRICE BASIS FOR MANOA LAUNCH SHAFT 50'-0" x 40'-0" x 44'-0"

1.	Labor:	$1,477,560.00
2.	Shaft Plant:	$175,650.00
3.	Consumables:	$31,650.00
4.	Shaft Subcontract:	$385,000.00
5.	Temporary Shaft Support Subcontract	$664,800.00
6.	Ground Treatment for TBM and MTBM Launch	$936,000.00

PRICE BASIS FOR MANOA TBM STARTER TUNNEL 250'-0" x16'-0" x16'-0"

1.	Labor:	$544,390.00
2.	Plant Equipment:	$186,575.00
3.	Consumables:	$437.650.00
4.	TBM Assembly, installation, and launch:	$1,500,00.00

MTBM INSTALLATION- 3 x 2000LF=6000LFX 84" RCP WITH WET RECOVERY

MARINE INSTALLED COFFER DAMS

1.	Subcontract estimated quotes:	$36,325,000.00

PRICE BASIS FOR MANOA INTAKE TBM RECOVERY SHAFT

SHAFT DIMENSION 30'-0" DIA. X 67'-0" VF

1.	Labor:	$302,390.00
2.	Plant Equipment:	$229,200.00
3.	Consumables:	$28,525.00
4.	Materials:	$394,400.00
5.	TBM Retrieval:	$35,000.00

BARE TOTAL MANOA INSTALLATION $89,190,377.00

TOTAL BARE COST ESTIMATE FOR MANOA AND PALOLO INSTALLATIONS: $172,136,892.00

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

INDIRECT (IND P) ESTIMATED COSTS FOR PALOLO

Resource ID	Description	Unit Rate	Unit Qty.	Total
IND P 1.	Mobilization	0.08	$82,946,515.00	$ 6,635,722.00
IND P 2.	Bond & Insurance	0.02	$82,946,515.00	$1,658,930.00
IND P 3.	Overhead & Profit	0.15	$82,946,515.00	$12,441,977.00
IND P 4.	Contingency	0.25	$82,946,515.00	$20,736,629.00
IND P 5.	Demobilization	0.02	$82,946,515.00	$1,658,930.00

Total Indirect Cost Palolo-	$43,132,188.00
Total Direct Cost Palolo-	$82,946,515.00
Total Direct Cost-Plus Indirect Cost Palolo-	$126,078,703.00

INDIRECT (IND M) ESTIMATED COSTS FOR MANOA

Resource ID	Description	Unit Rate	Unit Qty	Total
IND M 1.	Mobilization	0.08	$89,190,377.00	$7,007,166.00
IND M 2.	Bond & Insurance	0.02	$87,589,577.00	$1,751,792.00
IND M 3.	Overhead & Profit	0.15	$87,589,577.00	$13,138,437.00
IND M 4.	Contingency	0.25	$87,589,577.00	$21,897,394.00
IND M 5.	Demobilization	O.02	$87,589,577.00	$1,751,792.00

Total Indirect Cost Manoa-	$46,546,581.00
Total Direct Cost Manoa-	$89,190,377.00
Total Direct Cost-Plus Indirect Cost Manoa-	$135,736,958.00

TOTAL COST BOTH INSTALLATION COMBINING DIRECT AND INDIRECTS COSTS $261,815,661.00

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

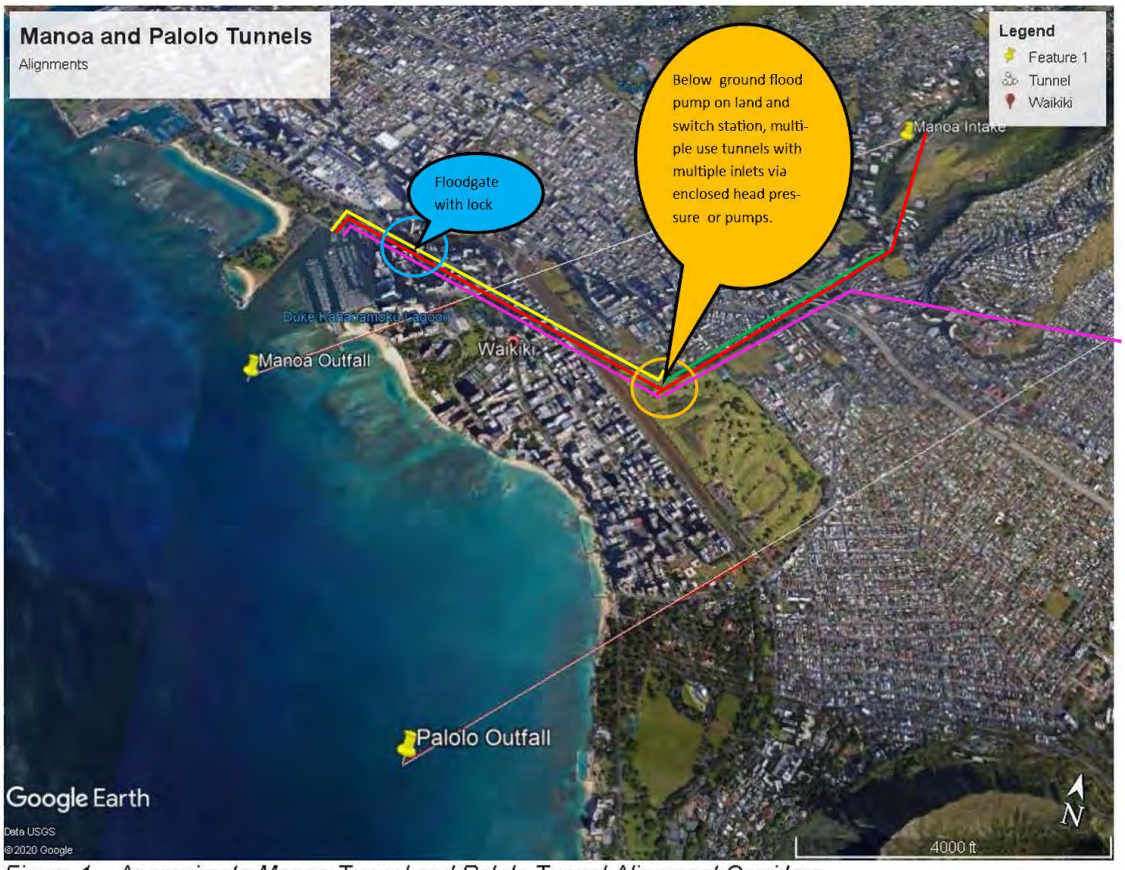

Figure 1 – Approximate Manoa Tunnel and Palolo Tunnel Alignment Corridors

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Laura
Sent: Saturday, May 6, 2023 10:13:12 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: lruby@hawaii.edu
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Laura
Last Name Ruby
Contact Phone Number (808)366-0847
Contact Email Address lruby@hawaii.edu
Contact Mailing Address 509 Unoversity Ave # 902 Message Dear Councilmembers,

Calvin Say and all council members, Ala Wai Watershed flood control, and Anton Kruskey Do you want to compromise the Waikiki and "Hawaii Sense of Place"?

None of the Army Corp of Engineers proposals should be enacted. Massive stretches of concrete are not the answer. I have been responding with positive suggestions since 2015 and the ACE. Please see the following:

What can the community do in a proactive way? Please list your own suggestions.

List the immediate or medium or long term suggestions—that is, what is possible (not what is a problem):

Immediate suggestions to mitigate possible flooding in the Ala Wai Watershed:
--3-4 foot earthberms around Ala Wai School, Iolani School, Hokulani School, Noelani School.
--detention basin extending to the whole of the golf course by lowering the elevation by 3-4 feet. (with a small underground outflow pump) --detention basin at Kaimuki HS track and field –detention basin at Kanewai Field --raise Ala Wai Blvd berm with sidewalk and bike path and visually appealing 3-4 foot blue stone lava rock railing/barrier along the Waikiki edge of the canal –hold off/stop any bridge over the Canal or pumping stations in the Canal on either the makai or mauka sides of the Canal

Plans requiring long-range planning:
--relief tunnel from Palolo Stream under City Mill and Kaimuki HS grounds and Ala Wai Golf Course to the Canal --relief tunnel from Manoa Stream under Kaimuki HI grounds and Ala Wai Golf Course --relief tunnel from the Diamond Head end of the Canal to the Kapahulu groin

Please add to these lists in a proactive way.

Please enter the security code displayed in the image

IP: 98.155.18.33

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Dave Watase
Sent: Saturday, May 6, 2023 10:54:27 AM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Dave Watase's Public Comment #4 - Walk the Ala Wai Canal, Users, and Neighborhood Boards

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Project. I am OPPOSED to the United States Army Corps of Engineers (USACE) plan to perform a Supplemental Environmental Impact Statement (SEIS) because it builds upon a flawed and outdated FEIS. I am OPPOSED to the General Reevaluation Study's Prospective Plan elements of an Ala Wai Canal Flood Wall and it will have irreversible negative impacts on the community.

It doesn't take a rocket science to recognize the flaws in the FEIS and many were so obvious that an 8th grader could figure it out. Yet, the USACE consistently ignored and dismissed valid community concerns. The common response was that the USACE met all requirements, procedures and notices, the selected alternatives were extensively vetted, examined by several tiers of experts on the mainland in order to secure Congressional funding, and that it was needed to save our lives and property. Who were we to question the something that had been approved by the best hydrology and hydraulic experts in the United States. We quickly realized that once the USACE completed 35% Engineering and cost feasibilities studies that it was nearly impossible to counter without our ideas and concerns having the same level of design support. This is why, right now, it is vitally important that the General Reevalution Study have conceptual alternatives that will in fact work, be economically feasible, and most importantly be accepted by the community.

On June 17, 2019 the USACE held the Ala Wai Industry & Innovation Day at the Honolulu Country Club and one statement I still remember. USACE's Denis Hoerner from New Orleans said that he was in charge of the walls around the Ala Wai Canal and that it was the first time he was able to visit the site and his comment was that "the canal looked a lot different in real life than from Google Maps". That explained a lot to me to have someone 8,000 miles away that never previously set foot on the island or talked to those living around the Ala Wai Canal be in charge of designing a flood wall for our protection. How would he know that the flood modeling looked off and unrealistic? Had he walked by the Makiki Stream with the plans he would have known it was missing a flood gate and would require a pump or the walls would have to retreat further up Makiki Stream to match the canal height walls. He would have immediately recognized that the Hausten's Ditch Detention basin was above the surrounding ground level elevation and wouldn't work or that the Ala Wai Elementary School and Iolani School would also need a flood wall and berm. He would have questioned why are there two pumping stations at the far end of the canal, a quarter mile walking distance away from the ocean, and designed for to handle peak flows only to be pumped into an already full canal with a 2-mile path to the ocean. He would have recognized the impossibility of building upon a 100-year historic wall and any wall would have to be substantially setback, and that space requirements would be difficult. So much more!

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The USACE must take a walk along the Ala Wai Canal and the Ala Wai Promenade to visualize the impacts a 6' high wall will have to the views and existing walls. The Ala Wai Canal is used by many for recreation and I've attached a few Youtube videos links for you to watch. Especially, for those decision makers outside of the State of Hawaii.

Take a stroll around the Ala Wai Canal and Ala Wai Golf Course:

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[Blockedhttps://i.ytimg.com/vi/RYPi_ENKJDM/maxresdefault.jpg]<Blockedhttps://www.youtube.com/watch?v=RYPi_ENKJDM>

Ala Wai Canal Walk Talk Tour January 30, 2022 Oahu Hawaii Virtual Walk<Blockedhttps://www.youtube.com/watch?v=RYPi_ENKJDM>
Ala Wai Canal Walk Talk Tour January 30, 2022 Oahu Hawaii Virtual Walk. We begin our walk at the Ala Wai Neighborhood Park. We take the Ala Wai Park Trail...
Blockedwww.youtube.com

Take a stroll around the Ala Wai Promenade:

It should be noted that the lower terrace of the Promenade experiences backflow flooding from the drainage pipes with a King Tides of 2.7' MSL. The lower end of Ala Wai Boulevard at the cul-de-sac near the Ala Moana Boulevard Bridge also experiences backflow flooding from the storm drainage pipes with a King Tide of 2.7' MSL. Kalakaua Avenue Bridge has arch supports and most likely will be an obstruction to flows. Makiki Stream confluence will have to be gated with a 6' wall and would require a flood pumping station or the EDR's Makiki Bypass. However, the EDR's Makiki Bypass would be susceptible to high tides, tide surges, and sea level rise and potentially risk backflow scenarios. The Makiki Bypass would most likely be submerged and would have very restrictive flows due to the low head pressure and wouldn't work as planned. Please study the area as you take a walk.

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[Blockedhttps://i.ytimg.com/vi/pv4eebife2s/maxresdefault.jpg]<Blockedhttps://www.youtube.com/watch?v=pv4eebife2s>

Waikiki Ala Wai Promenade and Canal Oahu Hawaii 4K60<Blockedhttps://www.youtube.com/watch?v=pv4eebife2s>
Waikiki Ala Wai Promenade and Canal Oahu Hawaii 4K60 10/25/2019. We begin our walk on McCully St in front of the American Legion Department of Hawaii and we...
Blockedwww.youtube.com

Recreational users:

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Canoe paddling on Ala Wai Canal in Waikiki<Blockedhttps://www.youtube.com/shorts/Lg_6p4dewGg>
Canoe paddling on Ala Wai Canal in WaikikiPlease LIKE, SUBSCRIBE and SHARE this video@hawaii-guy
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2017-02-26 - Hawaiian Outrigger Canoeing in Honolulu<Blockedhttps://www.youtube.com/watch?v=LbNLqvj7XtY>
2017-02-26 - Hawaiian Outrigger Canoeing in Honolulu Blockedwww.youtube.com

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06/29/18 - Sprint Outrigger OC-6 Training Ala Wai<Blockedhttps://www.youtube.com/watch?v=8BHOphWGvFU&t=488s>
▶ More about the team here: Blockedhttp://anuenuecanoeclub.orgOutrigger Canoe Sprint Paddle Training in Ala Wai.- Learn more about Anuenue Canoe Club:Visit the websi...
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Most Neighborhood Boards only pass a handful of resolution per year. Many resolutions are debated to death or take several months to pass. The Ala Wai Flood Project FEIS and EDR definitely caught the attention of the communities. It is rare that several Neighborhood Boards each with a diverse group of independently minded individuals can come together with interest of the Ala Wai Flood Project.

Attached are Neighborhood Board Resolutions regarding the FEIS and the EDR:

Kaimuki Neighborhood Board No. 4
Blockedhttps://www.honolulu.gov/rep/site/nco/nb4/resolutions/2019-04_Resolution_Concerning_the_Ala_Wai_Canal_Project.pdf
Blockedhttps://www.honolulu.gov/rep/site/nco/nb4/resolutions/2021-02_Resoltion_Concerning_USACE_and_Ala_Wai_Flood_Project.PDF

Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board No. 5
Blockedhttps://www.honolulu.gov/rep/site/nco/nb5/resolutions/2019-02_Resolution_Regarding_Proposed_Ala_Wai_Project.pdf
Blockedhttps://www.honolulu.gov/rep/site/nco/nb5/resolutions/2020-12_Resolution_Ala_Wai_Flood_Risk_Management.pdf

Palolo Neighborhood Board No. 6
Blockedhttps://www.honolulu.gov/rep/site/nco/nb6/resolutions/2019-03_Resolution_Concerning_the_Ala_Wai_Canal_Project.pdf
Blockedhttps://www.honolulu.gov/rep/site/nco/nb6/resolutions/2021-02_Resolution_Concerning_the_Revised_Plan_for_the_Ala_Wai_Flood_Risk_Management_Project.pdf

Manoa Neighborhood Board No. 7
Blockedhttps://www.honolulu.gov/rep/site/nco/nb7/resolutions/2019-02_Resolution_Concerning_the_Ala_Wai_Canal_Project.pdf
Blockedhttps://www.honolulu.gov/rep/site/nco/nb7/resolutions/2020-12_Resolution_Concerning_Revised_Plan_For_Ala_Wai_Flood_Risk_Management_Project.pdf

McCully/Moiliili Neighborhood Board No. 8 Blockedhttps://www.honolulu.gov/rep/site/nco/nb8/resolutions/2019-03_Resolution_Regarding_Ala_Wai_Flood_Mitigation_Project.pdf

3

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Blockedhttps://www.honolulu.gov/rep/site/nco/nb8/resolutions/2021-03_Resolution_Related_to_Ala_Wai_Flood_Management.pdf

Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10
Blockedhttps://www.honolulu.gov/rep/site/nco/nb10/resolutions/2019-02_Resolution_on_Ala_Wai_Canal.pdf
Blockedhttps://www.honolulu.gov/rep/site/nco/nb10/resolutions/2019-03_Resolution_Regarding_Ala_Wai_Canal_Project.pdf
Blockedhttps://www.honolulu.gov/rep/site/nco/nb10/resolutions/2021.02.18_Resolution_Concerning_the_Revised_Ala_Wai_Flood_Project.pdf

Ala Moana/Kakaako Neighborhood Board No. 11
Blockedhttps://www.honolulu.gov/rep/site/nco/nb11/resolutions/2019-02_Resolution_Concerning_the_Ala_Wai_Canal_Project.pdf
Blockedhttps://www.honolulu.gov/rep/site/nco/nb11/resolutions/2019-10_Resolution_Regarding_The_Ala_Wai_Canal_Flood_Project.pdf
Blockedhttps://www.honolulu.gov/rep/site/nco/nb11/resolutions/2020-10_Resolution_Regarding_Ala_Wai_Flood_Mitigation_Project_Alternatives.pdf

Mahalo,
Dave Watase

4

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KAIMUKĪ NEIGHBORHOOD BOARD NO. 4
NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BOULEVARD SUITE 106 • HONOLULU, HAWAII, 96817
TELEPHONE: (808) 768-3710 • FAX: (808) 768-3711 • INTERNET: http://www.honolulu.gov/nco

Resolution Concerning the Ala Wai Canal Project

WHEREAS, in the past several decades catastrophic flooding events have occurred more frequently in the United States and the rest of the world; and
WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Canal Project (the "Project"), also referred to as the Ala Wai Flood Mitigation Project, in response to the potential of a catastrophic flooding event (100-year storm) within the Ala Wai Watershed; and
WHEREAS, the Project includes, among other features, the construction of detention basins in Mānoa and Palolo Valleys, Makiki, Kanewai Park, the Ala Wai Golf Course, Ala Wai Park (Hausten Ditch) and an average four-foot reinforced solid concrete wall which extends as high as four and a half foot in certain segments surrounding portions of the Ala Wai Canal and Ala Wai Promenade; and
WHEREAS, the Ala Wai Watershed contains within it such areas of Honolulu as Manoa Valley, Pālolo Valley, Makiki, Tantalus, McCully, Mo'ili'ili, St. Louis Heights, Kapahulu, Kaimuki, Kapi'olani, Ala Wai, Ala Moana, and Waikīkī ; and
WHEREAS, the Kaimuki Neighborhood Board heard presentations by residents or property owners who live next to or within a proposed detention basin; and
WHEREAS, these residents stated that they did not receive proper notice of the Project and were not given an adequate amount of time to respond to the Draft Report/Environmental Impact Statement ("EIS") of the Project; and
WHEREAS, 'Iolani School, located on the Ala Wai floodplain, wrote a letter to the USACE in 2015 in which it claimed that neither it nor the other stakeholders were adequately engaged in an evaluation of the Project and urged that the Draft Report/EIS be reviewed and reissued for further public comment; and
WHEREAS, it is the sense of the Kaimuki Neighborhood Board that public awareness of this Project is insufficient to have the Project move forward; and
WHEREAS, Congress in the Fall of 2018 appropriated money to fund the federal portion of the proposed cost of the Project, leaving only the State funding as the final hurdle before commencement of construction; now, therefore,
BE IT RESOLVED by the Kaimuki Neighborhood Board that the USACE should put a hold on any further advancement of the Project until the very people who are supposed to benefit from the Project having future opportunity to consider and weigh in on the Project and alternatives to it; and
BE IT FURTHER RESOLVED that the Kaimuki Neighborhood Board requests that the Thirtieth Legislature of the State of Hawaii, Regular Session of 2019 defer appropriating any funds for the Project during this calendar year; and
BE IT FURTHER RESOLVED that copies of this resolution be transmitted to USACE, the members of Hawaii's Congressional delegation, the Governor of Hawaii, each member of the Hawaii State Legislature, the Mayor of Honolulu, and Honolulu City Council.

Submitted to the Kaimuki Neighborhood Board No. 4 on Wednesday, April 17, 2019.

This resolution was ADOPTED by the Kaimuki Neighborhood Board No. 4 by ROLL CALL VOTE at their Wednesday, April 17, 2019 meeting. Submitted by the: Sharon Schneider, its Chair.

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KAIMUKI NEIGHBORHOOD BOARD NO. 4
c/o NEIGHBORHOOD COMMISSION ◆ 925 DILLINGHAM BOULEVARD SUITE 160 ◆ HONOLULU, HAWAII, 96813
TEL: (808) 768-3710◆ FAX (808)768-3711◆ EMAIL: nco@honolulu.gov◆ INTERNET: http://www1.honolulu.gov/nco

KAIMUKI NEIGHBORHOOD BOARD NO. 4
RESOLUTION CONCERNING THE REVISED PLAN FOR THE ALA WAI FLOOD RISK MANAGEMENT PROJECT

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Flood Risk Management Project (the "Project"), in order to mitigate the effects of a potentially catastrophic 100-year flooding event within the Ala Wai Watershed; and

WHEREAS, the Kaimuki Neighborhood Board #4 ("Board") and six other Neighborhood Boards in the affected watershed passed resolutions in early 2019 requesting that the State Legislature defer appropriating any funds for the Project until community stakeholders' concerns were sufficiently addressed, including consideration of alternatives to the Project; and

WHEREAS, the Hawaii State Legislature declined to appropriate funds for the Project in the 2019 and 2020 Sessions; and

WHEREAS, based on the new 1D/2D modeling and new data, the USACE presented in August of this year a significantly revised flood mitigation plan in which the detention basins in the upper Manoa, Palolo, and Makiki Valleys were removed and new features added, such as a 40-foot-tall pumping station and miter gate set in the Canal itself in a protected scenic view plane, a Makiki Bypass conduit along the Ala Wai Promenade which may adversely affect the protected Exceptional Tree Grove, and high walls around the Canal and Ala Wai Park, and the continued existence of the Kanewai Park Multipurpose Detention Basin with 9' berms adjacent to Hokulani Elementary School, and areas mauka of the Ala Wai Canal would still be flooded under this revised proposal; and

WHEREAS, community members and recreational users have not had a full opportunity to absorb, understand, and react to these changes in the Project; and

WHEREAS, the community and the City Council have presented alternative proposals or alternative features to be incorporated into the current USACE plan; and

WHEREAS, this Board would like the USACE to evaluate seriously the proposals from the City Council and from the community; now, therefore,

BE IT RESOLVED that the Board requests of USACE that its environmental assessment process and any potential environmental impact statement process include technical engineering review of the City Council proposal and of the four community-generated alternatives listed in the Report of the City Council's Permitted Interaction Group on the Project; and

BE IT FURTHER RESOLVED that the USACE should ensure that it properly inform the public, residents, condominium associations, recreational clubs, and schools of the USACE's schedule of public engagements with respect impacts affecting the Kaimuki Neighborhood District Map; and

BE IT FURTHER RESOLVED, the Board requests the USACE establish an official Community Advisory Group that consists of members representing each of the neighborhood board communities of the Ala Wai Watershed; and

BE IT FURTHER RESOLVED that the Board also requests that the City and County of Honolulu defer entering into any partnership agreement with the USACE until community concerns are sufficiently addressed; and

BE IT FINALLY RESOLVED, that copies of this resolution be transmitted to the USACE to be included in the material for its environmental assessment, the Governor of the State of Hawaii, the Mayor of the City and County of Honolulu, all members of the Honolulu City Council, all members of the Hawaii State Legislature, the Director of the State Department of Land and Natural Resources, the Director of the State Department of Budget and Finance, the Director of the State Office of Environmental Quality, the Director of the City Department of Design and Construction, and the chairs of the Ala Moana-Kakaako, Makiki-Lower Punchbowl-Tantalus, Manoa, McCully-Moiliili, Diamond Head-Kapahulu-St. Louis Heights, Palolo, and Waikiki Neighborhood Boards in the City and County of Honolulu.

Passed by Unanimous Consent (10-0-0) at Kaimukī Neighborhood Board #4 Meeting
February 17, 2021

Sharon Schneider

Respectfully Submitted Sharon Schneider, Chair, Kaimukī Neighborhood Board #4

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DIAMOND HEAD/KAPAHULU/ST. LOUIS HEIGHTS NEIGHBORHOOD BOARD NO. 5
c/o NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BOULEVARD #160 • HONOLULU, HAWAII, 96817
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET: http://www.honolulu.gov/nco

Resolution Relating to the Proposed Ala Wai Canal Project

WHEREAS, in the past several decades approaching climate change, catastrophic flooding events have occurred more frequently in the United States and the rest of the world; and

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Canal Project (the "Project"), also referred to as the Ala Wai Flood Mitigation Project, in response to a 1% potential of a 100-year storm catastrophic flooding event within the Ala Wai Watershed; and

WHEREAS, the Project includes among other proposals the construction of large detention basins within the Ala Wai Golf Course, Kanewai Park, Ala Wai Park, Hausten Ditch, Makiki, and Manoa and Palolo Valleys; a reinforced solid concrete wall extending as high as four and a half feet along the perimeter of the Ala Wai Canal and the Ala Wai Promenade, and 45-foot high pump stations within and around the Ala Wai Golf Course; and

WHEREAS, the Ala Wai Watershed contains within it such areas of Honolulu as Kapahulu, St. Louis Heights, Palolo Valley, Kaimuki, Moili'ili, McCully, Ala Wai, Waikiki, Kapiolani, Ala Moana, Makiki, Manoa Valley and Tantalus; and

WHEREAS, following the Project's single area-wide public presentation by the USACE on November 5, 2015, the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board voted on November 12, 2015, to disagree with the USACE determination that the Project would have "no adverse effect"; and

WHEREAS, 'Iolani School, located on the Ala Wai floodplain, stated in a letter to the USACE in 2015 that area stakeholders were not adequately engaged in evaluation of the Project, and urged that the Draft Report/EIS be reviewed and reissued for further public comment; and

WHEREAS, public concerns relating to the Project at area Neighborhood Board meetings have centered on the proposed detention basins consuming private properties; proper maintenance of the detention basins to protect the public health; industrial pump stations proposed to be 45 feet high in and around the Ala Wai preservation area; and concrete walls along the perimeter of the Ala Wai Canal, which is listed on the Hawaii State Register of Historic Places; and

WHEREAS, property owners and residents who live next to or within proximity to a proposed detention basin are now reported to have not received proper notice of the Project and were not given an opportunity to respond to the Project's Draft Report/Environmental Impact Statement ("EIS"); and

WHEREAS, in the fall of 2018 Congress appropriated funding for the federal portion of the proposed cost of the Project, leaving only the State funding as the final hurdle before commencement of construction; now, therefore,

BE IT RESOLVED that the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board agrees that public input and full public awareness of the impacts of this Project have been insufficient to have the Project move forward; and

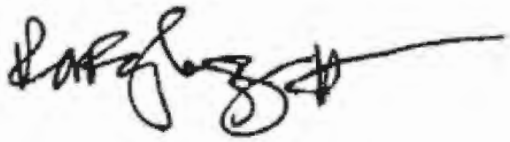
BE IT FURTHER RESOLVED that the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board agrees that the USACE should put a hold on any further advancement of the Project until the people directly impacted by the Project have had the opportunity to consider and respond to the proposed Project and all alternatives; and

DIAMOND HEAD/KAPAHULU/ST. LOUIS HEIGHTS NEIGHBORHOOD BOARD NO. 5 THURSDAY, FEBRUARY 14, 2019

BE IT FURTHER RESOLVED that the Diamond Head/Kapahulu/St, Louis Heights Neighborhood Board joins the Manoa Neighborhood Board in requesting that the Thirtieth Legislature of the State of Hawaii, Regular Session of 2019 defer appropriating any funds for the Project during this calendar year; and

BE IT FINALLY RESOLVED that copies of this Resolution be transmitted to the USACE, the Hawaii Congressional delegation, the Governor of Hawaii, all members of the Hawaii State Legislature, the Mayor of Honolulu, the Honolulu City Council, and all area Neighborhood Boards.

Richard Figliuzzi, Chair



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DIAMOND HEAD/KAPAHULU/ST. LOUIS HEIGHTS NEIGHBORHOOD BOARD NO. 5
c/o NEIGHBORHOOD COMMISSION OFFICE ◆ 925 DILLINGHAM BOULVARD SUITE 160 ◆ HONOLULU, HAWAII, 96817 TEL: (808) 768-3710 ◆ FAX: (808) 768-3711 ◆ INTERNET: www1.honolulu.gov/nco

RESOLUTION CONCERNING THE REVISED PLAN FOR THE ALA WAI FLOOD RISK MANAGEMENT PROJECT

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Flood Risk Management Project (the "Project"), in order to mitigate the effects of a potentially catastrophic 100-year flooding event within the Ala Wai Watershed; and

WHEREAS, the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board #5 ("Board") and six other Neighborhood Boards in the affected watershed passed resolutions in early 2019 requesting that the State Legislature defer appropriating any funds for the Project until community stakeholders' concerns were sufficiently addressed, including due consideration of alternatives to the Project; and

WHEREAS, the Hawaii State Legislature declined to appropriate funds for the Project in the 2019 and 2020 Sessions; and

WHEREAS, based on the recent 1D/2D modeling and new data, the USACE presented in August of this year a significantly revised flood mitigation plan in which the detention basins in the upper Manoa, Palolo, and Makiki Valleys were removed and new features added, such as:

- a 40-foot-tall pumping station and miter gate embedded and erected amidst the Ala Wai Canal, which is within a protected scenic view plane and is listed on the Hawaii State Register of Historic Places;
- a Makiki Bypass conduit along the Ala Wai Promenade which may adversely affect the protected Exceptional Tree Grove between the historic Kalakaua Avenue and Ala Moana Boulevard bridges crossing the Ala Wai Canal;
- high walls around the Canal and Ala Wai Park, obstructing the public view plane of the Ala Wai Canal and its Hawaiian cultural recreational uses;
- the continued existence of the Kanewai Park Multipurpose Detention Basin with 9' berms adjacent to Hokulani Elementary School;
- areas mauka of the Ala Wai Canal would still be flooded under this revised proposal; and

WHEREAS, community members and recreational users have not had a full opportunity to absorb, understand, and react to these changes in the Project; and

WHEREAS, the community and the City Council have presented alternative proposals or alternative features to be incorporated into the current USACE plan; and

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WHEREAS, this Board would like the USACE to evaluate seriously the proposals from the City Council and from the community; now, therefore,

BE IT RESOLVED that the Board requests of USACE that its environmental assessment process and any potential environmental impact statement process include technical engineering review of the City Council proposal and of the four community-generated alternatives listed in the Report of the City Council's Permitted Interaction Group on the Project; and

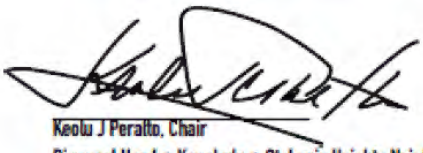
BE IT FURTHER RESOLVED that the USACE should ensure that the larger public, including residents, condominium associations, recreational clubs, and schools are properly informed of the USACE's schedule of public engagements with respect impacts affecting the Diamond Head/Kapahulu/ St. Louis Heights Neighborhood District Map; and

BE IT FURTHER RESOLVED, the Board requests the USACE establish an official Community Advisory Group that consists of members representing each of the neighborhood board communities of the Ala Wai Watershed; and

BE IT FURTHER RESOLVED that the Board also requests that the City and County of Honolulu defer entering into any partnership agreement with the USACE until all community concerns are sufficiently addressed; and

BE IT FINALLY RESOLVED, that copies of this resolution be transmitted to the USACE to be included in the material for its environmental assessment, the Governor of the State of Hawaii, the Mayor of the City and County of Honolulu, all members of the Honolulu City Council, all members of the Hawaii State Legislature, the Director of the State Department of Land and Natural Resources, the Director of the State Department of Budget and Finance, the Director of the State Office of Environmental Quality Control, the Director of the City Department of Design and Construction, and the chairs of the Ala Moana-Kakaako, Makiki-Lower Punchbowl-Tantalus, Manoa, McCully-Moilili, Palolo, Kaimuki, and Waikiki Neighborhood Boards in the City and County of Honolulu.

Resolution ADOPTED by UNANIMOUS VOTE (11-0-0) of the Diamond Head • Kapahulu • St. Louis Heights Neighborhood Board on December 10, 2020.



Keolu J Peralto, Chair
Diamond Head • Kapahulu • St. Louis Heights Neighborhood Board No.5

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PĀLOLO NEIGHBORHOOD BOARD NO. 6
NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BOULEVARD, SUITE 160 • HONOLULU, HAWAII, 96817
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET http://www.honolulu.gov/nco

RESOLUTION CONCERNING THE ALA WAI CANAL PROJECT

WHEREAS, in the past several decades catastrophic flooding events have occurred more frequently in the United States and the rest of the world; and

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Canal Project (the "Project"), also referred to as the Ala Wai Flood Mitigation Project, in response to the 100-years storm and potential catastrophic flooding event within the Ala Wai Watershed; an

WHEREAS, the Project includes, among other features, the construction of detention basins in Manoa and Palolo Valleys, Makiki, Kanewai Park, the Ala Wai Golf Course, Ala Wai Park (Hausten Ditch) and an average four-feet reinforced solid concrete wall which extends as high as four and a half feet in certain segments surrounding portions of the Ala Wai Canal and Ala Wai Promenade; and

WHEREAS, the Ala Wai Watershed contains within it such areas of Honolulu as Manoa Valley, Palolo Valley, Makiki, Tantalus, McCully, Moili'ili, St. Louis Heights, Kapahulu, Kaimuki, Kapiolani, Ala Wai, Ala Moana, and Waikiki; and

WHEREAS, the Palolo Neighborhood Board heard presentations or received letters by affected stakeholders, private property owners facing eminent domain condemnation, and residents or property owners who live next to or within a proposed detention basin; and

WHEREAS, these stakeholders and residents stated that they did not receive proper notice of the Project and were not given an adequate amount of time to respond to the Draft Report/Environmental Impact Statement ("EIS") of the Project; and

WHEREAS, 'Iolani School, located on the Ala Wai floodplain, wrote a letter to the USACE in 2015 in which it claimed that neither it nor the other stakeholders were adequately engaged in an evaluation of the Project and urged that the Draft Report/EIS be reviewed and reissued for further public comment; and

WHEREAS, it is the sense of the Palolo Neighborhood Board that public input and public awareness of this Project is insufficient to have the Project move forward; and

WHEREAS, Congress in the Fall of 2018 appropriated money to fund the federal portion of the proposed cost of the Project, leaving only the State funding as the final hurdle before commencement of construction; now, therefore,

BE IT RESOLVED by the Palolo Neighborhood Board that the USACE should put a hold on any further advancement of the Project until the very people who are supposed to benefit from the Project have had an adequate opportunity to consider and weigh in on the Project and alternatives to it; and

BE IT FURTHER RESOLVED by the Palolo Neighborhood Board agrees that privately owned properties, schools, occupied lands, culturally significant lands, and educational lands should not be

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used for detention basins, and other alternatives, such as traditional Hawaiian flood water management systems be seriously considered before implementation of any proposals by the USACE; and

BE IT FURTHER RESOLVED that the Palolo Neighborhood Board requests that the Thirtieth Legislature of the State of Hawaii, Regular Session of 2019 defer appropriating any funds for the Project during this calendar year; and

BE IT FURTHER RESOLVED that copies of this resolution be transmitted to the members of Hawaii's Congressional delegation, the Governor of Hawaii, each member of the Hawaii State Legislature, the Mayor of the City and County of Honolulu, and each Councilmember of the City and County of Honolulu.

Adopted by PALOLO Neighborhood Board No. 6 at its regular meeting of MARCH 13, 2019 by UNANIMOUS CONSENT.

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PĀLOLO NEIGHBORHOOD BOARD NO. 6
C/o NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BOULEVARD, SUITE 160 • HONOLULU, HAWAII, 96817
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET: http://www.honolulu.gov/nco

RESOLUTION CONCERNING THE REVISED PLAN FOR THE ALA WAI FLOOD RISK MANAGEMENT PROJECT

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Flood Risk Management Project (the "Project"), in order to mitigate the effects of a potentially catastrophic 100-year flooding event within the Ala Wai Watershed; and

WHEREAS, the Palolo Neighborhood Board #6 ("Board") and six other Neighborhood Boards in the affected watershed passed resolutions in early 2019 requesting that the State Legislature defer appropriating any funds for the Project until community stakeholders' concerns were sufficiently addressed, including consideration of alternatives to the Project; and

WHEREAS, the Hawaii State Legislature declined to appropriate funds for the Project in the 2019 and 2020 Sessions; and

WHEREAS, based on the new 1D/2D modeling and new data, the USACE presented in August of this year a significantly revised flood mitigation plan in which the detention basins in the upper Manoa, Palolo, and Makiki Valleys were removed and new features added, such as a 40-foot-tall pumping station and miter gate set in the Canal itself in a protected scenic view plane, a Makiki Bypass conduit along the Ala Wai Promenade which may adversely affect the protected Exceptional Tree Grove, and high walls around the Canal and Ala Wai Park, and the continued existence of the Kanewai Park Multipurpose Detention Basin with 9' berms adjacent to Hokulani Elementary School, and areas mauka of the Ala Wai Canal would still be flooded under this revised proposal; and

WHEREAS, community members and recreational users have not had a full opportunity to absorb, understand, and react to these changes in the Project; and

WHEREAS, the community and the City Council have presented alternative proposals or alternative features to be incorporated into the current USACE plan; and

WHEREAS, this Board would like the USACE to evaluate seriously the proposals from the City Council and from the community; now, therefore,

BE IT RESOLVED that the Board requests of USACE that its environmental assessment process and any potential environmental impact statement process include technical engineering review of the City Council proposal and of the four community-generated alternatives listed in the Report of the City Council's Permitted Interaction Group on the Project; and

BE IT FURTHER RESOLVED that the USACE should ensure that it properly inform the public, residents, condominium associations, recreational clubs, and schools of the USACE's schedule of public engagements with respect impacts affecting the Palolo Neighborhood District Map; and

BE IT FURTHER RESOLVED, the Board requests the USACE establish an official Community Advisory Group that consists of members representing each of the neighborhood board communities of the Ala Wai Watershed; and

BE IT FURTHER RESOLVED that the Board also requests that the City and County of Honolulu defer entering into any partnership agreement with the USACE until community concerns are sufficiently addressed; and

BE IT FINALLY RESOLVED, that copies of this resolution be transmitted to the USACE to be included in the material for its environmental assessment, the Governor of the State of Hawaii, the Mayor of the City and County of Honolulu, all members of the Honolulu City Council, all members of the Hawaii State Legislature, the Director of the State Department of Land and Natural Resources, the Director of the State Department of Budget and Finance, the Director of the State Office of Environmental Quality, the Director of the City Department of Design and Construction, and the chairs of the Ala Moana-Kakaako, Makiki-Lower Punchbowl-Tantalus, Manoa, McCully-Moilili, Diamond Head-Kapahulu-St. Louis Heights, Kaimuki, and Waikiki Neighborhood Boards in the City and County of Honolulu.

The Palolo Neighborhood Board No.6 adopted this resolution at its Wednesday, February 10, 2021 regular Board meeting, by 8-0-0

/s/ Josh Frost
Joshua Frost, #6 Palolo Neighborhood Board Chair

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MĀNOA NEIGHBORHOOD BOARD NO. 7
c/o NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BLVD, STE 160 • HONOLULU, HAWAII, 96817
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET http://www.honolulu.gov/nco

Resolution Concerning the Ala Wai Canal Project

WHEREAS, in the past several decades catastrophic flooding events have occurred more frequently in the United States and the rest of the world; and

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Canal Project (the "Project"), also referred to as the Ala Wai Flood Mitigation Project, in response to the potential of a catastrophic flooding event (100-year storm) within the Ala Wai Watershed; and

WHEREAS, the Project includes, among other features, the construction of detention basins in Mānoa and Palolo Valleys, Makiki, Kanewai Park, the Ala Wai Golf Course, Ala Wai Park (Hausten Ditch) and an average four-foot reinforced solid concrete wall which extends as high as four and a half foot in certain segments surrounding portions of the Ala Wai Canal and Ala Wai Promenade; and

WHEREAS, the Ala Wai Watershed contains within it such areas of Honolulu as Manoa Valley, Pālolo Valley, Makiki, Tantalus, McCully, Mo'ili'ili, St. Louis Heights, Kapahulu, Kaimuki, Kapi'olani, Ala Wai, Ala Moana, and Waikīkī ; and

WHEREAS, the Mānoa Neighborhood Board heard presentations by residents or property owners who live next to or within a proposed detention basin; and

WHEREAS, these residents stated that they did not receive proper notice of the Project and were not given an adequate amount of time to respond to the Draft Report/Environmental Impact Statement ("EIS") of the Project; and

WHEREAS, 'Iolani School, located on the Ala Wai floodplain, wrote a letter to the USACE in 2015 in which it claimed that neither it nor the other stakeholders were adequately engaged in an evaluation of the Project and urged that the Draft Report/EIS be reviewed and reissued for further public comment; and

WHEREAS, it is the sense of the Mānoa Neighborhood Board that public input and public awareness of this Project is insufficient to have the Project move forward; and

WHEREAS, Congress in the Fall of 2018 appropriated money to fund the federal portion of the proposed cost of the Project, leaving only the State funding as the final hurdle before commencement of construction; now, therefore,

BE IT RESOLVED by the Manoa Neighborhood Board that the USACE should put a hold on any further advancement of the Project until the very people who are supposed to benefit from the Project have had an adequate opportunity to consider and weigh in on the Project and alternatives to it; and

BE IT FURTHER RESOLVED that the Mānoa Neighborhood Board requests that the Thirtieth Legislature of the State of Hawaii, Regular Session of 2019 defer appropriating any funds for the Project during this calendar year; and

BE IT FURTHER RESOLVED that copies of this resolution be transmitted to USACE, the members of Hawaii's Congressional delegation, the Governor of Hawaii, each member of the Hawaii State Legislature, the Mayor of Honolulu, and Honolulu City Council.

This resolution was ADOPTED by the Mānoa Neighborhood Board No. 7 by UNANIMOUS CONSENT, 14-0-0 (**AYE**: Andersen, Armstrong, Borland, Budar, Chun, Fukumoto, Funk, Harrison, Hoe, Koff, Quadri, Rotter, Tom, and Watson; **NAY**: ~~None~~; **ABSTAIN**: None) **at its Wednesday, February 6, 2019 meeting.**

Submitted by: _____
Ben Rotter, its Chair.

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MĀNOA NEIGHBORHOOD BOARD NO. 7
c/o NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BLVD, STE 160 • HONOLULU, HAWAII, 96817
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET http://www.honolulu.gov/nco

RESOLUTION CONCERNING THE REVISED PLAN FOR THE ALA WAI FLOOD RISK MANAGEMENT PROJECT

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Canal Project (the "Project"), officially referred to as the Ala Wai Canal Flood Risk Management Project, in order to mitigate the effects of a potentially catastrophic 100-year flooding event within the Ala Wai Watershed; and

WHEREAS, this Board and six other Neighborhood Boards passed resolutions in February of 2019 requesting that the State Legislature defer appropriating any funds for the Project until community stakeholders' concerns were sufficiently addressed, including consideration of alternatives to the Project; and

WHEREAS, the Hawaii State Legislature declined to appropriate funds for the Project in the 2019 and 2020 Sessions; and

WHEREAS, based on the new 1D/2D modeling and new data, the USACE presented in August of this year a significantly revised flood mitigation plan in which the detention basins in the upper Manoa and Palolo Valleys were removed and new features added, such as a Woodlawn Bridge bypass, two floodwalls at Manoa Marketplace, a berm in Manoa District Park, higher walls along parts of the Ala Wai Canal, and a 40-foot-tall pumping station set in the Canal itself; and

WHEREAS, community members have not had a full opportunity to absorb, understand, and react to these changes in the Project; and

WHEREAS, the community and the City Council have presented alternative proposals or alternative features to be incorporated into the current USACE plan; and

WHEREAS, this Board would like the USACE to evaluate seriously the proposals from the City Council and from the community; now, therefore,

BE IT RESOLVED that the Board requests of USACE that its environmental assessment process and any potential environmental impact statement process include technical engineering review of the City Council proposal and of the four community-generated alternatives listed in the Report of the City Council's Permitted Interaction Group on the Project; and

BE IT FURTHER RESOLVED that the USACE should ensure that it properly inform Manoa residents who are stakeholders or who reside next to Manoa Stream of USACE's schedule of public engagements and of significant changes to their plans with respect to Manoa Valley; and

BE IT FURTHER RESOLVED that the Board also requests that the City and County of Honolulu defer entering into any partnership agreement with the USACE until community concerns are sufficiently addressed; and

BE IT FURTHER RESOLVED that copies of this Resolution be transmitted to the USACE (to be entered into the material for its environmental assessment), the Governor of the State of Hawaii, the Mayor of the City and County of Honolulu, members of the City Council of Honolulu, all members of the Hawaii State Legislature, the State Department of Land and Natural Resources, the Department of

Budget and Finance, the Office of Environmental Quality, and the City and County of Honolulu's Department of Design and Construction.

This resolution was ADOPTED by the Mānoa Neighborhood Board No. 7 by a roll call vote of 9-0-1 (AYE: Budar, Carroll, Fukumoto, Funk, Grace, Kawano, Koff, Watson, and Zane; **NAY**: None; **ABSTAIN**: Armstrong) **at its Wednesday, December 2, 2020 meeting.**

Submitted by: K. Russell Ho for
Dylan P. Armstrong, its Chair.

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McCULLY/MO'ILI'ILI NEIGHBORHOOD BOARD NO. 8
c/o NEIGHBORHOOD COMMISSION · 925 DILLINGHAM BOULEVARD, SUITE 160 · HONOLULU, HAWAII, 96817
TELEPHONE: (808) 768-3710 · FAX: (808) 768-3711 · INTERNET: http://www.honolulu.gov/nco

RESOLUTION

REQUESTING THE ARMY CORPS OF ENGINEERS TO CONSIDER ADDITIONAL COMMUNITY FEEDBACK BEFORE PROCEEDING WITH THE ALA WAI FLOOD MITIGATION PROJECT

WHEREAS, in the past several decades catastrophic flooding events have occurred more frequently throughout the world; and

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Canal Project (the "Project"), also referred to as the Ala Wai Flood Mitigation Project, in response to the potential for a catastrophic flooding event (100-year storm) within the Ala Wai Watershed; and

WHEREAS, the Project includes, among other features, the construction of detention basins in Manoa and Palolo Valleys, Makiki, Kanewai Park, the Ala Wai Golf Course, Ala Wai Park (Hausten Ditch) and an average four-foot reinforced solid concrete wall which extends as high as four and a half feet in certain segments surrounding portions of the Ala Wai Canal; and

WHEREAS, the Ala Wai Watershed contains within it such areas of Honolulu as Manoa Valley, Palolo Valley, Makiki, Tantalus, McCully, Moiliili, St. Louis Heights, Kapahulu, Kaimuki, Kapiolani, Ala Wai, Ala Moana, and Waikiki; and

WHEREAS, the McCully-Moiliili Neighborhood Board No. 8 has heard testimony from concerned residents, including property owners who live next to or within a proposed detention basin; and

WHEREAS, many residents have stated that they did not receive proper notice of the Project and did not have adequate time to respond to the Project's Draft Report/Environmental Impact Statement ("EIS"); and

WHEREAS, Iolani School, located on the Ala Wai floodplain, wrote a letter to the USACE in 2015 in which it claimed that neither it nor other stakeholders were adequately engaged in an evaluation of the Project and urged that the Draft Report/EIS be reviewed and reissued for further public comment; and

WHEREAS, Congress in the Fall of 2018 appropriated money to fund the federal portion of the proposed cost of the Project, leaving only the local portion of the Project's funding remaining; now, therefore,

BE IT RESOLVED, the McCully-Moiliili Neighborhood Board No. 8 requests the USACE to put on hold on any further advancement of the Project until the impacted residents and other stakeholders have had adequate opportunity to consider and provide input, so that USACE can revise the proposed alternatives, as necessary; and

BE IT FURTHER RESOLVED, the Board requests that the Hawaii State Legislature defer appropriating funds for the Project until the impacted residents and other stakeholders are properly consulted, and significant concerns are satisfactorily addressed; and

BE IT FINALLY RESOLVED, that copies of this resolution be transmitted to the USACE, the Governor of Hawaii, all members of the Hawaii State Legislature, the Mayor of the City and County of Honolulu, all members of the Honolulu City Council, and the chairs of the Ala Moana-Kakaako, Makiki-Lower Punchbowl-Tantalus, Manoa, Diamond Head-Kapahulu-St. Louis Heights, Palolo, Kaimuki, and Waikiki Neighborhood Boards in the City and County of Honolulu.

This resolution was ADOPTED by the McCully-Moiliili Neighborhood Board No. 8 at its March 7, 2019, regular meeting, 11-0-0 (AYE: Araceley, Barber, Devilbiss, Fujishige, LaHaela Walter, Robotti, St. Sure, Streitz, Takamura, Vares, Zibakalam; NAY: None; ABSTAIN: None).

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McCULLY/MO'ILI'ILI NEIGHBORHOOD BOARD NO. 8
c/o NEIGHBORHOOD COMMISSION · 925 DILLINGHAM BOULEVARD, SUITE 160 · HONOLULU, HAWAII, 96817
TELEPHONE: (808) 768-3710 · FAX: (808) 768-3711 · INTERNET: http://www.honolulu.gov/nco

RESOLUTION

CONCERNING THE REVISED PLAN FOR THE ALA WAI FLOOD RISK MANAGEMENT PROJECT

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Flood Risk Management Project (the "Project"), in order to mitigate the effects of a potentially catastrophic 100-year flooding event within the Ala Wai Watershed; and

WHEREAS, the McCully-Moiliili Neighborhood Board ("Board") and six other Neighborhood Boards passed resolutions in early 2019 requesting that the State Legislature defer appropriating any funds for the Project until community stakeholders' concerns were sufficiently addressed, including consideration of alternatives to the Project; and

WHEREAS, the Hawaii State Legislature declined to appropriate funds for the Project in the 2019 and 2020 Sessions; and

WHEREAS, based on the new 1D/2D modeling and new data, the USACE presented in August 2020 a significantly revised flood mitigation plan in which the detention basins in the upper Manoa, Palolo, and Makiki Valleys were removed and new features added, such as a 40-foot-tall pumping station and miter gate set in the Ala Wai Canal itself, a Makiki Bypass conduit along the Promenade, and high walls around the Canal and Ala Wai Park; and

WHEREAS, community stakeholders and the City Council have presented alternative proposals or alternative features to be incorporated into the current USACE plan, but no formal advisory group has been established to help guide the Project from the community perspective; and

WHEREAS, the Project indicates there will be widespread flooding in the low-lying communities mauka of the Canal, including large portions of the McCully-Moiliili community; and

WHEREAS, the general community, including recreational users in and around the Canal, have not had a full opportunity to absorb, understand, react to, and evaluate the tradeoffs of these changes in the Project; now, therefore,

BE IT RESOLVED, the Board requests of USACE that its environmental assessment process and any related environmental impact statement process include technical engineering review of the City Council proposal and of the community-generated alternatives; and

BE IT FURTHER RESOLVED, the USACE should ensure that it properly inform the public, condominium associations, recreational clubs, and schools of the USACE's schedule of public engagements, in particular with respect to impacts occurring within the McCully-Moiliili Neighborhood District Map; and

BE IT FURTHER RESOLVED, the Board requests the USACE establish an advisory group that consists of members representing each of the neighborhood board communities of the Ala Wai Watershed; and

BE IT FURTHER RESOLVED, the Board also requests that the City and County of Honolulu defer entering into any partnership agreement with the USACE until community concerns are sufficiently addressed; and

BE IT FINALLY RESOLVED, that copies of this resolution be transmitted to the USACE to be included in the material for its environmental assessment, the Governor of the State of Hawaii, the Mayor of the City and County of Honolulu, all members of the Honolulu City Council, all members of the Hawaii State Legislature, the Director of the State Department of Land and Natural Resources, the Director of the State Department of Budget and Finance, the Director of the State Office of Environmental Quality, the Director of the City Department of Design and Construction, and the chairs of the Ala Moana-Kakaako, Makiki-Lower Punchbowl-Tantalus, Manoa, Diamond Head-Kapahulu-St. Louis Heights, Palolo, Kaimuki, and Waikiki Neighborhood Boards in the City and County of Honolulu.

This resolution was ADOPTED by the McCully-Moiliili Neighborhood Board No. 8 at its March 4, 2021, regular meeting, 7-0-0 (AYE: Allred, Barber, Fujishige, Kippen, Peck, Prellberg, Streitz; NAY: None; ABSTAIN: None).

MAKIKI/LOWER PUNCHBOWL/TANTALUS NEIGHBORHOOD BOARD NO. 10
c/o NEIGHBORHOOD COMMISSION • 530 SOUTH KING STREET, ROOM 400 • HONOLULU, HAWAII 96813
PHONE: (808) 527-5748 • FAX: (808) 527-5760 • INTERNET: www.co.honolulu.hi.us

February 26, 2019

Ways and Means Committee
State Senate of Hawaii

Committee Members:

The Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10, held a hearing, February 21,2019 on the Ala Wai Project from the U S Army Corps of Engineers. There were over thirty community members present and after extended discussion, we passed the two resolutions below. Please consider them and attach them to your recommendations.

Motion I

"BE IT RESOLVED by the Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10 will meet with the affected Neighborhood Boards and the USACE to provide information to the communities. We will also work with the City Council. We are concerned with the lack of public communication on the Project.

Motion II

"BE IT RESOLVED by the Makiki/Lower Punchbowl/Tantalus Neighborhood Board No. 10 that the USACE should put a hold on any further advancement of the Project until the very people who are supposed to benefit from the Project have had an adequate opportunity to consider and weigh in on the Project and alternatives to it; and

BE IT FURTHER RESOLVED that copies of this resolution be transmitted to the members of Hawaii's Congressional delegation, the Governor of Hawaii, each member of the Hawaii State Legislature, the Mayor of the City and County of Honolulu, and each Councilmember of the City and County of Honolulu."

Sincerely,

John A Steelquist, Chair

Oahu's Neighborhood Board System - Established 1973

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MAKIKI/LOWER PUNCHBOWL/TANTALUS NEIGHBORHOOD BOARD NO. 10

RESOLUTION CONCERNING THE REVISED PLAN
FOR THE ALA WAI FLOOD RISK MANAGEMENT PROJECT

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Flood Risk Management Project (the "Project"), in order to mitigate the effects of a potentially catastrophic 100-year flooding event within the Ala Wai Watershed; and

WHEREAS, six Neighborhood Boards in the affected watershed passed resolutions in early 2019 requesting that the State Legislature defer appropriating any funds for the Project until community stakeholders' concerns were sufficiently addressed, including consideration of alternatives to the Project; and

WHEREAS, the Hawaii State Legislature declined to appropriate funds for the Project in the 2019 and 2020 Sessions; and

WHEREAS, based on the new 1D/2D modeling and new data, the USACE presented in August of this year a significantly revised flood mitigation plan in which the detention basins in the upper Manoa, Palolo, and Makiki Valleys were removed and new features added, such as a 40-foot-tall pumping station and miter gate set in the Canal itself in a protected scenic view plane, a Makiki Bypass conduit along the Ala Wai Promenade which may adversely affect the protected Exceptional Tree Grove, and high walls around the Canal and Ala Wai Park, and the continued existence of the Kanewai Park Multipurpose Detention Basin with 9' berms adjacent to Hokulani Elementary School, and areas mauka of the Ala Wai Canal would still be flooded under this revised proposal; and

WHEREAS, community members and recreational users have not had a full opportunity to absorb, understand, and react to these changes in the Project; and

WHEREAS, the community and the City Council have presented alternative proposals or alternative features to be incorporated into the current USACE plan; and

WHEREAS, this Board would like the USACE to evaluate seriously the proposals from the City Council and from the community; now, therefore,

BE IT RESOLVED that the Board requests of USACE that its environmental assessment process and any potential environmental impact statement process include technical engineering review of the City Council proposal and of the four community-generated alternatives listed in the Report of the City Council's Permitted Interaction Group on the Project; and

BE IT FURTHER RESOLVED that the USACE should ensure that it properly inform the public, residents, condominium associations, recreational clubs, and schools of the USACE's schedule of public engagements with respect to impacts affecting the Makiki - Lower Punchbowl - Tantalus Neighborhood District Map; and

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BE IT FURTHER RESOLVED, the Board requests the USACE establish an official Community Advisory Group that consists of members representing each of the neighborhood board communities of the Ala Wai Watershed; and

BE IT FURTHER RESOLVED that the Board also requests that the City and County of Honolulu defer entering into any partnership agreement with the USACE until community concerns are sufficiently addressed; and

BE IT FINALLY RESOLVED, that copies of this resolution be transmitted to the USACE to be included in the material for its environmental assessment, the Governor of the State of Hawaii, the Mayor of the City and County of Honolulu, all members of the Honolulu City Council, all members of the Hawaii State Legislature, the Director of the State Department of Land and Natural Resources, the Director of the State Department of Budget and Finance, the Director of the State Office of Environmental Quality, the Director of the City Department of Design and Construction, and the chairs of the Ala Moana-Kakaako, Palolo, Manoa, McCully-Moiliili, Diamond Head-Kapahulu-St. Louis Heights, Kaimuki, and Waikiki Neighborhood Boards in the City and County of Honolulu.

Adopted by the MAKIKI/LOWER PUNCHBOWL/TANTALUS NEIGHBORHOOD BOARD NO. 10 at its regular meeting of February 18th, 2021, by a vote of 9-4-2 (Aye: Chang, Char, Farden, Carson, Ross, Lee, Nakahara, Cambe, Ritchie; Nay: Agustin, Kawano, Mitchell, Tipton; Abstain: Steelquist, Young).

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ALA MOANA-KAKA'AKO NEIGHBORHOOD BOARD NO. 11
NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BOULEVARD, SUITE 160 • HONOLULU, HAWAII, 96817
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET http://www.honolulu.gov/nco

RESOLUTION CONCERNING THE ALA WAI CANAL FLOOD MITIGATION PROJECT

WHEREAS, in the past several decades, catastrophic flooding events have occurred more frequently in the United States and the rest of the world; and

WHEREAS, the United States Army Corps of Engineers ("USACE") has developed plans for the Ala Wai Canal Project (the "Project"), also referred to as the Ala Wai Flood Mitigation Project, in response to a 100-year storm and a potential catastrophic flooding event within the Ala Wai Watershed; and

WHEREAS, the Ala Moana-Kaka'ako Neighborhood Board No. 11 ("the Board") passed a resolution in February 2019 requesting that the Hawaii State Legislature defer appropriating any funds for the Project until sufficient community stakeholder concerns have been addressed, including consideration of alternative projects; and

WHEREAS, community members have continued to express concerns regarding public engagement on the planning and design of the Ala Wai Flood Mitigation Project, predicted efficacy of the improvements, and overall project costs; and

WHEREAS, the USACE recently announced changes to the recommended plan for the Ala Wai Flood Mitigation Project, including removal of large detention basis in Makiki and Pālolo, and establishment of an integrated system of distributed flood control features in Mānoa; and now therefore

BE IT RESOLVED that the Board requests that the environmental impact statement review process allow further community input on the design of the Ala Wai Flood Mitigation Project; and

BE IT RESOLVED that the Board also requests that the City and County of Honolulu defer entering into any partnership agreements with the USACE until community concerns are sufficiently addressed; and

BE IT FURTHER RESOLVED that copies of this resolution be transmitted to the U.S. Army Corps of Engineers, the City and County of Honolulu Department of Design and Construction, Department of Land and Natural Resources, the Office of Environmental Quality Control, and appropriate City and State elected officials.

ADOPTED by the Ala Moana-Kaka'ako Neighborhood Board No. 11 at its regular meeting on Tuesday, October 22, 2019, by a vote of 6-0-2.

RYAN TAM
Chair

ALA MOANA-KAKA'AKO NEIGHBORHOOD BOARD NO. 11
NEIGHBORHOOD COMMISSION • 925 DILLINGHAM BOULEVARD, SUITE 160 • HONOLULU, HAWAII, 96817
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RESOLUTION REGARDING ALA WAI FLOOD MITIGATION PROJECT ALTERNATIVES

WHEREAS, the United States Army Corps of Engineers ("USACE") is revising plans for the Ala Wai Flood Mitigation Project, in cooperation with State and City agencies in order to address community vulnerabilities associated with a 100-year storm and a potential catastrophic flooding event within the Ala Wai Watershed; and

WHEREAS, the USACE's Engineering Documentation Report eliminates 6 upstream detention basins in Manoa, Palolo, and Makiki, and evaluates the addition of a new bypass culvert under the Ala Wai Promenade, a new pump station and miter gate extending across the Ala Wai Canal near the Manoa confluence, higher walls and berms around the Ala Wai Canal and Ala Wai Golf Course, and other flood mitigation measures; and

WHEREAS, the recommended plan and proposed flood barrier systems will not prevent widespread flooding in the low-lying communities mauka of the canal, including parts of the Ala Moana community; and

WHEREAS, there have been multiple community efforts to develop comprehensive, effective, and cost-effective alternatives, such as the Oceanit SWIFT tunnel and other community generated alternatives; and now therefore,

BE IT RESOLVED that the Board requests that the USACE and partner agencies incorporate ways to equitably protect all communities mauka of the Ala Wai Canal from flooding, as well as Waikiki; and

BE IT RESOLVED that the Board requests that the USACE and partner agencies consider these other community alternatives for project development, supplemental environmental analysis, and consideration; and

BE IT FURTHER RESOLVED that copies of this resolution be transmitted to the U.S. Army Corps of Engineers, and appropriate City and State agencies and elected officials, and neighborhood boards.

ADOPTED by the Ala Moana-Kaka'ako Neighborhood Board No. 11 at its regular meeting on Tuesday, October 27, 2020, by a unanimous vote of 9-0-0.

RYAN TAM
Chair

From: Luciano Minerbi
Sent: Saturday, May 6, 2023 11:08:15 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Comments for the Alawai NOI, EISP

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha: I contribute my previous testimonies and comments on Ala Wai flood mitigation in the attached pdf as they remain to be addressed with proper documentations in the next reevaluation and EIS for the AlaWai plan.
I remain available for clarifications.
Thank you very much
Luciano

--
Luciano Minerbi, Dr. Arch. MUP, APA
Professor Emeritus
Department of Urban and Regional Planning Saunders Hall, 107
2424 Maile Way
University of Hawai'i, Honolulu, HI. 96926, USA Tel. (808) 955-5406 home office landline
e-mail: luciano@hawaii.edu<mailto:luciano@hawaii.edu>
("Non dat veritas sine memoria" Latin Proverb)

⚠ Novel Coronavirus - Latest Updates and Information ⚠ Proclamations, Orders, and Rules re:COVID-19

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Written Testimony

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Name *

LUCIANO MINERBI

Phone *

808-9555406

Email *

luciano@hawaii.edu

Meeting Date *

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Your position on the matter *

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Representing *

- (•) Self
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Written Testimony

GO TO TOP

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I am in support of resolution 21-19 CD1 because it is consistent with my concerns already expressed over the years about having a good flood management plan that protect all neighborhood and particularly lower Moiliili I attach my previous statements and testimony

Testimony Attachment

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(Draft Only) February 8, 2016

Notes on the Ala Wai Canal: Its Development and Impacts

Luciano Minerbi
Professor of Urban and Regional Planning
University of Hawaii

Waikiki Ahupua'a Pre- Ala Wai Canal

The orography of the Waikiki Ahupua'a includes several sub-watershed below the Ko'olau Mountain Range. They are the Makiki Sub-watershed, the Manoa Sub-watershed, the Palolo Sub-watershed, and, makai of them, the Ala Wai Sub-watershed and the Waikiki Sub-watershed. The Makiki Stream is fed by its 4 tributaries, the Manoa Stream by its 7 tributary and Palolo Stream by its 3 tributaries.

It is important to recognize that, before the construction of the Ala Wai Canal, all the above-mentioned three streams converged and then diverged again to reach the ocean in three different and direct outlets or stream mouth called "Muliwai" in the Hawaiian Language. This natural hydrographic configuration was unfortunately altered by the flawed construction of the Ala Wai Canal in the 1920, which reduced three Muliwai to only one outlet located at the current Ala Wai Boat Harbor. The Territory of Hawaii maps of the late 1880s and early 1900 document this fact.

The Hawaii Registered Map of Waikiki No. 1398 by S. B. Bishop dated 1881 clearly shows (from the east to west) the Pahoa Stream, and the Kalia Stream flowing into the Kukainaki Muliwai (river mouth); the Pahoa Stream and the Kalia Stream going into the Apuakehau Stream and into its muliwai into the Ocean at Hamohamo. The Paakea Stream enters the Piinaio Stream that reaches the Ocean at his Kahawai mouth, south of McCully Street at the location of current Fort De Russy.

The Hawaii Registered Map No 2848 Waikiki Fisheries of June 1909 by M.D. Monsarrat also clearly depicts these three different streams reaching the Ocean.

In this map the first (unnamed) stream, near Kapiolani Park outlets at Hamohamo Fisheries through the H.M. Liliukalani Lands, the second was the Apukehau Stream abutting into the Ocean between the Moana Hotel and the Seaside Hotel in Waikiki. The third was the Piinaio Stream collecting the water from its two tributary streams, Maunahala Stream and Makiki Stream, with its outlet reached the ocean at Kalia Fisheries, south of Punahou Street.

The Waikiki Ahupua'a Old Breadbasket

The construction of the Ala Wai Canal effectively destroyed the self-sufficient diversified food basket production system of taro, banana, rice fields and fowls of the large Moiliili District mauka of Waikiki and also obliterated the abundant fresh fish production raised by the dozen Waikiki ponds by land-filling of Waikiki with the earth dredged out from the canal.

The Early Design of the Ala Wai Canal

Appropriately, the early design of the Canal mimicked the natural stream hydrography: an April 1917 Waikiki Map by Wright-Harvey-Wright, as reported by Ross (2007), depicts three proposed drainage channels to reach the ocean in Waikiki (although one was marked "withdrawn"). The design of the Ala Wai Canal (1921-1928) originally envisioned –two outlets at both end of the canal-- but what instead was actually built was only the Western outlet at the Ala Wai Boat harbor, while the East outlet near the Aquarium at Kapiolani Park was unfortunately not realized. It is notable that the 1912 map of Chas.V.E. Dove Map of Honolulu depicts in dotted lines the road subdivision of Moiliili and the Ala Wai Channel, with the two outlets clearly marked. A note explains that this plan was approved by L.E. Pinham, the president of the Board of Health and approved by the Territorial Board of Health February 21, 1906.

The Flowed Construction of the Ala Wai Canal

With only one ocean outlet into the Ala Wai Harbor currently the Ala Wai Canal continues to slow down the natural flows of the 3 named streams to the ocean. One result is that the water accumulates, back-up and stagnates particularly at the eastern end of the canal. It is waiting only the next exceptional event to overflow and flood.

What is Needed to Ameliorate the Situation

The ocean outflow section from the Ala Wai Canal should be bigger than the sum of all sections of the streams coming into the canals so as to avoid water in the canal to stagnate and make flooding possible when more water comes in that what goes out into the ocean. If it is determined this to be the case, then it is the ocean water outlets than needs to he enlarged to decrease flooding by allowing the water in the canal to have an opening of adequate section into the ocean.

Two opening into the ocean at the opposite sides of the Ala Wai Canal – at it was originally designed in 1906 -- will also improve water quality, decrease pollution by avoiding stagnating water at the Diamond Head side of the in the canal. The real permanent solution to these problems and for lessening flood risk would be then to open the second outlet going to the Kapiolani Park near the aquarium and under a bridge for Kapahulu Street.

The Uneven Height of Ala Wai Canal Banks and Walls

The Ala Wai Canal edges are uneven in height: the Makai (ocean) side bank is about two feet higher than the Mauka (mountain) side: so that if a flood or a tsunami wave raises the water in the canal above two feet or more, the Waikiki district is protected and the Moiliili district will be flooded. If any money is available –for fairness-- it should be used first to raise the Moiliili bank to the same height of the Waikiki one.

The USACE Plan

USACE Plan 2-A proposes a 4-foot concrete wall to protect from flooding the entire length of the Waikiki side of the Ala Wai Canal and a 4-foot wall to protect the Moiliili side of the Ala Wai Canal.

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But the Plan 3-A, selected by USACE, does not have a wall at the Manoa-Palolo channel to effectively protect the Moiliili districts, so that flood water will hit and immediately inundate Iolani School and the Ala Wai Elementary School as well all the condominiums and walk-up apartments located in the area.

Actually if the two walls are constructed as in Plan 3 A on all Waikiki makai side but only ½ the Moiliili mauka side of the canal that would exacerbate flooding in terms of volume, velocity and power at the Iolani School Site into Moiliili much more than current condition without that wall because the flood water will disperse on the larger surface of the Moiliili district.

Moreover and importantly, if the walls on the two sides of the canal are not designed and built by USACE both at the same height from the water level, flood will go on one side only, the Moiliili side. Now Waikiki side is much more protected than the Ala Wai side because the existing walled bank of the Waikiki side is about two feet higher than the one on the Moiliili side. Therefore the priority and urgent need is to raise the Moiliili and the Manoa Palolo channel wall and bank two feet to make it level with the Waikiki side, before other improvements.

Findings

In sum, the construction of the Ala Wai Canal precipitated the destruction of the Waikiki Food shed with loss of crops, fish food and fowl. It made possible the real estate development of the Waikiki resort district. The current flowed design of the canal with only one outfall is a key factor in the deterioration of water quality with stagnation and pollution in the canal east side, and the increased risk of flooding well over the historical and natural hydraulic conditions of three original stream ocean outlets or muliwai. The proposed remediation by USACE Plan 3-A uses apparently a hydraulic model that will exacerbate flooding by not protecting the Moiliili side instead of preventing it.

This is because (a) lack of adequate sized and number of ocean outlets, (b) current channel walls not at equal heights, (c) USACE choice (Plan 3-A) of building only a makai wall for the Waikiki side and not a mauka wall for Moiliili to continue to protect the Moiliili side of the Manoa Palolo Canal, and (d) USACE lack of detail of what a 4 foot wall really means (if from the current one or raising both channel walls at the same level to avoid flooding on one side).

Conclusions

In my opinion planning and construction would be better spent to: (a) open a Kapiolani Park ocean outlet for the Ala Wai Canal -- as originally designed in 1906, (b) raise the Moiliili and Manoa Palolo Canal side banks at the same level as the one of Waikiki (c) only in a second phase raise both walls, as more money becomes available to reach a same higher elevation.

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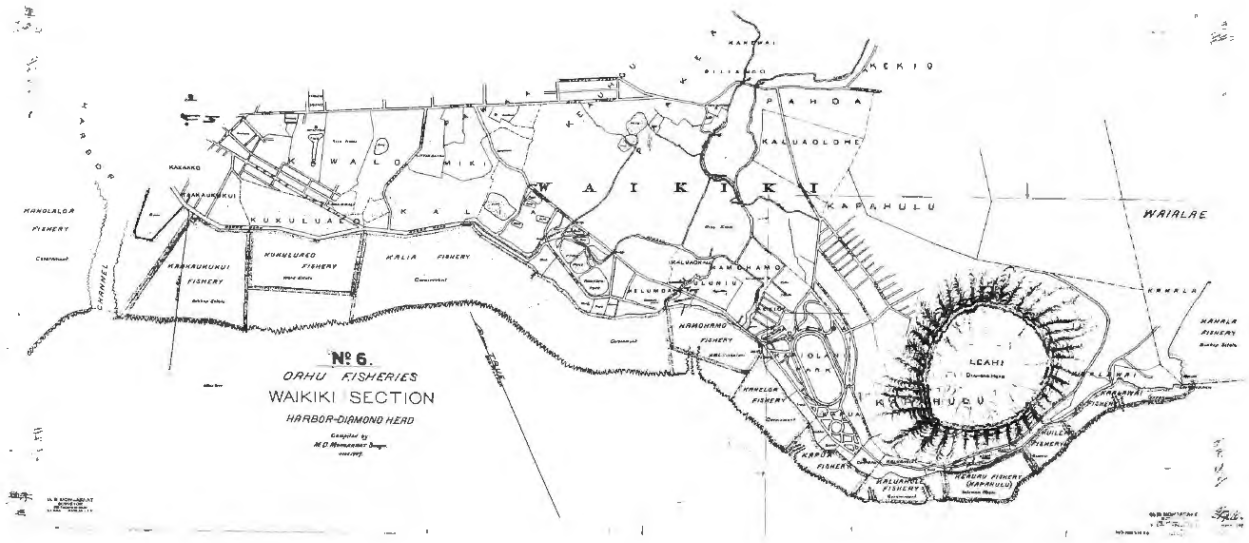

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C&C OF HONOLULU COMMITTEE ON
PUBLIC INFRASTRUCTURE, TECHNOLOGY AND SUSTAINABILITY
JUNE 19, 2019
TESTIMONY BY LUCIANO MINERBI

Thank you for the opportunity to testify. I support the C&C resolution 19-145 because real co-design is needed among the stakeholders affected by the USACE plan for flood risk minimization in the Ala Wai Canal.

Specifically the area of Iolani High School and Ala Wai Elementary School and adjacent low rise and high-rise properties, including the famed 100th Infantry Battalion Memorial Building, will be affected without a floodwall protection at Manoa-Palolo Canal right side.

The alternative selected by USACE 3-A-2-2 does not protect the Moiliili Neighborhood because the early flood model of July 2015 was wrong and its flood map in the final EIS document (at page 110) was wrong by indicating no flood where actually it will surely occur without flood-wall protection at the Iolani School and Ala Wai Elementary School site precisely where the there is a lower elevation of the bank of the canal.

More over terminating the proposed Moiliili flood wall at Ala Wai instead of running it around the site and up to protect the right side of the Manoa-Palolo Canal to Date Street will exacerbate an extreme flood event that will enter lower Moiliili with greater violence than without this incomplete floodwall.

The 3A alternative is to spend more than *300 million of dollars (*)* for a 100-year flood to protect Waikiki, but a 50 or a 10-year flood likely to come sooner and flood the working class Moiliili neighborhood at the Iolani-Ala Wai site.

In conclusion, a floodwall is needed to be constructed with much greater urgency at the right side of the Manoa-Palolo Canal to connect with the Moiliili floodwall of the Ala Wai Canal.

Not doing so, in my opinion, is a breach of two federal executive orders:
EO 12898 (Federal Actions to Address Environmental Justice in Minority Population and Low-Income Population) and
EO 13045 (Protection of Children from Environmental Health Risk and Safety Risk).

Therefore I ask that protection be provided also at these two school sites as part of the USACE plan and that dredging of the Ala Wai Canal be done immediately.

Respectfully submitted as an individual, as a resident of Moiliili, and an expert in my field.

Luciano Minerbi, Dr. Arch., MUP, APA
Retired Professor of Urban and Regional Planning, University of Hawaii, Manoa
Former C&C Commissioner Housing and Community Development
Former Vice Chair Moiliili-McCully Neighborhood Board No 8
Former Chair, Long Range Planning, Moiliili Community Center
Member, Hawaii Advisory Committee to the U.S. Commission on Civil Rights, USDJ

2444 Hihiwai St Apt 2005, Honolulu, Hi 96826; Tel 808-955406 email: luciano@hawaii.edu

* *$ item corrected since filing of the testimony.*

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Honolulu Star Advertiser
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Honolulu Star-Advertiser (Honolulu, Hawaii) · Sun, Oct 13, 2019 · Page F3
Printed on Nov 21, 2020

Moiliili needs better flood protection

By Luciano Minerbi

The banks of the Ala Wai Canal are not at the same height. The Moiliili side is two feet lower than the Waikiki one. Moiliili will be inundated by a major flood well before Waikiki precisely at that low elevation point where the Manoa-Palolo Drainage Canal enters the Ala Wai Canal.

Iolani School and Ala Wai Elementary School, with hundreds of students and staff; the many people living in the area's residential properties; and the famed 100th Infantry Battalion Memorial Building all will be flooded without a berm protecting the Iolani school side of the Manoa-Palolo canal.

But the U.S. Army Corps of Engineers' selected alternative does not shield the Moiliili neighborhood with on-site protection ("Engineers propose changes to Ala Wai flood project," Star-Advertiser, Sept. 28). The map in the final environmental impact statement (EIS) indicates no flood where one surely will occur because of the low elevation.

Terminating the Moiliili floodwall at Ala Wai Canal, without protecting the Iolani side of the Manoa-Palolo Canal to Date Street, will exacerbate a flood event with greater violence, velocity and duration entering lower Moiliili, and the area will retain floodwater longer without a pump at the University Avenue site.

The alternative to spend about $350 million for a 100-year flood to protect Waikiki, but not Moiliili for a 30- or 50-year flood that is likely to come much sooner, is not OK.

Not protecting a working class and ethnic minority population like that in the Moiliili neighborhood also breaches two federal executive orders: Environmental Justice in Minority Population and Low-Income Populations (EO 12898) and Protection of Children from Environmental Health Risks and Safety Risks (EO 13045).

The EIS generated an inadequate estimate of the actual socioeconomic assets and demographic weight of the Moiliili neighborhood, leading to the choice of a flawed alternative in the recommended plan. The economic cost of a flood to the Moiliili working families, many in the hotel and service sectors, should not have less weight than the damages to the cars in the garages of Waikiki. The EIS did not process the 2005 book, "Mo'ili'ili — The Life of a Community," to calculate the link between the cultural-historical values with the economic values of the many assets of this neighborhood.

Importantly, we should refute the statement that it is "an unacceptable tradeoff" to protect the Iolani School site because "additional induced damages in Waikiki would greatly exceed any benefit associated with Iolani School."

Expanding the intake holes of the Manoa-Palolo canal into a much-extended retention basin inside the Ala Wai Golf Course will instead ensure that the excess floodwater will flow into the golf course and not on the Waikiki side. Thus an improved Army Corps plan should certainly protect lower Moiliili, which has a higher probability to flood than Waikiki.

The city, state and federal partnership can hopefully agree on a just process to implement stream maintenance with new construction, by integrating a) low-impact design and b) constructed wetlands with living machines, as green infrastructure of a "sponge" watershed, so as to address simultaneously pollution with flood control.

Integrated ecological and flood control planning generate quite different design solutions than flood control alone. Moving forward with cleaner water, the original design of the 1920s for two ocean outlets can then become the definite solution to the Ala Wai Canal problem.

ISLAND VOICES

Luciano Minerbi is a retired professor of urban and regional planning at the University of Hawaii at Manoa.

BRUCE ASATO / BASATO@STARADVERTISER.COM

Heavy rains from the remnants of Hurricane Lane in August 2018 turned the water brown in the Ala Wai Canal and the Manoa-Palolo Drainage Canal, which borders Iolani School and feeds into the canal.

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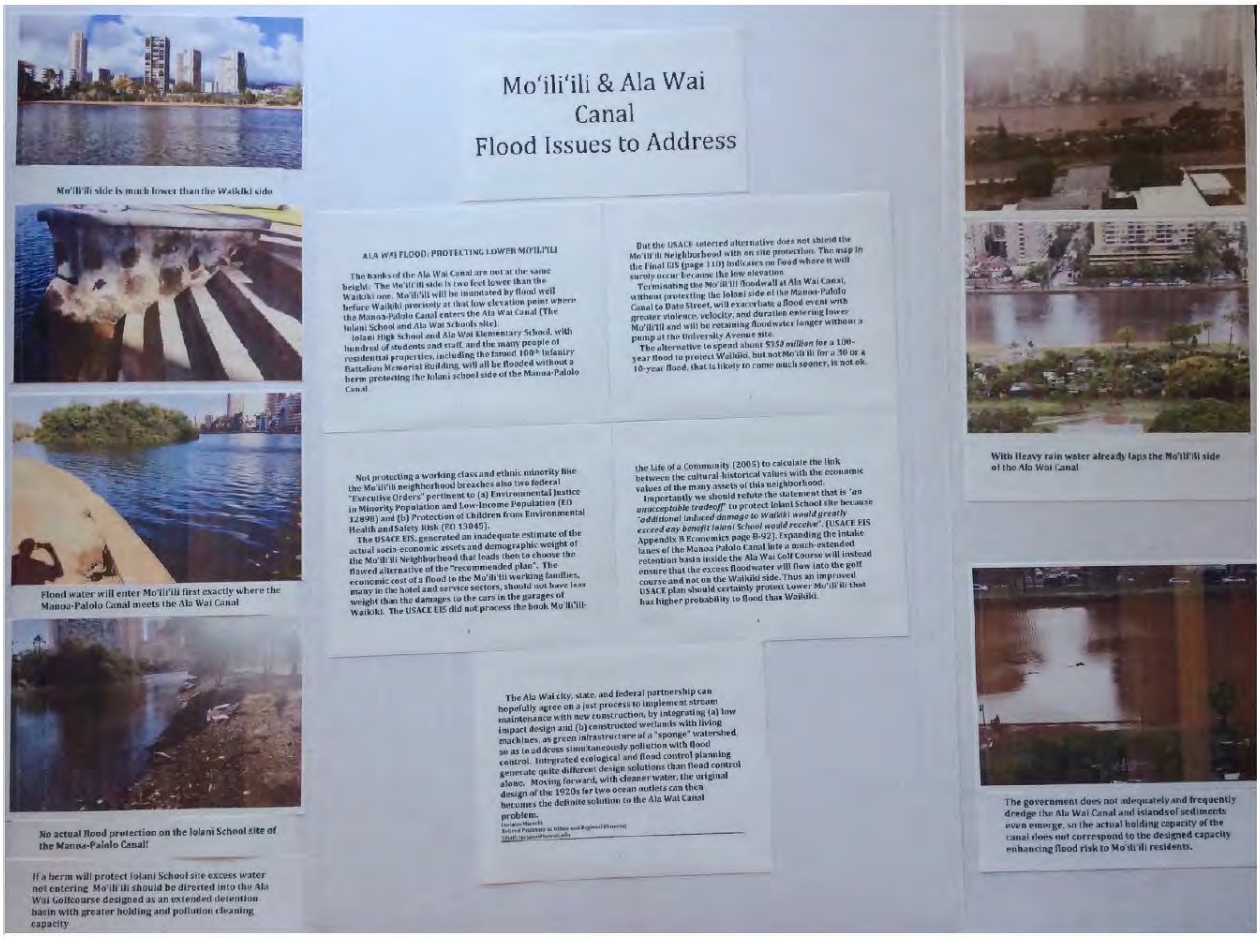

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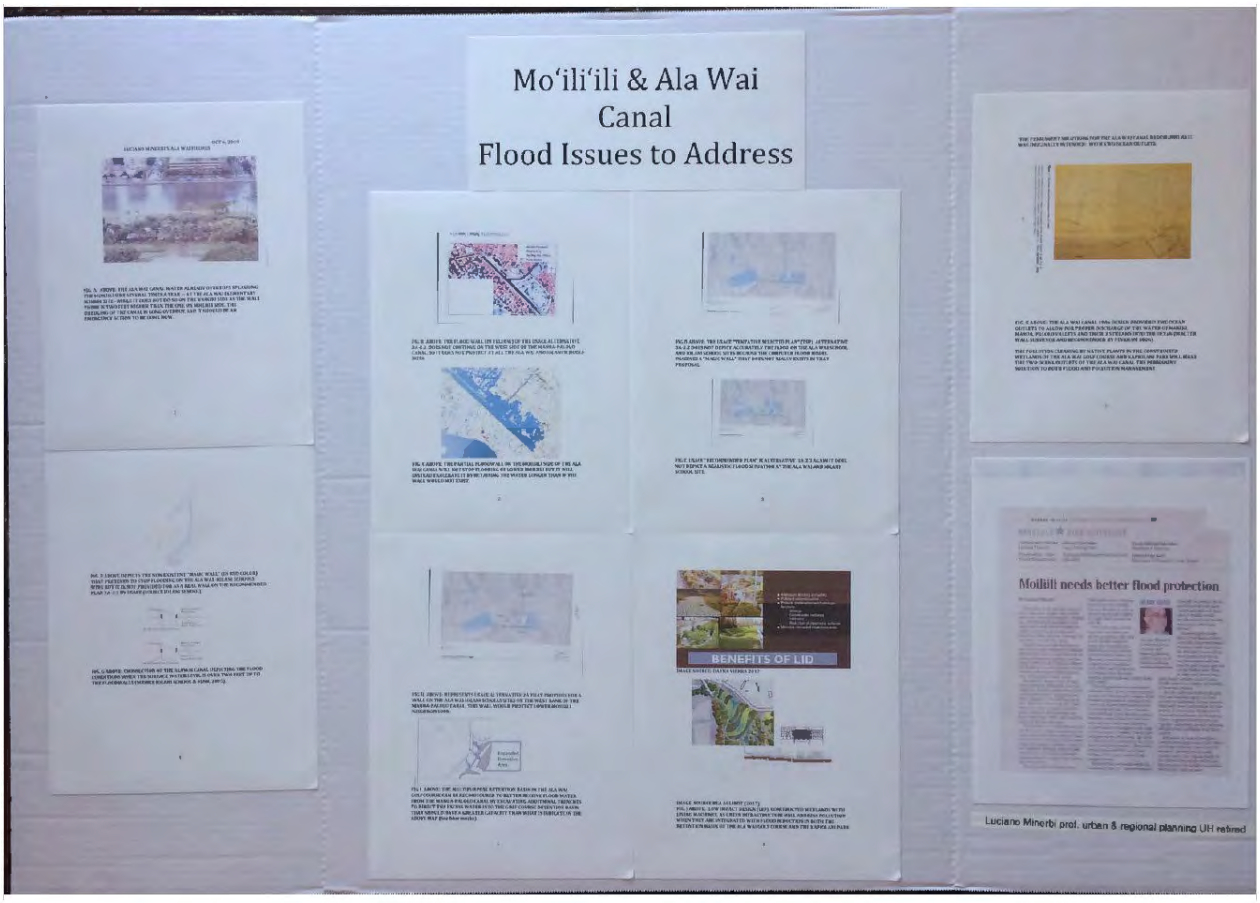

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TESTIMONY ON THE ALA WAI CANAL FLOOD REDUCTION

WATERSHED HISTORY

1 PRE ALA WAI CANAL DEVELOPMENT 3 VALLEYS, AT LEAST 3 STREAMS AND 3 MULIWAI.

2 THE ALA WAI CANAL WAS CONCEIVED WITH 3 OCEAN OUTLETS, DESIGNED WITH TWO, AND BUILT WITH ONLY ONE: THAT IS THE PROBLEM TODAY.

FLOOD MITIGATION ALONE ARE NOT GREEN INFRASTRUCTURE

3 THE DESIGN FOR FLOOD MITIGATION ALONE IS QUITE DIFFERENT FROM THE DESIGN OF AN INTEGRATED POLLUTION REDUCTION AND FLOOD MITIGATION ATTAINED BY THE "SPONGE CITY APPROACH" (SEE SCIENTIFIC AMERICA ARTICLE WITH EXAMPLES FROM CHINA AND RUSSIA).

THEREFORE, POLLUTION REDUCTION WITH GREEN INFRASTRUCTURE WITH NATIVE PLANTS IN THE ALA WAI GOLF COURSE AND IN KAPIOLANI PARK SHOULD BE CONSIDERED WITH A SECOND OCEAN OUTLET.

MOILIILI IS NOT PROTECTED BY THE USACE PLAN

4 MOILIILI SIDE OF THE CANAL IS TWO FEET LOWER THAN THE WAIKIKI SIDE SO IT WILL FLOOD WELL BEFORE WAIKIKI EXACTLY WHERE THE MANOA PALOLO CANAL ENTERS INTO THE ALA WAI CANAL.

5 THE USACE MAY 2017 PLAN DOES NOT REALLY PROTECT-ON SITE MOILIILI-, BUT IT EXACERBATES FLOODING, EXTENT, INTENSITY, AND DURATION WITH ITS INCOMPLETE WALL ON THE MOILIILI SIDE OF THE CANAL.

6 THE USACE MAY 2017 PLAN DOES NOT PROPERLY ACCOUNTS FOR THE REAL ECONOMIC VALUE OF MOILIILI BY NOT EXPLICITELY CONSIDERING THE HISTORIC, CULTURAL,

1

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ENVIRONMENTAL AND DEMOGRAPHIC VALUE OF THIS NEIGHBORHOOD SO THAT THE CURRENT COST /BENEFITS ANALYSIS EXCLUDES PROTECTION MEASURES FOR MOILIILI LIKE A PUMP AND A BERM AT THE IOLANI SIDE OF THE MANOA-PALOLO CANAL.

7 THE USACE MAY 2017 PLAN DOES NOT DESIGN THE ALA WAI GOLF COURSE AS AN EXPANDED RETENTION BASIN WITH ENLARGED AND ADDITIONAL INTERCEPTS LANES TO CHANNEL WATER INTO THE GOLF COURSE BEFORE HITTING MOILIILI AND WAIKIKI NEIGHBORHOODS.

RECOMMENDATION

8 THE USACE AND STATE EIS SHOULD BE RADICALLY IMPROVED BY ADDRESSING THE POINTS I JUST RAISED FOR MO'ILI'ILI AND FULLY CONSIDERS THE SUGGESTIONS MADE BY THE "PROTECT OUR ALA WAI WATERSHED".

9 THE MOILIILI NEIGHBORHOOD BOARDS AND NEIGHBORHOOD REPRESENTATIVES SHOULD BE VIGILAN T AND ASSIST USACE TO AMEND AND IMPROVE ITS ALA WAI CANAL FLOOD RISK MANAGEMENT STUDY AND EIS TO ENSURE PROTECTION AND FLOOD REDUCTION MANAGEMENT FOR THE MOILIILI NEIGHBORHOOD.

November 7, 2019

Respectfully submitted to Mo'ili'ili Neighborhood Board no. 8
Luciano Minerbi, Dr. Arch, MUP
UHM Professor of urban and regional planning (retired)
Former Vice Chair Mo'ili'ili NB# 8
Former Chair, Board of Directors Long Range Planning Committee, Mo'ili'ili Community Center
Formers C&C of Honolulu Commissioner on Housing and Community development
Residents of the Ala Wai Watershed, since 1969.

ALA WAI CANAL FLOOD RISK MANAGEMENT PROJECT
SUPPLEMENTAL NEPA PUBLIC SCOPING MEETING – COMMENT SHEET

November 14 & 21, 2020

Thank you for participating in the Public Scoping Meeting on the ALA WAI CANAL FLOOD RISK MANAGEMENT PROJECT SUPPLEMENTAL NEPA. This comment period is intended to assist the team in developing the Draft NEPA Document for publication. Please use this form to submit any questions or comments you may have about the environmental, NEPA, archaeological, or cultural impacts of the proposed action. Completed forms may be emailed to AlaWaiFloodProject@usace.army.mil by **December 8, 2020** for inclusion to the Draft NEPA document, scheduled for publication in February 2021.

Thank you for the opportunity to comments on the NEPA adequacy of the USACE Ala Wai Flood Risk Management Project, Honolulu, Hawaii Engineering Documentation Report Engineering Documentation Report (EDR) July 16, 2020. This EDR is related to the USACE Ala Wai Canal Flood Risk Management Study, O'ahu, Hawaii Feasibility Study with Integrated Environmental Impact Statement (EIS) Interim Final Report May 1917. Comments and suggestions I made to that May 1917 documents are recalled here to see if they have been addressed or not in the EDR.

My comments are focused mainly the McCully-Moiliili Neighborhood N.8 of the City and County of Honolulu because it is adversely impacted by the above plans, unless they are indeed corrected and suggestion to reduce flood risk are actually implemented for this neighborhood as an essential and an integral part of a finalized USACE Ala Wai Canal Flood Risk Management Plan.

I have been living in this watershed for about 50 years. I and the residents and businesses of this area will be adversely affected. I am motivated by my continue community services as a past vice chair of the Neighborhood Board No. 8, past long range planning chair of the Moiliili Community Center, former commissioner of Housing and Community Development with the City and County of Honolulu, and emeritus professor of urban and regional planning with the University of Hawaii at Manoa.

My comments are those of an individual and an expert in my field that were made to USACE, the City and County and the affected Neighborhood Boards at several community meetings. They are included below in chronological order to see which suggestions are addressed by USACR EDR in system modification, or not yet.

* Luciano Minerbi, Draft only February 8, 2016 "Notes on Ala Wai Canal its Development and Impacts".
* Luciano Minerbi, June 19, 2019, City& County of Honolulu Committee on Public Infrastructure, Technology and Sustainability. Testimony.
* Luciano Minerbi, July 3, 2019 Testimony on Resolution No 19-14-145.
* Luciano Minerbi, October 6, 2019 "Ala Wai Canal Flood Protection Needs for Lower Moiliili Neighborhood". Handout.
* Luciano Minerbi, October 13. 2019 "Moiliili Needs Better Flood Protection". Island Voices Honolulu Star Advertiser.

The spirit and the letter of NEPA is fully realized only when documents by USACE, the State of Hawaii and the City and County are explicit in their respective authority in finalizing risk minimization from flood, storm surge, sea level, by integrated environmental maintenance with flood protection so as to comply with the following Executive Orders: EO 11514, Protection and Enhancement of Environmental Quality, EO 11988 Floodplain Management, EO 13690 Federal Flood Risk Management Standards, EO 11990 Protection of Wetlands, EO 12898 Environmental Justice, EO 13045 Protection of Children from Environmental Risks and Safety Risks, and EO 13112 Invasive Species. Comments and suggestions by community members address and are pertinent to these EO themes. Thank you very much. Sincerely

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CONTACT INFORMATION

Name: Luciano Minerbi, Dr. Arch., MUP. Phone: (808) 955-5406 Date: Dec 6, 202

Email: luciano@hawaii.edu

EDITORIAL | ISLAND VOICES

Column: Malama Ala Wai watershed ecosystem

By Luciano Minerbi - May 11, 2022

A recent editorial called for prioritizing green remedies and ecosystem resiliency while mitigating flood risk in the Ala Wai watershed ("Craft a holistic Ala Wai solution," Star-Advertiser, Our View, April 20). It requires an integrated natural resource management plan for the Waikiki ahupua'a, historically a wetland. Residents requested this all along. Also, University of Hawaii graduate planning students in 2001 were already advocating the integration of indigenous Hawaiian land and resources management techniques.

Available now is a useful tracking spreadsheet by the U.S. Army Corps of Engineers (ACE) listing about 200 measures that are "under consideration" or are already "screened out" when they are not within its authority or study scope. But this relegates to an afterthought essential environmental design measures.

An integrated ecological and flood control design solution would have different configurations than the one focusing on flood alone. Instead, a "co-design" approach engages federal, state, county and community partners in collaboration at each step of the process.

I hope officials populate and share the 200 measures with their own assessments by revealing in the spreadsheet which agency would be the leading one, and which other would be listed in a supporting role. A good example is how the Ala Wai Watershed Collaboration describes proposed linked measures, such as ones for the Ala Wai Golf Course and the Ala Wai Canal.

An appropriate engineering solution addressing simultaneously overlapping risks — potential imminent riverine flood and tsunami, and sea level rise — has a quite different design from one addressing only riverine flood. The same applies to ecosystem restoration — inclusive of pollution abatement, water quality, debris management and channel cleanups, invasive species control, forest management, coastal flooding and cultural recreational uses.

Evaluation should not be limited to what is permitted by the authority of ACE. There are other entities involved: the Environmental Protection Agency and several presidential executive orders requiring compliance with protection and enhancement of environmental quality; federal flood risk management standards; protection of wetlands; invasive species; environmental justice; and protection of children from environmental risk and safety risk. In fact, Hawaii's 1st Circuit Court in 2019 correctly reminded us that the state needs an acceptable environmental impact statement (EIS) to commit funds.

Good documentation allows each organization to clarify its kuleana, what they can accomplish or not and propose additional resources needed from funding authorities. Agencies should have institutional memory and document what was done in the past for this watershed. "Complying by referencing" previous studies and then updating what is missing can help the EIS be done more efficiently.

The Ala Wai Watershed Analysis already in 2003 recommended detailed ecosystem restoration measures. The Ala Wai Canal Flushing System and the Ala Wai Golf Course Detention System engineering studies done previously designed a multipurpose wetland for sediment, filtration, irrigation and vegetated marsh to greatly improve water quality. This is key for flood protection of Moiliili and Waikiki because it diverts storm waters from the Manoa-Palolo Canal right into the golf course.

The ocean water pumped up at Kapahulu into the Ala Wai Canal east end keeps its water moving and clean. These two measures make feasible the second ocean outfall at Kapiolani Park, well away from Waikiki.

Most importantly, after three decades, we deserve a planning framework that explicitly addresses how environmental justice serves all the affected neighborhood, including McCully-Moiliili, in terms of risks, flood reduction and ecosystem restoration. This would move forward the aspiration of the recent editorial.

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Luciano Minerbi is a professor emeritus of urban and regional planning at the University of Hawaii-Manoa.

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From: Dave Watase
Sent: Saturday, May 6, 2023 12:48:37 PM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Dave Watase's Public Comment #5 - Koali Road Wall

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Project.

The total property damage for the areas of Man1 and Pal1 is $5.03 million for the 50-year flood. I question the economic feasibility of the walls surrounding Koali Road area.

2017 FEIS - Appendix B - Economics - page 55

[cid:a6b088ac-8821-4099-a8d8-6478566bffcd]
2017 FEIS - Appendix B - Economics - page 57

[cid:85451d3a-b73c-4282-9937-e9861a601f8e]

Dave Watase
c. 808.728.0759

Table B-8. Existing Condition Single-Event Damages
1 Oct 2016 Prices ($000s); Index Year: 2015

Reach	0.5	0.2	0.1	0.05	0.02	0.01	0.005	0.002
ALA1	$0	$0	$32,033	$55,685	$98,044	$299,809	$464,886	$563,932
ALA2	$1,786	$21,768	$56,827	$101,139	$166,007	$214,029	$255,098	$334,810
ALA3	$170	$10,820	$37,957	$79,067	$158,907	$223,309	$264,326	$351,575
MPC1	$0	$0	$3,836	$7,481	$23,944	$43,945	$56,761	$76,808
MPC2	$0	$0	$0	$0	$9,505	$25,388	$39,516	$48,923
Ala Wai subtotal	$1,956	$32,587	$130,653	$243,371	$456,406	$806,480	$1,080,587	$1,376,048
Kah1	$0	$0	$0	$0	$0	$0	$0	$0
Kah2	$0	$0	$0	$61	$213	$349	$443	$643
Kao1	$0	$0	$0	$2,020	$4,416	$8,009	$9,806	$10,884
Mak1	$0	$0	$1,066	$3,447	$8,697	$12,814	$26,576	$98,376
Mak2	$0	$0	$0	$3,349	$28,650	$42,965	$58,485	$73,393
Mak3	$0	$0	$0	$0	$0	$0	$0	$0
Mak4	$0	$0	$0	$1,737	$2,289	$2,675	$3,030	$3,243
Makiki subtotal	$0	$0	$1,066	$10,614	$44,265	$66,811	$98,339	$186,540
Man1	$0	$9	$230	$1,018	$2,966	$9,656	$16,286	$24,194
Man2	$0	$0	$0	$0	$0	$0	$0	$0
Man3	$0	$0	$0	$0	$0	$0	$0	$3,570
Man4	$0	$0	$17	$703	$3,202	$4,960	$6,823	$17,583
Man5	$0	$0	$180	$600	$2,126	$3,602	$4,746	$9,092
Man6	$0	$0	$0	$186	$1,193	$2,257	$3,152	$5,403
Man7	$0	$0	$0	$0	$0	$0	$366	$789
Uni1	$0	$0	$0	$230	$21,736	$43,242	$63,871	$104,176
Uni2	$0	$0	$0	$0	$59,189	$201,089	$277,085	$322,683
Manoa subtotal	$0	$9	$426	$2,737	$90,411	$264,805	$372,329	$487,489
Pal1	$0	$0	$0	$0	$2,064	$2,957	$3,989	$4,980
Pal2	$0	$0	$0	$0	$0	$0	$0	$3,026
Pal3	$0	$0	$0	$0	$0	$0	$3,667	$6,039
Pal4	$0	$0	$0	$0	$0	$0	$2,015	$3,319
Puk1	$0	$0	$0	$0	$0	$7	$115	$263
Wai1	$0	$0	$0	$0	$0	$0	$2	$53
Palolo subtotal	$0	$0	$0	$0	$2,064	$2,964	$9,788	$17,680
STUDY AREA TOTAL	$1,956	$32,596	$132,145	$256,722	$593,146	$1,141,059	$1,561,044	$2,067,756

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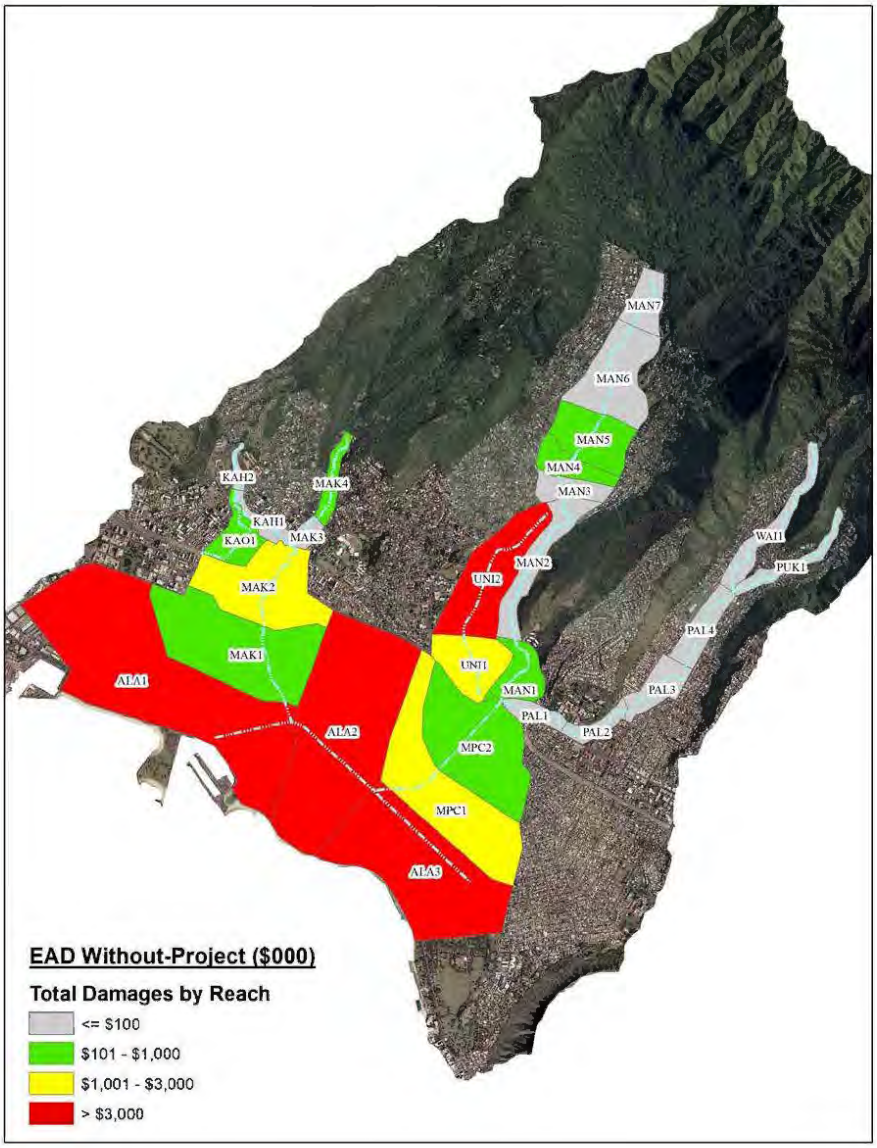
Figure B-4. Existing Condition Expected Annual Damages
2015 Conditions
1 Oct 2016 Prices ($$$)



CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Dave Watase
Sent: Saturday, May 6, 2023 4:20:06 PM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Dave Watase's Public Comment #7 - 2017 FEIS Flood Pumps at the end of the Ala Wai Canal

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Project.

This is the short version on the poor engineering application with the flood pumps in the 2017 FEIS which included two separate flood pumping stations one next to the Waikiki Library and the other near the AWGC driving range.

Purpose:

The flood pumps were needed to pump the stormwater into the Ala Wai Canal floodwalls whenever the flap gates are closed and the canal is above ground level.

Poor application:

* Directly hooked up without a collector or detention basin behind it and would have to be designed to handle the peak flows;
* With use of a detention basin behind the pumps could reduce the pump size requirements and cost;
* The hydrograph show that 75% of the peak flows would last for a duration of about an hour and this capacity would be underutilized for the rest of the storm;
* The peak flows pretty much coincide with the peak flows for the Ala Wai Canal in other words when canal is already full;
* Basically, whatever is pumped into the canal would have to be detained until the Manoa/Palolo Stream flows subside, then have to travel 2 miles at approximately 1 fps to exit at the Ala Wai Harbor;
* This seems like such a waste of pumping power which can be run several hours before a storm to lower the canal if worked in conjunction with a flood gate;
* If the flood pumps were designed to handle the peak flow of 3,600 cfs and run full blast for 8-hours the pumps could evacuate up to 100 million cubic feet of stormwater;
* One option would be to pump it down Kapahulu Avenue to the ocean a quarter of a mile away but that option most likely will be resisted;
* However, it would almost have a similar effect of having a second opening at the far end of the canal;
* Mike Elholf a local hydraulic engineer and contractor said a small 50-100 cfs pump could be used to pump clean ocean water into the far end to circulate and flush the canal and move over 4-8 million cf in 24 hours, this pump system can be separate and specific to improve circulation in the canal;

1

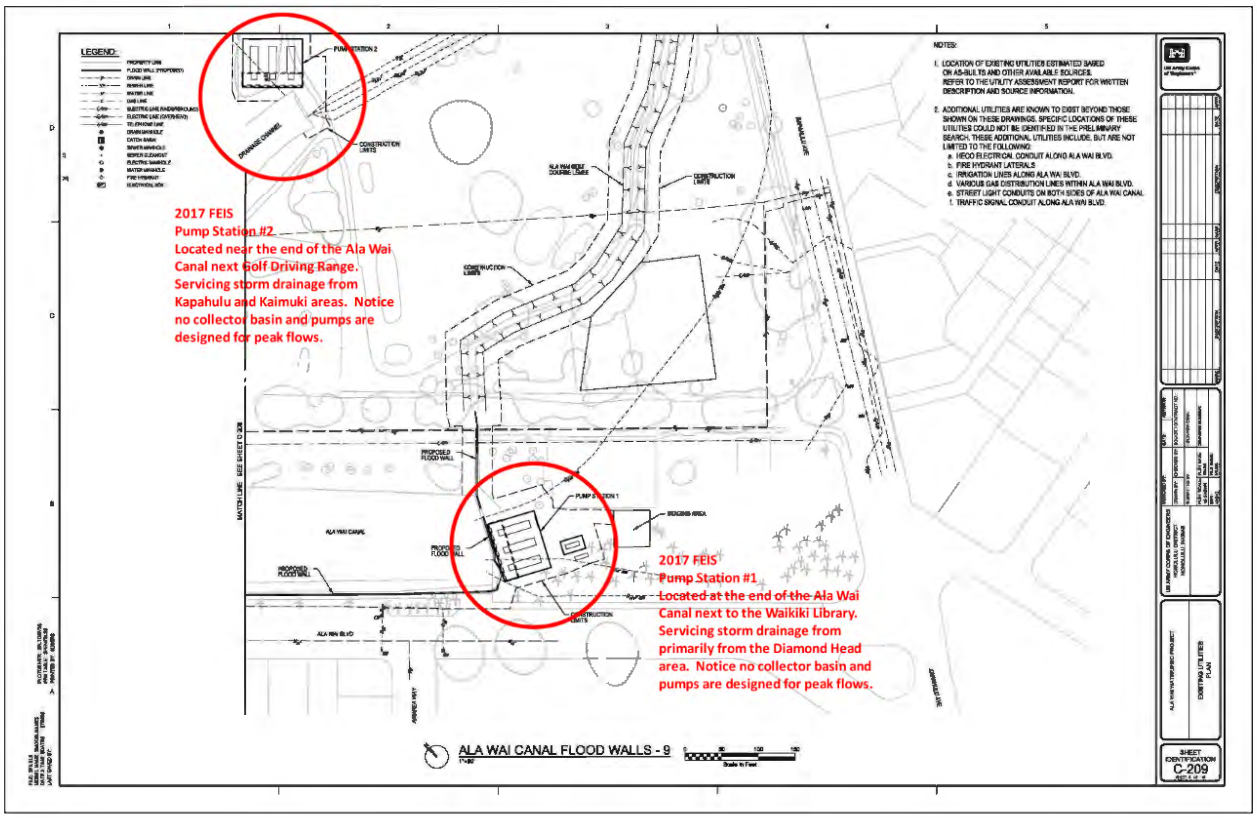
* With pipes and tunnels, the pumping station could be consolidated and constructed anywhere with in reach and in a location with least impacts;
* Having a central pumping station with multiple inlet locations provides flexibility and avoid repetitive redundancy requirements;
* My recommendation is to place the pumping station on the Ala Wai Golf Course (AWGC) and since the total volume from the Kapahulu end is not significant use the canal as the conduit to the Manoa/Palolo confluence pump inlet, from there the pump will send the flows via tunnels or pipes to the Ala Wai Harbor;
* Peer Engineering suggest the combining of pump station #1 and #2 to eliminate redundancy;
* Peer Engineering also suggested a pump station #3 near the University Avenue storm drainage outlet;
* Flood walls would most likely require a pumping station for Kapahulu confluence at the Manoa/Palolo Stream;
* Flood walls would most likely require a Makiki flood gate and Makiki Promenade Bypass or pumping station;
* Hausten's Ditch will have to be figured out;
* Flood walls would require a method to take care of interior drainage because Waikiki and the lower watershed will not be all blue skies when the big one hits;
* For comparison, the USACE said the Ala Wai Golf Course detention basin in the Perspective Plan has 300 ac-ft. of storage which equates to 13 million cubic feet;
* A 3,600 cfs pumping station can remove 13 million cubic feet out to the ocean in 60 minutes, bypassing the canal, and not susceptible to high tides, tide surges, and sea level rise.

[cid:576371a3-8bda-4cfb-a001-9c37a3423388]

[cid:a4d63ead-1189-4772-a921-8b75c263a1b7]

[cid:8199484a-6799-4795-8b8d-907cb213ff17]

Sincerely,
Dave Watase
c. 808.728.0759



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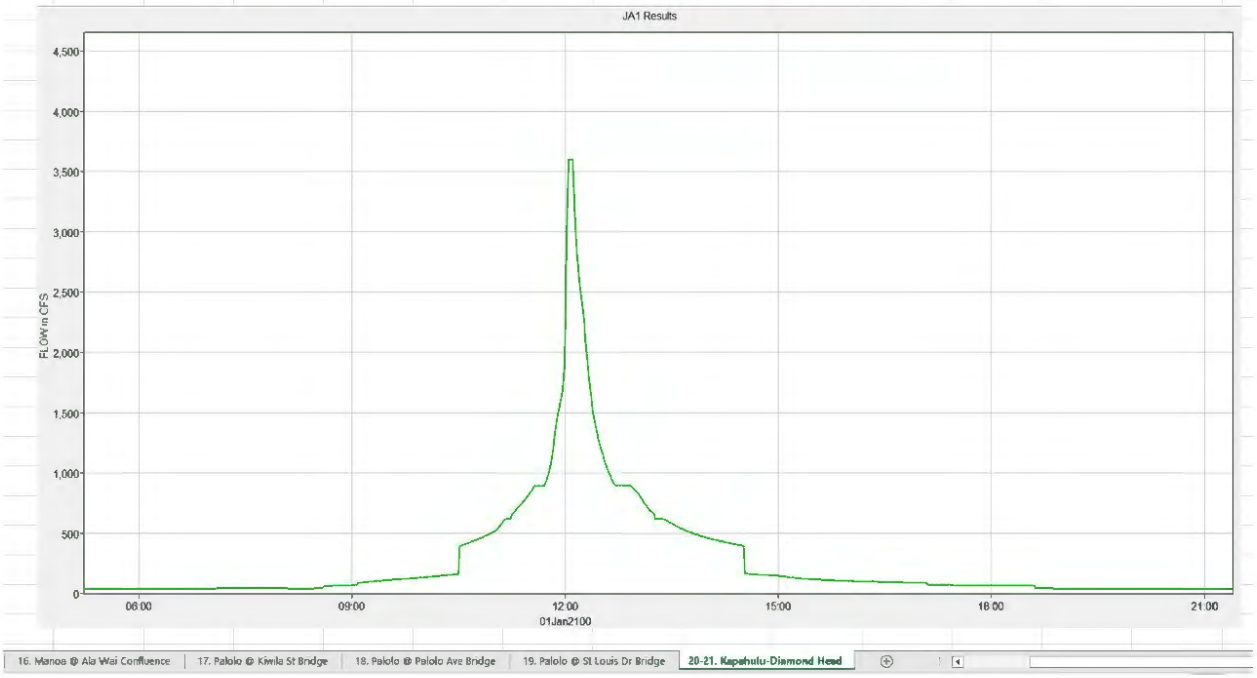

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Dave Watase
Sent: Saturday, May 6, 2023 8:55:00 PM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Dave Watase's Public Comment 8 - Hausten's Ditch Detention Basin

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Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Project.

Just want to point out the FLAWED Hausten's Ditch Detention Basin in the FEIS. The detention basins walls and berms are all above ground level in the grass area in front of the coconut trees and includes a baseball field as pictured below. The Hausten's Ditch gate will be closed to allow the floodwaters to flow above ground in the FEIS Ala Wai Flood walls (average 4'). No explanation on how the blocked stormwater will fill the detention basin since it too is above ground. The picture shows the University Avenue and this area of the street is relatively flat. Under the University Avenue is also a major 10'x8' storm drainage conduit.

The General Reevaluation Report's Prospective Plan calls for 6' high walls around the Ala Wai Canal. It will require taking care of the stormwater from the Hausten's Ditch when blocked off or be the cause of flooding.

[cid:5293477e-6a55-4bc4-9ca2-ce6541f88f63]

[cid:1b8d0ce6-dd70-4964-9966-f19f962d0e06]

Something's wrong and the water elevation on the profile drawing is not level.

[cid:caffc54a-c997-4432-ba4f-b1b16d8e84ee]

The University Avenue 10'x8' storm drainage conduit that the FEIS considered adding a Pump Station #3.

[cid:83902220-cc35-4f91-8fd2-1595c294f3fa]

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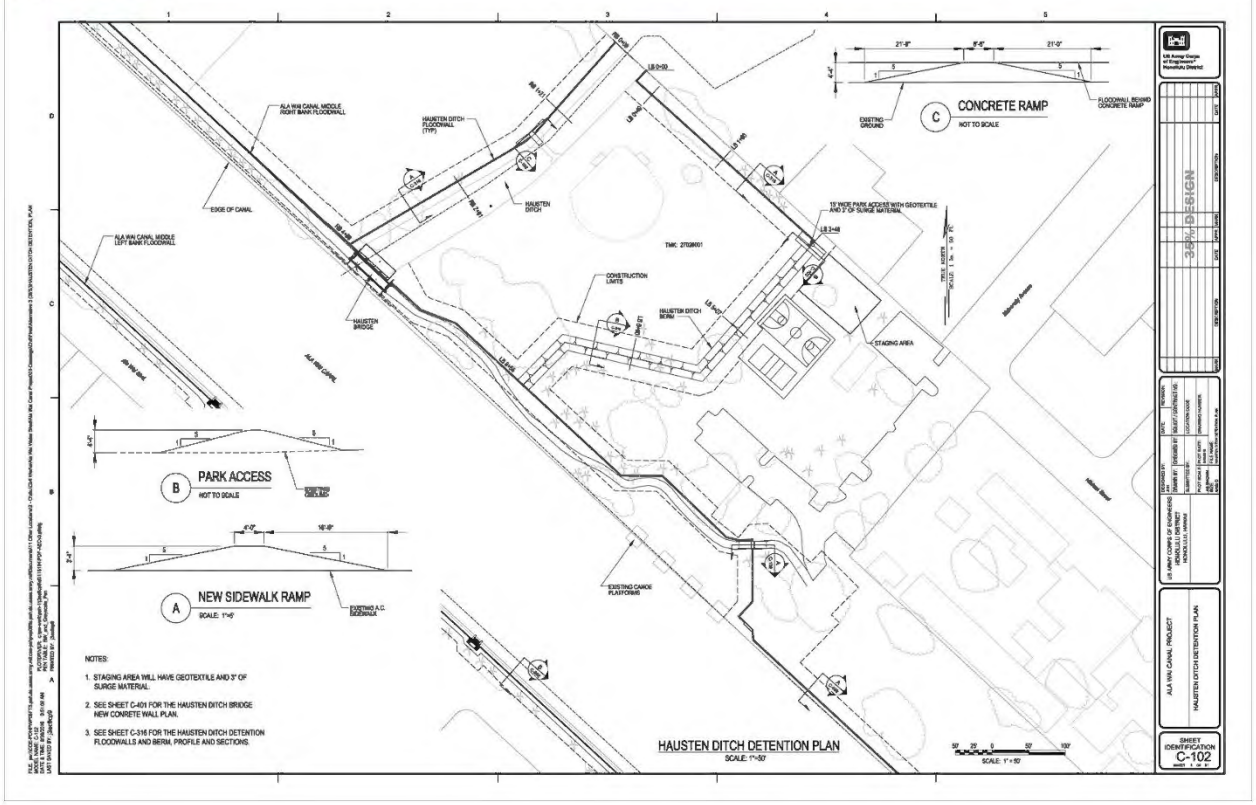

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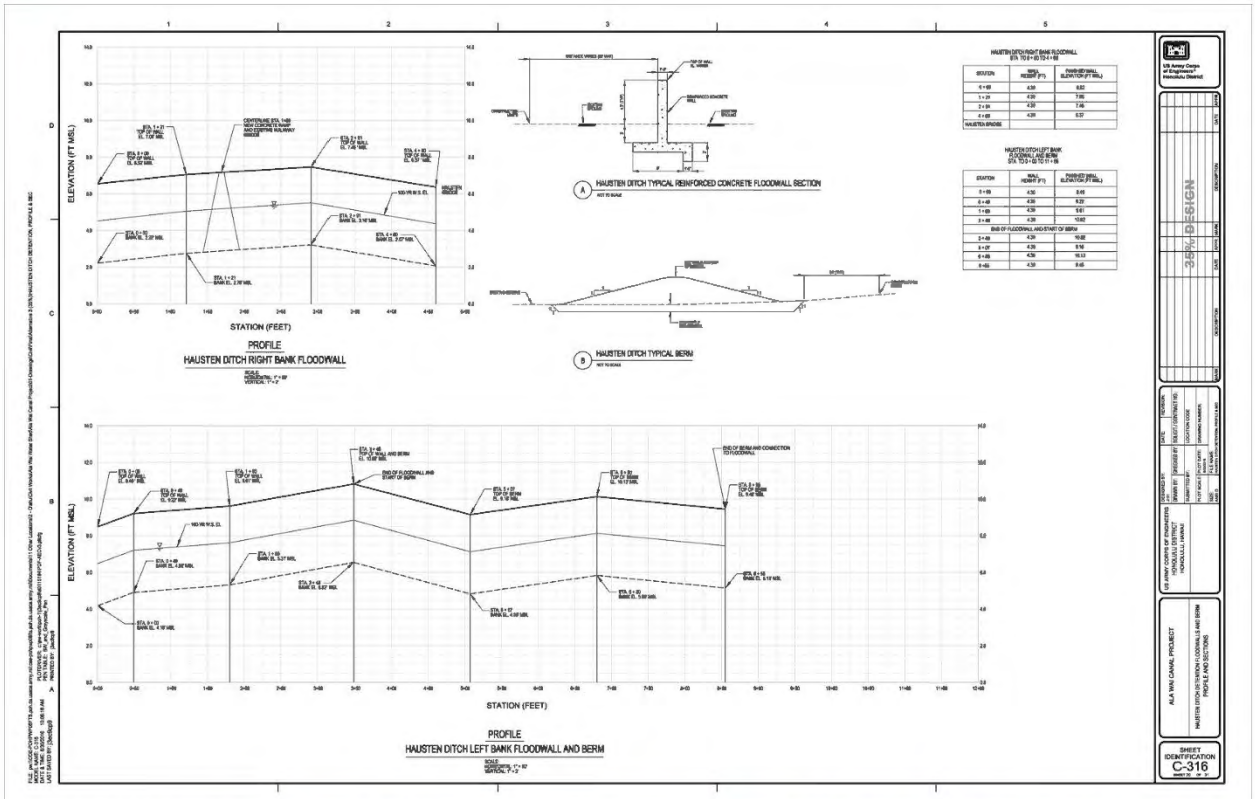

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Luciano Minerbi
Sent: Sunday, May 7, 2023 9:55:11 AM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Re: Comments for the Alawai NOI, EISP

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Aloha USACE & C&C: I add a list of themes I trust will be addressed in the Ala Wai watershed EIS. They summarize what was provided in more detail in my previous e-mail.
Mahalo for your consideration.
Luciano Minerbi

THEMES TO FULLY INVESTIGATE AND DESIGN IN THE ALA WAI NEW EIS Submitted by Luciano Minerbi May 7, 2023
Email: luciano@hawaii.edu<mailto:luciano@hawaii.edu>

AlaWai Golf Course: It should be designed with the greatest capacity as a Detention Basin to receive storm water by fully utilizing its acreage and depth, as the best features for flood mitigation in the entire watershed.

Manoa-Palolo Canal: recognize that the protection of the Iolani School site west of the Manoa-Palolo Canal needs to extend up to Date Street. Provide design and modeling details on how at least two conveyance conduits would direct floodwater into the Ala Way Golf Detention Basin to really protect Moiliili and the Waikiki neighborhoods. Provide pumps and movable dikes at this location to really divert this floodwater into the Ala Wai Golf Course Detention Basin.

Moiliili Drainage: provides interior drainage pumps to ensure that during storm events they convey the accumulated floodwater from the streets into the Ala Wai Golf Course and Canal.

AlaWai Canal: recognizes that Waikiki is two feet higher than Moiliili and that any improvements to the canal walls must make them at the same level on all sides. Recognize that the site where the Manoa-Palolo Canal reaches the Ala Wai Canal is lower than Waikiki and needs protection.

Canal Walls: water in the canal would be higher than along the surrounding areas. Explain how the Culverts operating in the Makiki and would avoid backflows.

AlaWai Pumps: Provide pumps in the Ala Wai Canal to keep water circulating and flowing to the Ocean both at the AlaWai Boat Harbor, the AlaWai Kapahulu outlet.

Kapahulu Side of Ala Wai Canal and Kapahulu Groin Site: fully assess feasibility of Reverse Pump and water wells to periodically flush the Ala Wai Canal by keeping water quality, velocity, temperature, dissolved oxygen at acceptable levels with ocean water or pumped from the Kapahulu Groin as suggested in the OEQC Dec 31, 1976 report "Improvement of Ala Wai Canal" by Cox and Miller; DLNR Noda 1993 report and in the DLNR Mitsunaga 2015 report and in the Stantec report June 1, 2022 at page 60-61.

1

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Watershed-wide Flood Detention Basin: redesign the Ala Wai Golf Course and the Kapi'olani Park as constructed wetlands with Hawaiian plants for water circulation and pollution abatement. For major flood events, divert the water overflow from the Ala Wai Golf Corse into Kapi'olani Park, so that both form a giant detention basin and constructed wetlands.

Integrated Agency Authority: ensure that the Ala Wai planning and design solution of the EIS does emerge in MOA and MOU from the effective collaboration by DLNR, C&C and USACE.

Viability of Design Solutions: ensure that the EIS spell out how, when and by whom maintenance is to be provided to the features of the Ala Wai Watershed flood mitigation plan.

On Sat, May 6, 2023 at 11:08 AM Luciano Minerbi <luciano@hawaii.edu<mailto:luciano@hawaii.edu>> wrote:
Aloha: I contribute my previous testimonies and comments on Ala Wai flood mitigation in the attached pdf as they remain to be addressed with proper documentations in the next reevaluation and EIS for the AlaWai plan.
I remain available for clarifications.
Thank you very much
Luciano

--
Luciano Minerbi, Dr. Arch. MUP, APA
Professor Emeritus
Department of Urban and Regional Planning Saunders Hall, 107
2424 Maile Way
University of Hawai'i, Honolulu, HI. 96926, USA Tel. (808) 955-5406 home office landline
e-mail: luciano@hawaii.edu<mailto:luciano@hawaii.edu>
("Non dat veritas sine memoria" Latin Proverb)

--
Luciano Minerbi, Dr. Arch. MUP, APA
Professor Emeritus
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("Non dat veritas sine memoria" Latin Proverb)

THEMES TO FULLY INVESTIGATE AND DESIGN IN THE ALA WAI NEW EIS

Submitted by Luciano Minerbi May 7, 2023
Email: luciano@hawaii.edu

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Viability of Design Solutions: ensure that the EIS spell out how, when and by whom maintenance is to be provided to the features of the Ala Wai Watershed flood mitigation plan.

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Seth Kamemoto
Sent: Sunday, May 7, 2023 1:10:20 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Public Comment to Ala Wai SEIS

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Dear Accepting Authority,

Please accept my public comment to the Ala Wai SEIS Notice (attached).

Thank you,
Seth Kamemoto

Seth Kamemoto
3228 Pakanu St.
Honolulu, HI 96822
skamemoto@gmail.com

May 7, 2023

Haku Milles
City and County of Honolulu, Department of Design and Construction
650 South King St, 11th Floor, Honolulu, HI 96813
(808) 768-8480
dominic.milles@honolulu.gov

Dear Haku Milles:

Please accept the following as my public comment pertaining to the Supplemental Environmental Impact Statement Preparation Notice (EISPN) for the proposed Ala Wai Canal Flood Risk Management Project.

Clarifying Questions:

How was the storm protection level chosen (i.e. 50-year modeled event vs. 100-year modeled event)? My understanding was that the previous Ala Wai proposal was attempting to mitigate a 100-year flood event, and this current proposal will attempt to mitigate a 50-year event. What factors go into this requirement for protection level?

How will the proposed system perform WHEN it is overwhelmed by a storm event in excess of the design storm? Beyond the breaking point, how will the proposed system perform, especially compared to a No Action Alternative? I'm concerned that there might be more risk when floodwalls overflow, and then potentially trap water in areas not designed to flood at all, causing more damage, especially to public health, as standing water after flooding is acutely dangerous to anyone who remains in the area.

How is "value" determined (both for life and property), in choosing what areas to protect and how to protect them? Is property value based on assessments (so value of buildings themselves) or revenue generation (commercial or rents)? There's phrasing in one of the presentations, "would not benefit most socially vulnerable communities," which was used as justification for removing a protection measure. What is meant by this? Is life risk from flooding lower in socially "non-vulnerable" communities? What is the life risk in general from flooding? How many people have died historically from catastrophic flooding events in the area?

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General Comments:

This is an over-engineered solution to address a hypothetical or modeled flood event problem; not a real-world flooding problem. Any flood event exceeding the modeled event could be more catastrophic than no action. A 51-year storm will overwhelm a system designed for a 50-year storm. It's not a question of IF, it's of WHEN. Communities on the "other side" of any floodwall will be immediately flooded, with no viable drainage options. Standing water will remain longer, and cause more risk to public health.

This assumes that models and projections are accurate, AND that the system remains in working order AS DESIGNED throughout the flooding event. Loss in power could render pumps useless and debris caused before or even *during* the flooding event can clog drains/culverts. Our existing stormwater systems are not well-maintained (filled/clogged with debris/silt); how can we be confident that the proposed system will be adequately maintained and ready for the designed flood event?

These flood models are showing a 50-year flood event much worse than we've seen in the past 100 years, and worse than what current FEMA Flood Maps appear to indicate. Please elaborate on this difference. I suspect that projections for climate change (sea-level rise, loss of forest/watershed, more-intense rain storms) and development (increase in impervious surfaces) are probably driving these drastic model forecasts. If that's true, we should work to *reduce* the source of the problem (e.g. fight climate change, save our green space, reduce impervious surfaces), as opposed to just build a wall that we think might be high enough to protect from a model of it.

50-year flood as modeled for the Ala Wai Flood Project

FEMA shows most of Manoa as Zone X (outside a 500-year flood event)

Modeled 50-year flood vs. Current FEMA Map

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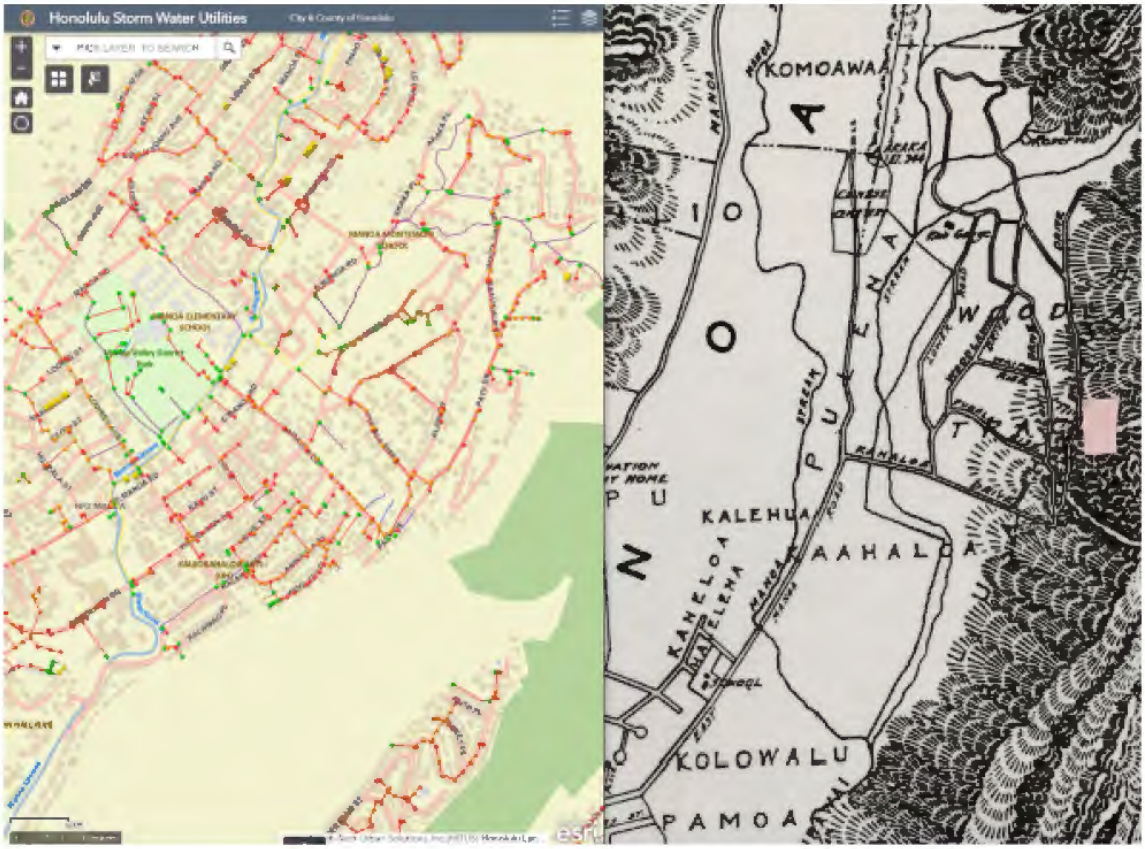
An ounce of prevention is worth a pound of cure. Reducing excessive surface water runoff from entering our rivers and streams in the first place should be the primary focus. This will help with EVERY storm event, from an annual storm to a 100-year storm. Less stormwater entering our systems is always a benefit. On its own, our island would be very effective at managing rainwater. It's our impact, from actions such as over-development that reduces ground permeability and green space, that is making this flooding problem worse for our future.

Suggestions:

Please revisit the Woodlawn area (previously referenced as the Woodlawn Ditch in the original Ala Wai EIS). The stated objective of this project is to reduce riverine flood hazards to property and life safety in the Ala Wai watershed, but for whatever reason, it appears that natural stream systems in the Woodlawn area of Manoa Valley were reclassified as "drainage ditches" at some point in the past (as shown in the map comparisons below). Those "feeders" on the Woodlawn side of Manoa, although currently considered part of a "drainage system", appear to be natural rivers and streams, and therefore should be considered in this project, as water from them should be considered "riverine flooding". The 50-year flood model with No Action shows significant flooding in the Manoa area, specifically in the section where Woodlawn "ditch" meets Manoa Stream.



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Current Honolulu Stormwater Map (Left) compared to 1920 Map of Manoa (Right). Note that in 1920 there were two streams through most of Manoa; today what was once a stream on the Woodlawn side has been reclassified as city stormwater drainage ditches (purple lines, top right of map on Left) and redirected through Woodlawn Ditch to meet Manoa Stream before the Manoa District Park.

Please revisit watershed health. I realize that this project is focused on riverine flooding, but river water comes from somewhere: it's not just conjured into a river or stream. Riverine flooding will reduce if the source of that surface water is better managed through a healthier watershed. And the argument that watershed health alone can't protect against some modeled catastrophe and therefore should be dismissed is fundamentally flawed. A real storm can run the entire gamut of possibilities, so the modeled measure is completely arbitrary, and only provides statistical protection against the modeled event. Floodwalls and detention basins provide specific protections up to some specified flooding level, which is brittle in the sense that a larger flood will completely defeat the protection and could cause even more damage than nothing at all. In contrast, watershed health buffers against every storm event, providing meaningful protection from every storm. Most critically, it could buffer enough to mitigate a potential catastrophe, for example by making a currently-modeled 40-year storm look more like a 25-year storm, which would be much more manageable.

Thank you for your consideration,
Seth Kamemoto

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Dave Watase
Sent: Sunday, May 7, 2023 4:01:31 PM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Dave Watase's Public Comment 9 - FEIS flood walls and berms

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Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Project. I have the same concerns for the FEIS Ala Wai Canal flood walls (average 4' in height) as for the 6' high walls around the Ala Wai Canal for the General Reevaluation Study. I OPPOSE the use of 6' high flood walls around the Ala Wai Canal and question if the wall hydrology and hydraulics were done accurately.

One major difference between the 2015 Draft EIS (DEIS) and the FEIS is that sea level rise (50-years in the future 2075) was added into the hydrology and hydraulic computations. Clearly, the increased sea level rise had a significant impact on the flood modeling depth. Flood damage figures increased across the board including areas in higher grounds and with an increase to $1.14 billion (in the FEIS) from $317 million (in the DEIS).

USACE's project manager, Jeff Herzog, said that the FEIS was designed to accommodate an intermediate sea level rise of 2.7' MSL. Honolulu has average high tides throughout the year of 2.0', King Tides of up to 2.7'. In the worst case scenario a total of 4.7'-5.4' MSL would have to be accommodated on the drawings. The wall edge of the Ala Wai Canal ranges from around 4'-6' MSL and is around 5' MSL across the Manoa Stream Confluence. Without the FEIS floodwalls, the maximum velocity is dependent on the difference in height of the canal flood water at the Manoa Stream Confluence and the height of the ocean at the Ala Wai Harbor. At low tide this would be 5' of difference that would generate the velocity of the flows. It should be noted that the Ala Wai Boulevard is around 6" below the edge of the wall height and much of Ala Wai Canal's surrounding interior storm drainage systems have very little head pressure to generate velocities. High tides and when Manoa Stream flows raise the level of the canal, the immediate interior storm drainage systems become nonfunctional and could even backflow.

Already when we have King Tides of approximately 2.7' MSL some sections of our roadways experience backflow from their storm drainage outlets.
[cid:724fd094-dc6d-4911-a6fd-8fa37b0ed349]

This is the same location without a King Tide. The picture below and above are located at the end of Ala Wai Boulevard near the Ala Moana Boulevard Bridge.

What should also be noted is that the limited potential for volume exiting the Ala Wai Canal is limited to the available cross-sectional area under the Ala Moana Boulevard Bridge. The cfs exiting the Ala Wai Canal is not dependent on the depth of the canal and another way of looking at it is as if the ocean level is the solid base of the canal. Whenever the

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ocean level is higher than the Ala Wai Canal no storm water will be able to exit until the canal is higher and only then will water build up to generate a slope which will dictate the velocity of the flow. The USACE needs to evaluate the actual additional cfs flows exiting the canal as a result of the 6' Ala Wai Canal walls and berms. The Ala Wai Canal is about 200' across near the Ala Moana Boulevard Bridge and the height of the flows at this point seem to be only a few feet of added benefit. This means 200-600 cross-sectional area and when multiplied by the projected velocity gain will produce the cfs. At 1 fps it would barely increase conveyance and the result is more detention.

[cid:2d82a3c1-9a32-4bd7-a567-16ccf5d329b8]

[cid:e4f1d63a-f498-4afb-893e-795c14d6a9e8]

The problem with the General Reevaluation Study is that the USACE for the most part has for the longest time not set a target storm for protection. Recently, we have been told it is a 50-year flood. So, the first question that comes to mind is what happens when a storm greater than the 50-year model hits. Will the flood walls and berms be overtopped? The FEIS indicated that even the 4' average flood walls would have residual flooding in Waikiki because of the because the floods are flashy in nature (not consistent in flows), this flashiness could easily erode segments of earthen berms unless scouring protection is provided to withstand overtopping. As we all know, holding back water creates catastrophic flood damage when dams and walls fail. The FEIS in the Engineering peer review have legitimate concerns regarding the flood walls primarily because of the porous coral substrate which can be prone to liquification and lose its supporting capacity resulting in walls tipping over. The porous coral substrate is like a sponge that will let water through under pressure possibly requiring micro piles under every inch of the wall or sump pumps and larger footings. The idea of an elevated walkway and bike path half and half wall could be a solution but will most likely require removing an additional lane of traffic along Ala Wai Boulevard, eliminate a parking lane, eliminate right turn lanes, and require handicap ramps at ever intersection and access to the canal steps. I don't think you can relocate the coconut trees to the edge of the original Ala Wai Canal wall even if you put a sloped earthen embankment.

[cid:f449e616-3dca-42c9-a2ef-a2df5cbabb46]

Sump pumps and micro piles?

[cid:90794879-87bf-4427-9a9e-bca2f551ae00]

Concern regarding potentially damaging the 72" sewer force main serving all of Waikiki

[cid:5d44b24d-55f7-47b9-a2f9-2764caad4f9d]

The FEIS impact on interior drainage is flawed. Only assessed pipes larger than 18" and only did modeling for a 10-year storm for 1-hour duration. A lot of backflow flooding can result from storm drains smaller than 18" and the flood flaps would be closed for an estimated 6-hour duration.

[cid:6da578af-8b54-4071-8955-a83d059796aa]
The Residual Flood Modeling with the FEIS flood walls only accounting for 18" and larger pipes and only for the 10 year flood with a duration of 1-hour. Should have been studied for the 100-year flood for 6- hours duration.

[cid:077833a1-1b1f-4a37-b7ee-e00598656ad6]
The Makiki Stream will require a something to prevent backflow flooding up stream. The FEIS failed to address this mistake. The EDR included a poorly thought out solution called the Makiki Bypass.

[cid:ce6a0011-372f-4b91-b840-31d0e5ac035a]

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The EDR's Makiki Bypass which would have to include a flood gate. It would be susceptible to high tides, tide surges, and sea level rise. At high tide 80% of it would be submerged and there is limited head pressure to establish the proper flow velocity to handle the needed cfs, especially in a storm condition. The other big thing is that the Ala Moana Neighborhood Board was very critical in their comments to going under the Ala Wai Promenade with historic walls and designated trees.

[cid:f675fb6f-245f-4bd1-840b-35291a8aa66d]

The EDR's Makiki Bypass a 10' x 20' conduit pass though under the Ala Wai Promenade in addition to building the flood walls. Good luck!

[cid:04cc1057-ec24-46cb-8ed8-c27b074e6a70]
[cid:a62eef96-b2ef-44a1-8724-a05779bc3574]

The Kalakaua Bridge does not have adequate cross-sectional clearance to accommodate increased flows. The higher the wall the greater the restriction.

[cid:f19e9a88-c030-4f2e-9058-63b496b087e4]

December 2021 storm caused Kalakaua Avenue to flood near the Royal Hawaiian Shopping Center because the Waikiki's interior drainage did not have adequate head pressure to push the flood waters to the Ala Wai Canal. This storm was not even a 50-year or 100-year storm and if you combine a 10, 20, 50, 100-year flood with storm drainage flap gates it would result in severe flooding. The big storms, or a downgraded hurricane could park itself in Manoa Valley and Palolo Valley and uniformly dump rain across both the upper and lower Ala Wai Watershed which is only 16.2 square miles and 7 miles long from top of the watershed to the ocean.

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[cid:ba7d8c91-c750-40e5-8b9c-e4e7255eadb5]<Blockedhttps://www.youtube.com/watch?v=X-dQB3462tg>

Waikiki Flood<Blockedhttps://www.youtube.com/watch?v=X-dQB3462tg>
Hawaii, Oahu, Waikiki rain, storm, flood Blockedwww.youtube.com

The Ala Wai Canal's interior storm drainage system is tidal influenced and has very little room to spare. Much of it is submerged with a King Tide. It won't take much sea level rise to shutdown our whole interior storm drainage system and the flood walls no matter how high will not help one bit and everything will have to be redesigned at that time. It is better now, to incorporate a solution to both the 50-100 year flood with making our interior storm drainage system more resilient to climate change, sea level rise, and tide surges. Pictured below is the University Avenue storm drainage culvert completely submerged during a King Tide.

[cid:9ccb2e0a-5573-4107-bc53-a836afa648b0]

The Ala Wai Canal according to an April 1998 Study on the Ala Wai Watershed states that the Ala Wai Canal can carry a maximum of 5,200 cfs at a velocity of 1 foot per second. The distance from the Manoa Stream Confluence to the Ala

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Wai Harbor is approximately 1 mile and at a velocity of 1 fps would take the flood water about 1-1/2 hours to reach the Ala Wai Harbor. The Ala Wai Canal is flat and can generate no velocity by itself. As the floodwaters rush into the Ala Wai Canal, the waters rise because of the no slope condition, the rising waters basically create it's own slope and the maximum velocity of the existing flood waters from the Ala Wai Canal would be dependent on the height of the canal walls.

[cid:98282a1d-d9f3-4807-96bb-dbb674b1036e]

The FEIS has several versions of wall profiles and is not consistently put together. Below is the latest version at 35% engineering and should include 2.7' of sea level rise and accommodate for high tides. What I want to point out is that the MSL is 2.0 which would only factor in the regular high tides. King Tides are 2.7' MSL and to take sea level rise into consideration you would have to add an addition 2.7' for a total of 5.4' (for 2075). The wall profiles don't reflect any accommodation to sea level rise. The other big thing to notice is that the flow cross-section would be 1' x 200' which would increase the capacity cfs by 200 x the velocity of the flow. There seems to be about 2' spare from the water elevation to the top of wall but even factoring this in has very limited capacity improvements. I'd like a hydraulic engineer to examine and determine the maximum flows that can be determined by the energy of the height of the water at the Manoa Confluence to push out the water less the friction of the canal. We all know water flows downhill and nothing will leave the canal until it is higher than the ocean.

[cid:4fcdc644-3c09-44a5-be17-8070c2716d64]

[cid:b324355a-238d-42aa-af05-a34de8c5203c]

The Engineering Documentation Report's - Grand Flood mitigation element: A 4,000 cfs flood pump built in the middle of the Ala Wai Canal with a flood gate, bridge and mosaic

Right of the bat - what's the thinking. Although, this flood pump has a detention basin behind it ... lesson learned from the FEIS. A 4,000 cfs pump can empty the back half of the canal 10' deep in about 30-40 minutes and can empty the General Reevaluation Study's 300 ac-ft AWGC Detention Basin in about 54 minutes. This is a crazy idea because if the front end of the canal is running at capacity, the flood pump will have to remain idle and for most of the time ... that's probably what will happen. Constructing a flood pump in the middle of the canal with water all around got to be twice as costly as building it on land. This flood pump would evacuate a very small portion of the total volume from a 100-year storm. If the big storm doesn't follow the exact calibration of the model then the whole plan fail. A 4,000 cfs pump if utilized right can be run for the full 8-hour peak duration of the storm's hydrograph and completely bypass the Ala Wai Canal with a tunnel or pipe going under the canal or another route to the ocean or harbor.

4000 cfs x 60 sec/min x 60 min/hr x 8 hours = 115,200,000 cubic feet (better use if placed on the AWGC in conjunction with tunnels and a flood gate)

Based on the updated modeling hydrograph curve data the 100-year flood over a 24-hour period will generate 347 million cubic feet of water. Really, what good is a few million cubic feet of detention storage using Kaimuki High School. Potentially the Manoa and Palolo tunnels combined can evacuate 6,000 cfs and completely bypass the Ala Wai Canal. Tunnels are immune to tide surges, sea level rise, and high tides.

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The General Reevalution's Grand Flood mitigation element: The Ala Wai Flood Walls

According to the USACE's plan ... the 6' high flood walls would require Kalakaua Avenue Bridge and McCully Street Bridge which are major ingress and egress for Waikiki. Just blockage alone should be a no starter and disqualify high walls around the Ala Wai Canal. But it doesn't end there and includes Date Street, Kapiolani Boulevard, and King Street which are also major thoroughfares. The FEIS hydrographs show high volumes of flow for at least 6-hours duration.

[cid:fa0777be-76b0-4034-a8ce-7653f8c96900]

I believe the best solutions are those that can work independent from the Ala Wai Canal.

* Manoa, Palolo, and Makiki Tunnels;
* Flood pump and switching station on the Ala Wai Golf Course;
* Flood gate (lock gate for recreational user if sea level rise occurs);
* Ala Wai Golf Course Multiple Detention Basins with flood waters captured upstream at a higher elevations;
* If a flood gate and pump system is built then the Ala Wai Canal can also be lowered to increase detention capacity;
* Any time the canal water elevation is higher than the ocean the flood gates can be opened to allow additional releases
* Everything would still have to be vetted by the communities;
* An idea that would have to be run by the paddlers would be to have an outflow riser that doubles as a canoe launch near Magic Island at the Ala Wai Harbor, if not it would be piped underwater at near that location (see diagram below).

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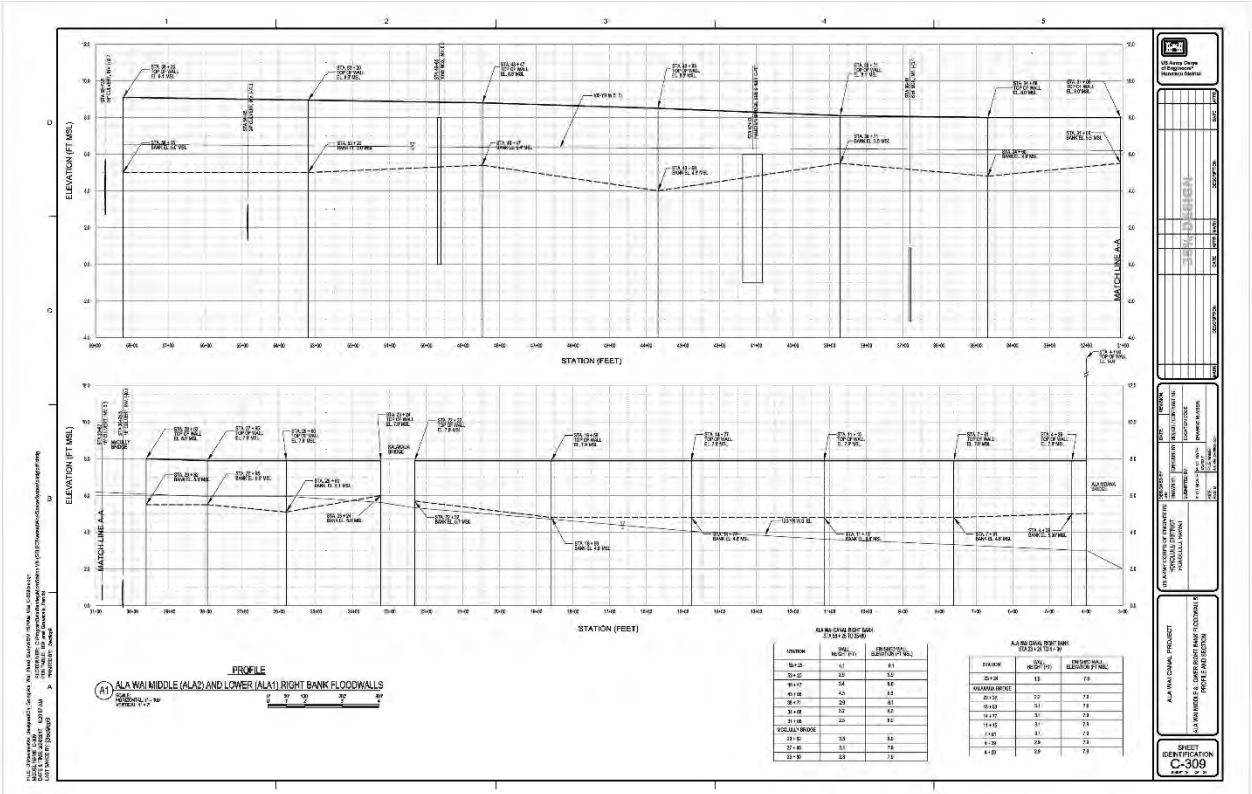

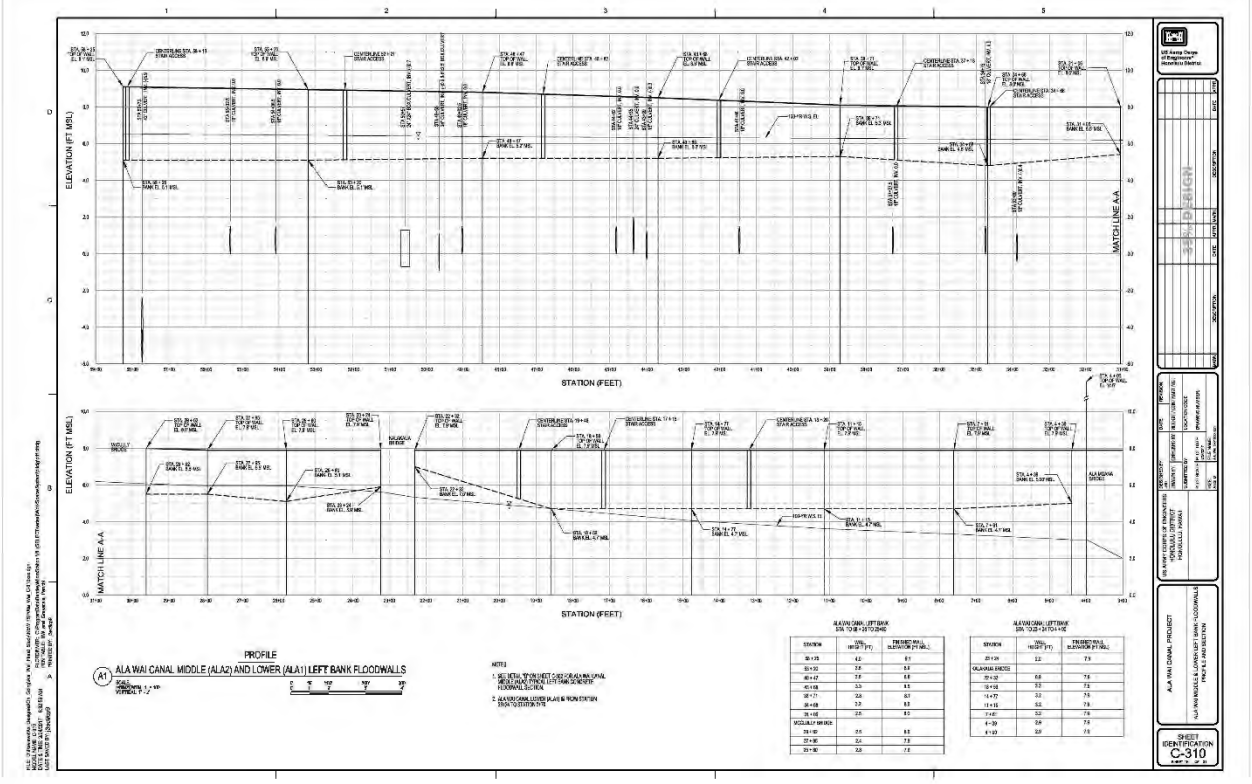

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3.5. *Problem:* Flooding. Flood hazards in Waikiki and areas surrounding the Ala Wai Canal are one of the least well-known public health and safety problems. The actual design-capacity of the Canal provides for about a "10-year" storm flow (DLNR, January 26, 1994). This is a very small capacity which does not meet current City drainage standards. A suitable design standard in conformance with City drainage standards in this urban area would be at least a capacity for a "100-year storm". A "10-year" storm has a 10 percent chance of occurring once in any year. In recent history, the most severe event was a "30 to 40-year" rainfall which occurred in 1968. A 100-year storm has a one percent chance of occurring in any year. (See Figure 22A)

To improve the flood carrying capacity of the Ala Wai Canal requires that the cross-sectional areas of the Canal be increased, especially from the location of the McCully Street Bridge, all the way to the ocean. The problem is that the Canal is 100 yards wide upstream of this bridge, but it narrows to about 75 yards to pass under this and the two bridges downstream - Kalakaua and Ala Moana.

In the event of an extremely serious rainstorm, the Canal will overflow its banks, first on the mountain-side, then on the Waikiki side. Water would overflow into Waikiki. Waikiki's storm drains in the area between Kalakaua and the Canal would back-up and overflow because they could not drain the rainwater into the flooding Canal. Basement sump pumps in many of the larger buildings and garages in Waikiki would be flooded and unable to remove water from low-lying areas.

In some cases, pumps which move sewage from buildings into the City sewers (or even the City sewage pumping station on Kuhio Avenue) could be flooded and fail. These events would halt the movement of raw, untreated sewage out of Waikiki.

All of Waikiki would be covered with a layer of silt, mud and debris. Traffic would be snarled and it would take some time for the area to become passable. Clean-up and return to normalcy would take longer.

All the tributary streams to the Ala Wai Canal have less than a 100-storm capacity, even though some of them are hardened channels constructed primarily to drain water from the urban

FLOODING

- **The Canal has only a 10-year flood capacity, and can carry a maximum of about 5,200 cubic feet per second (cfs) of water at a velocity of one foot per second.**
- The 100-year flood has an estimated peak discharge of 22,400 cfs, more than four times the Canal's capacity.
- **The most recent severe storm recently was in 1968, somewhat less than a 50-year event (19,247 cfs).**
- Since 1968 there have been only two rainfall events (1968 and 1971) approximately equal to or exceeding the 10-year event.
- Waikiki storm drains in the area between Kalakaua Avenue and the Canal will not function under higher Canal flows (probably those less that the 10 year flows).
- **Maintenance dredging does not significantly improve the flood carrying capacity of the Canal.**
- Three types of flooding threaten Waikiki.
  - tsunami (from the ocean)
  - hurricane storm waves (from the ocean)
  - Ala Wai Canal flooding (from rainfall)
- The Flood Insurance Rate Map flood elevations and water flow velocities are higher for non-Ala Wai Canal flooding.

Figure 22. Swollen Ala Wai Canal After Minor Rains.

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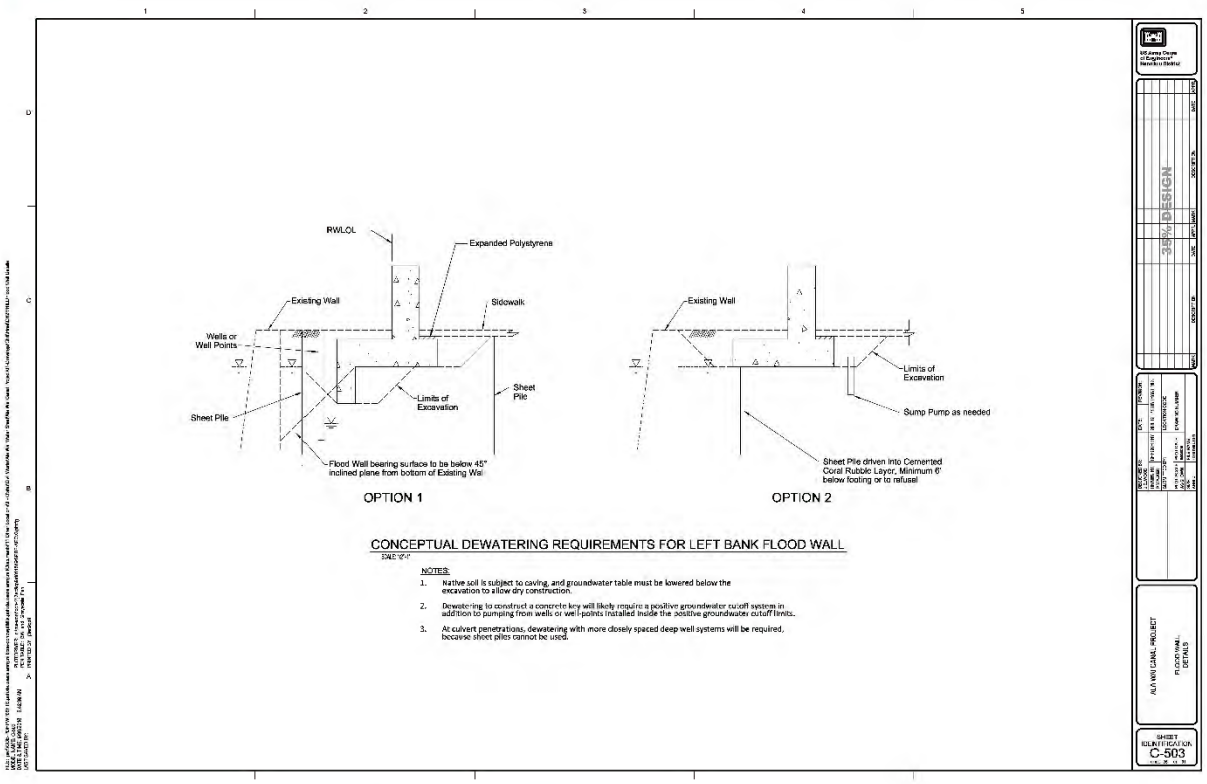
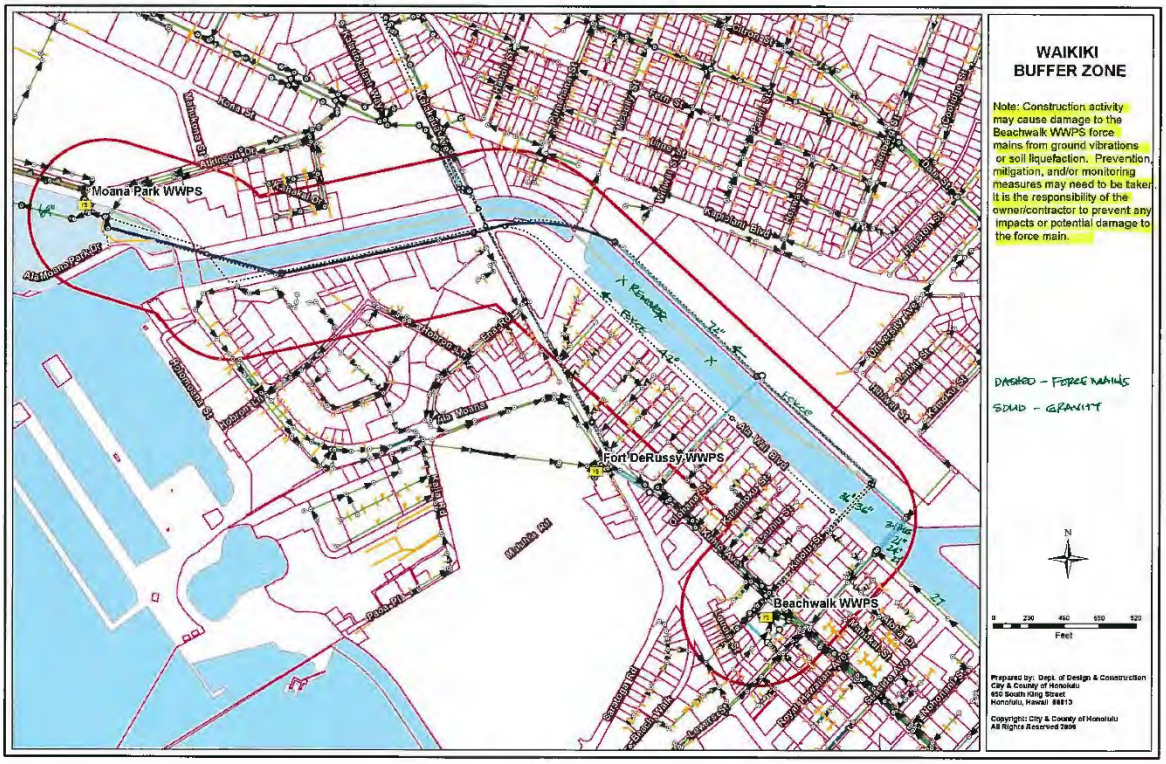
Final Panel Comment 4
Site conditions for the Ala Wai Canal left bank floodwall may not have sufficient space to design an adequate factor of safety against sliding and overturning.

Basis for Comment
Ala Wai Canal FS/EIS Draft Report Appendix A2, Plate 11, TSP 35% Design sheets C-103, C-309 and C-316 indicate construction of "inverted T" shaped floodwalls for Hausten Ditch Detention Basin and the right bank (mountain side) Ala Wai Canal with foundations 3 feet below grade and 9.5 feet wide, with a key to resist sliding an additional 3 feet deep. Report Appendix A2, Plate 11, TSP 35% Design sheets C-310 and C-311 indicate construction of "L" shaped floodwalls for the left bank (ocean side) of the Ala Wai Canal with no foundation heel, no key, and the toe foundation 1 foot below grade. The report does not include specific geotechnical data or floodwall design calculations. The Panel expects that geotechnical data and design loading for floodwalls on both sides of the canal would be similar; thus, the floodwall foundations would also be similar. However, as indicated above, the foundations are very dissimilar. USACE Engineer Manual (EM) 110-2-2502 Retaining and Flood Walls does not provide guidance for the use of "L" shaped floodwalls, though the same general design process for "inverted T" shaped walls can be applied to "L" shaped walls. While EM 110-2-2502 addresses only specific design methodologies, conservative rule-of-thumb professional judgment would begin with a floodwall foundation width equal to wall height, with the foundation heel equal to approximately 2/3 the foundation width and the foundation toe equal to approximately 1/3 the foundation width (Federal Emergency Management Agency [FEMA] Engineering Principles and Practice Chapter 5F). The "L" shaped left bank floodwall includes a foundation equal to only 2/3 the wall height, with all foundation in the toe and no foundation heel. Therefore, the Panel is concerned that the "L" shaped left bank floodwall foundations may not have sufficient factor of safety to resist sliding and overturning. Ordinarily, this matter would be corrected during the Preconstruction Engineering & Design (PED) phase and increased incremental cost would be covered by the project contingency. However, the left bank site conditions may not provide adequate available space for construction of either the floodwall design indicated in Detail C of Sheet C-311 or any other cantilever design resulting from a re-evaluation of foundation conditions. The already narrow available left bank work area is complicated by existing, possibly historic, canal wall stone work, existing utilities (street lighting and hydrants observed on Google Earth) and trees (indicated on plan drawings and artist renderings), and proximity of heavy vehicular and pedestrian traffic. If a left bank flood wall foundation designed with an adequate factor of safety against sliding and overturning cannot be constructed within the available site without impacts to site constraints, then a significant change in the TSP 35% design may be required. This change may be so major as to change the design concept and cause more environmental impacts to existing canal stone walls, utilities and trees, and traffic. Furthermore, the design is not aligned with the currently assessed level of risk assigned at this stage in the SMART Planning process.

Significance – Medium





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At the Manoa-Palolo canal, water overtops the right bank and will inundate the area around the Iolani School. An economic analysis was performed to determine whether extending the floodwall upstream to the Date St. Bridge can be incrementally justified. This analysis showed the floodwall extension to be economically infeasible.

At several locations along the streams modeled, hydraulic jumps appear. These jumps occur at the upstream side of various bridges and culverts and are mainly a result of changes in topography and channel slope as the stream bed transitions from the steep uphill areas to the flatter valley areas.

In general, implementation of the recommended plan reduces peak flows entering the Ala Wai Canal system and the floodwalls protect the surrounding area from damage due to flooding. Plate 4 shows the water surface profiles of the modeled stream for the TSP.

8 INTERIOR DRAINAGE

Along both banks of the Ala Wai canal, there are numerous drainage outlets from the storm sewer system. These outlets will require the installation of flap-gates to prevent water from backing up and inundating areas beyond the floodwalls. During storm events, these flap-gates will close and prevent water from draining into the canal. This will cause residual flood inundation to the areas protected by the floodwalls. This residual flooding is not expected to be significant due to it being shallow sheetflow and not dep ponding.

To determine impacts of storm drain or storm sewer outfalls being shut during periods of high water surface elevation in the Ala Wai Canal with the project floodwalls, stormdrains greater than 18-inch diameter pipes along the Ala Wai Canal (21 out of 43 outfalls) were analyzed for backwater impacts. Only the larger stormdrain pipe or culvert sizes were chosen for this analysis since these stormdrains had drainage areas larger than 4 acres and pipe sizes greater than 18-inches. Many of the small outfalls only drain the Ala Wai Boulevard roadway, those of single 18-inch or less diameter pipes (22 out of 43 outfalls), have very minimal drainage areas, will only have minor impacts to Ala Wai Boulevard in case of backwater, and would have only minor residual damages if any.

To evaluate the interior flooding due to backwater in gravity storm drains, the coincident frequency assumption is that the interior flooding input for these gravity outlets to the canal would use the 10% 1-hour rainfall intensity volumes and given the flashy nature of runoff in the watershed, the gates could be closed for up to 6 hours depending on the riverine flood event. Next the pipe and channel storage; i.e. volume capacity; for those stormdrain outfalls were determined based on the pipe or culvert sizes and lengths. Then using existing topographic data to determine the street elevation of stormwater inflow grates and overbank conditions, excess volumes which exceeded the storm drain capacities were mapped assuming that the shallow flooding, up to 1 foot depth, would spread following the local topology with roads serving as the primary channels of this

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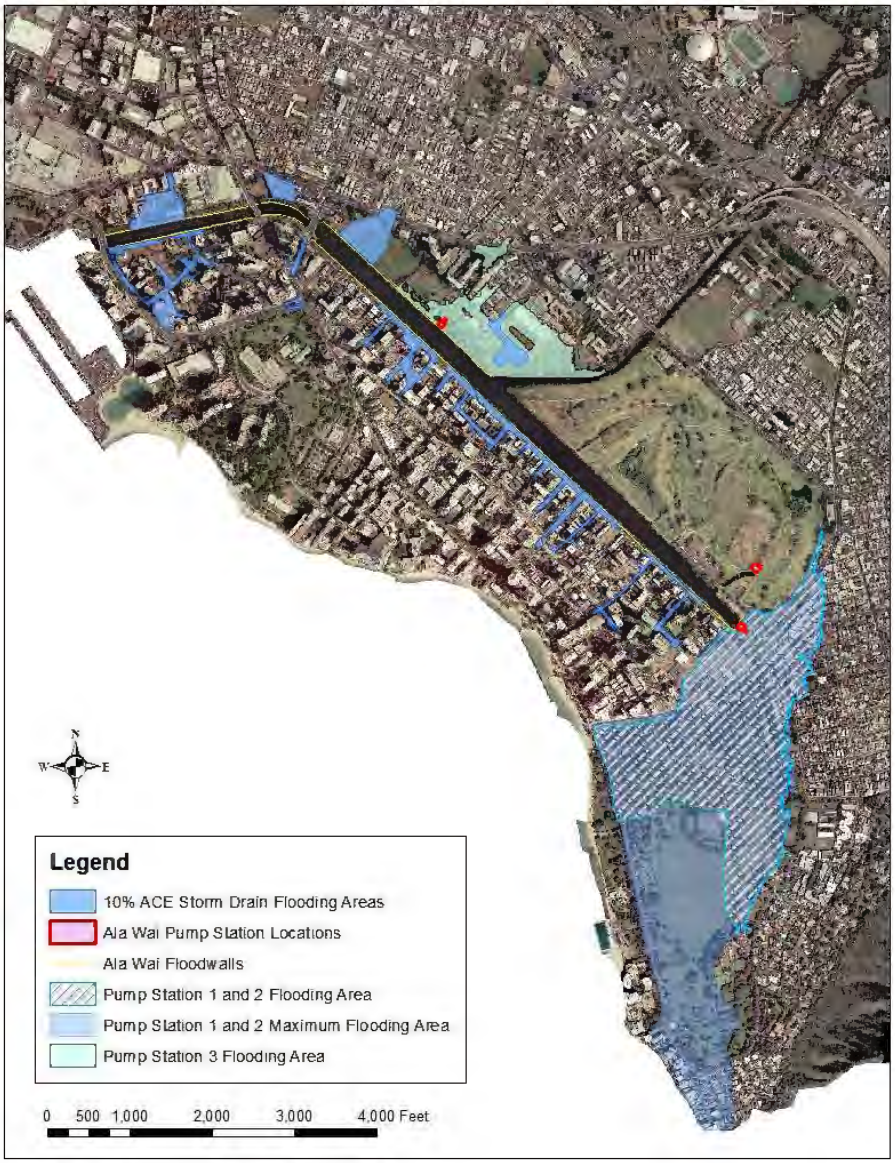

Figure 15. Residual Flood Inundation

Figure 10: Conceptual footprint of Makiki Diversion

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Google Maps 1801 Kalakaua Ave

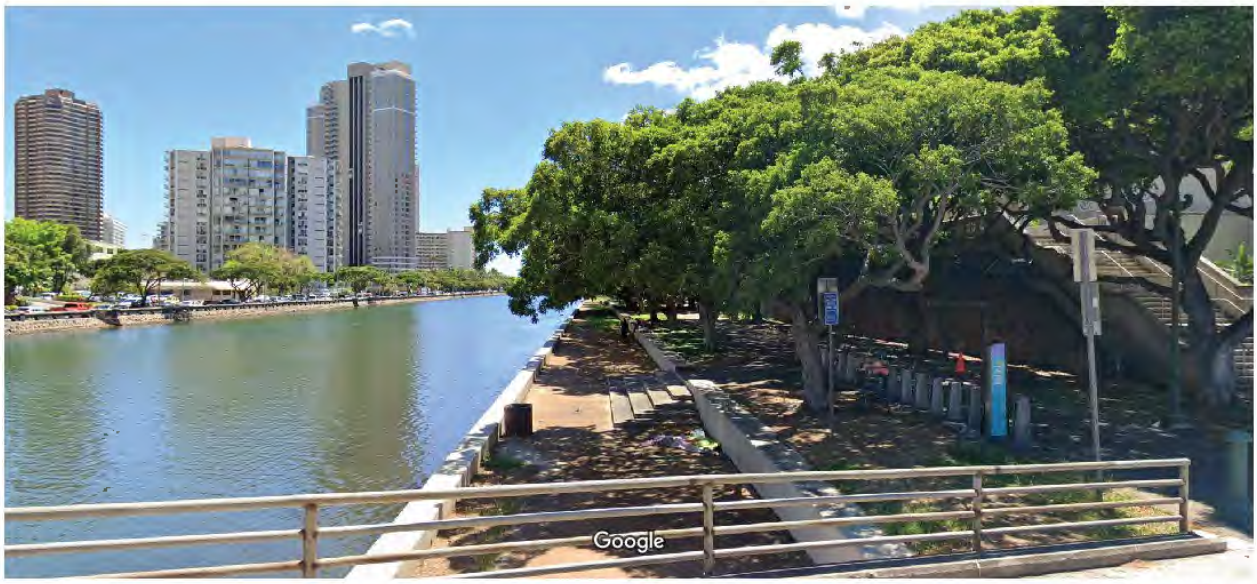

Image capture: Jun 2019 © 2020 Google

Google Maps 1801 Kalakaua Ave

Image capture: Jun 2019 © 2020 Google

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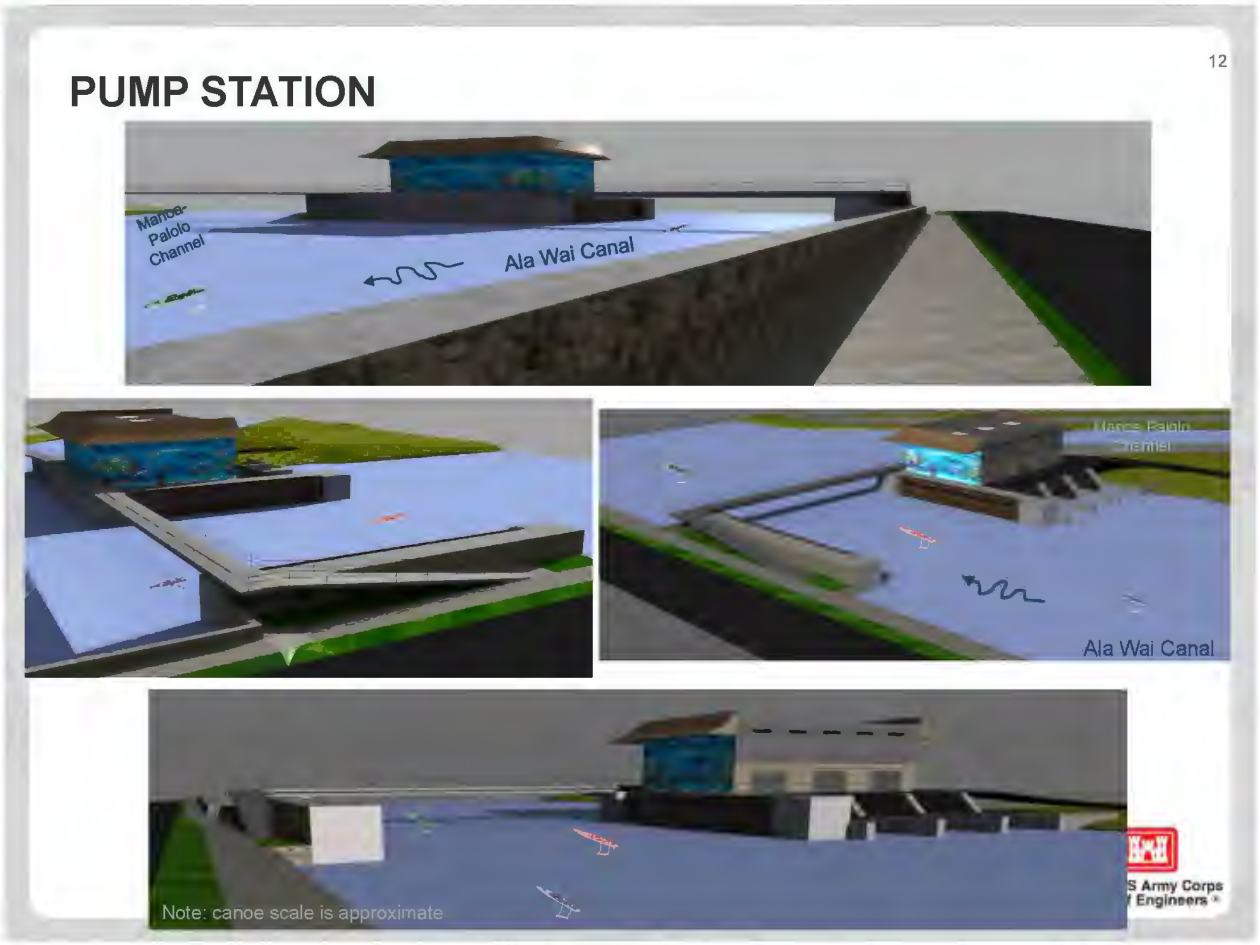

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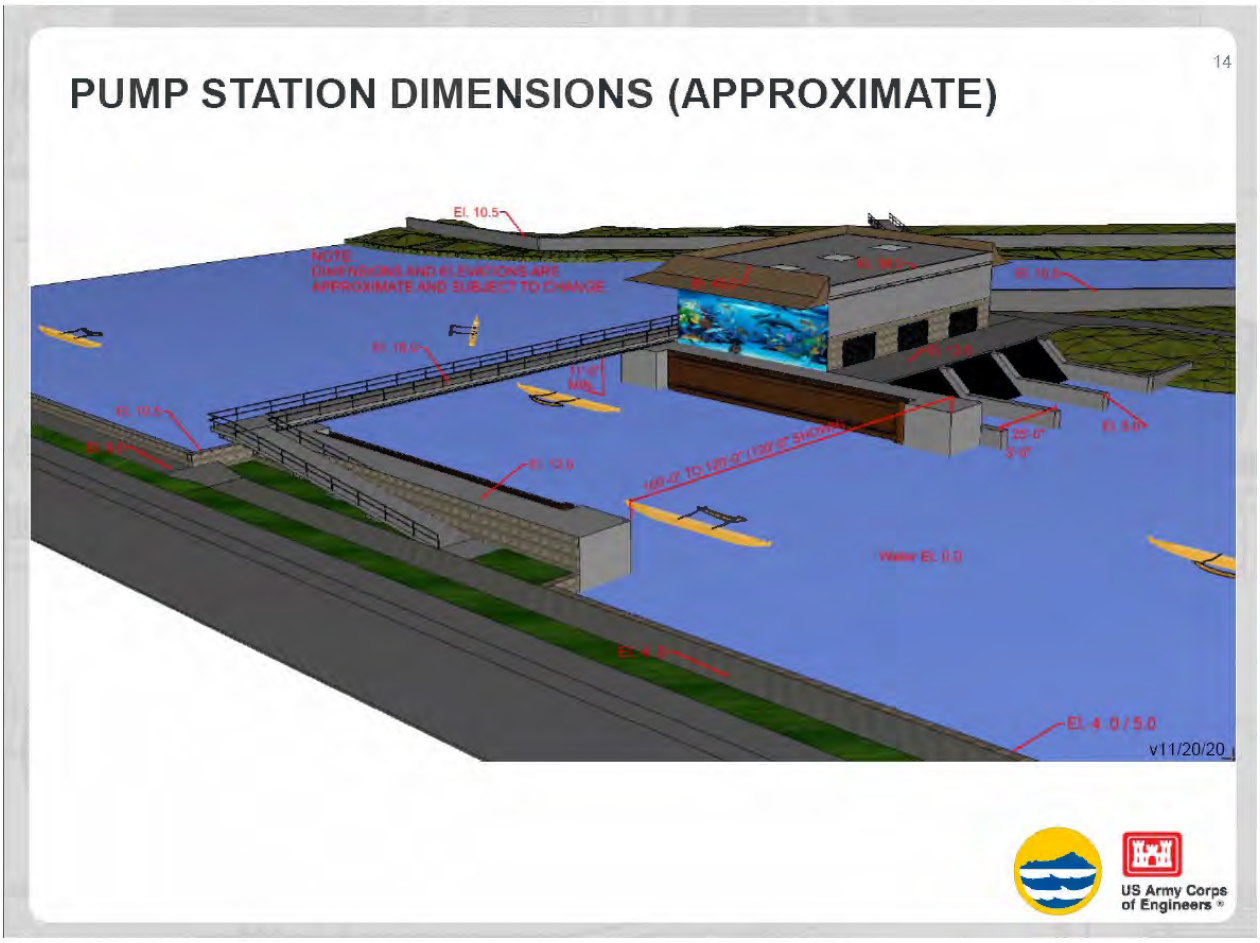

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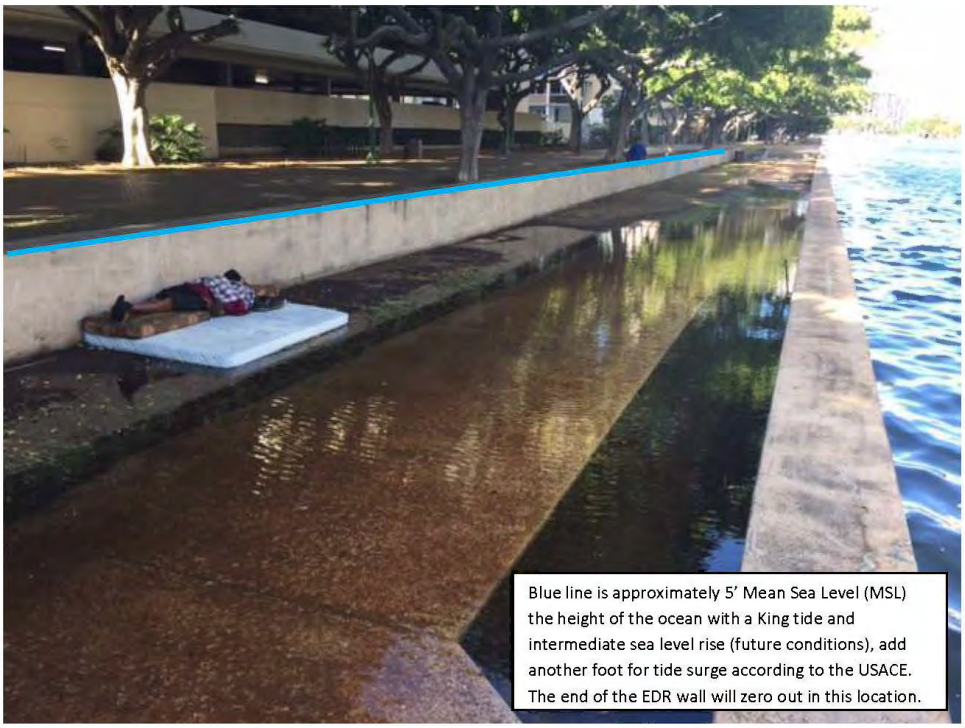
PUMP STATION (EWA DIRECTION)

Kapahulu Ave
Kapahulu Ave
Kapahulu Ave



date: June 24, 2017 4:54 PM

photographer: Shellie Habel

island(s): O'ahu

location: Western most end of Ala Wai Blvd on Convention Center side

comments: Water coming through drain hole in the wall directly from the Ala Wai Canal

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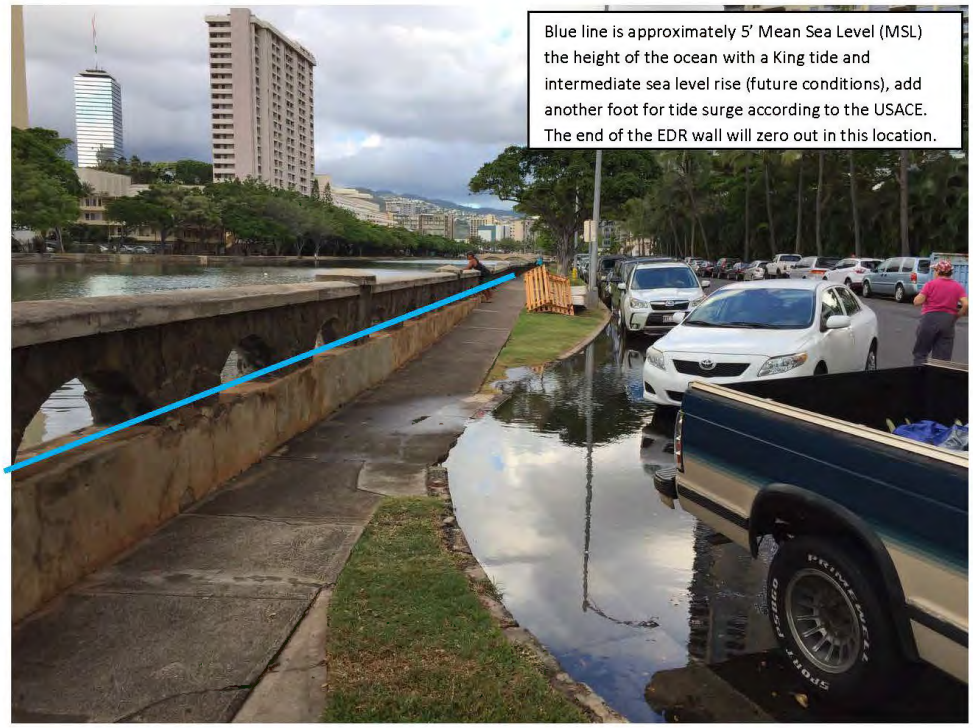
This is flooding from a King Tide along the Promenade side of the Ala Wai Canal near the Ala Moana Blvd. Bridge. Future conditions will raise the canal water elevation approximately an additional 2.7' for intermediate sea level rise 50-years in the future.

Supposedly, the route of the USACE's EDR Makiki Bypass, a 10' in height x 20' in width concrete conduit to be built down the Promenade. It will be difficult to built without damaging the trees with exceptional designation and most likely require the reconstruction of the walkway, lighting and utilities.

The blue line indicates the approximate sea level elevation of +5.0 MSL with high tides and future intermediate sea level rise. The Makiki Bypass with walkway, ground covering and conduit thickness will be underwater and will require head pressure or flooding conditions upstream to force the floodwater through the Makiki Bypass.



date: May 26, 2017 5:25 PM

photographer: Matthew Gonser

island(s): O'ahu

location: Ala Wai Blvd terminus

comments: Water in the road from canal via stormdrain

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This is the cul-de-sac turn around at the end of Ala Wai Blvd. near the Ala Moana Blvd. Bridge. Future conditions will raise the canal water elevation approximately an additional 2.7' for intermediate sea level rise 50-years in the future. The flooding shown in this picture is the result of backflow from a storm drainage outlet from a King Tide.

The added blue line indicates the approximate sea level elevation of +5.0' MSL with high tides and future intermediate sea level rise. The wall as proposed in the EDR is said to be tapper or sloped from 10' MSL at the Manoa Stream confluence to zero out near the Ala Moana Blvd. bridge at 5' MSL.

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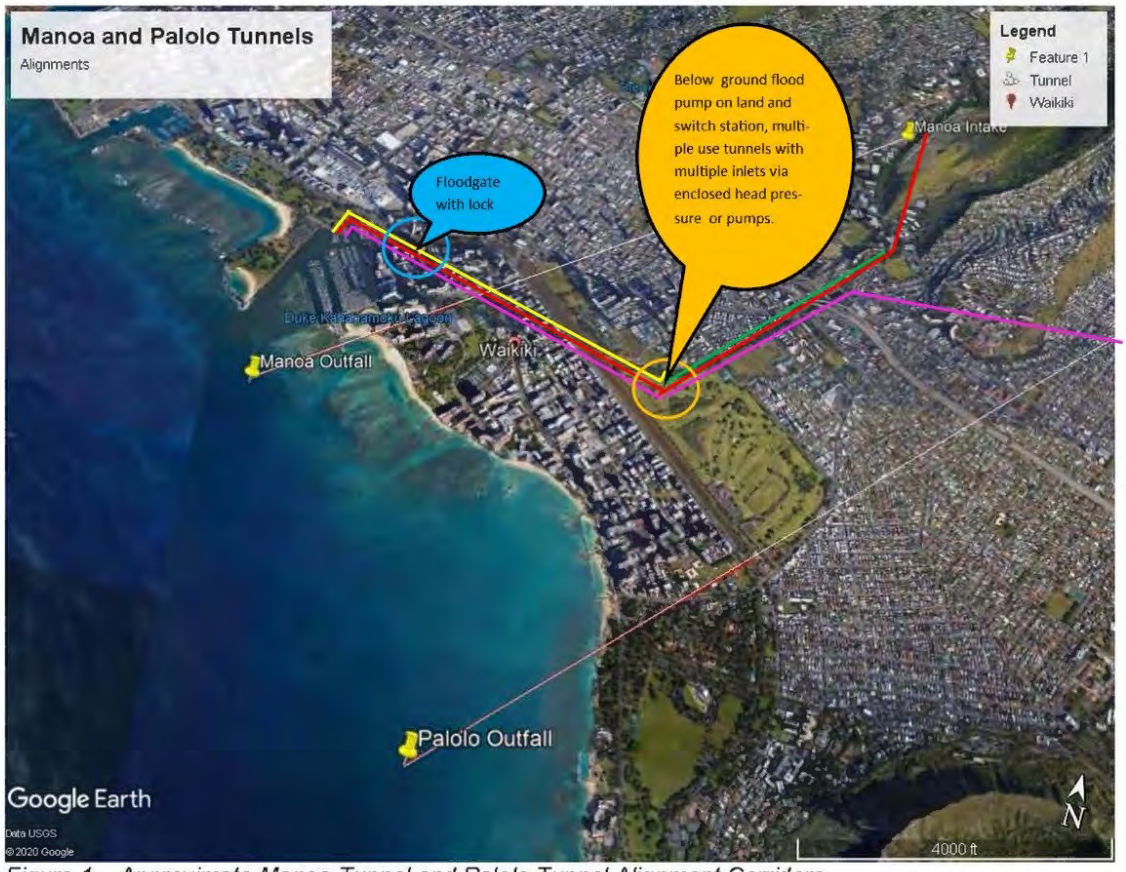

Figure 1 – Approximate Manoa Tunnel and Palolo Tunnel Alignment Corridors

From: Truitt, Robin
Sent: Monday, May 8, 2023 9:16:52 AM (UTC-10:00) Hawaii
To: Ala Wai; Herleth-King, Shawna S CIV USARMY CELRC (USA)
Subject: EPA's scoping comments on the Ala Wail Canal Flood Risk Management Study and SEIS

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Hi Shawna -
Please find attached EPA's scoping comments as you prepare the Supplemental EIS for the Ala Wai Canal flood risk assessment. Please don't hesitate to contact me if you have any questions. I look forward to continuing to work with you.

Respectfully,

Ms. Robin Truitt, Life Scientist
USEPA, Region 9
Environmental Review Branch
75 Hawthorne St., TIP-2
San Francisco, CA 94105
(415) 972-3742
Truitt.Robin@epa.gov<mailto:Truitt.Robin@epa.gov>

*Note that the federal government is transitioning to a fully electronic environment. Please transmit all correspondence/documents electronically.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

May 8, 2023

Shawna Herleth-King
U.S. Army Corps of Engineers,
Honolulu District, 230 Otake St.
(Attn: POH–PPC, Ala Wai),
Fort Shafter, Hawai'i 96858–5440

Subject: EPA's scoping comments on the General Reevaluation Report/Supplemental Environmental Impact Statement for the Ala Wai Canal Flood Risk Management Study, Honolulu, Hawai'i

Dear Shawna Herleth-King -

The Environmental Protection Agency has reviewed the Federal Register Notice published on February 22, 2023 requesting comments on the Army Corps of Engineers' decision to prepare a General Reevaluation Report and Supplemental Environmental Impact Statement (SEIS) for the subject project. Our comments are provided pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations (40 CFR Parts 1500-1508) and our NEPA review authority under Section 309 of the Clean Air Act.

The project area watershed encompasses 12,064 acres and includes the Makiki, Mānoa, and Pālolo streams, which flow to the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920's to drain coastal wetlands and develop the Waikīkī District. The Corps has estimated that Waikīkī beach, along with its 54,000 residents and nearly 80,000 daily visitors, faces a 1 percent chance of a major flood each year that risks loss of life and would cause $1.14 billion in damage to more than 3,000 structures. The proposed action would consider alternatives that include floodwall construction along various reaches of the upland streams and direct stormwater to detention basins to minimize these risks.

The EPA has provided comments and recommendations on some variation of this project since 2004, most recently on the 2015 - 2017 Draft and Final EISs. Since 2021, the EPA has participated in numerous interagency meetings to discuss new evaluation reports, criteria for alternatives and designs, and studies needed to evaluate impacts to resources. The EPA will work with the Corps and continue to support alternatives that:

- Provide a level of protection that reduces flood impacts to life and property to the greatest extent possible;
- Identify and combine non-structural and nature-based features with structural flood risk measures;
- Protect aquatic resources, including corals;
- Avoid or minimize adverse effects from climate change and expected sea level rise;
- Address community and environmental justice concerns; and

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- Improve or avoid adverse impacts to water quality by addressing continued concerns about dispersing contaminated sediments to the nearshore environment.

We offer for your consideration the following scoping comments and applicable new climate change and environmental justice guidance for use in the preparation of the reevaluation report and SEIS.

Purpose and Need

The SEIS for the proposed project should clearly identify the underlying purpose and need that forms the basis for proposing the range of alternatives (40 CFR 1502.13) The Notice of Intent states that purpose of this SEIS is to confirm or modify the authorized project or propose new recommendations because 2020 designs were found to lack the economic justification necessary for continued federal involvement. Although economic justification is necessary, the EPA recommends that this SEIS focus primarily on ways to meet the need to eliminate or minimize flood risk and protect life and property.

The EPA notes that the suite of structural features now proposed is not designed to provide the same level of flood protection against the 1% annual exceedance probability (AEP) flood or 100-year storm event as previous iterations of the project. The EPA understands that the Corps has not yet conducted Hydrologic and Hydraulic (H&H) modeling to determine the level of the proposed projects' performance, and recommends that the SEIS include the appropriate level of modeling in order to compare solutions that would be needed to achieve the 1% AEP level and/or potential FEMA certification with the proposed actions in this SEIS. For the SEIS, outline the parameters and inputs of an Ala Wai H&H model to determine performance for the major damage reaches, and discuss residual and incremental risk and uncertainties in this context. Discuss what mitigation measures, if any, may be needed to address incremental risks.

Alternatives Analysis

Alternatives currently under consideration have reduced costs by eliminating several upland detention basins and other features from earlier versions of the project. The EPA recognizes that continued public involvement and interagency coordination have narrowed the range of alternatives to the following:

- Alternative 1 (Storage Cornerstone) primarily focuses on increasing storage in detention basins throughout the watershed to reduce flood risk.

- Alternative 2B (Conveyance Cornerstone) focuses on increasing conveyance throughout the watershed through the construction of floodwalls along the Ala Wai Canal and at other select locations in combination with one detention basin.

- Alternative 5 (Hybrid) is the Tentatively Selected Plan to increase both storage and conveyance throughout the watershed. It includes the Ala Wai Golf Course Detention Basin, Ala Wai Canal Flood Wall and Kaimuki High School Floodwall extension, Woodlawn Bridge Floodwall and Koali Road Floodwall.

- The EPA understands that a Nonstructural Alternative is under development and may include floodproofing, elevating or removing structures from the floodplain, dry proofing structures, and/or an early flood warning system but would not include any in-stream or nearshore work. EPA recommends that options or designs that maximize natural and nature-based features,

mimic the natural resiliency that nature can provide, and be designed with consideration of environmental quality benefits.

In the SEIS discuss these alternatives, in whole or in combination, in the context of the Corps' authorities and detail how they fulfill the project's purpose and need. Address whether there are any management measures or alternative actions that may fall outside the Corps' jurisdiction but may compliment or help achieve the Corps' goals or objectives or avoid significant environmental impacts (40 CFR Section 1502.14(c)).

Impacts Analysis

The EPA offers the following recommendations for analyzing and disclosing impacts:

- Include appropriate baselines for the resources of concern with an explanation as to why those baselines were selected; Discuss the degree to which the action may adversely affect special districts, highways, or cause loss or destruction of important scientific, cultural, Native Hawaiian, or historical resources.

- Include a description of the affected environment that focuses on each affected resource or ecosystem. Identify the affected environment through perception of meaningful impacts and natural boundaries rather than predetermined geographic areas. Discuss the degree to which potential effects or mitigation measures are highly uncertain or technically or scientifically controversial.

- Focus on resources of concern, i.e., those resources that are most "at risk" and/or are significantly affected by the proposed project, before mitigation. Identify which resources are analyzed, which ones are not, and why. For this project, discuss the degree to which the action may adversely affect water quality and aquatic resources in the nearshore environment, as identified by state and federal resource agencies.

- Identify all other on-going, planned, and reasonably foreseeable projects in the study area. Where studies exist on the environmental impacts of these other projects, use these studies as sources for quantifying impacts. Refer to the CEQ report, *Considering Cumulative Impacts under NEPA*[1] and an additional systematic way to analyze cumulative effects jointly prepared by EPA and California Department of Transportation,[2] as the methodology has wide applicability beyond just transportation projects.

- When impacts occur in combination with other trends and reasonably foreseeable effects, discuss mitigation thresholds and success criteria, when such mitigation may be implemented and whether contingency plans exist. Clearly state who would be responsible for mitigation measures and how mitigation implementation would be ensured.

[1] https://ceq.doe.gov/docs/ceq-publications/ccenepa/sec1.pdf
[2] https://dot.ca.gov/programs/environmental-analysis/standard-environmental-reference-ser/other-guidance#cumulative

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Protection of Corals and Aquatic Resources

Follow Clean Water Act (CWA) Section 404 and 404(b)(1) guidelines in evaluating potential impacts to Waters of the United States and associated aquatic resources. Continue to engage with the National Marine Fisheries Service, United States Fish and Wildlife Service, and State of Hawai'i in the preparation of a Fish and Wildlife Coordination Act resource assessment, as well as Endangered Species Act and Essential Fish Habitat consultations, as relevant, to ensure potential impacts to biological resources are properly evaluated. In consultation with all resource agencies, identify and analyze all appropriate impact avoidance and minimization measures, and the potential need for compensatory mitigation (e.g., translocation of corals in the nearshore environment) for any unavoidable impacts.

Climate Change and Adaptation

On January 9, 2023, the Council on Environmental Quality (CEQ) published interim guidance[3] to assist federal agencies in assessing and disclosing climate change impacts during environmental reviews. CEQ developed this guidance in response to EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*. This interim guidance is effective immediately. CEQ indicated that agencies should use this interim guidance to inform the NEPA review for all new proposed actions and may use it for evaluations in process, as agencies deem appropriate, such as informing the consideration of alternatives or helping address comments raised through the public comment process. EPA recommends that the Corps utilize this guidance to help outline the framework for its climate change discussion in the Feasibility Study to ensure robust consideration of potential climate impacts, mitigation, and adaptation issues.

As discussed in this guidance, consider: (1) the potential effects of a proposed action on climate change, including by assessing both GHG emissions and reductions from the proposed action; and (2) the effects of climate change on a proposed action and its environmental impacts. An accurate and clear climate change analysis will help promote climate change resilience and adaptation and prioritize the need to ensure climate-resilient infrastructure and operations by considering the reasonably foreseeable effects of climate change on infrastructure investments and the resources needed to protect such investments over their lifetime.

Include a discussion of the comparative resiliency of the alternatives, e.g., expected rise in sea levels and stronger or more frequent storm events, as well as a discussion of the particular aspects of the project design that promote effective adaptation, to help decision makers, stakeholders, and the public identify and assess reasonable courses of action.

Environmental Justice -Protecting Community Health

The recent Executive Order 14096 on *Revitalizing Our Nation's Commitment to Environmental Justice for All*[4] requires, among other things, that environmental reviews under NEPA a) analyze direct, indirect, and cumulative effects of Federal actions on communities with environmental justice concerns; b) consider best available science and information on any disparate health effects (including risks) arising from exposure to pollution and other environmental hazards, such as information related to the

[3] https://www.federalregister.gov/documents/2023/01/09/2023-00158/national-environmental-policy-act-guidance-on-consideration-of-greenhouse-gas-emissions-and-climate; 2023-01-CEQ interim guidance on GHG emissions and climate change.pdf (energy.gov)

[4] https://www.whitehouse.gov/briefing-room/presidential-actions/2023/04/21/executive-order-on-revitalizing-our-nations-commitment-to-environmental-justice-for-all/

race, national origin, socioeconomic status, age, disability, and sex of the individuals exposed; and c) provide opportunities for early and meaningful involvement in the environmental review process by communities with environmental justice concerns potentially affected by a proposed action (Sec. 3). The EPA recommends that the SEIS clearly identify how the NEPA process and analysis were developed with the *Assistant Secretary of the Army for Civil Works Memorandum for Commanding General, U.S. Army Corps of Engineers, Implementation of Environmental Justice and the Justice40 Initiative* (March 15, 2022)[5] and its *Interim Environmental Justice Strategic Plan* (December 16, 2022)[6] to improve outreach, access civil works information and technical services, and maximize benefits to disadvantaged communities to achieve environmental justice.

EPA recommends that the Corps continue with the robust outreach approaches that maximize community participation by identifying an array of community representatives and other stakeholders who have deep community knowledge and desire to address disproportionate adverse impacts in the community. Maintain continued meaningful community engagement throughout the planning process to ensure ample time to incorporate community feedback into the project. Identify and commit to all available measures to avoid, minimize, or mitigate any disproportionate human health and environmental effects on low-income or minority communities resulting from construction and operation of the project (e.g., redesigning the Manoa-Palolo canal floodwall to optimize space, respect aesthetics and consider the feasibility of a silent pile driver).

We appreciate the opportunity to coordinate early and are available to discuss our comments or provide additional information upon request. Please contact Robin Truitt, the lead reviewer at (415) 972-3702 or Truitt.Robin@epa.gov. We look forward to our continued participation in the NEPA process.

Sincerely,

ROBERTA TRUITT

Digitally signed by ROBERTA TRUITT
Date: 2023.05.08 12:03:20 -07'00'

Robin Truitt
Environmental Review Branch

Cc: Dan Polemus, U.S. Fish and Wildlife Service
Sean Hauser, National Marine Fisheries Service
Edward Chen, Hawai'i Department of Health
Haku Miles, City and County of Honolulu
Debra Mendes, State of Hawai'i

[5] https://api.army.mil/e2/c/downloads/2022/03/22/6ab6eb44/final-interim-implementation-guidance-on-environmental-justice-1.pdf
[6] https://planning.erdc.dren.mil/toolbox/library/MemosandLetters/ImplementationInterimEnvironmentalJusticeStrategicPlan_16Dec2022.pdf

From: Lisa
Sent: Monday, May 8, 2023 11:11:37 AM (UTC-10:00) Hawaii
To: Ala Wai
Cc: lizajane999@gmaill.com
Subject: Ala Wai Contact Form

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

First Name Lisa
Last Name Miller
Contact Phone Number (808)220-9029
Contact Email Address lizajane999@gmaill.com
Contact Mailing Address 1805 Palolo Ave, Honolulu Hi 96816 Message I am very upset that ecosystem restoration has been dropped as part of this project. The public needs to see more information about the feasibility and effectiveness of ecosystem-based solutions. It is a travesty that we are being asked to support more artificial degradation of our beautiful 'aina (6 foot high floodwalls) to protect an artificially drained area. Please enter the security code displayed in the image

IP: 72.235.13.146

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Dave Watase
Sent: Monday, May 8, 2023 1:45:14 PM (UTC-10:00) Hawaii
To: Ala Wai; earl.t.vaughn@usace.army.mil
Subject: NOI - Ala Wai Flood Project - Dave Watase's Public Comment 10 - Ecosystem Restoration

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Aloha,

My name is Dave Watase, I am a resident who lives within the Ala Wai Watershed and a key stakeholder in the 2017 Final Environmental Impact Statement (FEIS) for the Ala Wai Flood Project.

I've created a timeline that generally describes the Ala Wai Canal's project history. It may not be fully accurate because of my limited understanding and my involvement is post September 2015. However, I think it is important have a broad understanding of what happened in the past because as we all know people change jobs, people retire, and government administrations change. I also believe that it is important that the decision makers at the very least skim through the studies dating back to 1998.

In 1998 the Ala Wai Project began as an ecosystem restoration project conducted by the State's Department of Land and Natural Resources (DLNR) primarily focused on contamination and water quality issues.

In 2001 the USACE conducted the Ala Wai feasibility study and technical flood study in partnership with DLNR. At the time the USACE's policy required that project investigations adopt a system approach and through their Environmental Operating Principles create mutually supporting economic and environmentally sustainable solutions.

In 2003, the Ala Wai Canal Project feasibility study was expanded to include flood mitigation and ecosystem restoration and involved the USACE engaging with the community resulting in the Ala Wai Watershed Analysis Final Report dated July 2003.

The October 2004 flood which caused $80 million in property damage to the University of Hawaii and $5 million to residents in Manoa increased the focus to include the upper watershed and gave rise to the USACE's Manoa Stream Hydrology and Hydraulics Study October 2004, the Manoa Technical Study Summary Final November 2008, and the Final Hydrology Report Ala Wai Watershed Project December 2008. Around this time, the USACE worked to increase the study scope to include the whole Ala Wai Watershed via cost sharing agreements and to include flood damage reduction and ecosystem restoration features.

In 2012 the Ala Wai Canal Project was rescoped at a time when the USACE was trying to streamline their civil works project process and established the 3x3x3 methodology limiting the feasibility studies to 3-years, $3 million, 3 levels. The Ala Wai Canal Project feasibility study was adjusted to fit the 3x3x3 methodology and SMART Planning Process and the elimination of ecosystem restoration as a project purpose to be able to meet the new restraints.

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It should be noted that DLNR at the time objected to the elimination of ecosystem restoration features from the project and refused to sign the Tentatively Selected Plan. The DLNR reluctantly agreed because the USACE explained that ecosystem restoration could be added by separate authorities such as Section 206 of WRDA 1996, Aquatic Ecosystem Restoration or Section 1135, WRDA 1986, Environmental Restoration. Prior to the 3-years completion date, it was determined that a comprehensive sea level rise analysis was omitted from the 2015 Draft EIS and the public was never able to comment on it as it was completed behind closed doors and only unveiled in the 2017 Final EIS. There has always been a debate between the C&C of Honolulu and State DLNR on sponsorship. The C&C of Honolulu did not want to take responsibility for maintenance of the Ala Wai Canal Project.

In 2018 the C&C of Honolulu became an active participant in the project after Congress appropriated funds for the $345 million project and when the State promised to provide the funding in the amount of $125 million via a memorandum of agreement between the Governor Ige and Mayor Caldwell. The State's funding was not secured and the project was halted. The USACE conducted an Engineering Documentation Report in July 2020 with a project cost of $376 million. And now we are in the General Reevaluation Study (GRS) which began in June 2021.

This project has stretched on for decades and it is important to understand the history. Having read all of the studies going back to 1998 the bulk of the community generated concerns center around ecosystem restoration and this time around seems to be no different. It seems obvious that ecosystem restoration and flood mitigation go hand in hand and even if initiated separately should be done at the same time.

The USACE conducted 10 community engagement activities for the GRS beginning in November 2021 and the most recent one on April 24, 2023. However, for the longest time, the plan and the goals were unclear for the public to make comment. Alternatives were weeded out without discussion or debate. Only recently through the NOI was the Prospective Plan disclosed and that was further refined on the April 24, 2024 by eliminating the Makiki District Park Detention Basin and Manoa District Park Detention Basin. Out of 223 total management measures 200 were from the public. My guess is that most of the public measures were related to ecosystem restoration because that is what is most important to them. Those measures are most important to them because it is what they see annually which are the smaller and more frequent storms. The average person may not realize that a detention basin designed for the 100-year flood may let a 20-year flood pass through and cause them flooding. The average person may not realize that flood walls around the Ala Wai Canal will not help prevent flooding in the upper watershed.

My suggestion is that the USACE do both ecosystem restoration and flood mitigation at the same time because historically ecosystem restoration was included in the projects and it was the USACE that separated it and chose only pursued flood mitigation.

Attached is an article regarding a USACE project for New York and New Jersey. It seems to include ecosystem restoration at the same time. "The plan also calls for integrating natural solutions such as wetlands restoration and creation of "living shorelines," with features such as oyster colonies designed to blunt the force of incoming waves in several spots to complement the man-made engineering projects."

Sincerely,
Dave Watase
c. 808.728-0759

2

CONTROLLED UNCLASSIFIED INFORMATION (CUI)

Storm protection plan draws scrutiny

By Wayne Parry

Associated Press

PERTH AMBOY, N.J. >>

People are asking questions about a storm protection proposal for New York and New Jersey that would be among the most massive and costly flood control projects ever done in America, aiming to prevent the type of catastrophic flooding caused by Superstorm Sandy in 2012.

At a public hearing Wednesday night on the U.S. Army Corps of Engineers' proposed $52 billion project, some wanted to know where all the water that would be thwarted by storm gates would go instead.

Others wanted to know why the plan doesn't solve more of the problem.

And one had a pointed question for the Army Corps.

"When has the Army Corps of Engineers ever beaten Mother Nature?" asked David Merwin, who lives in a Raritan bay-front community in Old Bridge, N.J. "Where have you done a project where you won?"

The hearing in a yacht club in the blue-collar Raritan Bay community was among the first public hearings on a massive storm protection plan unveiled by the Army Corps in September.

The agency proposes building movable barriers and gates across bays, rivers and other waterways in the two states hardest-hit by the October 2012 storm.

It includes building sea gates on several industrial canals, bays and other urban waterways in New York City, the tidal straits that separate Staten Island from New Jersey and at the mouths of New Jersey's Hackensack and Passaic rivers in the Meadowlands region.

The gates would remain open during calm periods and could be closed when major storms approach. But the proposed barriers have drawn they don't adopt the more farranging option. Her community was devastated by Sandy.

"It would solve the problem for the whole area, millions of people," she said. "They are engineers and they're wonderful, and they know how hard it is to persuade politicians to spend money. But people whose houses could be wiped out want this done."

Bryce Wisemiller, a project manager with the Army Corps, said there are two main reasons the more extensive option was not chosen.

"Tremendous cost and tremendous time period," he said.

The agency uses a costbenefit analysis to look at how much damage could be prevented by a project compared with how much it would cost to build it, Wisemiller said. Using those calculations, the corps tentatively chose the current option, he said.

Bruce Hoch of West Orange, N.J., said Sandy was one of the most expensive storms in U.S. history, adding he could make a good case for spending more to protect more.

"Sandy caused $70 billion in damages," he said. "I could do a cost-benefit analysis (to support) that."

The costlier option would benefit 94% of the study area in the two states; the currently chosen option would benefit 62% of it.

The Army Corps will make its final recommendation on the project to Congress in late 2024, Wisemiller said.

When has the Army Corps of Engineers ever beaten Mother Nature?"

David Merwin

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opposition from property owners who worry about how they would look, and environmentalists concerned about adverse effects on water quality and natural ecosystems.

Shore-based barriers including flood walls, levees and elevated walkways would be built in Brooklyn, Queens and Manhattan in New York, and Jersey City and Newark in New Jersey.

The plan also calls for integrating natural solutions such as wetlands restoration and creation of "living shorelines," with features such as oyster colonies designed to blunt the force of incoming waves in several spots to complement the man-made engineering projects.

Work would not begin until 2030 at the earliest and would not be completed until 2044.

The plan tentatively chosen by the Army Corps was one of five options that varied from doing nothing to doing much more than what is currently proposed.

The most ambitious option would include more flood control measures in more places in New York and New Jersey, including 7.4 miles of flood barriers along the two states' shorelines centered on New York Harbor that would be — by far — the longest storm barrier in the world, according to the corps.

That plan would cost more than twice as much as the option currently under consideration: $112 billion. Yet it drew some support at Wednesday's meeting. Sara Jane Millard, a London native living in Manasquan, N.J., asked representatives of the Army Corps why

Resident of Raritan Bay community in Old Bridge, N.J.

An enormous pile of debris sits on the oceanfront in Long Branch, N.J., two weeks after Superstorm Sandy pummeled the New Jersey coast.

ASSOCIATED PRESS / 2012

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CONTROLLED UNCLASSIFIED INFORMATION (CUI)

From: Aspen Billiet
Sent: Monday, May 8, 2023 5:14:52 PM (UTC-10:00) Hawaii
To: Ala Wai
Cc: chris.hfia@hawaiiforest.org; Guy Cellier; Peter Simmons
Subject: Comments on the Ala Wai Flood Control Project

CAUTION: Email received from an EXTERNAL sender. Please confirm the content is safe prior to opening attachments or links.

Aloha,

Please find the Hawaii Forest Industry Association's comments on the Ala Wai Flood Control Project attached.

Mahalo for your time and consideration,

Aspen Billiet
Membership, Legislative & Administrative Services Hawaii Forest Industry Association
808/933/9411

HAWAI'I FOREST INDUSTRY ASSOCIATION (HFIA)
7192 Kalaniana'ole Highway
Suite A-143A, #249
Honolulu, HI 96825-1849
Phone: 808/933/9411
Email: hfia@hawaiiforest.org

Date: 05/08/2023
TO: U.S. Army Corps of Engineers, Honolulu District Public Affairs
FROM: The Hawai'i Forest Industry Association (HFIA)
SUBJECT: Comments on the Ala Wai Flood Control Project

To whom it may concern,

On behalf of the Directors and members of the Hawai'i Forest Industry Association (HFIA), please consider our comments on the Ala Wai Flood Control Project.

Since 1989 HFIA has been the voice of Hawaii's Forest Industry. A healthy and responsible forest industry involves planted and native forest management as well as broader resource management. We pride ourselves in our many projects and programs that promote healthy and productive forests.

Healthy forests provide many services to Hawaii's wildlife and residents, including but not limited to:

- Cleaning our drinking water
- Minimized soil erosion
- Provide shelter for endangered species and wildlife
- Purify the air we breathe
- Facilitate Native Hawaiian cultural practices
- Provide recreation, such as hiking & bird watching
- Anchor our economy, creating the climate and beauty that draws people to our islands

Considering the wide ranging benefits of healthy forests, including flood control, we hope that the U.S. Army Corps of Engineers will continue to utilize forest and resource management whenever and wherever possible, as it has for many years via its Natural Resource Program. When it comes to flood control we encourage the U.S. Army Corps of Engineers to utilize reforestation and growth of healthy forests to the extent possible.

We hope that the U.S. Corps of Engineers can move this project forward in the most effective and sustainable way possible while continuing their Natural Resource Management Programs and efforts widely. We encourage making those efforts optimally visible to the public and engaging with the public to maximize participation in those programs.

Mahalo for your time and consideration,

Guy Cellier

Guy Cellier, President

Hawaii Forest Industry Association

Established in 1989, HFIA's is a nonprofit organization founded by people committed to sustainable forest management. HFIA's mission is to promote healthy and productive forests and a sustainable forest industry through management, education, planning, information exchange, and advocacy. HFIA has over 130 members including woodworkers, landowners, sawyers, foundations, foresters, growers, educators, environmentalists, architects, millers, ranchers, and others interested in HFIA's mission and goals.

HFIA Board of Directors
Officers: President Guy Cellier, Vice President Irene Sprecher, Secretary Taylor Coons, Treasurer Wade Lee,
Directors: Jeremy Campbell, Aaron Hammer, Nickolas Koch, Michael Sowards, Aileen Yeh

From: Whitney Bosel
Sent: Monday, May 8, 2023 8:40:57 PM (UTC-10:00) Hawaii
To: Ala Wai
Subject: Comment for the EISPN of the Ala Wai Canal Flood Risk Management Project

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To the Accepting Authority:

The number one stated goal of the GRR is to "redefine the flood problems and risks in the Ala Wai watershed by updating hydrology, physical, biological, and socioeconomic conditions." In this "update" I highly suggest that a more expansive and holistic view of the watershed be studied, and more specifically that more waterways than enumerated on Figure 1 "Overview of the Ala Wai Watershed" as included in the EISPN document, but rather ALL of the water sources contributing to the watershed, be adequately studied.

A number of waterways in Manoa have been excluded I believe erroneously from the study; these waterways will have an impact and need to be duly considered. Specifically the multiple waterways which converge into what at one time was referred to as the Woodlawn Stream, the lower portion of which was channelised to join into the Manoa Stream. Throughout the vast majority of length of these waterways they are in their natural state, with water running through intermittently at different levels along the different paths. A ditch by any records in planning documents of multiple municipalities, and from how the USACE even seems to define it based on their own writings, is "an artificial, human-made channel that was not formerly a stream. Many waterways appear to be ditches but actually are altered streams that were straightened or moved". (This is the most efficient, but again generally widely corroborated definition I've stumbled across, found here Blockedhttps://www.oregon.gov/ODA/shared/Documents/Publications/NaturalResources/StreamsideAreas.pdf)

Whether or not a small Makai portion at the bottom has been channelized does not make all the upper portions no longer natural waterways. However the USACE seems to think that all of these waterways are part of a man-made system, and that therefore it is out of their purview:

From the "Summary of the Ala Wai Public Workshop held on April 8, 2022 focusing on management measure development and screening within the Manoa sub-watershed.":

f. Woodlawn stormwater drainage ditch: A community member raised concerns for the stormwater ditch upstream of the Kahaloa St. bridge in Manoa, which is known to flood nearby homes. Provision, modification, and/or maintenance of drainage systems to capture and convey interior runoff in urban areas is a non-Federal responsibility; therefore, cannot be included in a recommendation made as a result of the GR report. This study can, however, make modifications to natural stream channels or previously modified natural waterways that help reduce backup within adjacent drainage systems. In other words, the study can consider modifications to Manoa Stream which may help to reduce backup to the nearby drainage ditch.

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At some point this mistake seems to have occured, to look from the Ala Wai, mauka, and once seeing a concrete portion of a waterway stop looking further upland to see what is above and how it might be classified. It has perpetuated to the point of folly, wherein these various natural water paths have not been allowed to have been studied because of a difference and confusion of terms, and that subsequent mis-classification.

I have spoken to people in DLNR about these waters and they have agreed they appear to be natural drainage, perhaps an intermittent tributary, though to settle on a precise definition would require some study. The fact that the city's stormwater GIS map calls it a ditch, and the unfortunate but common issue that it doesn't appear at all on other maps (like many many waterways in the US according to the EPA) does not mean that in what should be such a comprehensive study as that undertaken in concert by the City and the USACE these other water systems shouldn't be given adequate consideration.

I would say this omission ought to be rectified in this new EIS, along with a truly comprehensive study of all aspects of the watershed and its current health. One cannot legitimately propose solutions, or expect to be supported in conclusions, to a problem one doesn't legitimately understand in full.

Sincerely,

Whitney Bosel

1.16 Additional Public Engagement After NOI and EISPN

Three additional public engagement opportunities have occurred since the closing date for the NOI and EISPN public notices. The first of three virtual 'Talk Story' meetings was held May 15, 2023, at 12:00 p.m. HST. The second virtual 'Talk Story" was held June 5, 2023, at 12:00 p.m. HST. The last virtual 'Talk Story' was held June 26, 2023, at 12:00 p.m. The recordings of the three 'Talk Stories' are available in their entirety at https://www.honolulu.gov/alawai/public-engagement.html.

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