



Santa Cruz

CALIFORNIA

Street Tree Master Plan 2021



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PREPARED FOR:

City of Santa Cruz
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“Finding new creative ways to support this incredible resource is our shared challenge.”

City of Santa Cruz, Parks and Recreation Partner

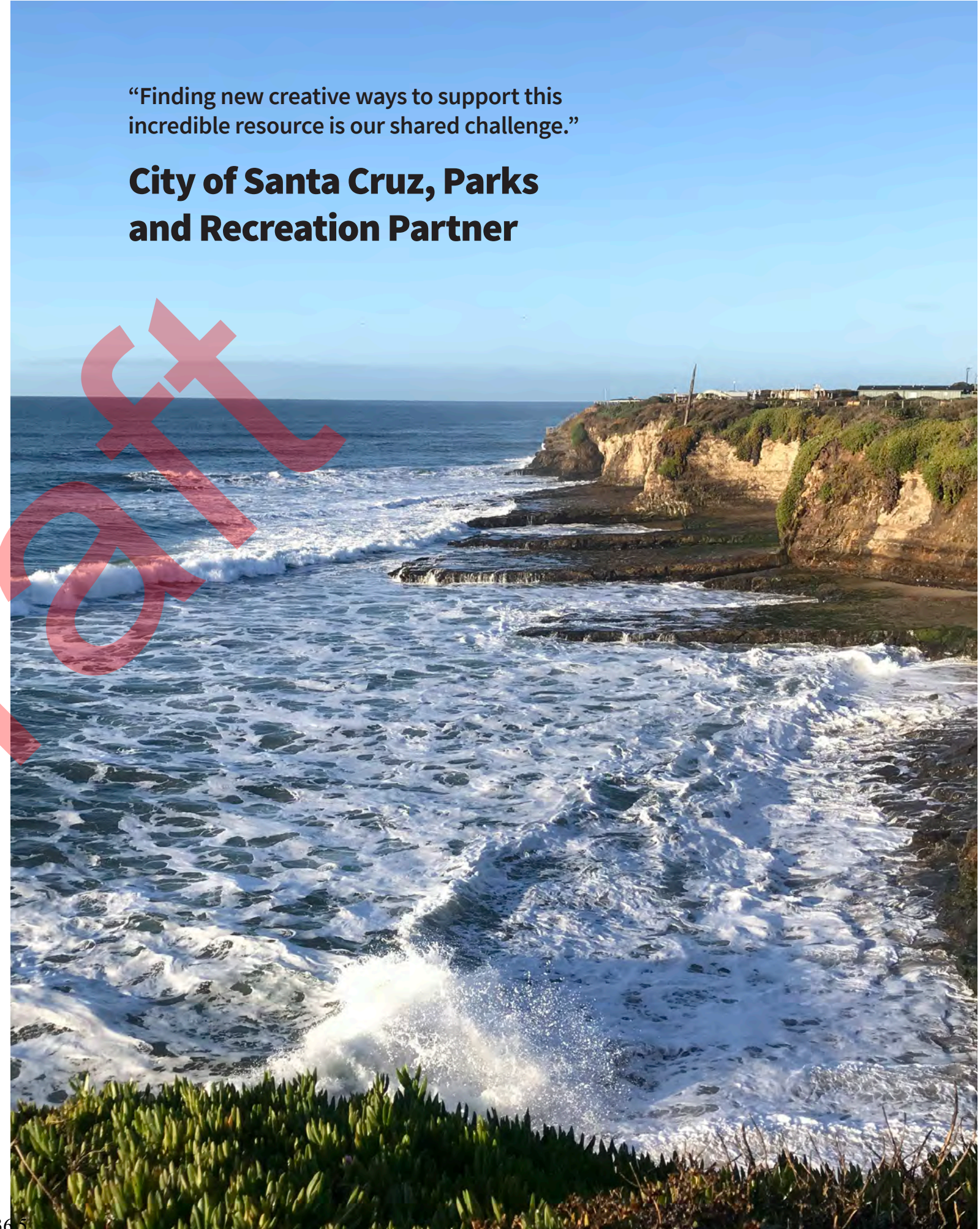




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“You can take for granted that people know more or less what a street, a shop, a beach, a sky, an oak tree look like. Tell them what makes this one different.”

Neil Gaiman



Executive Summary

Santa Cruz is a coastal city situated on the north end of Monterey Bay and almost entirely surrounded by public open space. The community is invested in and proud of their urban forest, which is a complex and varied resource ranging from natural forests to trees grown in small planters in densely developed areas.

An **urban forest** is defined as the collection of privately- and publicly-owned trees and woody shrubs that grow within an urban area. Santa Cruz’s community urban forest (public trees) is the subset of the urban forest in publicly owned lands and rights-of-way including on streets, in city parks, and at city-owned facilities. In Santa Cruz, a relatively large proportion of the community urban forest is composed of native species in open spaces, river corridors, and parks.

The Street Tree Master Plan (STMP) specifically addresses the street tree resource, which is a mixture of native and non-native species planted along the streets in Santa Cruz. The street tree resource enhances aesthetics and provides numerous environmental and socioeconomic benefits that contribute to the quality of life and sustainability of the community.

In 2019, the City of Santa Cruz contracted with Davey Resource Group, Inc. (DRG) to conduct an inventory of



community trees in rights-of-ways including along streets and in parks and city-owned facilities. Trees in open spaces were not inventoried. The inventory mapped the geographic location of trees and vacant planting sites and collected data on tree species, size (DBH¹), condition, and maintenance needs. The inventory data is managed by the Urban Forestry Office within the Parks and Recreation Department utilizing TreeKeeper® software.

Santa Cruz’s street tree resource includes 9,742 trees and approximately 2,608 vacant planting sites for a total of 12,350 sites and a 78.9% stocking level (Table 1). Santa Cruz Municipal Code, Chapter 13.30 (adopted in 1985) requires property owners to maintain street trees that are adjacent to their property. As a result, 8,231 street trees (84.5%) are cared for by the adjacent property owner. The City is responsible for maintaining street trees that are not located adjacent to private property, including median trees, arterial roads, and some commercial/retail areas. Currently, the City provides maintenance for 1,511 street trees (15.5%). The STMP serves as a manual for the care and management of community street trees, including:

- Work plans for resolving the maintenance needs identified by the inventory
- Suggested maintenance cycles for ongoing maintenance
- Standards of care for community street trees
- Clarifies the responsibilities of adjacent property owners for the care of street trees

- Identifies long-term goals for management of street trees and the overall urban forest, including goals for increasing canopy cover on both public and private property

Annually, Santa Cruz’s street trees provide \$44,177 in environmental benefits to air quality, carbon reduction, and reduced stormwater runoff. To replace the street tree resource with trees of similar species, size, and condition would cost \$38.6 million.

A 2020 land cover assessment, using i-Tree Canopy and random point sampling methodology, estimated that tree canopy (public and private) currently covers 38.9% (± 1.09%) of Santa Cruz. A previous assessment, City of Santa Cruz Urban Tree Canopy Report, completed in 2016 found 36.4% cover in 2009 and 38.2% cover in 2016, indicating a growing canopy over the last 11 years.

“Trees are very important in urban design, trees are only second to sidewalk width in designs.”

**Planning Department
Partner, City of Santa
Cruz**

TABLE 1: CITY OF SANTA CRUZ STREET TREE BENCHMARK TABLE

Santa Cruz Street Tree & Benchmark Values 2020		
Street Tree Resource		
Number of street trees	9,742 trees	
Street trees maintained by the City	1,511 trees	
Street trees maintained by adjacent property owners	8,231 trees	
Street tree canopy cover	4.3%	
Number of available sites	2,608 available sites	
Stocking level	78.9%	
Total number of unique species	227 unique species	
Prevalence of top ten species	41.8%	
Species exceeding recommended 10%	0	
Street Tree Benefits		
Carbon stored to date	4,946 tons	\$843,540
Annual carbon benefits	105.6 tons	\$18,013
Annual air quality benefits	2.4 tons.	\$20,729
Annual stormwater benefits	605,263 gallons	\$5,435

TABLE 2: CITY OF SANTA CRUZ URBAN FOREST (PUBLIC AND PRIVATE TREES) AND BENCHMARK TABLE

Santa Cruz & Urban Forest Benchmark Values 2020		
Urban Forest Canopy Cover (Public and Private)		
Overall canopy cover	38.87% ± 1.09%	
Impervious surfaces	37.67% ± 1.08%	
Grass and low-lying vegetation	19.51% ± 0.89%	
Existing canopy cover goal	increase canopy cover (Climate Adaptation Plan, 2018)	
Urban Forest Canopy Benefits (Public and Private)		
Carbon stored to date	107.11 ± 3.00 kilotons	\$9.1 million ± \$256,193
Air quality benefits	4,367 ± 123 tons	\$1.2 million ± \$33,385
Stormwater benefits	3,273 ± 91.80 million gallons	more than \$300,815 ± \$8,438
Community Tree Resource (Public)		
Number of community trees	13,917 trees	
Number of park trees	4,186 trees	
Number of facilities trees	422 trees	
Number of street trees	9,742 trees	

¹ DBH: Diameter at Breast Height. DBH represents the diameter of the tree when measured at 1.4 meters (4.5 feet) above ground (U.S.A. standard).

The community recognizes the value of urban trees and vision for Santa Cruz's future urban forest and tree canopy is communicated in guiding documents, including the 2030 General Plan, the Climate Action Plan (2012), and the Climate Adaptation Plan (2018). Urban trees will be a major focus of the second-generation Climate Action Plan project launching in January 2021. Municipal Code, Chapter 9.56 *Preservation of Heritage Trees and Heritage Shrubs* established requirements for tree preservation and permits for work significantly affecting heritage trees. Chapter 13.30 Trees communicates requirements for street trees, including a requirement for a *City Approved Street Tree List* and requirements for maintenance, planting, and removal. Eight area plans provide more specific requirements for defined areas, including more limited species palettes in some areas.

The Urban Forestry Office is responsible for managing street trees, including providing program administration and contract oversight, permitting (tree removal, planting, pruning), plan review, tree inspection and responding to service requests, and liaison with volunteers and property owners for tree planting and community engagement. A parks maintenance worker is dedicated full time to the maintenance of street trees and provides tree care for establishing trees and some pruning of small trees. Additionally, parks maintenance workers assist with care of street trees on park property. Most tree pruning and removals are contracted. Part-time staff provide additional support for irrigation and maintenance when available. With current resources and operation challenges, street tree management operations are frequently exceeding capacity.

Multiple stakeholders were engaged in the development of the STMP, including city departments responsible for maintenance and planning, utility

providers, state forestry officials, and city leadership. Key findings include consensus on the following:

- Current funding is inadequate to address all of the needed proactive tree maintenance or for addressing conflicts and damage to hardscape.
- Santa Cruz is built out, sidewalks are mostly narrow, and incorporating street trees into development projects is challenging.
- Climate change is a concern that ongoing planning must address
- Staff from all departments have long-standing relationships and high rapport. They routinely work together to accomplish goals for the street tree resource.

Data collected by the street tree inventory was analyzed to benchmark the current structure and condition of the resource as well as existing maintenance needs. Nearly 60% of all street trees are in good or better condition. The majority of city-maintained street trees (96.6%) were identified as requiring no maintenance or routine maintenance (Table 3). Fifty-one trees (3.4%) of city-maintained trees require priority maintenance, including 23 trees recommended for removal.

The Street Tree Master Plan addresses opportunities and challenges for the street tree resource and provides a 5-year work plan for addressing priority maintenance needs and ongoing maintenance for street trees. This includes working with residents to resolve the needs for trees maintained by the adjacent property owner (PO). The STMP also includes key goals for the overall urban forest (Table 3).

In addition to the management considerations, the Plan includes 20 goals for the street tree resource and to further support the community's vision for its urban forest (Table 3).

TABLE 3: SUMMARY OF PRIMARY MAINTENANCE NEEDS

	City Maintained	Adjacent Property Owner-Maintained	All Street Trees Total	All Street Trees (%)
Priority Removals				
Priority 1 Removal	4	42	46	0.47
Priority 2 Removal	12	98	110	1.13
Priority 3 Removal	7	147	154	1.58
Total	23	287	310	3.18
Priority Pruning				
Priority 1 Prune	5	113	118	1.21
Priority 2 Prune	23	126	149	1.53
Total	28	239	267	2.74
Routine Pruning				
Large Tree Routine Prune	145	1,299	1,444	14.82
Small Tree Routine Prune	433	2,094	2,527	25.94
Structural Prune	1	13	14	0.14
No Maintenance Specified	881	4,299	5,180	53.17
Total	1,460	7,705	9,165	94.08
Total	1,511	8,231	9,742	100%





TABLE 4: SANTA CRUZ'S STREET TREE GOALS AND OBJECTIVES

Focus Area Street Tree Management
GOALS
Goal 1: Manage the street tree resource
Goal 2: Promote street tree health and good structure
Goal 3: Enhance resiliency with a comprehensive tree species palette
Goal 4: Increase street tree planting efforts
Goal 5: Increase the environmental benefits resulting from street trees
Goal 6: Advocate for tree lined streets
Goal 7: Provide predictable and sustainable funding for the street tree resource
Goal 8: Strive for optimal staffing levels
OBJECTIVES
Maintain a tree inventory that can be used to manage the street tree resource
Regularly inspect City-maintained street trees
Elevate the care of street trees maintained by adjacent property owners
Create a Master Street Tree List
Set emphasis on the right tree in the right place
Create a City-wide street tree Planting Plan (Municipal Code 13.30, General Plan)
Expand opportunities for street tree planting
Retain large trees and create additional opportunities for the incorporation of large (preferably California native species) into streetscapes
Encourage tree lined streets to enhance the well-being and aesthetics of the community
Work with the Downtown Association to resolve conflicts with businesses visibility and signage
Explore the feasibility to the City taking responsibility for the maintenance of street trees adjacent to private property
Secure funding for the care of City-maintained street trees
Optimize the Urban Forestry Office's ability to manage the current workload
Encourage employees to engage in professional development

TABLE 4: SANTA CRUZ'S STREET TREE GOALS AND OBJECTIVES (CONTINUED)

Focus Area Urban Forest Policy and Regulation
GOALS
Goal 9: Encourage a culture of safety
Goal 10: Enhance risk management and public safety
Goal 11: Promote tree protection
Goal 12: Strive for uniformity between City plans, policies, guiding documents, and Departments
Goal 13: Encourage tree establishment through efficient and sustainable irrigation solutions
Goal 14: Use trees to enhance the aesthetics and function of the urban landscape
Goal 15: Follow Integrated Pest Management (IPM) protocols and best management practices when addressing pests and diseases
OBJECTIVES
Implement policies and procedures that make that tree work as safe as possible
Establish a risk management policy
Enhance methods for cost recovery in the case of tree removals or improper tree maintenance
Continue to implement tree protection during construction
Explore revising and amending Municipal Code to promote the protection of community trees
Continue to communicate and coordinate with other departments
Provide water to trees efficiently and sustainably
Upgrade existing and planned planting sites to encourage root establishment
Emphasize incorporating trees in development and redevelopment projects
Collaborate with Planning and Public Works Departments to find practical solutions to allow for trees in areas with hardscape limitations
Develop policies around parking lot shade
Incorporate trees into stormwater management systems to improve stormwater capture
Continue to address pests and diseases using best management practices.

Focus Area Urban Forest Vision
GOALS
Goal 16: Promote species diversity in the urban forest
Goal 17: Expand canopy cover and the resulting environmental benefits
Goal 18: Celebrate the importance of urban trees
Goal 19: Partner with city departments and other stakeholders to develop a cohesive city-wide Urban Forest Master Plan
Goal 20: Promote community engagement and stewardship of the urban forest
Goal 21: Contribute to a fire safe community
Goal 22: Repurpose woody materials whenever possible
OBJECTIVES
Promote species diversity to build a more sustainable urban forest
Increase tree canopy throughout the community
Increase street tree carbon sequestration as a carbon neutrality strategy in coordination with Climate Action Plan 2030
Maintain the Tree City USA designation
Create a city-wide Urban Forest Master Plan
Update the Parks and Recreation Department webpage to include information on tree care
Enhance citizen and volunteer engagement in care for street trees
Continue to use multiple methods of accessible and translated outreach to engage a greater proportion of the community
Mitigate the risks of wildfire
Identify a wood reutilization policy

Background

The City of Santa Cruz is situated on the coast of central California and framed by the Santa Cruz mountains on the northern edge of Monterey Bay. Encompassing 8,396 acres, Santa Cruz is the largest community in Santa Cruz County and serves as the county seat. Referred to as a place where the mountains meet the ocean, trees, and particularly redwoods, are an integral part of the community's identity.

Topography in Santa Cruz varies, with parts of the community along the coast and others located in the hills at the base of the Santa Cruz mountains. The Santa Cruz mountains reach heights around 3,000 feet and despite this, Santa Cruz does not typically experience freezing temperatures. The community enjoys a Mediterranean climate with daytime temperatures in the 60s and 70s year-round (U.S. Climate Data, 2020). The rainy season, between November and March, brings an average of 31.4 inches of precipitation each year (U.S. Climate Data, 2020). Summers are typically dry, but the breeze off the ocean has a cooling effect and often brings night and early morning fog (Santa Cruz Chamber of Commerce, n.d.).

Community

Santa Cruz is a passionate and lively community with abundant access to recreational opportunities such as biking, hiking, fishing, and surfing. Surrounded by 2,000 acres of open space in the Santa Cruz Mountains and the Pacific Ocean, Santa Cruz is also a popular destination for visitors (Vista Santa Cruz County, 2020). The Monterey Bay National Marine

Sanctuary is home to the nation's largest kelp forest as well as one of the largest underwater canyons (Santa Cruz 2030 General Plan). Each year, the community welcomes migratory whales, birds, and monarch butterflies that overwinter in the local eucalyptus groves (Santa Cruz Chamber of Commerce, n.d.).

Events are hosted year-round, including, festivals, fairs, and tours. There is a strong emphasis on music and art and there are many local museums, studios, and public art displays. Coupled with the many local amenities, a pleasing landscape and festive, creative energy create a destination for an estimated 4 million visitors per year (Choose Santa Cruz, n.d.). The tourism and hospitality industry is a larger sector in Santa Cruz when compared to the rest of the state (City of Santa Cruz Economic Development, 2003) but the largest industry is Educational Services (City of Santa Cruz Economic Development, 2003) followed by Retail Sales and Healthcare. The University of California at Santa Cruz is the largest employer for the estimated 64,600 residents (U.S. Census Bureau, 2019).



“A clean light soaked into the shaggy bark of a eucalyptus and it was a powerful thing to see, the whole tree glowed, it showed electric and intense, the branches ran to soft fire, the tree seemed revealed”

Don DeLillo

History

1700s

The Ohlone were the first people to call the area that is now the Monterey Bay home. The livelihood of their coastal village communities revolved around the abundant wildlife and plant life. Acorns from the native oak trees were a staple food and when acorns were not abundant, buckeye nuts were harvested (Teixeira, 1991). The Ohlone constructed reed structures on the outskirts of the San Lorenzo river floodplain on what is now “Beach Flats” (San Lorenzo Urban River Plan, 2003). Santa Cruz and the San Lorenzo river were named by the Spanish explorer Don Gaspar de Portola in 1769. The Santa Cruz Mission was established by Father Fermin de Lasuen in 1791 (History of Santa Cruz, n.d.). After the arrival of European settlers, a few Ohlone were assimilated but most were displaced due to secularization and cultural changes or died from the introduction of new disease (Teixeira, 1991).

1800s

Following the Mexican-American War, the European settler Elihu Anthony purchased land that is now Santa Cruz in 1848. He subdivided the land and sold it to incoming settlers. First incorporated as a town in 1886, European structures became more abundant as industries such as logging, lime processing, agriculture, and commercial fishing prospered (City of Santa Cruz, n.d.a). During this time, one of California’s first boat building yards was constructed along the San Lorenzo River (San Lorenzo Urban River Plan, 2003).

Frederick Hihn, a general store owner and businessman, was integral in bringing railroads to Santa Cruz to transport timber and limestone from the Santa Cruz mountains. The Southern Pacific Railroad decided to bypass Santa Cruz in 1870 by building the rail line inland. Hihn prompted local investors to build the Santa Cruz Railroad and connect Santa Cruz to the station in Watsonville. Subsequently, the Southern Pacific Coast line was built and this passenger train, in addition to Highway 1, connected Santa Cruz to neighboring cities (Domhoff, 2020).

By the turn of the century, due to the rate of industry growth and development, resources were diminishing and the community began to rely more on tourism (Domhoff, 2020). Certain areas along the coast became known for surfing which was first introduced to the mainland US in Santa Cruz during the summer of 1885 by three Hawaiian princes (City of Santa Cruz, 2020). The San Lorenzo River attracted tourists for its steelhead fishery and numerous public docks (San Lorenzo Urban River Plan, 2003).

1900s

José Vicente DeLaveaga was an early resident of Santa Cruz that valued nature and had a particular interest in trees (Pumphrey, 2014). DeLaveaga planted fruit and nut trees, as well as notable trees from around the world such as walnut, hickory, and Cedar of Lebanon. Part of his family estate was donated to the City of Santa Cruz in 1900. In the 1930s, hundreds of commemorative redwood trees were planted in what is known as “George Washington Grove” in DeLaveaga Park. These redwoods signify importance to the community, as these trees were integral to the early economy of Santa Cruz (Santa Cruz Sentinel, 1971).

The Beach Boardwalk, the oldest amusement park in California, was built next to the ocean in 1907 to expand the tourism industry (Santa Cruz Beach Boardwalk, 2020) and the wharf in 1914 for ship access (City of Santa Cruz, n.d.b). Trains and automobiles made this resort town accessible to those escaping the heat from the Central Valley. As tourism increased, so did the population of Santa Cruz. After World War II, many families settled in Santa Cruz and growth continued to expand with the opening of the University of California Santa Cruz in 1965. Santa Cruz had a strong place in, and in many ways was shaped by the environmental movement. Several community groups became active, the University college for conservation was established, and many residents were and continue to be united through shared community values and events that prioritized the environment.

The epicenter of the 1989 earthquake was just 10 miles east of the downtown area where it took several lives and destroyed many historical buildings (City of Santa Cruz, n.d.c). Shortly after, redevelopment and revitalization activities began, including the reconstruction and landscaping of the current downtown

2000s

Today, Santa Cruz is a popular destination that provides residents and tourists many natural and built attractions. The community is active and passionate about the environment and residents value the unique landscape and the character found in the different areas of Santa Cruz. Many community members strongly identify with preserving and maintaining the urban forest and support the incorporation of native tree species. Although natural disasters are not new challenges in Santa Cruz, recent and unprecedented challenges such as the 2017 storms that resulted in saturated soils and wind-thrown trees and the 2020 CZU Lightning Complex fires continue to shape the community as well as the native and urban forest.

“Continue to keep the Urban Forester position to provide program management and assist the public and private sector in addressing problematic trees and common sense solutions.”

**Public Works
Department Partner,
City of Santa Cruz**

FIGURE 1: HISTORIC INVENTORY OF STREET TREES IN THE SEABRIGHT AREA

History of Urban Forestry in Santa Cruz

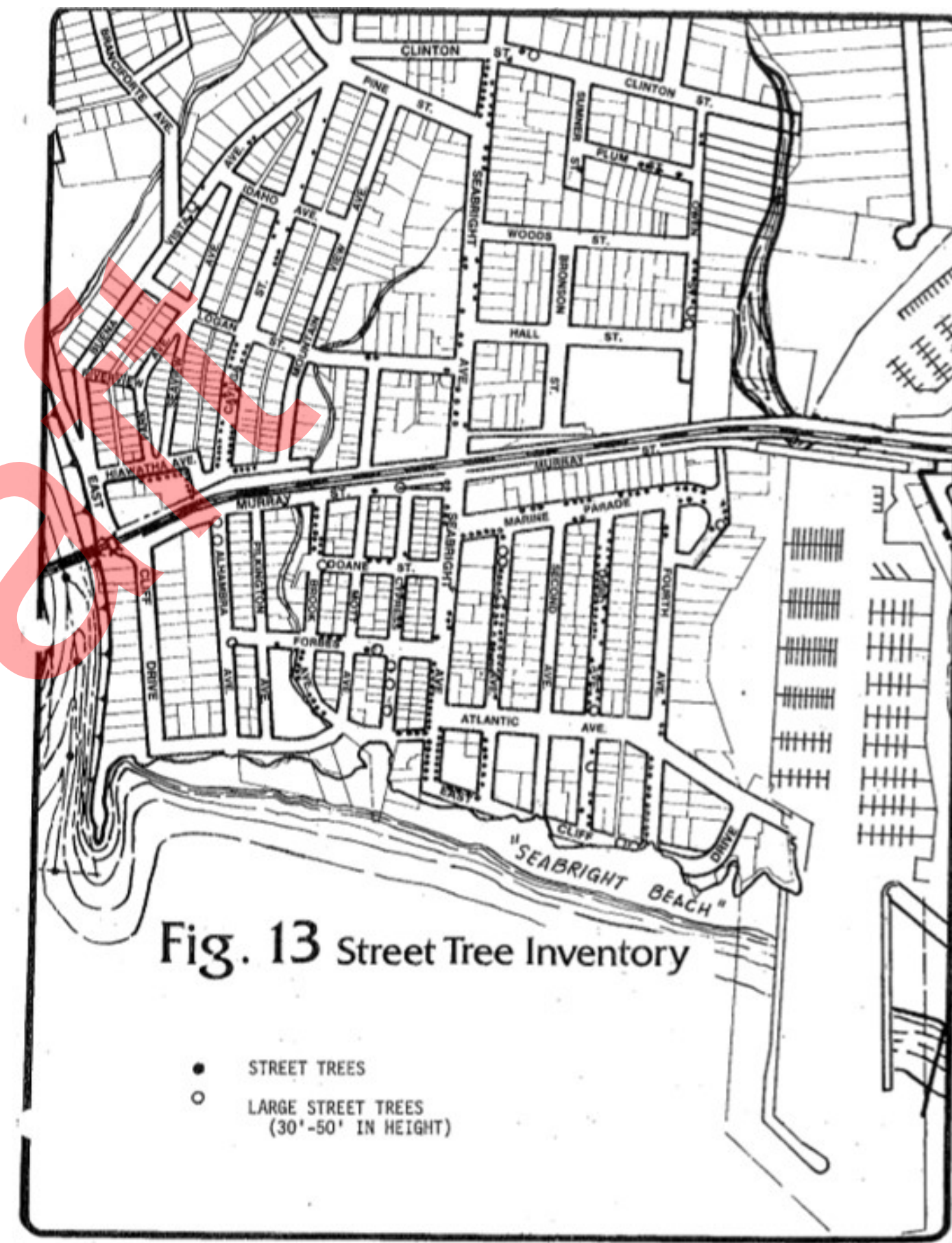
Santa Cruz's urban forest is unique and varied and includes oak woodlands, riparian corridors, and redwood and pine forests (Ingersoll, 1893). There is a rich history of human interaction with trees in the Santa Cruz area that predates Spanish colonization and the subsequent establishment of the City. Along with ongoing development, logging, wildfire, earthquakes, and urban forestry management activities, these factors have all shaped the urban forest (Nowak 1993).

In 1958, the Parks and Recreation Department was expanded to promote tree planting and beautification of the downtown area. Notably, Santa Cruz was an early adopter (1963) of a street tree ordinance that established rules and regulations for the care of street trees throughout the community (History of Santa Cruz Parks and Recreation Department, 1968). In 1976, Santa Cruz adopted the Heritage Tree Ordinance (last revised in 2013) that outlines requirements for tree protection on public and private property. By the late 1980s, approximately half of the cities in California had a tree ordinance in place (Swiecki and Bernhardt 1991). The early adoption of tree ordinances is an example of Santa Cruz's forethought and commitment to urban forestry stewardship and interest in the long-term success of the urban forestry program.

By 1981, the City of Santa Cruz was responsible for the care of 6,000 community street trees. Street trees in the Seabright Area were recorded in an inventory and emphasis was placed on large, mature trees for their contribution to a sense of place (Figure 1). Currently, the street tree inventory includes 9,742 trees.

Up until 1985, and the adoption of Ordinance Chapter 13.30 *Trees*, the City of Santa Cruz provided care for all street trees. Chapter 13.30 conveyed the responsibility for street tree maintenance onto the adjacent property owner, where it currently lies. This change was a direct result of budget cuts that led to an overall reduction in services. In spite of this transition in care, the City has maintained the Urban Forestry Office, which continues to be responsible for management oversight and the preservation of all community trees. Street trees that are not adjacent to private property, including medians, arterial roads, and some retail/commercial areas, continue to be maintained by the City of Santa Cruz. Currently, the City directly maintains 15.5% of the street tree resource. While the adjacent property owner is responsible for maintaining the remainder of street trees (84.5%), the City retains responsibility for the overall management and liability, including:

- Provide policies and regulations for care and preservation of street trees
- Maintaining an approved street tree list
- Review and adjudicate requests for permits to plant, remove, and prune/trim street trees
- Communicate maintenance requirements with adjacent property owners, as needed
- Provide policies and oversight to manage risk and promote safety in the street tree resource, including declaring public vegetation nuisances



REPURPOSING URBAN WOOD



During the 2000s, the City of Santa Cruz had a program to repurpose wood obtained from large urban tree removals. The wood utilization program was a collaborative effort between Public Works sign shop, Parks and Recreation maintenance and construction staff, and the Urban Forester. The wood was milled for lumber and used to enhance public spaces. Key projects included:

- Benches in the courtyard at City Hall
- Bridges and steps along the Bay Street Walkway, south of Nobel Drive, and access to Parks Yard on Harvey West Blvd
- Retaining walls for heritage cypress on Cliff Street and DeLaveaga Park ball fields
- Fences on the perimeter of Louden Nelson and Harvey West Park ball fields
- Picnic tables
- Signs in parks and DeLaveaga Golf Course
- Sign posts in open space areas

This program was one of the first urban wood repurposing programs and was highlighted as an example for other communities. Several International Society of Arboriculture Meetings were held at Harvey West Park and the Civic, where the City was showcased to the green industry in recognition for tree diversity and the wood utilization program. The wood utilization program continued until approximately 2005 when it was disassembled due to lack of funding. The Urban Forester has continued to work with public and private partners to repurpose wood whenever possible.

“The redwoods, once seen, leave a mark or create a vision that stays with you always.”

John Steinbeck

Memorial trees are common throughout the community and provide commemoration for significant people, events, or projects. The Daughters of the American Revolution dedicated two dawn redwood saplings (*Metasequoia glyptostroboides*) to Santa Cruz citizens integral in establishing the school system, including Mary Amney Case and Louden Nelson (Santa Cruz Rowland, 1955). Interesting or unusual trees have been highlighted by the community

throughout the years, including these Memorial dawn redwood plantings at Harvey West Park (Koch, 1966). Memorial trees may still be planted by Parks & Recreation staff upon request in exchange for a donation. Furthermore, spectacular heritage trees are called out each year for their grandeur in the Downtown Santa Cruz Significant Tree Walk, an event established by community advocates in the 1970s and since the early 2000s, led by the Urban Forester.



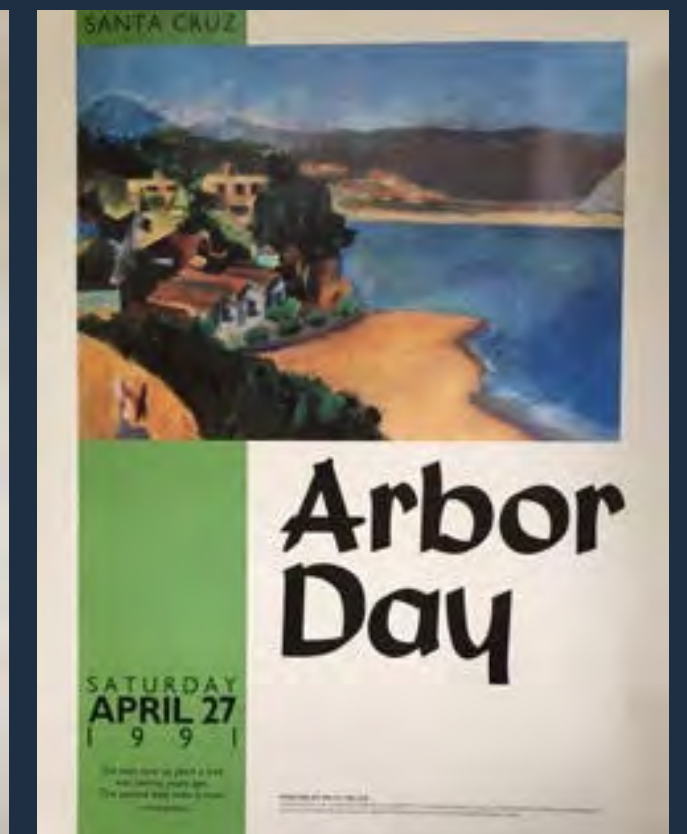
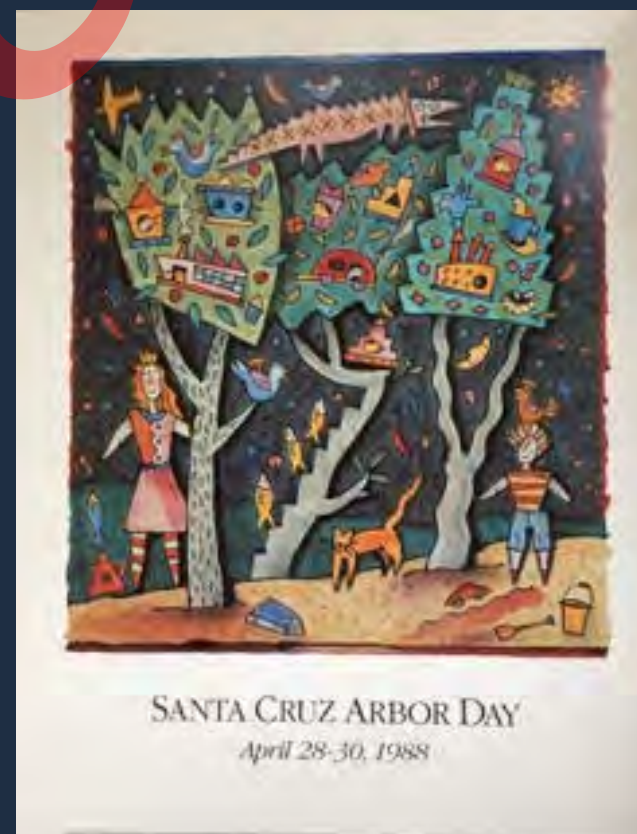
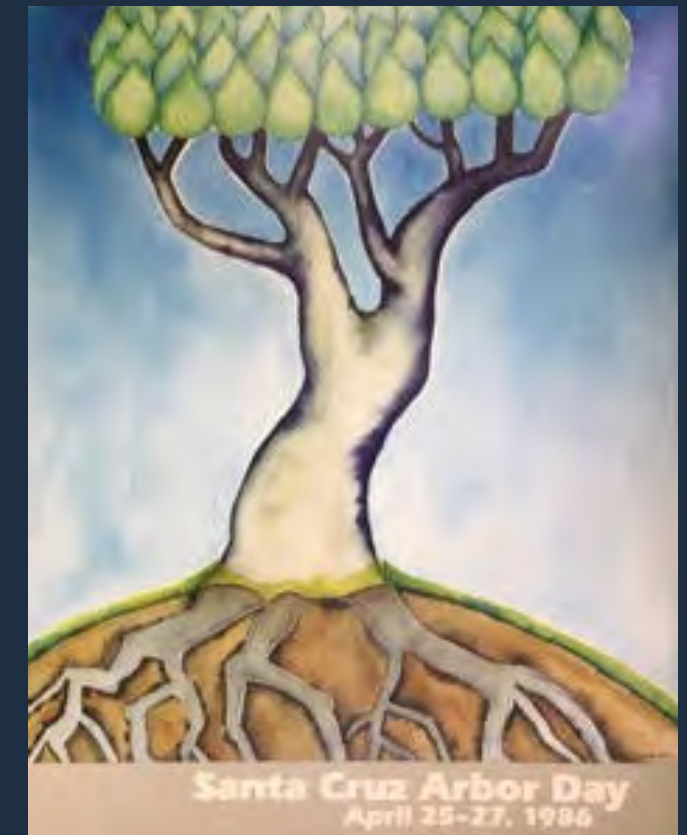
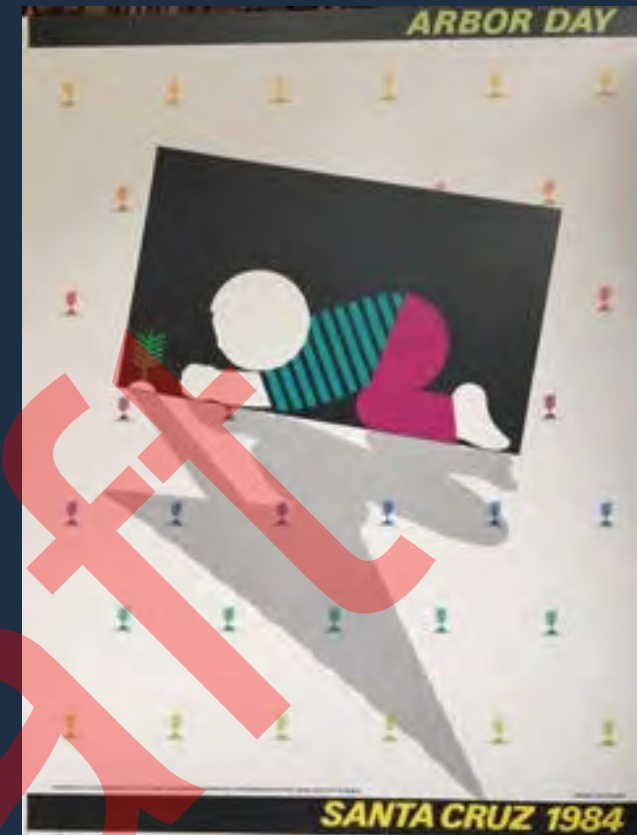
Dawn Redwood in downtown Santa Cruz parking lot is visited by Mr. and Mrs. Donly Gray of Elverta, north of Sacramento, owners of the nursery where it was grown from seed. New leaves are just beginning to appear. The lot is adjacent to The Sentinel.



Not only was the City proactive in urban forestry, but several community groups were involved in expanding street tree planting in the downtown area and promoting outreach and education on the urban forest. Downtown Neighbors worked with the City to organize work days and events for sidewalk cutouts and street tree plantings. Between the 1970s and 1990s, this group was responsible for coordinating the planting of over

100 street trees, organizing yearly Arbor Day and Earth Day celebrations, informational brochures, and tree tours. Since then, the City of Santa Cruz has continued to carry on these traditions and encourages others. For example, a flowering cherry tree was planted in the garden outside of City Hall as a gift from Santa Cruz's sister city, Shingu, Japan. Two Japanese maples were planted in the City Hall courtyard to memorialize the City's adoption of its first Climate Action Plan in 2012.

Tree City USA is an initiative of the Arbor Day Foundation to green urban areas through enhanced tree planting and care (Arbor Day Foundation, 2019). Santa Cruz's urban forest has been recognized as a Tree City USA for over 25 years. Each year Arbor Day is officially recognized with a mayoral declaration and ceremony.



SPATIAL ARRANGEMENT OF COMMUNITY TREES

Maintaining species diversity in a community tree resource is important. Dominance of any single species or genus can have detrimental consequences in the event of storms, drought, disease, pests, or other stressors that can severely affect a community tree resource and the flow of benefits and costs over time. Catastrophic pathogens, such as Dutch elm disease (*Ophiostoma ulmi*) and sudden oak death (*Phytophthora ramorum*) are some examples of unexpected, devastating, and costly pests and pathogens that highlight the importance of diversity and the balanced distribution of species and genera.

Urban Foresters typically follow the widely recognized 10-20-30 rule of thumb, which states that an urban tree population should consist of no more than 10% of any one species, 20% of any one genus, and 30% of any one family (Clark et al. 1997; Santamour, 1990). While this rule does ensure a minimum level of diversity, it may not encourage enough genetic diversity to adequately support resilience. Recent studies recommend even greater diversity (Ball et al. 2007; Kendal et al. 2014) and the spatial arrangement of trees plays a role in resilience. The overall street tree resource in Santa Cruz has high species diversity (the most abundant species represents 6.2% of the overall population), but it is common for a particular species to be abundant within a small area of the community. When many individuals of a single species are concentrated in a small area,

the impact of a stressor can have significant implications.

Prior to the devastating impacts of Dutch elm disease, it was a common trend to design streets with a single species and therefore promote monocultures. Like the majority of communities, Santa Cruz named streets after trees and planted some streets with a continuous lining of one species. This practice is still called for in some of the Area Plans, including the Eastside Business Improvement Plan (1996), the Beach and South of Laurel Plan (1998) and the Downtown Area Plan (2017). The Downtown Area Plan is quite recent, but also calls for consistent lining of London plane trees on the east side of the Boulevard. This design appeals to many people because it is aesthetically pleasing and promotes the character of an area, but current industry standards do not recommend this practice.

Long term management can be achieved through successional planting and removal/replacement with a wider variety of species. This is already occurring in Santa Cruz. Walnut Avenue and areas around City Hall and the Downtown Library were planted with a near monoculture of liquidambar in the 1970s, a species that has proven to be particularly susceptible to breakage and often responsible for sidewalk upheaval. Removal and replacement of liquidambar began in the early 1990s, and currently most of these trees have

been phased out. Diversity at the street level should be considered during replacement plantings throughout Santa Cruz. Not only does the climate allow a broad species palette to thrive, but urban forest managers are uniquely poised to strive for no species representing more than 5% of the overall diversity.



Managers can regularly assess, evaluate, and indicate the current performance levels of the urban forest through a Sustainable Urban Forest Assessment Matrix. The current assessment for Santa Cruz's street tree resource, in context of the overall community forest, can be found in Appendix I. From a management perspective, goals can be set and achieved using criteria from the Indicators for a Sustainable Urban Forest Matrix. This allows managers to benchmark their current conditions and understand how they can be improved to meet industry recommendations and then establish performance measures to improve the effectiveness of their management approach. The criteria sustainable urban forest management proposed by Kenney, et al (2011) were used as a reference standard to assess the current urban forestry practices in the City.



“Forests are trees holding hands underground.”

Jeffrey Campbell

Benefits of Trees & Canopy

Trees in the urban forest work continuously to mitigate the effects of urbanization and development as well as protect and enhance lives within the community. Healthy trees are vigorous, producing more leaf surface and canopy cover area each year. The amount and distribution of leaf surface area are the driving forces behind the urban forest's ability to produce services for the community (Clark et al. 1997). Some of the main services (i.e. benefits) include:

- Air quality improvements
- Carbon dioxide reductions (i.e. carbon sequestration)
- Water quality improvements
- Energy savings
- Health, aesthetic, and socioeconomic benefits
- Wildlife habitat



Air Quality

- Trees improve air quality in five fundamental ways:
- Lessening particulate matter (e.g., dust and smoke)
- Absorbing gaseous pollutants
- Providing shade and transpiring
- Reducing power plant emissions by decreasing energy demand among buildings
- Increasing oxygen levels through photosynthesis

Trees protect and improve air quality by intercepting particulate matter (PM₁₀), including dust, pollen, and smoke. The particulates are filtered and held in the tree canopy until precipitation rinses the particulates harmlessly to the ground. Trees absorb harmful gaseous pollutants like ozone (O₃), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂). Shade and transpiration reduce the formation of O₃, which is created at higher temperatures. Scientists are now finding that some trees may absorb more volatile organic compounds (VOCs) than previously thought (Karl, 2010; McPherson and Simpson, 2010). VOCs are carbon-based particles emitted from automobile exhaust, lawnmowers, and other human activities.

Air quality guides can be used to determine goals for the community in future Climate Action Plans (e.g., AirNow and CalEnviroScreen). The seasonal air quality average for Santa Cruz is considered good. The community experienced five dangerous days per year between 2016 to 2018. These days were attributed to high levels

of fine particulate matter resulting from wildfires (IQAir, 2021).

Carbon Dioxide Reduction

As environmental awareness increases, governments are paying more attention to the effects of greenhouse gas (GHG) emissions and concerns about climate change. As energy from the sun (sunlight) strikes the Earth's surface, it is reflected into space as infrared radiation (heat). Greenhouse gases absorb some of this infrared radiation and trap this heat in the atmosphere, increasing the temperature of the Earth's surface. Many chemical compounds in the Earth's atmosphere act as GHGs, including methane (CH₄), nitrous oxide (N₂O), carbon dioxide (CO₂), water vapor, and human-made gases/aerosols. As GHGs increase, the amount of energy radiated back into space is reduced and more heat is trapped in the atmosphere. An increase in the average temperature of the earth can result in changes in weather, sea levels, and land use patterns, as well as localized changes that impact the suitability of some trees and other plant species to a specific region. In the last 150 years, since large-scale industrialization began, the levels of some GHGs, including CO₂, have increased by 25% (EIA, 2018). Carbon sequestration is a promising carbon reduction strategy in climate action planning and implementation.

Trees and forests reduce atmospheric carbon dioxide (CO₂) in two ways:

- Directly, by reducing CO₂ in the atmosphere through growth and sequestration of CO₂ in woody and foliar biomass.
- Indirectly, by lowering the demand for energy and reducing CO₂ emissions from

the consumption of natural gas and the generation of electric power.

Stormwater management and Water Quality

Trees and forests improve and protect the quality of surface waters, such as creeks and rivers, by reducing the impacts of stormwater runoff through:

- Interception
- Increased soil capacity and infiltration rate
- Runoff reduction and detention
- Reduction in soil erosion

Trees intercept rainfall in their canopy, which acts as a mini reservoir (Xiao et al. 1998). During storm events, this interception reduces and slows runoff. In addition to catching stormwater, canopy interception lessens the impact of raindrops on barren soils. Root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and snowmelt (Xiao et al. 1998). Each of these processes reduces the flow and volume of stormwater runoff, avoiding erosion and preventing sediments and other pollutants from entering streams, rivers, and lakes. Urban stormwater runoff is a major source of pollution for surface waters and riparian areas, threatening aquatic and other wildlife as well as human populations. Requirements for stormwater management are becoming more stringent and costly. Reducing runoff and incorporating urban trees in stormwater management planning have the added benefit of reducing the cost of stormwater management, including the expense of constructing new facilities necessary to detain and control stormwater as well as the cost of treatment to

remove sediment and other pollutants (McKeand and Vaughn, 2013).

Energy Savings

Urban trees and forests modify climate and conserve energy in three principal ways:

- Producing shade for dwellings and hardscape reduces the energy needed to cool the building with air conditioning (Akbari et al. 1997)
- Tree canopies engage in evapotranspiration, which leads to the release of water vapor from tree canopies and cools the air (Lyle, 1996)
- Trees in dense arrangements may reduce mean wind speed and solar radiation below the top of the tree canopy by up to ~90% compared to open areas (Heisler and DeWalle, 1988)

An urban heat island is an urban area or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities. The moderate climate in Santa Cruz helps buffer the community from the heat island effect. As such, the energy conserved by Santa Cruz's trees may not be as apparent as in other climates, but trees nevertheless provide energy benefits.

Trees reduce energy use in summer by cooling the surrounding areas. Shade from trees reduces the amount of radiant energy absorbed and stored by hardscapes and other impervious surfaces, thereby reducing the heat island effect, a term that describes the increase in urban temperatures in relation to

surrounding locations. Transpiration releases water vapor from tree canopies, which cools the surrounding area. Evapotranspiration, alone or in combination with shading, can help reduce peak summer temperatures (Huang et al. 1990). The energy saving potential of trees and other landscape vegetation can mitigate urban heat islands directly by shading heat-absorbing surfaces, and indirectly through evapotranspiration cooling (McPherson, 1994). Individual trees through transpiration have a cooling effect equivalent to two average household central air-conditioning units per day or 70 kWh for every 200 L of water transpired (Ellison et al. 2017). Studies on the heat island effect show that temperature differences of more than 9°F (5°C) have been observed between city centers without adequate canopy cover and more vegetated suburban areas (Akbari et al. 1997).

Trees also reduce energy use in winter by mitigating heat loss, where they can reduce wind speeds by up to 50% and influence the movement of warm air and pollutants along streets and out of urban canyons. Urban canyons are streets flanked by dense blocks of buildings, affecting local conditions, such as temperature, wind, and air quality. By reducing air movement into buildings and against conductive surfaces (e.g., glass and metal siding), trees reduce conductive heat loss from buildings, translating into potential annual heating savings of 25% (Heisler, 1986).

Three trees properly placed around the home can save \$100–\$250 annually in energy costs. Shade from trees significantly mitigates the urban heat island effect - tree canopies provide

surface temperature reductions on wall and roof surfaces of buildings ranging from 20–45°F and temperatures inside parked cars can be reduced by 45°F. Reducing energy use has the added bonus of reducing carbon dioxide (CO₂) emissions from fossil fuel power plants.

Health Benefits

Exposure to nature, including trees, has a positive impact on human health and wellness through improvements in mental and physical health, reductions in crime, and academic success (University of Washington, 2018; University of Illinois, 2018).

A study of individuals living in 28 identical high-rise apartment units found residents who live near green spaces had a stronger sense of community and improved mental health, coped better with stress and hardship, and managed problems more effectively than those living away from green space (Kuo and Sullivan, 2001). In a greener environment, people report fewer health complaints (including improved mental health) and more often rate themselves as being in good health (Sherer, 2003). Other research has revealed lower incidence of depressive symptoms in neighborhoods with greater access to green space (Jennings and Gaither, 2015).

Trees shade impervious surfaces and prevent the sun's rays from hitting them, thus reducing heat storage and later release, which contribute to the urban heat island effect. Tall trees that create a large, shaded area are more useful than short vegetation. Trees also contribute to cooler temperatures through transpiration, increasing latent heat storage (the sun's energy goes to convert water from its liquid to vapor form)

rather than increasing air temperature (sensible heat). According to a study conducted by the Nature Conservancy, it is estimated that trees have the potential to reduce summer maximum air temperatures by 0.9 to 3.6° F. Trees help to address public health concerns for both heat and air quality. Globally, an annual investment of \$100 million in planting and maintenance costs would give an additional 77 million people a 1° C (1.8° F) reduction in maximum temperatures on hot days (McDonald et al. 2016).

Several studies have examined the relationship between urban forests and crime rates. Park-like surroundings increase neighborhood safety by relieving mental fatigue and feelings of violence and aggression that can occur as an outcome of fatigue (Planning the Urban Forest: Ecology, Economy, and Community Development, 2009). Research shows that the greener a building's surroundings are, the fewer total crimes. This is true for both property crimes and violent crimes. Landscape vegetation around buildings can mitigate irritability, inattentiveness, and decreased control over impulses, all of which are well established psychological precursors to violence.

Residents who live near outdoor greenery tend to be more familiar with nearby neighbors, socialize more with them, and express greater feelings of community and safety than residents lacking nearby green spaces (Planning the Urban Forest: Ecology, Economy, and Community Development, 2003). Public housing residents reported 25% fewer domestic crimes when landscapes and trees were planted near their homes (Kuo, 2001). Two studies (one in New Haven, CT and the other in Baltimore City

and County, MD) found a correlation between increased tree coverage and decreased crime rates, even after adjusting for a number of other variables, such as median household income, level of education, and rented versus owner-occupied housing in the neighborhoods that were studied (Gilstad-Hayden et al. 2015; Troy et al. 2012).

A 2010 study investigated the effects of exposure to green space at school on the academic success of students at 101 public high schools in southern Michigan (Matsuoka, 2010). The study found a positive correlation between exposure to nature and student success measured by standardized testing, graduation rate, percentage of student planning to go to college, and the rate of criminal behavior. This trend persisted after controlling for factors such as socioeconomic status and race or ethnicity. Conversely, views of buildings and landscapes that lacked natural features were negatively associated with student performance.

Wildlife Habitat

Trees provide important habitat for birds, insects (including bees), and other animal species. Their greatest contributions include:

- Preservation and optimization of wildlife habitat
- Natural corridors for increased landscape connectivity and animal movement and dispersal

Trees and forest lands provide critical habitat (to forage, nest, spawn, etc.) for mammals, birds, fish, and other aquatic species. Urban forests contain an array of flowering trees that

produce pollen and nectar food sources for pollinators. Foliage, sap, flowers, and fruits all provide essential food sources for a variety of invertebrate species, mammals, and birds. Plant feeding species are commonly fed upon by other wildlife, so wherever trees are planted, wildlife such as insects, birds, and mammals are soon to follow (Tallamy, 2009).

Research has shown that increasing tree species diversity and richness contributes to greater numbers of bird species among urban bird communities (Pena et al. 2017). In addition to greater tree diversity, understory vegetation and the retention of large trees improves outcomes for both birds and bats by increasing opportunities to find adequate food and habitat (Threlfall et al. 2016). Not all plants provide the same wildlife benefits. Native plants are known to provide greater wildlife benefits and particular species are able to support wildlife to a higher degree (e.g. oaks) (Tallamy, 2009). Shifts in tree composition from native to introduced species results in fewer specialist feeders and more generalist feeders and exotic species (Kroftová and Reif, 2017). Overall, diverse landscaping, with an emphasis on native species, enhances wildlife habitat and promotes endemic species.

Wooded streets potentially function as movement corridors, allowing certain species—particularly those feeding on the ground and breeding in trees or tree holes—to fare well by supporting an alternative habitat for feeding and nesting (Fernandez-Juricic, 2001). Restoration of urban riparian corridors and their linkages to surrounding natural areas has facilitated the movement of wildlife and dispersal of flora (Dwyer et al. 1992). Usually, habitat creation and enhancement increase biodiversity and complement other beneficial functions of the urban forest. These findings indicate an urgent need for conservation and restoration measures to improve landscape connectivity, which will reduce extinction rates and help maintain ecosystem services (Haddad et al. 2015).

Calculating Tree Benefits

Communities can calculate the benefits of their urban forest by using a complete inventory or sample data in conjunction with the USDA Forest Service i-Tree software tools (itreetools.org). This open-source, state-of-the-art, peer-reviewed software suite considers regional environmental data and costs to quantify the ecosystem services unique to a given urban forest resource. Individuals can calculate the benefits of trees to their property by using i-Tree Design (www.itreetools.org/design).



Urban Forest Resource

Santa Cruz’s urban forest consists of all privately-owned and publicly-owned trees and woody shrubs that grow within the city. Santa Cruz’s street tree resource is a subset of the urban forest comprised of the public-owned trees on streets. A summary of the composition and value of the overall urban forest and the street tree resource follows.

Tree Canopy

Tree canopy is the layer of leaves, branches, and stems of trees and other woody plants that cover the ground when viewed from above. Understanding the location and extent of tree canopy is critical to developing and implementing sound management strategies that will promote the smart growth and resiliency of Santa Cruz’s urban forest (public and private trees) and the invaluable services it provides.

EXISTING LAND COVER

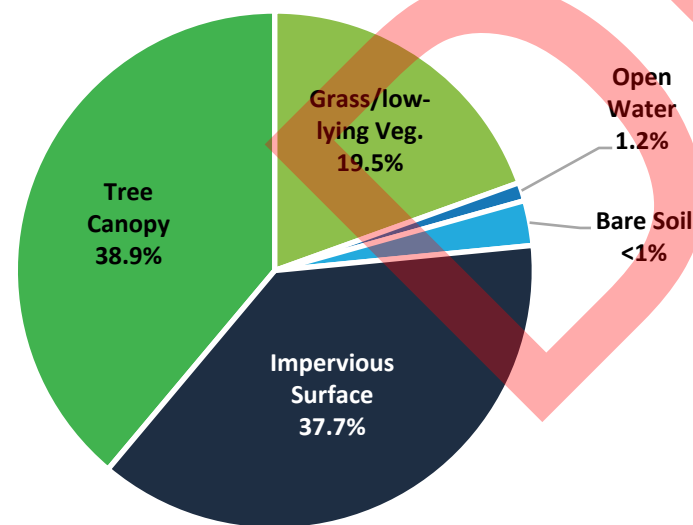
Santa Cruz’s 2020 canopy cover and the resulting benefits were approximated using i-Tree Canopy². This web browser application can be used to determine the amount of coverage by tree canopy and other user-defined surfaces. The application automatically generates random plot points within the boundaries of a study area. Each point is reviewed and assigned a land cover category (bare soil, open water, grass/low-lying vegetation, impervious surface, and tree canopy). Land cover and tree benefit estimates are then generated statistically.

In contrast to a GIS land cover assessment, based on aerial imagery, which can provide a bird’s-eye-view of the entire urban forest and map the distribution of canopy and other land cover, i-Tree Canopy lacks the ability to show the distribution of tree canopy across a community.

Based on the i-Tree Canopy assessment, Santa Cruz is covered by approximately 38.9% ($\pm 1.09\%$) tree canopy on public and private land. Other land cover was estimated as follows:

- 37.67% $\pm 1.08\%$ impervious surface
- 2.80% $\pm 0.37\%$ bare soil
- 19.51% $\pm 0.89\%$ grass/low-lying vegetation
- 1.15% $\pm 0.24\%$ open water

FIGURE 2: LAND COVER CLASSIFICATION IN SANTA CRUZ



The City of Santa Cruz Urban Tree Canopy report (2016) estimated canopy and provides a baseline canopy cover of 38.2%, indicating that overall canopy cover has not changed significantly over the past four years.

Santa Cruz’s tree canopy (public and private trees) are providing \$1.5 million \pm \$41,823 in annual benefits (i-Tree Canopy, 2020), including the removal of 107.0 \pm 3.0 tons of air pollutants (826,552 \pm 23,184), reducing carbon by 4,260 \pm 120 tons (363,695 \pm 20,201), and reducing 3,306.5 \pm 91.8 million gallons of stormwater runoff (\$300,815 \pm \$8,438) (Table 5.)

TABLE 5: ANNUAL ENVIRONMENTAL BENEFITS FROM SANTA CRUZ’S URBAN FOREST

Environmental Benefits from Santa Cruz’s Urban Forest				
Air Quality Benefit				
	Tons	Standard Deviation (Tons)	Value (\$)	Standard Deviation (\$)
CO	2.2	0.06	2,927	82
NO ₂	3.39	0.1	1,622	45
ozone	73.82	2.07	320,752	8,997
PM _{2.5}	2.29	0.06	355,587	9,974
PM _{2.5-10}	23.19	0.65	145,345	4,077
SO ₂	2.11	0.06	319	9
Total	107.00	3.00	826,552	23,184
Carbon Benefit				
	Tons	Standard Deviation (Tons)	Value (\$)	Standard Deviation (\$)
CO ₂ sequestered	4,260	120	363,695	10,201
Stormwater Benefit				
	Million Gallons	Standard Deviation (Million Gallons)	Value (\$)	Standard Deviation (\$)
Reduced runoff	33.66		300,815	8,438
Evaporated	176.08	4.94	.	.
Intercepted	177	4.96	.	.
Transpired	293.99	8.25	.	.
Potential evaporation	1,414.17	39.67	.	.
Potential transpiration	1,211.58	33.98	.	.
Total	3,306.48	91.80	300,815	8,438

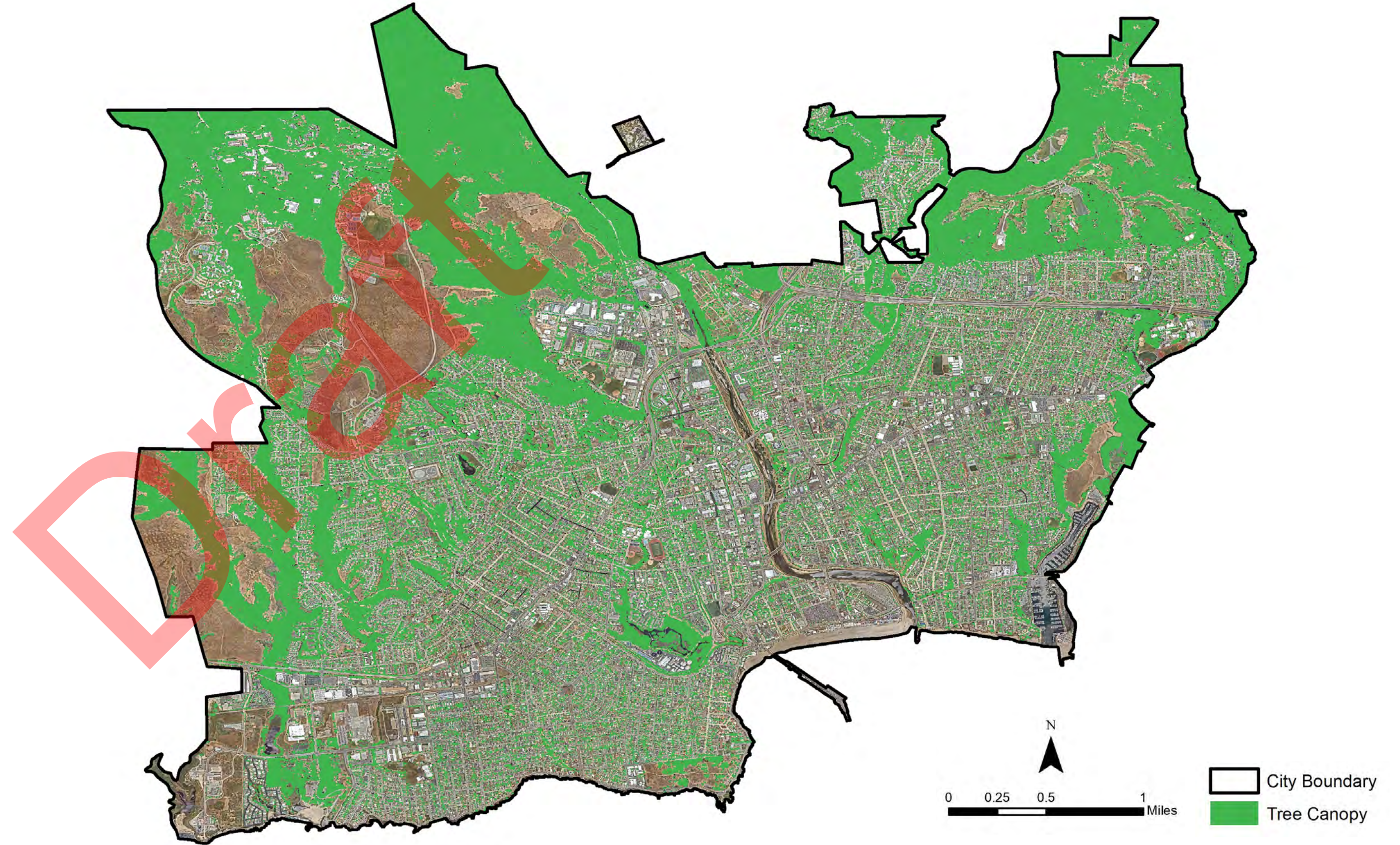
In addition to the annual benefits, trees in Santa Cruz on both public and private property have stored 107.1 metric tons (± 3.00 MT) of carbon in woody and foliar biomass to date, valued at \$9.1 million (\pm \$256,193)³.

² i-Tree Canopy (v7.0) <https://canopy.itreetools.org/> using 2020 Landsat / Copernicus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency and 2,000 points of reference.

³ Carbon dioxide (CO₂) storage is a total biomass amount of 21.940 kT/mi² valued at \$23,256.92.



MAP 1: TREE CANOPY COVER IN SANTA CRUZ





Street Tree Resource

The street tree resource is the collection of community trees planted in the public rights-of-way along the streets in Santa Cruz. The street tree resource, comprising 9,742 trees, is a mixture of native and non-native species⁴. Street trees enhance aesthetics and provide numerous environmental and socioeconomic benefits that contribute to the quality of life and sustainability of the community (Santa Cruz Street Tree Mapbook, 2020). A 2020 resource analysis, using i-Tree Eco⁵.

STRUCTURE AND COMPOSITION

A structural analysis is the first step toward understanding the benefits provided by trees as well as their management needs. Considering species composition, diversity, age distribution, condition, canopy cover, and replacement value, the following information characterizes Santa Cruz's street tree resource in 2020:

- 9,742 individual trees representing 277 unique species
- London plane tree (*Platanus X hispanica*, 6.2%) is the most common species, followed by crape myrtle (*Lagerstroemia indica*, 5.7%) and coast redwood (*Sequoia sempervirens*, 5.1%)
- 50.9% of trees are less than 8-inches in diameter (DBH) and 13.4% of trees are larger than 24-inches in diameter, indicating an almost ideal age distribution
- 57.2% are in good or better condition

⁴Santa Cruz Urban Forest Resource Analysis
⁵i-Tree Eco (itreetools.org)

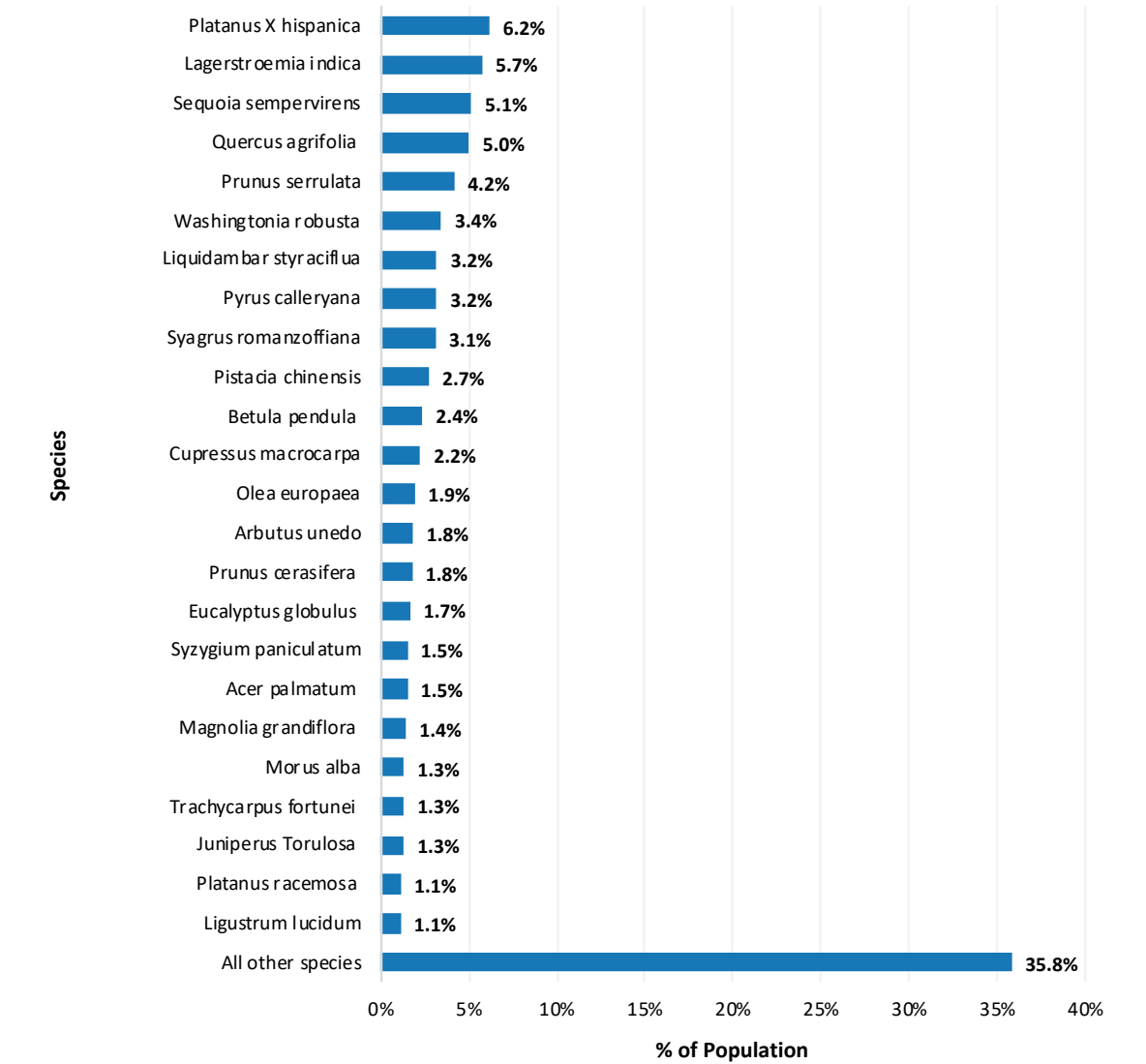
- Street trees provide an estimated 361.3 acres of tree canopy cover, 4.3% of total land area
- Replacement of Santa Cruz's 9,742 street trees with trees of equivalent size, species, and condition, would cost nearly \$38.6 million
- To date, street trees have stored 4,946 tons of carbon (CO₂) in woody and foliar biomass, valued at \$843,540.

SPECIES DIVERSITY

Maintaining species diversity in an urban forest is essential. Dominance of any single species or genus can have detrimental consequences in the event of storms, drought, disease, pests, or other stressors that can severely affect a public tree resource and the flow of benefits and costs over time. The most abundant species in Santa Cruz's street tree resource are *Platanus X hispanica* (London plane tree, 6.2%), *Lagerstroemia indica* (crape myrtle, 5.7%), and *Sequoia sempervirens* (coast redwood, 5.1%). The City of Santa Cruz is able to increase species diversity and strive for less than 5% of any species in the overall street tree resource.



FIGURE 3: MOST PREVALENT STREET TREE SPECIES IN SANTA CRUZ



RELATIVE AGE DISTRIBUTION

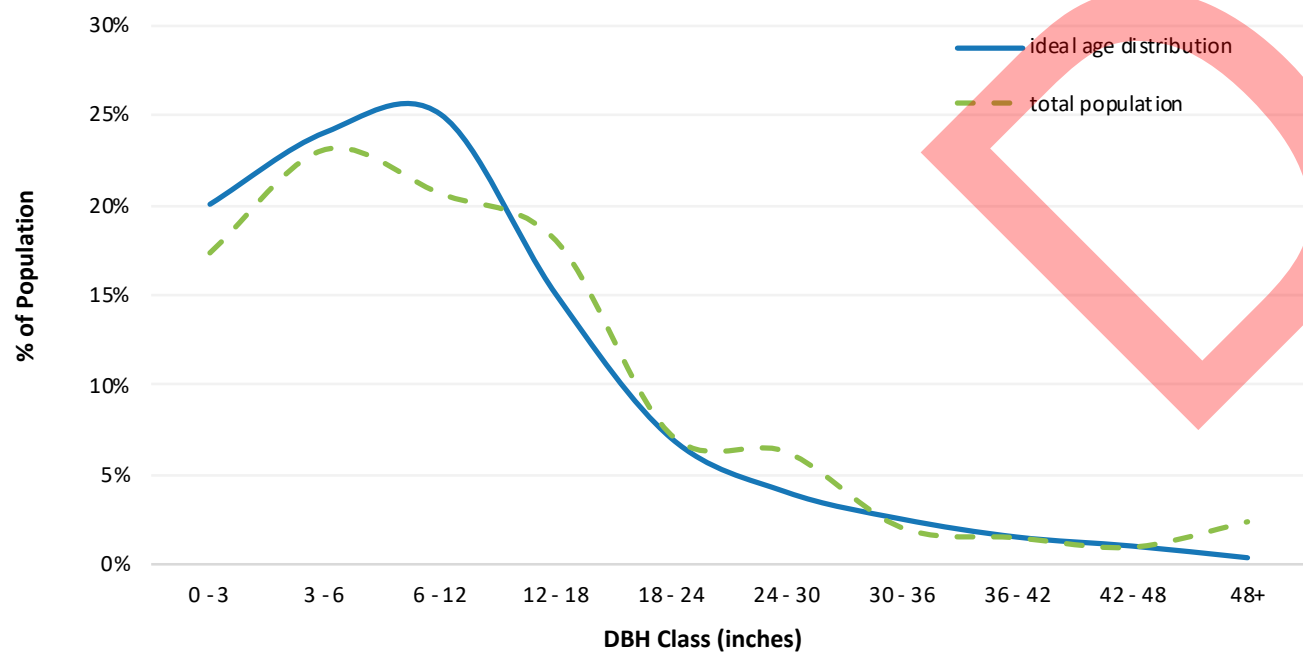
The relative age distribution can be approximated by considering the DBH range of the overall inventory. Trees with smaller diameters tend to be younger. Palms do not increase in diameter over time, so they are not considered in this analysis. In palms, height more accurately correlates to age and mature height varies among palm species.

The relative age distribution of the urban forest is a key indicator and driver of maintenance needs (Richards, 1982-83). Although, it is important to note that in many regions of the world, urban trees larger than 24 inches are

mature and, in some cases, over-mature and beginning to senesce. However, on the central and northern California coastline, native species, including coast redwood (*Sequoia sempervirens*), Monterey cypress (*Cupressus macrocarpa*), and coastal live oak (*Quercus agrifolia*) commonly exceed 48 inches in diameter and a 24-inch diameter tree may still be in a phase of active growth.

The relative age distribution of Santa Cruz's street tree resource (excluding palms) reveals an almost ideal age distribution with 50.8% of trees 8 inches in diameter or less and 13.4% of trees larger than 24 inches diameter (Figure 4).

FIGURE 4: RELATIVE AGE DISTRIBUTION OF SANTA CRUZ STREET TREES



In general, trees greater than 24 inches in diameter require more regular inspections and routine maintenance as they mature. Santa Cruz's street tree inventory has 1,168 mature trees (13.4%), 199 of which are City maintained. Managers can gain a better understanding of the specific risks that individual mature trees pose with regular inspection and risk assessment.

Trees between 6 and 18 inches in diameter are generally established and are a mixture of young, large- and medium-stature tree species and mature small-stature species. This age group is a positive indicator for future benefits from the street trees since large shade trees typically provide more shade, pollutant uptake, carbon sequestration, and rainfall interception than small trees. The 3,365 trees between 6 and 18 inches in diameter represent 38.7% of the street tree population. In total, 607 are City maintained street trees.

Trees below 6 inches in diameter indicate young trees and new tree plantings. Of the street trees, 5,033 trees are below 6 inches and represent 40.5% of the population (554 trees are City-maintained). This figure reflects tree planting over the last two decades from both City projects and conditions of approval for development projects.

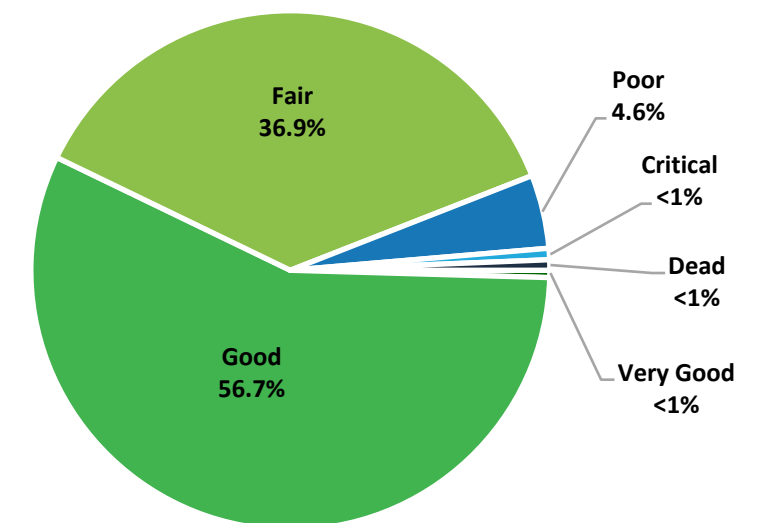
CONDITION

Tree condition is an indication of tree health, which can be measured by how well trees are managed and how well they are performing in each site-specific environment (e.g., street, median, parking lot, etc.). Condition ratings can help managers anticipate maintenance and funding needs. In addition, tree condition is an

important factor for the calculation of public tree resource benefits. A condition rating of good assumes that a tree has no major structural problems, no significant mechanical damage, and may have only minor aesthetic, insect, disease, or structural problems, and is in good health. When trees are performing at their peak, as those rated as good or better, the benefits they provide are maximized.

The majority of community trees (57.2%) in Santa Cruz are in good or better condition, with 5.9% of trees in poor or worse condition. Less than 1% of community trees are dead or dying (Figure 5).

FIGURE 5: CONDITION OF STREET TREES IN SANTA CRUZA



STOCKING LEVEL

Stocking level is an indication of how many planting sites contain trees. Considering that there are 12,350 total sites in the street tree inventory, including 9,742 existing trees and 2,608 available sites, the stocking level for the street tree resource is currently 78.9%.

BENEFITS

The benefits provided by the street tree resource are dependent upon the species, age (size), and condition of the tree population. Trees are the one component of urban infrastructure that has the potential to increase in value over time and with proper care. As tree canopy cover increases, so do the benefits afforded by leaf area.

Annually, Santa Cruz’s 9,742 street trees provide cumulative environmental benefits to the community at an average value of \$4.53 per tree, for a total value of \$44,177. These annual environmental benefits include:

- \$5,435 in intercepted stormwater (608,263 gallons), an average benefit of \$0.56 per tree.
- \$20,0729 in air quality improvements (2.4 ton of particulates removed), an average of \$2.13 per tree.
- \$18,013 in sequestered atmospheric carbon (105.6 tons), an average of \$1.85 per tree.

It should be noted that these quantified benefits are only a fraction of the overall benefits provided by the street tree inventory. Ongoing research continues to identify and demonstrate relationships between tree canopy and environmental and human health. i-Tree *Eco* is only able to quantify those benefits to

air quality, carbon, and stormwater that can be accurately measured and related to known costs. Some benefits that can be calculated by i-Tree *Eco* could not be included in the analysis such as reductions in energy use (electricity and natural gas) through shading and climate effects. Furthermore, many benefits are intangible and/or difficult to quantify such as increases in property values and impacts on psychological and physical health, crime, and violence. Empirical evidence of these benefits does exist (Wolf, 2007; Kaplan and Kaplan, 1989; Ulrich, 1986), but there is limited knowledge about the physical processes at work and the complex nature of interactions make quantification imprecise. Tree growth and mortality rates are highly variable. A true and full accounting of benefits and investments must consider variability among sites (e.g., tree species, growing conditions, maintenance practices) throughout the City, as well as variability in tree growth. In other words, trees are worth far more than what one can ever quantify!

Street Tree Maintenance Needs

Santa Cruz’s street tree resource includes 9,742 trees, 2,419 planting sites, and 189 stumps. The tree inventory identified primary maintenance needs (pruning, removal, and stump grinding) where applicable. Table 6 summarizes maintenance needs as well as responsibility (e.g., city-maintained (CITY) or adjacent-property-owner-maintained (PO). Overall, the majority of street trees require routine pruning. Street trees maintained by adjacent property owners require a higher percentage of priority removals and priority pruning (13.8% and 8.1% of primary maintenance, respectively) (Figures 6 and 7).

PRIORITY 1 REMOVAL

Forty six (46) street trees require Priority 1 removal (4 CITY: 42 PO). Trees categorized as Priority 1 removals have defects that cannot be cost-effectively or practically treated. The majority of the trees in this category has a high percentage of dead crown and pose an elevated risk of failure. This category also includes trees that are a potential danger to persons or property and that may cause a potential liability. Large dead and dying trees that have high liability risks are also included in this category.

PRIORITY 2 REMOVAL

One hundred ten (110) street trees require Priority 2 removal (12 CITY: 91 PO). Like removals designated as Priority 1, Priority 2 removals should be removed as soon as possible, but they do not pose risks as significant as the Priority 1 trees.

PRIORITY 3 REMOVAL

One hundred fifty four (154) street trees are recommended for Priority 3 removal (7 CITY: 147 PO). Trees with this designation should also be removed but have a lesser prioritization compared to the other removal categories and pose minimal liability to persons or property.

TABLE 6: SUMMARY OF STREET TREE MAINTENANCE NEEDS

Maintenance Task	Priority Removal			Priority Prune		Structural Prune	Routine Prune	Stump Grind/Removal	Plant	Total	
	Priority 1	Priority 2	Priority 3	Priority 1	Priority 2						
	Diameter Class (inches)										
City-Maintained	0 - 3	1	4	1	0	0	1	276	3	104	390
	4 - 6	0	3	0	0	4	0	283	0		290
	7 - 12	0	0	1	0	5	0	357	1		364
	13 - 18	0	0	5	1	1	0	252	3		262
	19 - 24	0	3	0	0	5	0	130	5		143
	25 - 30	2	1	0	1	2	0	71	0		77
	31 - 36	0	0	0	0	2	0	27	0		29
	37 - 42	1	0	0	0	0	0	20	1		22
43 +	0	1	0	3	4	0	43	0		51	
Activity Total(s)	4	12	7	5	23	1	1,459	13	104	1,628	
Adjacent Property Owner-Maintained	0 - 3	9	12	33	0	0	12	1236	16	2,315	3,633
	4 - 6	9	12	30	7	4	1	1775	47		1,885
	7 - 12	16	20	47	23	49	0	2023	46		2,224
	13 - 18	4	19	16	17	31	0	1226	22		1,335
	19 - 24	1	12	10	21	14	0	585	19		662
	25 - 30	1	6	8	11	7	0	375	17		425
	31 - 36	1	3	3	13	5	0	146	3		174
	37 - 42	0	2	0	3	9	0	113	3		130
43 +	1	5	0	18	14	0	213	3		254	
Activity Total(s)	42	91	147	113	133	13	7,692	176	2,315	10,722	
Overall Total(s)	46	103	154	118	156	14	9,151	189	2,419	12,350	

FIGURE 6: CITY MAINTAINED STREET TREE PRIORITY MAINTENANCE

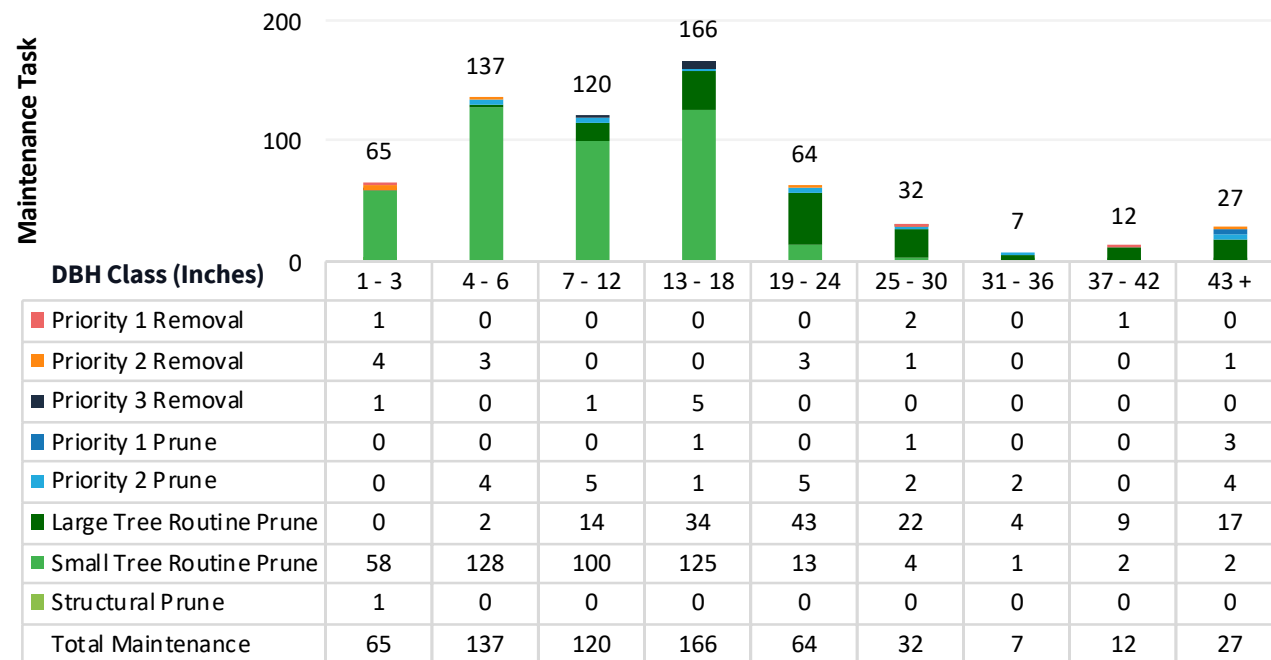
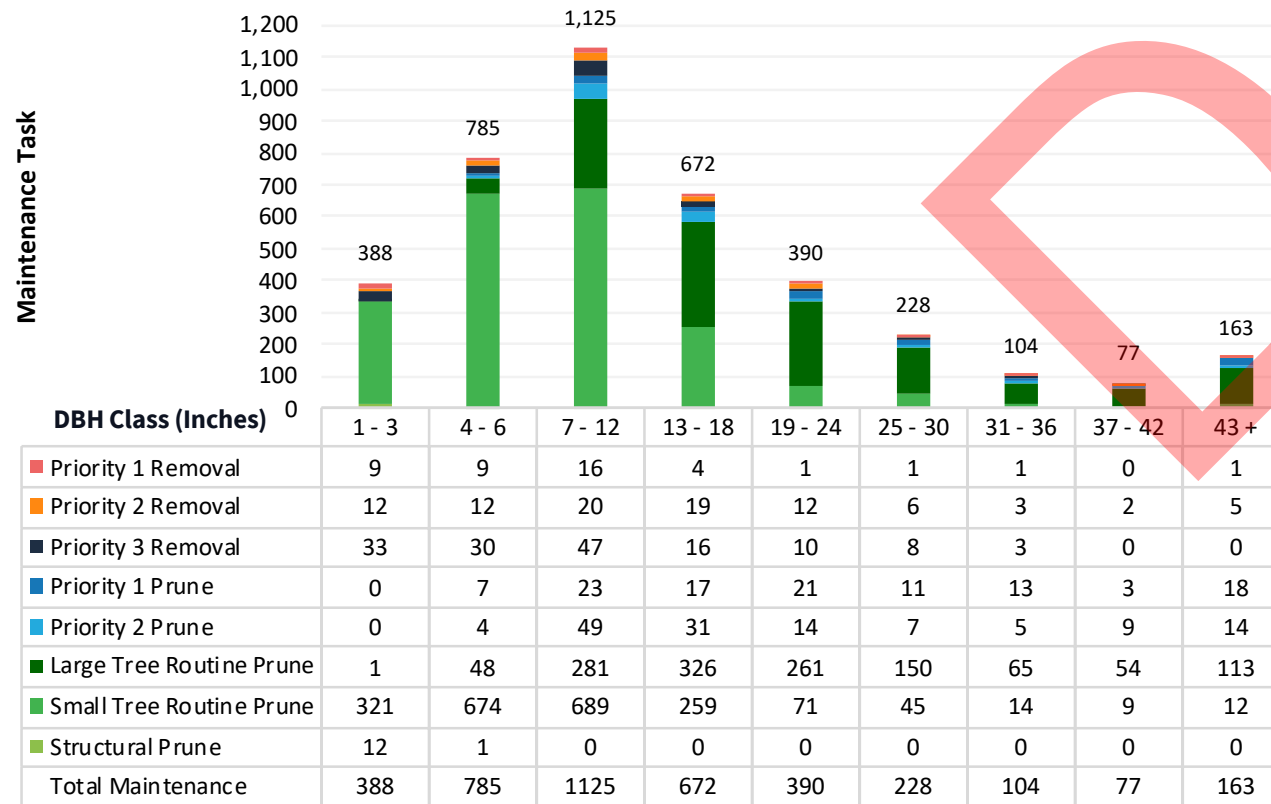


FIGURE 7: ADJACENT PROPERTY OWNER MAINTAINED STREET TREE PRIORITY MAINTENANCE



PRIORITY 1 PRUNE

One hundred eighteen (118) street trees require Priority 1 pruning (5 CITY: 113 PO). Priority 1 pruning generally refers to trees recommended for pruning to remove hazardous deadwood, hangers, or broken branches. These trees have broken or hanging limbs, hazardous deadwood, and dead, dying, or diseased limbs or leaders greater than 4 inches in diameter.

PRIORITY 2 PRUNE

One hundred forty nine (149) street trees were recommended for a Priority 2 prune (23 CITY: 133 PO). These trees need pruning to remove hazardous deadwood limbs greater than two, but less than four inches in diameter.

LARGE TREE ROUTINE PRUNE

One thousand four hundred forty four (1,444) trees are recommended for large-tree routine prune (145 CITY: 1,299 PO). Some trees with this priority maintenance level are in poor or critical condition. Trees with the lower condition ratings should be prioritized, because the condition of these trees might be improved through prompt response. For example, a tree in poor condition may require some management of mistletoe. If the mistletoe is removed, the condition of the tree may be improved with relief from this parasitic organism.

SMALL TREE ROUTINE PRUNE

Two thousand five hundred twenty seven (2,527) trees are recommended for small-tree routine prune (433 CITY: 2,094 PO). Small-tree care/pruning does not require many tools and can be completed in a relatively short amount of time, often from the ground.

STRUCTURAL PRUNE

Fourteen (14) street trees require a structural prune (1 CITY: 13 PO). Training, defined as the selective pruning of small branches to influence the future shape and structure of a young tree. Training is important for young trees, as minor pruning cuts can improve the overall structure of a tree and can often reduce more significant maintenance needs as the tree matures.

STUMP GRINDING

One hundred eighty-nine (189) otherwise vacant tree sites require stump grinding (13 CITY: 176 PO). Once the stumps are removed, these sites should be confirmed as available for tree planting.

“The road and sidewalk layout throughout the City is not conducive to tree growth.”

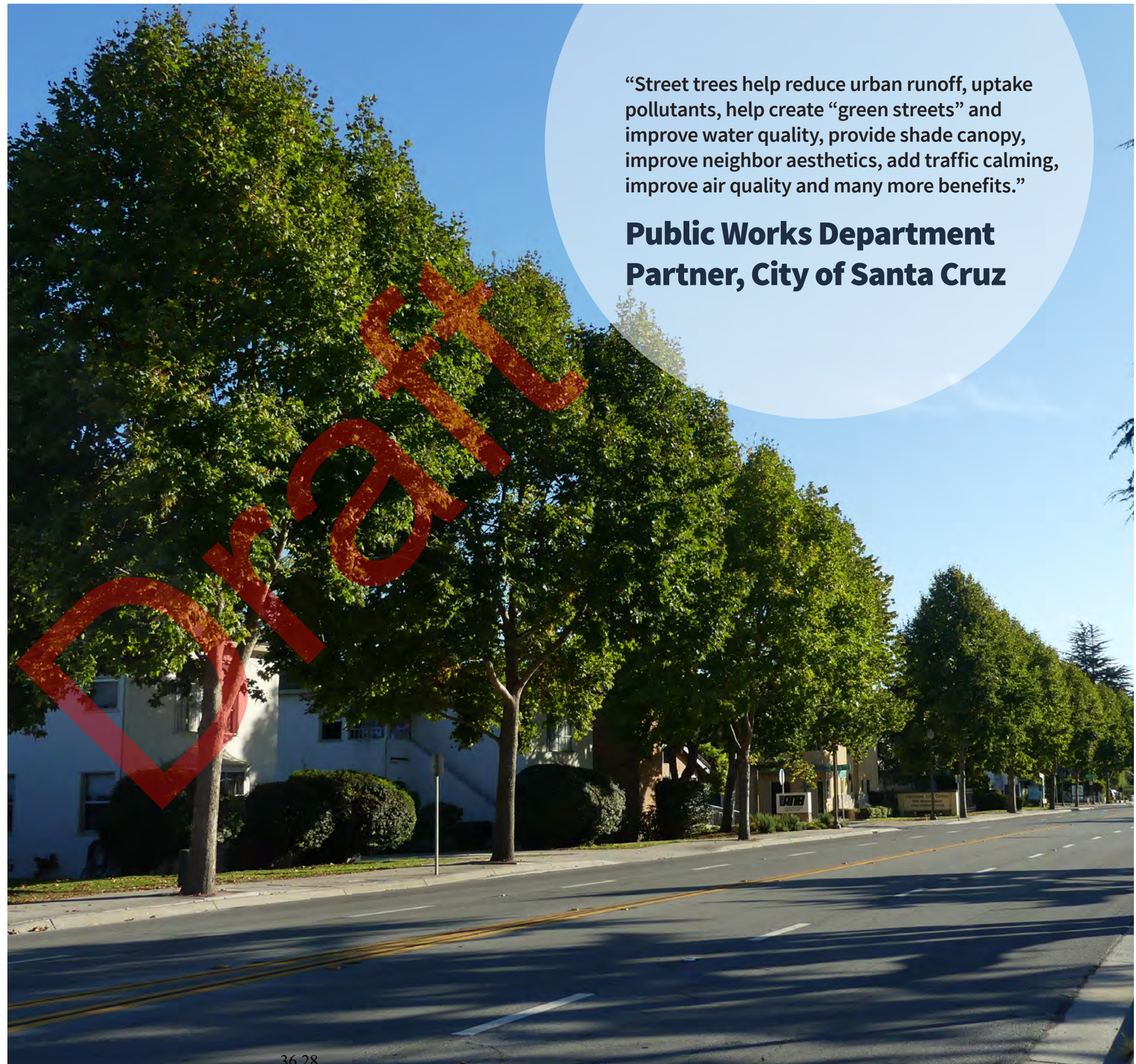
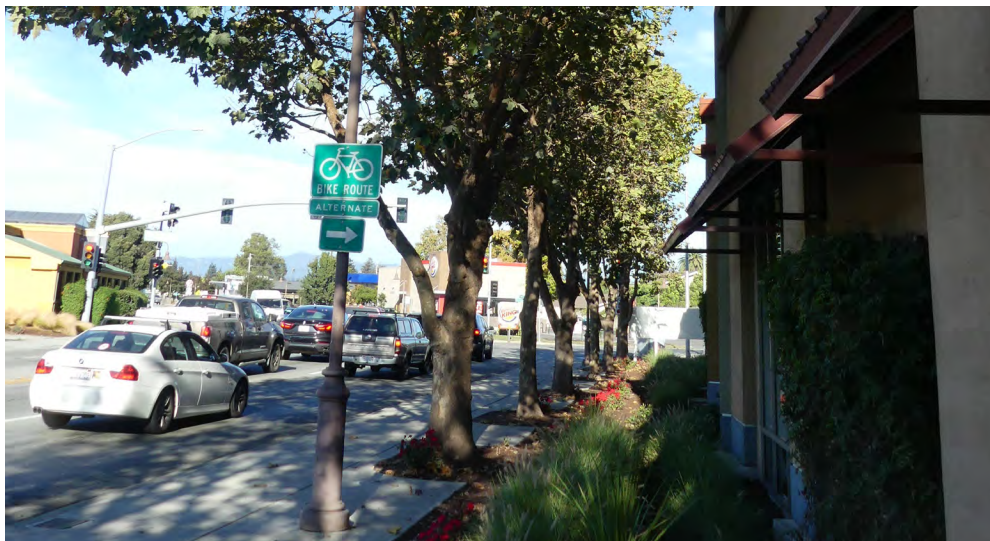
Parks and Recreation Partner, City of Santa Cruz

Street Tree Program

The Urban Forestry Office within the Department of Parks and Recreation has responsibility for the administration of the street tree program. Currently, the Urban Forestry Office employs one full-time Urban Forester, one full-time Parks Maintenance Worker, and one part-time, temporary staff member (1,000 hrs./year) as funding allows.

Prior to 2004, the City employed 5 full-time staff that focused on tree-related work: one forester, one assistant arborist, one administrative assistant, and a two-person tree crew. After 2004 administrative staff, the assistant arborist, and the tree crew were dissolved to the current staffing levels and funding was allotted for contractual tree maintenance. Intermittent furloughs and staff reductions in other departments often result in an increase in collateral work for the Urban Forestry Office, further impeding staff's ability to keep up with permitting, plan review, code enforcement, public education and outreach, grant administration, and inventory management. In the future, the Department is hoping to focus more of the Urban Foresters time and energy to forestry management and canopy enhancement.

Ideally, the Urban Forestry Office would employ two full-time Parks Maintenance Workers (or a combination of full-time and temporary staff), one full-time



“Street trees help reduce urban runoff, uptake pollutants, help create “green streets” and improve water quality, provide shade canopy, improve neighbor aesthetics, add traffic calming, improve air quality and many more benefits.”

**Public Works Department
Partner, City of Santa Cruz**

Administrator, one Assistant Arborist, and an Urban Forester in order to reallocate duties to better manage the current administrative and outreach workload as well as advance in permitting and cost recovery. The Urban Forestry Office provides the following services:

- Maintaining community trees along a subset of streets, in medians, and chokers/bump-outs
- Assisting private property owners with the maintenance of rights-of-way trees adjacent to private property along specific areas of the downtown surrounding Pacific Avenue, and arterials such as the Mission Street Caltrans corridor
- Overseeing the maintenance for community trees managed by other City Departments and Offices including trees in parks, at City facilities, and street trees adjacent to facilities and parking lots
- Permits for Heritage Tree and Street Tree Ordinances
- Tree planting and establishment
- Enforcing City Code relating to street trees
 - Informing private property owners of tree maintenance needs
 - Overseeing the Heritage Tree Ordinance
- Emergency response (coordination, clearing the rights-of-way of tree debris)
- Plan review for internal and development projects
- Sidewalk inspections for root damage

- Contract monitoring for street tree maintenance (pruning, removal, stump grinding)
- Community outreach and street tree giveaways
- Manage tree inventory and permit data
- Coordinating with the Climate Action Program on common interests and projects
- Non-street tree related duties:
 - Enforcing Code related to private trees
 - i. Heritage Tree Ordinance
 - Administering the Heritage Tree Grant funds to assist property owners in the maintenance of private trees
 - Horticultural technical support
 - Stormwater reporting and management
 - Vegetation management of the San Lorenzo River corridor north of Hwy 1 in collaboration with Public Works
 - Assist with regulatory permits for fish and wildlife in riparian areas
 - Assist with endangered species and biological consulting
 - Fire suppression and vegetation management

The Urban Forestry Office's responsibilities extend to the overall urban forest, including trees in parks, streets, and city properties and facilities. Other departments and teams share responsibility for maintaining trees in specific

locations, including the departments of Libraries and Public Works. Approximately 20% of staff time is dedicated to the maintenance of street trees. Most tree maintenance, including pruning and tree removal, is provided by professional tree contractors. Utility providers are responsible for tree maintenance in utility corridors (e.g. gas lines and overhead power lines). In residential and business areas, trees in the rights-of-way and adjacent to private property are maintained by the adjacent property owners with ordinance oversight by the Urban Forestry Office.

Currently, the street tree resource includes 9,742 trees. The city provides maintenance for 1,511 street trees (15.5%) and adjacent property owners are responsible for maintaining 8,231 street trees (84.5). The Urban Forester maintains authority for all street trees, including code enforcement and approval of permits for planting, pruning, root pruning or design modification for sidewalk repair, and tree removal.

The Urban Forestry Office is led by an Urban Forester and supervised by the Superintendent of Parks, both of which are ISA certified arborists. Because most tree maintenance work is contracted, the City does not have a need for aerial lifts, bucket trucks, chippers, etc. Chainsaws are only used by trained personnel and all work is done from the ground with chainsaws, pole saws, and pruners. Any equipment the Urban Forestry Office uses is owned by the City and shared between Departments. Training on equipment is performed in-house by supervisors or by the distributor. Documenting safety tailgates and trainings is done by supervisors under the

ultimate oversight of the City's Risk Management team. Staff are expected to inspect all equipment and vehicles before and after use. In addition, a Department mechanic ensures equipment is safe for use.

TREE PRUNING

In addition to the City, numerous parties are responsible for tree care, including private property owners, the state, and utility providers (electric, cable, phone, etc.). As a result, street trees are not currently maintained in a consistent manner nor on a regular cycle.

City-maintained street trees (currently 1,511 trees), including trees within medians, chokers, and in the public rights-of-way along designated arterials and the downtown area, are maintained under professional tree care contracts. Most pruning on city-maintained street trees is currently reactive, with the exception of trees on Pacific Avenue and side streets downtown (389) and on Mission St., which are pruned every one to two years. A parks maintenance worker supplements contract pruning in medians. According to Municipal Code, contractors must be licensed by the state (CA C27 and D49, California Code of Regulations), but do not have to be certified arborists. While most pruning conducted by contractors meets the City's standards (as laid out in the Heritage Tree Ordinance), some trees do not receive adequate care. The Heritage Tree Ordinance allows for up to 25% of the canopy to be pruned without a permit. Depending upon the age, condition, and species, the removal of 25% of living canopy can substantially impact tree growth.

Currently, the adjacent property owner is responsible for the maintenance, including pruning, for the majority of community street trees (8,231). At one point, the City maintained all street trees in Santa Cruz. The shift in rights-of-way tree maintenance to adjacent property owners (in 1985) has been to the detriment of the street tree resource. Resident responsibilities are clearly laid out in the Municipal Code and call for residents to only hire licensed tree care companies and follow standards for tree maintenance. Despite this, many residents are not aware of this responsibility and Municipal Code standards are not always followed. Some property owners prioritize proactive maintenance and hire licensed and certified arborists while others hire unaccredited parties, attempt tree maintenance themselves, or defer maintenance. The Urban Forestry Office places an emphasis on education and outreach to property owners so they better understand tree benefits and the value of the urban forest. In cases where pruning severely and negatively affects street trees, the Urban Forester may

cite the property owner for not using a licensed vendor. Citations are often complaint driven and largely dependent upon the neighborhood.

The Municipal Code specifies requirements for visibility, clearance, and sidewalk condition. Residents can submit service requests to the Public Works Department. If street trees violate requirements, the Public Works Department then collaborates with the Urban Forester to notify property owners of their responsibilities. The Urban Forester may post letters that indicate any Municipal Code violations and supports notifications sent by Public Works.

Pacific Gas & Electric (PG&E) manages trees located under utility lines and AT&T maintains trees under phone lines. Trees with overhead power lines should be directionally pruned by trained and authorized line clearance personnel only to provide clearance and/or reduce height. Tree species that regularly interfere with utility lines are subject to removal and replacement and the City coordinates with the utility provider for mitigation on site or by paying an in lieu fee to fund replanting elsewhere.

EMPHASIZING THE BENEFITS OF TREE CANOPY ON BUSINESS SUCCESS

Santa Cruz's downtown is a business district, but it also serves as a gathering place for residents and tourists to enjoy community events, performances, and dining. Those interested in community art, fitness, or games are also drawn to the downtown area. The many local and unique retail stores also draw consumers (Downtown Association of Santa Cruz, 2020). In all, downtown Santa Cruz is a social and economic hub for the community.

Local businesses have expressed concerns over trees blocking views of signage. As a result, the City has some planning recommendations to prevent conflicts between signage and street trees (Eastside Business Improvement Plan, 1996; Downtown Plan, 2017). The City follows guidelines for species with compatible growth forms in these areas, specifically trees with high or narrow canopies. The City also gives special consideration to the Downtown Association, proactively pruning street trees in the downtown area to raise their canopies for increased sign visibility.

From a design perspective, trees with a narrow habit or with open and airy canopies and mature heights that are higher than business signs are preferred. Using sign designs that incorporate colors that contrast with the foliage as well as monument signs (i.e., ground signs) that are visible below the canopy. Traffic calming devices reduce speed and allow more time for people to notice the signage (Wolf, 2005).

Promoting trees in shopping areas is important, as there is growing evidence that trees are good for business. Visually, shoppers prefer locations with trees, but trees also influence shopper perceptions and behaviors. Shopping areas can stimulate stress and frustration in consumers when locating a product is difficult or overcrowding and time constraints occur. In these situations, trees can help decrease stress levels and restore attention (Joye et al. 2010). The frequency, duration, and willingness of consumers to travel a larger distance are all connected to the presence of trees in the retail area (Wolf, 2009). Consumers tend to spend more time and money on goods, an average of 11% more in landscaped areas (Wolf, 1998). In all, there is a need for future conversations addressing any misconceptions of street trees on business success and adapting signage to allow for the promotion of street trees in business districts.



Tree Permitting

The Urban Forestry Office administers permits for the following:

- Tree planting in rights-of-ways
- Tree removal, including heritage trees on private property
- Tree pruning, greater than the percentage of canopy indicated in the Municipal Code, including heritage trees on private property

Permits are subject to the criteria stated in Municipal Code 13.30 and in the approved Resolutions to Municipal Code 9.56 Preservation of Heritage Trees and Heritage Shrubs (NS-23,710). All trees that meet the Heritage Tree or Street Tree requirements, whether they are on public or private land, are subject to the Ordinances.

Approximately 90% of tree permit applications are approved, but the turnaround time varies depending on the type of permit. Street tree applications are typically processed within 2-3 weeks and Heritage tree permits within 3-4 weeks. Heritage trees within the shoreline protection overlay require Coastal Permits which are processed by the Planning Department and are typically approved within 4-6 months. Processing time may vary due to permit volume.

“If a jacaranda (*Jacaranda mimosifolia*) were planted as a street tree and lived for 20 years, it would provide numerous environmental benefits including sequestering 2,064 lbs of CO₂, preventing 13,169 gallons of rainfall runoff, and intercepting 9 lbs of air pollutants.”

from i-Tree Design

Tree Planting

The Urban Forestry Office coordinates with community volunteers to plant new and replacement street trees. The community advocates for tree lined streets and plays an active role in tree-planting events. Individuals and neighborhoods groups can contact the Urban Forester or the Parks and Recreation Department for a tree planting permit or to request street tree giveaways and neighborhood planting events. The majority of city-maintained trees are planted during community events with volunteers and city staff. On occasion, the city will contract tree planting.

Once a permit has been obtained, the City delivers the free street trees and marks the curb to identify where the trees should be planting. The Urban Forester provides expertise and educational documents on tree planting, including the Public Works Standard Planting Detail, but property owners are responsible for planting and caring for the trees. The City follows American Nursery Standards (ANSI Z60.1) for new tree plantings. On average, the City plants 250-300 trees annually through community partnership each year.

Since 2001, the City of Santa Cruz maintains an Approved Street Tree Planting List for trees planting along city sidewalks. The list is periodically reviewed and updated to reflect

evolving information on species performance, pests, and climate adaptation. The Approved Street Tree Planting List does not apply to medians or other specific land use, including commercial and arterial streets. The Urban Forester maintains the authority to specify or approve species not on the Approved Street Tree Planting List with consideration for the umbrella policies provided in the General Plan and area plans.

The Urban Forester works to provide residents with their preferred species of tree. Occasionally, species selection is influenced by the planting palette for a specific area (see Area Plans section). Residents can request certain species that are not included in the Area Plan or Approved Street Tree List, but they must be approved by the Urban Forester. Species availability is also dependent upon current nursery stock. Local nurseries stock an assortment of species, but on occasion, some species of oak are not available. Other species, like paperbark trees *Melaleuca* spp.), perform well in Santa Cruz, but they are hard to source and therefore are not widely planted.

Tree planting is funded through the Tree Trust Fund, a City Fund generated through private donations and in lieu fees associated with tree removal when on site mitigation planting is not practical. In recent years, supplemental funding has allowed for a temporary increase in tree planting. Between 2018 and 2020, 500 additional trees were planted as a result of grant funding for canopy trees along streets, in medians, and parks. Tree planting also occurs annually in celebration of Arbor Day.

RIGHT TREE RIGHT PLACE

The practice of installing the optimal species for a particular planting site is known as **Right Tree Right Place**. This planning philosophy considers the effects of trees as they grow on existing and planned landscapes, utilities, and other infrastructure. Factors to consider include planter size, soil characteristics, water needs, as well as the intended role and characteristics of the species. In many instances, conflicts and premature removal of trees can be avoided by considering the long-term consequences of planting a particular tree species in a particular place. Santa Cruz has been successfully practicing “Right Tree Right Place” for over 20 years. Large shade trees are planted where space allows and small-statured ornamentals are installed in more constrained sites.

Small statured palms and trees are recommended for use near and under power lines (PG&E, n.d.). Urban forest managers avoid and discourage the planting of palms in areas where they may conflict with power transmission lines. Some species of palm can reach substantial heights and if planted under power lines, must be removed because they cannot be directionally pruned to avoid contact. Palms are adapted to withstand high wind events, but the fronds are commonly bent toward or carried in the direction of the wind. If power lines are in their line of movement, problems can occur upon contact. Palms are called for in area plans along the beach frontage and on Morrisey Blvd. In other areas many Santa Cruz residents prefer shade trees over palms.

There are a number of trees in the inventory that were planted prior to the adoption of Right Tree, Right Place policies, including several large stature species planted in spaces that are too small, resulting in infrastructure conflicts (e.g., sidewalks, drainage, and utilities) or visibility problems. The City has identified several key species in Santa Cruz that regularly conflict with infrastructure and therefore need large planting spaces such as redwoods (*Sequoia sempervirens*) and eucalyptus (*Eucalyptus* spp.). In some cases, repurposing of streets and bike lane improvements have reduced planting space exacerbating this problem. In other instances, unpermitted planting and replacement of street trees has resulted in inappropriate placement.

The City's Downtown Plan provides examples of species that are known to conflict with sidewalks (e.g., Privet or *Ligustrum*) and the City avoids planting ash (*Fraxinus* spp.) and sweetgum (*Liquidambar* spp.) for this reason. These species, along with species that have been identified as poorly adapted (e.g., Victorian Box or *Pittosporum*), are avoided. Several of the Area Plans recommend the incorporation of native tree species, but the City recognizes that many native species lift and damage infrastructure. Therefore, coastal live oak (*Quercus agrifolia*) is the only native species widely planted as a street tree and other native species are incorporated into medians, wide street side rights-of-ways, or other public areas that have sufficient space.

Irrigation

The City is responsible for watering city-maintained street trees, the majority of which do not have irrigation systems. The Parks and Recreation Department has placed an emphasis on planting more drought tolerant species. The City is responsible for watering new trees during establishment, which is more difficult in areas that lack existing irrigation. New street trees are watered with the City's shared water tanker (300-gallon tank). Overall, approximately 70% of median tree plantings are watered by hand. Due to time constraints, street trees planted with recent grant funding are watered by contractors. Other strategies such as water bags, mulching, and informal neighbor adoption are also utilized.

Residents are responsible for watering street trees adjacent to private property. This causes some concern about high water bills, which can become a disincentive to planting new street trees.

Santa Cruz receives around 31 inches of rainfall each year, mostly between November and March. In recent years, droughts have occurred more frequently and can sometimes be severe. As a response to previous droughts, water has been restricted. In dry years, supplemental water is needed to ensure tree health. Unlike turf and other vegetation, when trees are damaged or killed by drought, it can take 15 years or more to reestablish a new tree in addition to the lost benefits.



Tree Removal

A permit is required by ordinances 13.30 and 9.56 for the removal of a community street tree or the removal of a heritage tree on public or private property, including for emergency removals. The Urban Forester has the authority to cite property owners for the illegal removal of street trees or heritage trees. When a tree is removed without a permit, mitigation requirements are increased. Property owners must request a dead tree verification permit to ensure the tree being removed is in fact dead.

Heritage trees on public and private property are protected by the Heritage Tree Ordinance. Tree removals are warranted when the health of the tree is compromised or it is likely to cause damage to the structural integrity of a building, or unable to be incorporated into development sites. Heritage tree removals require a permit and a notification of removal must be posted to give citizens an opportunity to appeal the removal. Appeals are heard by the Parks and Recreation Commission or Planning Commission

(for trees within the Coastal Zone). Decisions of the Commission may be appealed to the City Council. If trees are approved for removal, then the mitigation requirements must also be completed.

Although current mitigation requirements do not fully account for the loss of a tree, the relatively low fees help ensure that residents comply with the mitigation requirements. When trees cannot be replanted on site, mitigation fees are applied to the Santa Cruz Tree Trust Fund, which provides funding for tree planting on public property throughout the City.

Wood chips generated from the maintenance or removal of city-managed trees are used at dog parks and in parks and medians. Some supervisors purchase wood chips rather than using the generated wood chips. Woody material 15 inches in diameter and larger goes to the landfill. In some instances, redwoods are repurposed.



SOLAR ENERGY AND TREES

Promoting both trees and solar energy production can help communities advance in resource efficiency, yet in many cases trees and solar compete for the same space. Tree branches can shade roofs resulting in blocked light that would otherwise reach a rooftop solar array. This can lead to conflicts between neighbors and may result in tree removal.

Solar energy has been promoted and developed in Santa Cruz since the 1980s and is a leader in solar energy. In the past decade, Santa Cruz implemented the Solar One Project focused on promoting solar energy throughout the community. Recently, three solar parking lot canopies were constructed at the Santa Cruz Police Station, City Hall, and DeLaveaga Golf Course. The City estimates these solar arrays will substantially decrease pollution and emissions that result from traditional power sources and save over \$4 million in energy costs over its 25 year lifespan (City of Santa Cruz, n.d.).

The City of Santa Cruz encourages solar initiatives and is expanding on them in future Climate Action Plans. Currently, solar is also promoted for individual customers in Santa Cruz, both residential and commercial, as part of the same Go Solar Santa Cruz initiative. There are occasional conflicts between trees and solar arrays in Santa Cruz and there is increasing concern that if existing trees are removed, their replacement will be more difficult due to the potential conflict. Currently Municipal Code Title 24 Zoning requires property owners "maintain a compatible relationship to and preserve solar

access of adjacent properties" and California Shade Act guidelines are followed. There is concern among Parks and Recreation staff that Santa Cruz may experience a reduction in tree canopy due to future solar energy infrastructure conflicts. Although current trees are protected by the Act and the City's Heritage Tree Ordinance, if trees are removed, the subsequent incorporation of solar infrastructure may prevent large canopy shade trees.

The City will continue to evaluate the potential for community solar opportunities. Community solar gardens are an alternative to small residential rooftop solar, where multiple parties own or lease a portion of an offsite solar system. The concept of shared solar, allows a greater number of people access to solar energy, due to limitations in owning suitable roof space (e.g. shading or poor orientation). In community solar models, those involved receive credits on their utility bills that correspond to the portion of the energy that is produced (Residential Consumer Guide to Community Solar, 2016). The solar array can be strategically implemented in a space that allows for maximum energy production as well as integration with the grid (Office of Energy Efficiency and Renewable Energy, n.d.).

As the amount of solar energy infrastructure increases, conflicts between solar and trees will continue to rise. Rather than a dotting of solar arrays spread throughout a community, shared solar allows for the aggregation of solar panels and has the unintended benefit of reducing solar and tree conflicts.

Emergency Response

The Santa Cruz Fire Department coordinates city-wide Emergency Operations Center (EOC) and provides protocols for emergency response. Staff from the Parks and Recreation Department attend meetings where multiple Departments assess damage and determine an appropriate response plan.

The City is responsible for clearing the rights-of-way after storm damage occurs. After hours on-call staff (made up of volunteer City maintenance staff) clear fallen branches or restrict public access until a contractor can complete the work. The City does not have any staging areas or debris storage areas, so during large storm events material may be piled on or near site with proper delineation for public safety for approximately one week before a contractor chips the material. When possible, tree debris is moved to an area that can be blocked off (e.g., parking spot), but in some cases it is piled on the private property adjacent to the damaged tree. In situations where a chainsaw and ground work cannot clear the debris, contractors are needed and their assistance is coordinated by the Urban Forester.

WILDFIRE—WILDLAND URBAN INTERFACE

Vegetation management for fire hazards may also be part of emergency response. Less than 1% of street trees are in fire prone areas of Santa Cruz, the Urban Forester is involved with routine and emergency fire mitigation activities. If emergency removals are necessary or public safety concerns arise, utility providers, fire, police, public works officials, or the Urban Forester coordinate to remove the trees or otherwise mitigate the hazard.

“No one knows exactly when or where the redwood entered the history of life on earth, though it is an ancient kind of tree and has come down to our world as an inheritance out of deep time.”

Richard Preston



SEA LEVEL RISE AND TREES IN SANTA CRUZ

A steady rise of sea levels has occurred through much of the last century but has recently been exacerbated with an increase of nearly 3 inches in the past 25 years (Lindsey, 2020). In the United States, this phenomenon has been seen most clearly along the eastern U.S. where freshwater wetland ecosystems have shifted to salt marshes. This phenomenon is not unique to the southern and mid-Atlantic coastal forests but is also occurring in other parts of the world (Drouin, 2016). Sea level is projected to increase up to 6 feet in the foreseeable future, which will likely have significant impacts on coastal cities such as Santa Cruz (Map 2⁶).

The trees that once dominated wetland areas that now have salt intrusion are stressed, dying, or dead depending on their salt tolerance level, the duration of exposure, and the concentration of salt. Initially, trees cease growing when exposed to salt water, but continued exposure leads to death in many species.

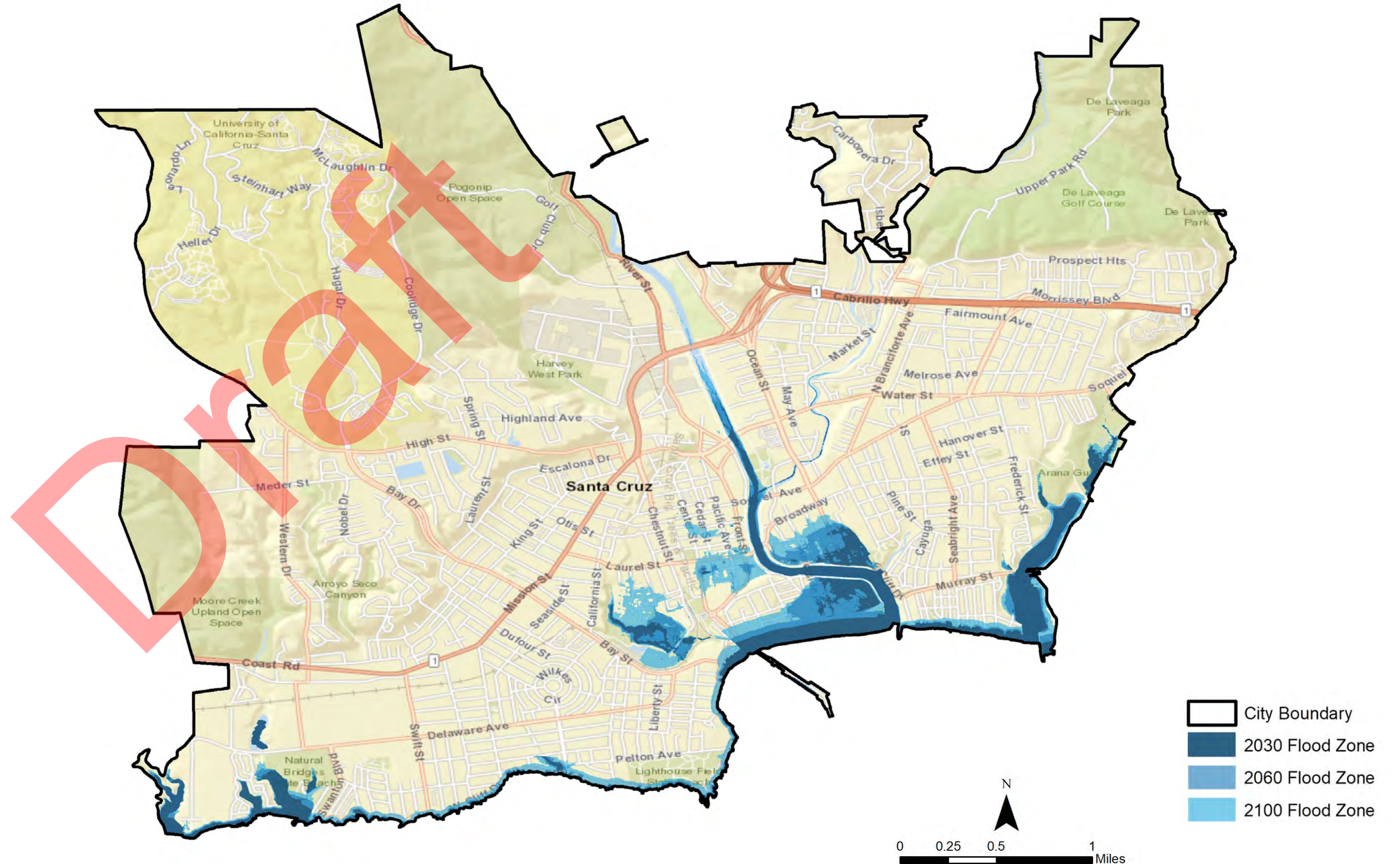
In Santa Cruz, the San Lorenzo River brings fresh water into the Pacific Ocean. The tidal influence and amount of saltwater present in the estuary is dynamic and dependent upon the river flow and weather events, but the impact of saltwater intrusion will not only impact these wetlands. The City's General Plan, Local Hazard Mitigation Plan, and Climate Adaptation Plan (2018) map FEMA flood zones and identify areas in Santa Cruz that are most vulnerable to saltwater intrusion. Sea level rise, erosion and coastal storm flooding are also projected in the Climate Adaptation Plan and

more current Resilient Coast Santa Cruz Initiative (2019-2020). Without intervention, Inundation is projected in low lying areas such as Beach Flatts and downtown Santa Cruz.

Although the City has not yet faced street tree mortality as a result of flooding, erosion or saltwater intrusion, the potential is there (City of Santa Cruz, 2012, 2018). Recognizing the threat of saltwater intrusion, the City is already working to incorporate more salt tolerant tree species into high risk areas. One of the neighborhoods that is at most risk of flooding is interested in planting fruit trees. The City is trying to find ways to provide this neighborhood with the trees they want while planning for mitigation in the case of salt damage. Here, they have installed stormwater pumps and large planter boxes. Sea level rise and stormwater surges are a real threat and the City is exploring ways to move forward with equitable solutions in policy and infrastructure planning and implementation.

Trees can be tested for salt tolerance using experimental trials where irrigation water is modified with different concentrations of salt. Although most of the species planted in Santa Cruz have not been tested for salt tolerance, silk tree, Deodar cedar, Japanese boxwood, juniper, olive, pinyon pine, hawthorn, Chinese tallow tree, and California fan palm were more tolerant when compared to other species (Wu et al. 2001). These species may be good choices for incorporation into high-risk areas of Santa Cruz.

MAP 2: PROJECTED SEA LEVEL RISE IN SANTA CRUZ



⁶ Disclaimer: City of Santa Cruz has provided this map to allow easy access and a visual display of City information. We have made considerable effort to assure the accuracy of the maps and data provided; nevertheless, some information may be inaccurate. City of Santa Cruz shall assume no liability for any



Community Engagement and Outreach

Starting as early as the 1970s, the urban forestry program in Santa Cruz has continually played a role in outreach and education. This long-standing relationship with residents and community partners is illustrated by the many volunteers who help during tree planting events and engage in outreach programs held by the Urban Forestry Office. Currently, the Urban Forestry Office and the Parks and Recreation Department are active at annual events and engage the community on many levels.

ANNUAL EVENTS

- Arbor Day events are centered around tree planting and education and the ceremonial reading of a mayoral proclamation. The annual Arbor Day event is often hosted in collaboration with Horticulture students attending Cabrillo College. Each year they plant 20 to 30 trees along streets, in natural areas, and parks. The City will host additional tree planting and educational events if other groups such as the Boy Scouts are interested in participating in an Arbor Day activity.
- Earth Day events are celebrated at a community festival to highlight the City's greenbelt and tree programs. The Parks and Recreation Department booth contains informational handouts and seedling giveaways. The Urban Forester interacts with the community around the importance of caring for the urban forest. Topics such as planting the right tree in the right place,

common pests, right way to trim a tree/ proper pruning, the importance of hiring an arborist, and energy conservation are commonly covered.

- The Downtown Santa Cruz Significant Tree Walk is led by the Urban Forester. The walk highlights 25 significant trees in the downtown area, most of which are heritage trees on private property. The common name, scientific classification, fun facts about the tree, and history of the community are presented. Participation is always high and the community appreciates the walk.
- The Parks and Recreation Department celebrates July as Parks and Recreation month where they host free activities.

Santa Cruz has an engaged and active public that participates in tree planting events and activities to celebrate the urban forest. While most volunteers are students, residents and environmental nonprofits also participate in volunteer activities. Although there has not been a consistent nonprofit organization involved in the urban forest events.

OTHER ENGAGEMENT

The Parks and Recreation Department has a strong following and a well-curated media presence. The Parks and Recreation Department posts information on the Heritage Tree Grant Program⁷, neighborhood tree planting events, and any outreach events that the Urban Forestry Office is hosting on social media (e.g., Facebook, Instagram). In addition, information is posted

on the city websites and further distributed by a city-wide communication staff.

Currently, the city webpage has tree-related information centered around permitting and regulations. The Department webpage advertises annual events and other outreach activities such as volunteer events centered around urban forestry. Increasingly, the community looks to the city webpage as a resource. Staff recognize that a more robust city webpage for tree-related information would be beneficial for providing quick and accurate answers to residents. A tree-related page could further engage and educate the community about the urban forest. Incorporating educational materials about the benefits of trees, the state of the urban forest, tree care operations, tree selection (the Approved Street Trees List), or information on how property owners can best care for trees into the City website would provide another avenue to promote community involvement in the urban forest.

Disease, Pest, and Weed Management

Trees are inspected for pests and diseases upon complaint, but property owners are responsible for any management. The Urban Forestry Office follows the City Integrated Pest Management Guidance Manual and only uses cultural methods to prevent pest and disease problems. Namely, the Urban Forester avoids monocultures, tracks species that experience pest or disease issues, and avoids planting species that are known to have problems. For example, pears (*Pyrus spp.*) and California fan palm (*Washingtonia filifera*) are not planted due to consistent disease problems in the past.

In some instances where sucking insects are causing a sticky film on surfaces underneath the tree canopy, a forced stream of water is used to dislodge the insects and wash away the sugar residues. Tanglefoot® or natural predators may also be used. The Urban Forestry Office does not have specific funding for pest or disease management, however significant outbreaks can be addressed using existing resources.

Despite routine hand-pulling and mowing of weeds, Parks and Recreation staff are not able to control weedy plants that pose a threat to City infrastructure. Therefore, exemptions to the City's IPM policy are periodically requested for the targeted use of herbicides in medians, traffic islands, and chokers/bulb-outs in designated locations throughout the City. Applications are conducted in a manner that does not pose a threat to street trees, wildlife, or the public.

SUDDEN OAK DEATH

Sudden oak death (caused by the pathogen *Phytophthora ramorum*) is documented in many coastal counties of California and has been detected in Santa Cruz county (California Oak Mortality Task Force, 2020). The City of Santa Cruz Park Master Plan 2030 identifies this disease as a threat and calls for action to prevent the spread of this disease. In susceptible hosts, the pathogen can become systemic and girdle trees as quickly as one year after infection (Daugherty and Hung, 2020). Of Santa Cruz's most abundant species, *Quercus agrifolia* (coastal live oak) is highly susceptible to sudden oak death and incurs high mortality rates upon infection. Sudden oak death has not been a significant problem to date, though cases have been observed in the open spaces.

⁷When available, these funds are used to assist property owners in maintaining any heritage trees on their property and for street tree maintenance (e.g., pruning, cabling) and sidewalk repairs in the rights-of-way

FIRE BLIGHT

Fire blight is a disease caused by the bacterium *Erwinia amylovora* which is an active pathogen in Santa Cruz's urban forest. Fire blight can infect over 150 plants in the *Rosaceae* family. Some street trees in Santa Cruz are vulnerable to fire blight including apples (*Malus*), pears (*Pyrus*), quinces (*Cydonia*), hawthorns (*Crataegus*), and mountain ash (*Sorbus*) (Koski and Jacobi, 2014). This disease can result in blighted branches or limb dieback, or tree death (Teviotdale, 2011). The symptoms include branches bent over resembling a shepherd's crook, which contain dead foliage or shriveled fruit. Street trees with fire blight are typically pruned rather than removed. To avoid the spread of the disease, managers should plant resistant trees and use proper sanitation while pruning or removing infected trees.

PITCH CANKER

Pitch Canker is a disease of pine species caused by the fungal pathogen *Fusarium circinatum*. Monterey pine is most severely impacted by pitch canker, but a wide range of other native and exotic pine species are also vulnerable. First discovered in Santa Cruz County in 1986, this disease is adapted to the mild climate experienced in the central coast of California. The pathogen causes discrete cankers which can cause seedling die-off or branch and tip dieback in established and mature trees (Swett and Gordon, 2013). The fungus does not spread within the tree, but multiple infection sites coupled with increased susceptibility to pest infestations, can block the flow of nutrients and cause tree death. Proactively management can help to slow or control the disease (i.e., minimizing the spread and removing diseased branches).

Funding

Stable and predictable funding is critical to effective and efficient management of an urban forest. Trees are living organisms, constantly growing and changing over time and in response to their environment. There are a number of factors that affect tree health and structure, including nutrition, available water, pests, disease, wind, and humidity. In addition, some specific maintenance is critical at certain stages of life. For instance, young trees benefit greatly from early structural pruning and training. Minor corrections that are simple can be applied with low costs when a tree is young. However, if left unattended, they can evolve into very expensive structural issues and increase liability as trees

mature (at which point it may be impossible to correct the issue without causing greater harm). Over mature trees often require more frequent inspection and removal of dead or dying limbs to reduce the risk of unexpected failure. A stable budget allows urban forest managers to program the necessary tree care at the appropriate life stage when it is most beneficial and cost effective.

The majority of street tree operations are funded through the General Fund (Figure 8). All Departments funded through the General Fund have experienced reductions in their budgets since the early 2000s, including the Urban Forestry Office.

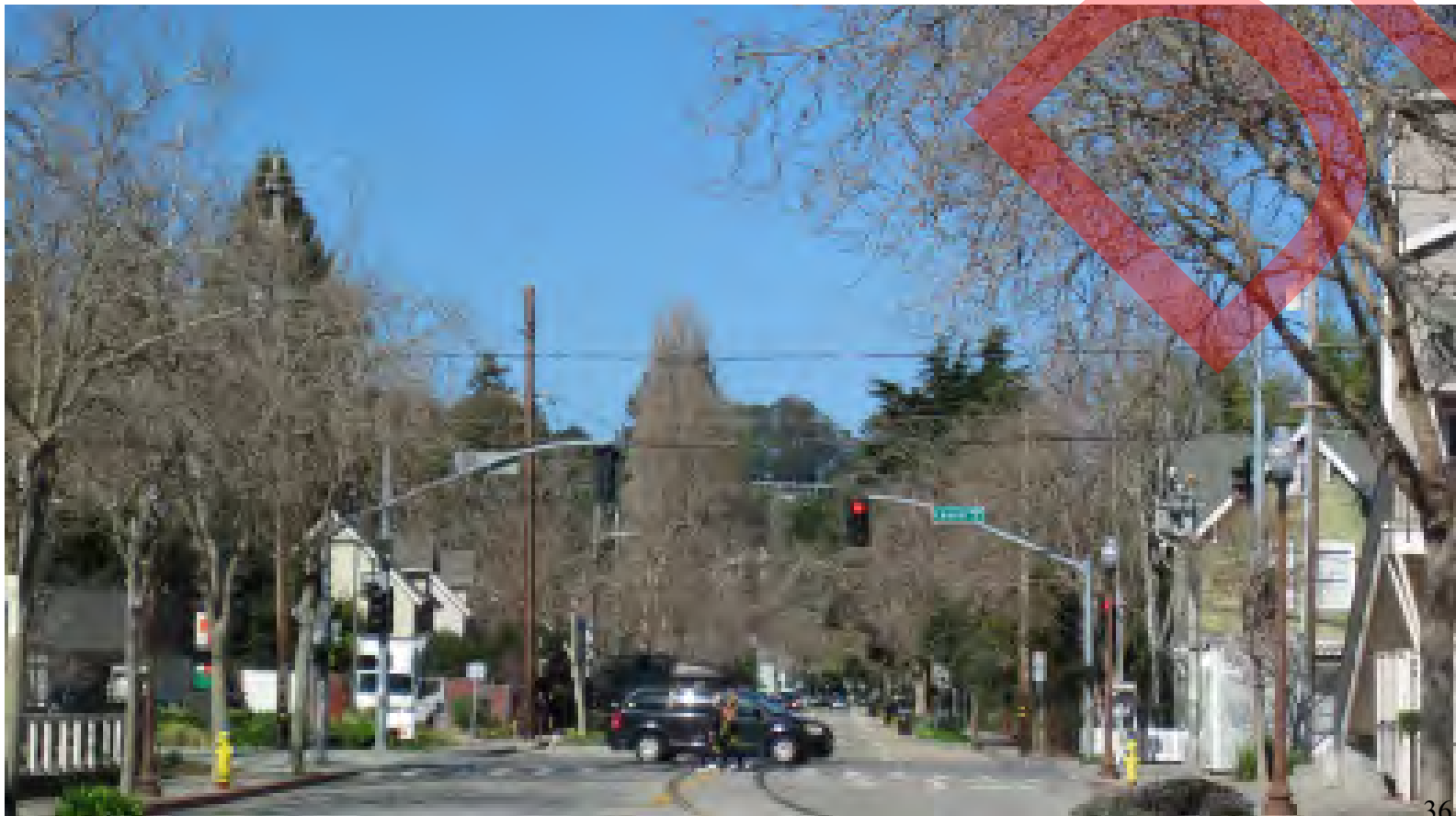
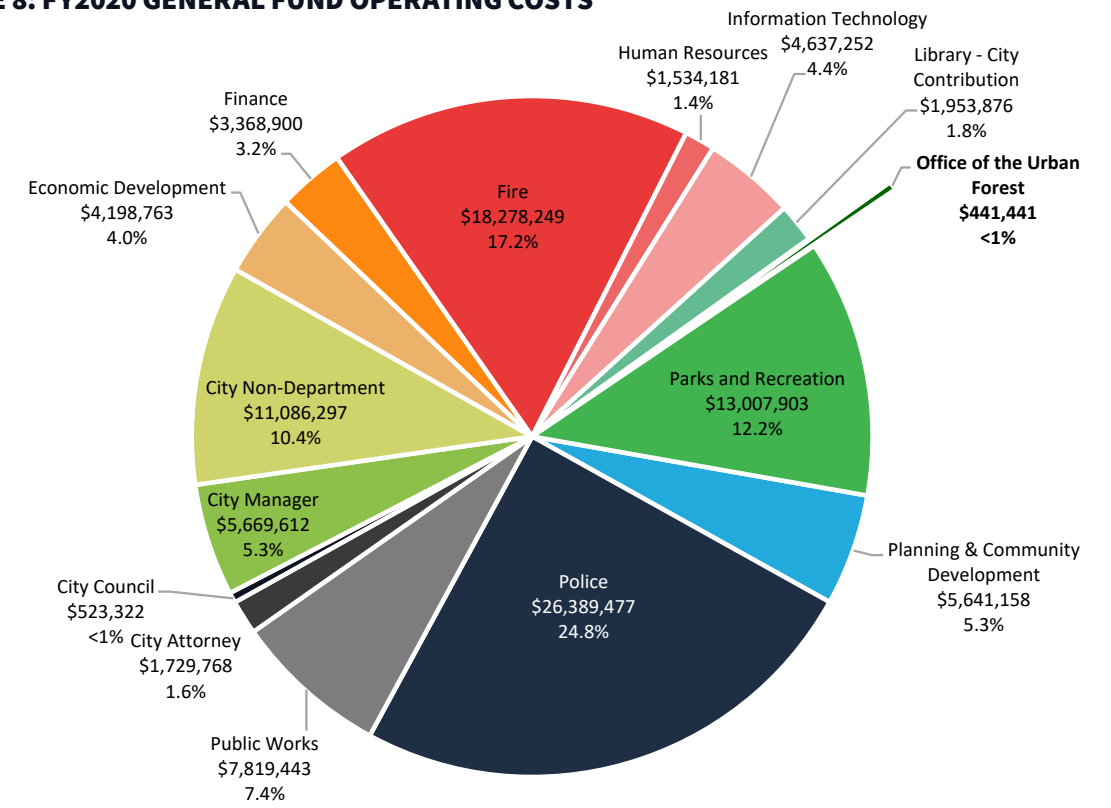


FIGURE 8: FY2020 GENERAL FUND OPERATING COSTS



Annual funding for urban forestry in Santa Cruz has followed larger economic trends (Figure 9). In 2004, the Urban Forestry Office employed five full-time employees including a tree crew. Staff were responsible for facilities management duties for a short time (2005 through 2007) before Public Works assumed responsibility. In 2006, the crew was reduced to an Urban Forester and, in general, funding continued to decline until 2014. When funding was the lowest (2010) the Urban Forester position became part-time. When it was restored to a full-time position in 2011, one third of the costs were funded by other City Departments (i.e., Public Works and Planning). In 2014, the Urban Forestry Office expanded and hired additional staff, increased the budget, and became responsible for the care of medians. In 2016, funding was restored to the Urban Forestry Office to support new prevailing wage requirements. The 2021 increase in urban forestry funding is a result of Liability Funds to support hazard tree maintenance.

The **Tree Trust Fund** provides funding for planting City-maintained trees as well as rights-of-way trees adjacent to private property throughout Santa Cruz. Funding for the Tree Trust Fund is generated through private donations and revenue from citations and mitigation fees (for the removal of Heritage Trees on private property and the removal of street trees by utility providers when replacement plantings cannot be done at the removal site). Each year approximately \$15,000 from this fund are used to purchase trees for public property across the City, some of which are street trees. Grant funding, including this CAL FIRE grant, is used to supplement street tree planting and other urban forest operations.

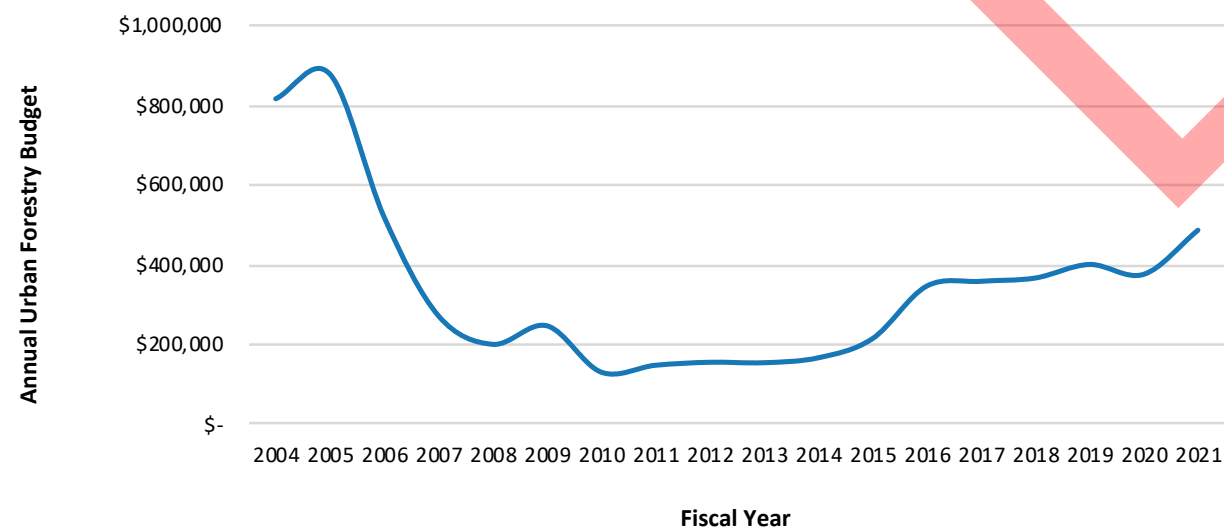
The **Liability Fund** is a City of Santa Cruz fund directed toward risk management. Although the urban forestry liability funding largely pertains to non-street trees, there are instances where blue gum in the rights-of-way are in need of maintenance, including the trees along LaFonda, as well as East Cliff Drive and Hiawatha.

Street tree funds are used to support staff salary and benefits, equipment, supplies, services, materials, contract maintenance and tree removals or city-maintained trees along medians, in chokers, and in the designated rights-of-ways (e.g., Downtown Area, and some arterials) (Table 7).

TABLE 7: 2021 URBAN FORESTRY PROGRAM FUNDING

	Total Urban Forestry Budget (\$)	Street Trees Portion (\$)
Parks and Recreation Department		
Urban Forestry Office	502,000	240,000
Other Parks and Recreation Units	141,000	-
Other City Departments		
Other Departments ⁸	124,000	39,000
Total	\$767,000	\$279,000

FIGURE 9: HISTORICAL URBAN FORESTRY FUNDING



PARTNERS

While managing the community street tree resource is primarily the responsibility of the Urban Forestry Office, a number of internal departments and teams share responsibilities for tree management, regulation, advocacy, and planning. The Urban Forester regularly interacts with staff from other Departments to obtain grants that incorporate street trees and projects that involve street trees. Urban forestry staff members make a large impact and have strong rapport with other City Departments. Collaboration is common during design and problem solving around tree and infrastructure conflicts to ultimately find solutions that improve the streetscape. Furthermore, staff from across Departments recognize that street tree and urban forest goals support other City initiatives and work toward policies that transcend guiding and planning documents. Thirteen stakeholders contributed to the development of the Street Tree Master Plan, including the following groups and individuals:

- Parks and Recreation Department
- Public Works Department
- Planning and Community Development
- Human Resources Department
- City Manager's Office, Climate Action Program
- California Department of Forestry & Fire Protection
- California Urban Forests Council
- Pacific Gas & Electric Company
- City leadership

These partners provided important information about the current function of the Urban Forestry Office and furthering the congruence between the Urban Forestry Office and others involved in tree management. Concerns, requests, and suggestions from all stakeholders were of primary interest and were provided full consideration in the development of the Plan. The following information summarizes the challenges and opportunities that were identified by stakeholders.

PUBLIC WORKS DEPARTMENT — ENGINEERING

Within the Public Works Department, Engineering is responsible for maintaining and improving Santa Cruz's public rights-of-way as well as reviewing land development proposals that impact the rights-of-way. As such, the Department manages the Capital Improvement Program for streets, sidewalks, curbs, gutters, sewer, and storm drains. Public Works receives service requests for infrastructure repairs. When trees damage hardscapes or impede visibility in the rights-of-way, Engineering Staff collaborates with the Urban Forester. Property owners are notified by letter when sidewalk repairs are mandated due to tripping hazards or impassable sidewalks. The Urban Forester addresses the service requests and acts as a liaison to the community during problem solving around tree and infrastructure conflicts. Challenges and opportunities include the following:

- Property owners are responsible for the cost of repairs that result from tree roots buckling or lifting sidewalks adjacent to their property. Most residents are not aware of this responsibility. Mitigation varies by

property owner where some elect to reroute sidewalks and implement bump-outs, but other residents rely on personal insurance and prefer to avoid the repairs because they can be costly.

- Whenever possible, the City works with community members with a strong desire to preserve rights-of-way trees by using mitigation techniques and alternative designs to avoid tree removals. Efforts made to preserve existing trees include root pruning, root barriers, redirecting the sidewalk, and implementing bump-outs when the street and drainage designs are conducive.
- Property owners that request sidewalk cutouts to incorporate street tree plantings are responsible for funding the project. Because this is more cost restrictive, it has decreased the number of neighborhood tree planting events.
- To comply with American Disabilities Act (ADA) and California Building Code (CBC) standards, the Public Works Department does not allow for street tree planting where sidewalks are too narrow. This limits opportunities for street tree plantings. In some instances, tree grates may be approved or plantings may be done at the back of the sidewalk. The City is also exploring other opportunities to incorporate trees through alternative planter designs (Gilman, 2006; Smiley, 2008; Appendix E). The City's street tree planting specification also does not meet the CAL FIRE standard for future grant funding.

- Some tree species are more prone to infrastructure conflicts (e.g., redwoods and eucalyptus). Considering mature tree stature can reduce conflicts, including raised sidewalks and streets.
- The City avoids removing trees whenever possible during capital improvement projects. Sometimes tree removals are needed and the City decides whether to conduct an Environmental Impact Review. These reviews are costly but are prioritized in instances where community members use the California Environmental Quality Act to start lawsuits.
- It is common for building and sidewalk configurations in redevelopments to be implemented around protected trees. With more long-term vision, the funds could be redirected to support designs that allow the incorporation of more trees, even if some trees have to be removed in the process.
- There is a desire from staff in multiple departments to collaborate on updating the standards, details, and specifications for tree planting.



PUBLIC WORKS DEPARTMENT – STORMWATER

The Storm Water Division is responsible for the storm drain system and implementing low impact development requirements that can help to control flooding. Trees are considered in planning meetings and plan reviews, but the majority of stormwater projects have not included trees specifically. However, many small residential development projects do disconnect the roof downspouts so that these discharge onto splash blocks that direct the roof runoff to landscaping. When possible, trees are implemented into stormwater designs and the Urban Forester will specify the tree species to be incorporated into stormwater systems. The City has several successful stories where stormwater was diverted toward existing trees and significantly enhanced their condition. Currently, there are several examples of stormwater designs that incorporate trees in Santa Cruz (e.g., bioretention facilities or bioswales), but there are opportunities to expand the use of trees in stormwater management to promote greater stormwater retention and improve water quality. Challenges and opportunities include the following:

- Currently trees are not typically included in curb cuts where the stormwater runoff is directed toward landscaping. The City uses the plant list provided by Central Coast Low Impact Development Initiative and although this document contains reasons to incorporate trees in low impact designs, trees are not included in their plant list.

- Including trees is not the typical recommendation for stormwater infrastructure because some shrubs and perennials use less water. Therefore, tree establishment and supplemental irrigation may limit the incorporation of trees in stormwater infrastructure.
- The City's catch basin projects typically do not provide enough space for trees to be incorporated and sometimes the catch systems use liners to prevent contaminants from entering the groundwater. Liners and other underground features cause tree root conflicts and prevent the incorporation of trees.



PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT — PLANNING

The Urban Forester reviews all design plans, regardless of whether street trees are included. When designs impact trees, the Urban Forester collaborates regularly with other Departments and provides input on whether to remove or protect a tree in place and identifies the best options for the incorporation of new trees. Challenges and opportunities include the following:

- The city is built out and the road and sidewalk layout throughout the City is not conducive to tree growth (i.e., existing tree wells are relatively small). This makes the incorporation of additional planting spaces and maintaining mature trees difficult.
- The continued increase in urban density has resulted in expansions to urban infrastructure. Infill development and redevelopment projects are expected to continue as Santa Cruz grows, which poses one of the biggest challenges for Santa Cruz's street trees.
- Parkways are considered in all redevelopment projects, but they are only implemented when feasible, and in many cases they are not possible.
- Identifying opportunities to expand street tree planting opportunities is important to meet tree canopy goals. City staff have expressed a desire to incorporate alternative planter designs, structural soils, and structural cells to continue to allow for further street tree plantings.

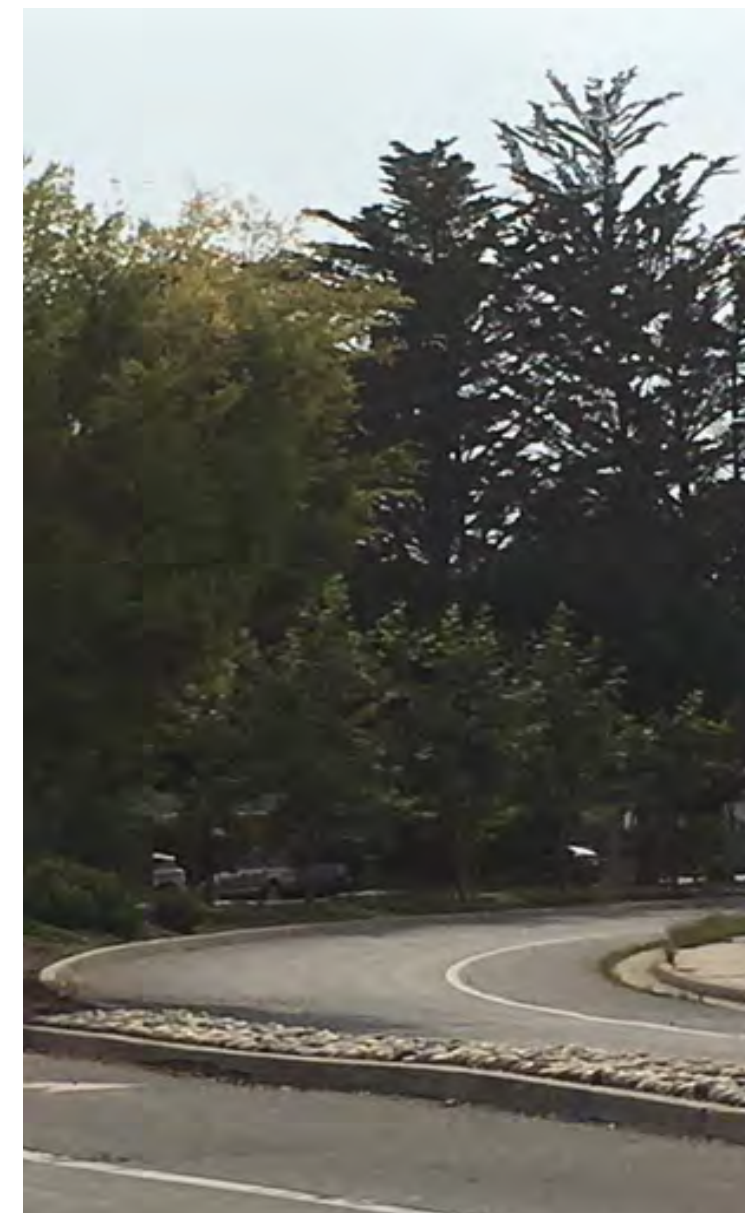
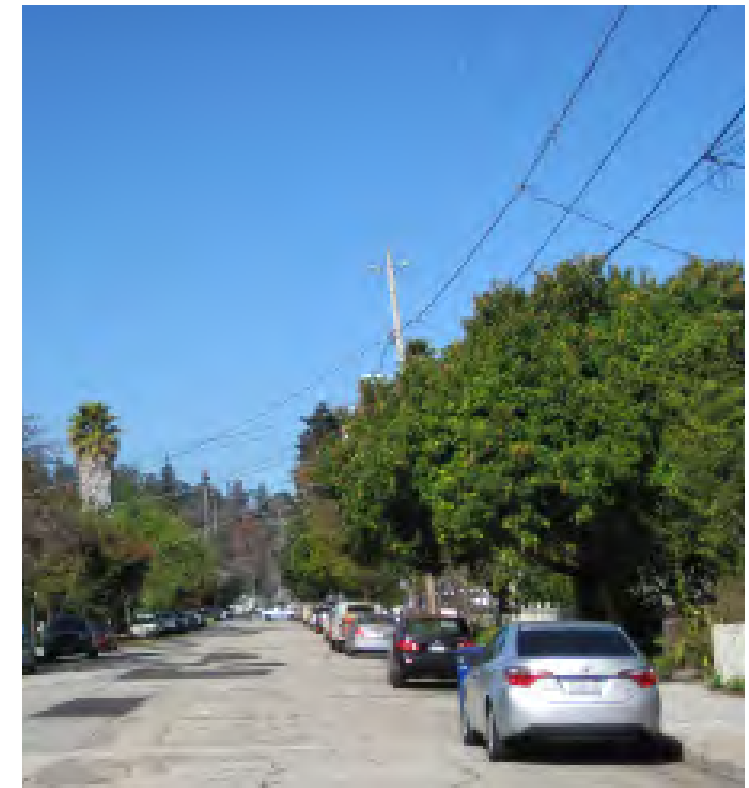
- Currently, the City's Municipal Code does not include shade requirements for parking lots, rather it has tree requirements for the property. City Staff are currently working on the parking ordinance and recognize trees are essential to urban cooling efforts. Therefore, recommendations for shading around parking lots are being considered.
- Currently, City planning documents do not go into detail regarding structural soils or alternative planter designs that could increase options for trees in urban areas. There are opportunities to promote and incorporate such revamps in public/community projects.
- Community members hold distinct and differing views on the types of trees that should be planted in the community. A subset of the community reveres, or loathes, certain species of trees (e.g. eucalyptus, palms, or redwoods), but the City incorporates or protects each species so the community benefits from the distinct roles these trees play (e.g., roosting habitat for monarch butterflies, a beach town atmosphere, or protecting native species).
- For City planners, trees are also important from a pedestrian safety standpoint.

Climate Action Program

The Climate Action Program is part of the City Manager's Office and is integral to the implementation of the City's Climate Action Plan (2012) and Climate Adaptation Plan (2018) and will lead the development of the Climate Action Plan 2030 in 2021. Similar to many communities,

Santa Cruz is expected to experience climatic events that can cause additional stress to street trees such as water resource concerns (i.e., increased frequency and duration of droughts, storm surges, and sea level rise), wildfires, and pests and diseases. Challenges and opportunities related to the street tree resource include the following:

- City staff are looking to increase canopy cover throughout the urban forest and consider the street tree resource as an important aspect in climate change adaptation measures.
- Particular areas of the City are the focus of additional street tree planting and planning efforts as they are at most risk to the future impacts of climate change.
- City staff are interested in having regional conversations on suitable trees to include in the planting palette, also considering species that do well with the temperature and precipitation patterns that may be experienced in the future due to climate change.
- The urban forest is tied directly to the Climate Action Plan and will continue to be a key carbon mitigation strategy. Therefore, benchmarks for the urban forest and street trees could be reported in conjunction with those in development for the Climate Action Plan 2030.



EXTERNAL PARTNERS

Pacific Gas & Electric (PG&E)

Tree and utility conflicts are a common source of concern for electric providers. Trees that grow into power lines can cause electrical outages and fires. They can even conduct an electric shock to someone who comes into contact with a tree that is contacting a high-voltage line.

In California, all utility providers are subject to General Order 95; Rule 35 Vegetation Management (California Public Utilities Commission, revised 2012) and FAC-003-2 Transmission Vegetation Management (NERC) which outline requirements for vegetation management in utility easements. These requirements include clearance tolerances for trees and other vegetation growing in proximity to overhead utilities.

Many street trees located under power lines are too large for the site, requiring extreme pruning to maintain clearance. Trees located under utility lines must be directionally pruned by trained, authorized line clearance personnel. Selecting

small-stature tree species that are utility friendly for planting sites in utility rights-of-way or using undergrounding lines as alternative means for providing energy can minimize the need for these maintenance activities.

In 2017, PG&E did extensive work to main distribution lines located within the public rights-of-way that resulted in the removal of many street trees. The Urban Forestry Office received mitigation funds and replaced trees on a two-for-one basis. When the utility company removes community trees, they voluntarily submit mitigation payments.

California Department of Forestry & Fire Protection (CAL FIRE)

Under the authority of the Urban Forestry Act (PRC 4799.06 - 4799.12), the California Department of Forestry and Fire Protection's Urban & Community Forestry Program works to expand and improve the management of trees and related vegetation in communities throughout California.

The mission of the California Department of

Forestry and Fire Protection's Urban Forestry Program is to lead the effort to advance the development of sustainable urban and community forests in California. Trees provide energy conservation, reduce stormwater runoff, extend the life of surface streets, improve local air, soil, and water quality, reduce atmospheric carbon dioxide, improve public health, provide wildlife habitat, and increase property values. In short, they improve the quality of life in our urban environments, which increasingly are where Californians live, work, and play. The program also administers State and Federal grants throughout California communities to advance urban forestry efforts such as the California Greenhouse Gas Reduction Fund that funded the recent planting of 500 trees, the tree inventory, and this plan (fire.ca.gov).

Cabrillo College and University of California Santa Cruz

Cabrillo College is located in Aptos, California approximately 6 miles east of Santa Cruz. The College offers associate degrees in more than 70 fields of study, including Horticulture. The Horticulture Department offers diverse classes and hands-on experience. Facilities such as greenhouses, a nursery, and shade houses provide opportunities for students to study and practice production of ornamental plants, including trees. They offer two plant sales throughout the year and several of the Clubs are centered around environmental stewardship and industry experience. Annually Cabrillo College students participate in Arbor Day tree planting.

Environteeers

Environteeers is a non-profit organization dedicated to providing the community with environmental volunteer opportunities and promoting events held by over 50 local environmental groups and organizations. They support environmental-centered actions and compile news and resources. The *Environteeers* have participated in several tree planting events.

Ecology Action

Ecology Action is a nonprofit organization that engages businesses and community members in various energy, water, and transportation actions to decrease greenhouse gas emissions. This group supports agencies, utilities, and other nonprofit organizations in reaching goals to help create a lower carbon footprint.

Santa Cruz Local Schools

Santa Cruz City Schools operates 10 public schools including elementary, middle, and high schools across the community and there are additional private schools throughout the City. Students are encouraged to engage in community service hours and approximately half of the volunteers in the City-hosted community tree planting events are students.

Monterey Bay Master Gardeners

The Monterey Bay Master Gardeners are the local Master Gardener volunteers affiliated with the University of California Extension Service. The Master Gardeners provide the community with research-based information about horticulture and served as a promotional partner for the urban tree inventory project.



Policies and Regulations

The following documents and regulations provide direction and requirements specific to Santa Cruz's urban forest, including vision, policy, and regulatory requirements.

Federal and State Law

CALIFORNIA URBAN FORESTRY ACT

Section 4799.06-4799.12 of the California Public Resources Code defines a chapter known as the California Urban Forestry Act. The Act defines trees as a "vital resource in the urban environment and as an important psychological link with nature for the urban dweller." The Act also enumerates the many environmental, energy, economic, and health benefits that urban forests provide to communities.

The purpose of the Act is to promote urban forest resources and minimize the decline of urban forests in the state of California. To this end, the Act facilitates the creation of permanent jobs related to urban forestry, encourages the coordination of state and local agencies, reduces or eliminates tree loss, and prevents the introduction and spread of pests. The Act grants the authority to create agencies and mandates that urban forestry departments shall provide technical assistance to urban areas across many disciplines (while also recommending numerous funding tools to achieve these goals).

VEGETATION MANAGEMENT STANDARD

All utility providers in the nation are subject to the Federal Regulatory Commission (FERC) approved North American Electric Reliability Corporation (NERC) reliability standard FAC-003-3 Transmission Vegetation Management which requires vegetation maintenance along transmission lines and sets clearance tolerances.

MIGRATORY BIRD TREATY ACT

Passed by Congress in 1918, the Migratory Bird Treaty Act defines that it is unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg or any such bird, unless authorized under a permit issued by the Secretary of the Interior.

This Act can impact forestry operations during times when birds are nesting, which may delay work to avoid violating the MBTA.

ENDANGERED SPECIES ACT

Signed in 1973, the Endangered Species Act provides for the conservation of species that are endangered or threatened throughout all, or within a significant portion of, their range, as well as the conservation of the ecosystems on which they depend. The listing of a species as endangered makes it illegal to "take" (i.e., harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. Similar prohibitions usually extend to threatened species.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE

To promote the conservation and efficient use of water and to prevent the waste of water, a Model Water Efficient Landscape Ordinance (MWELO) was adopted in 2009 and later revised in 2015. The Ordinance requires increases in water efficiency standards for new and retrofitted landscapes through the use of more efficient irrigation systems, greywater usage, and onsite stormwater capture. It also limits the portion of landscapes that can be covered in turf.

CALIFORNIA SENATE BILL NO. 606 AND NO. 1668

The California Senate Bill No. 606 and No. 1668, signed in 2018, require cities and water districts to set permanent water conservation rules, even in non-drought years. Under the bills, each urban water provider is required to set target water use goals that must be approved by the State Water Resource Control Board by 2022. If agencies fail to meet these goals, potential fines as high as \$10,000 a day may be issued. Standards are based on 55 gallons per person, per day for indoor water use (later decreasing to 50 gallons by 2030) and regional based standards for outdoor use.

“If a London plane (*Platanus hybrida*) were planted as a street tree in the Downtown area and lived for 20 years, it would provide numerous environmental benefits including sequestering 2,416 lbs of CO₂, preventing 19,659 gallons of rainfall runoff, and intercepting 16 lbs of air pollutants.”

from i-Tree Design

CALIFORNIA SOLAR SHADE ACT

Passed in 1978, California's Solar Shade Control Act supported alternative energy devices, such as solar collectors, and required specific and limited controls on trees and shrubs. Revised in 2009, the Act restricted the placement of trees or shrubs that cast a shadow greater than ten percent of an adjacent existing solar collector's absorption area upon the solar collector surface at any one time between the hours of 10am and 2pm.

The Act exempts trees or shrubs that were:

- Planted prior to the installation of a solar collector
- Trees or shrubs on land dedicated to commercial agricultural crops
- Replacement trees or shrubs that were planted prior to the installation of a solar collector and subsequently died or were removed (for the protection of public health, safety, and the environment) after the installation of a solar collector
- Trees or shrubs subject to City and county ordinance

CALIFORNIA GLOBAL WARMING SOLUTIONS ACT

In 2006, the California Global Warming Solutions Act (Assembly Bill 32) was implemented to reduce greenhouse gas emissions. Through this Act, California was the first state in the nation to initiate long term measures to help mitigate the effects of climate change through improved energy efficiency and renewable technology. California approached the goal to reduce emissions to 1990 levels by 2020 through direct regulations, market-based approaches, voluntary measures, policies, and programs. The 2015 update set targets to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030.

VEGETATION MANAGEMENT

In California, all utility providers are subject to the state regulations outlined in General Order 95; Rule 35 Vegetation Management (California Public Utilities Commission, revised 2012) and by the California Department of Forestry and Fire Protection (Public Resource Code 4292 and Public Resource Code 4293) which outline requirements for vegetation management in utility easements. These requirements include clearance tolerances for trees and other vegetation growing in proximity to overhead utilities and are to be conducted by authorized line clearance personnel. Utility providers must also comply with the Public Utilities Commission of the State of California Resolution ESRB-4 (enacted in 2014) which mandates the removal of dead or dying trees near power lines and poles.

Municipal Code

CHAPTER 9.56 PRESERVATION OF HERITAGE TREES AND HERITAGE SHRUBS

Chapter 9.56 defines relevant definitions including that for a heritage tree. It also outlines the powers and duties of the parks and recreation director and the Parks and Recreation Commission, protective measures and permits for work affecting heritage trees, along with the appeals process. The code defines and exempts emergency situations by the chapter and requires state tree care licensed professionals perform all pruning, maintenance, care, or removal of heritage trees. It also requires mitigation as part of removal permits or in the instance a tree is damaged, destroyed or removed and defines penalties for violations.

CHAPTER 13.30 TREES

Chapter 13.30 defines “street tree”, as well as the areas in which a City street tree may be located. The chapter defines the duties and responsibilities of the Director of Parks and Recreation, including the issuance of permits for planting, pruning, and removal of street trees. The chapter also requires the director to prepare and maintain a master street tree list that allows for which trees are permitted to be planted on public property, as well as prepare a street tree planting plan. Along with the Director of Parks and Recreation, the duties and responsibilities of the Parks and Recreation Commission are defined, including hearing appeals and making recommendations to city council concerning policies, programs, and decisions related to trees. In Santa Cruz, property owners are responsible for the maintenance of street trees; the chapter defines the duties and liabilities of property owners when it comes to the maintenance of street trees, as well as, requiring property owners to obtain a permit to plant, prune, or remove such trees. The chapter prohibits any person from injuring a street tree by any means, defines nuisance vegetation, and requires property owners to abate such nuisance vegetation.

Chapter 13.30 defines penalties associated with violation of any of the sections within the chapter and the costs that can be recovered as a result of damage or loss of trees. It defines the right of property owners to appeal and the process by which they may file for an appeal, including where to file, the process, stays, and hearings. The chapter also defines liability.



CHAPTER 15.20 DRIVEWAYS AND SIDEWALKS

Chapter 15.20 designates property owners be responsible for maintenance of the sidewalk area, including any trees in planting strips. Tree maintenance may include root pruning, installing root barriers, or pruning and must follow City the permit process outlined in Chapter 13.30.

CHAPTER 23.24 SUBDIVISION IMPROVEMENTS

Chapter 23.24 requires a street tree and landscaping plan in all subdivisions. Plans must include information such as tree species, location, and maintenance as well as an impact report if infrastructure is designated to the City. All street tree maintenance is to be performed in accordance with Chapter 13.30. The chapter also outlines protections for existing trees.

CHAPTER 24.08 LAND USE PERMITS AND FINDINGS

Chapter 24.08 outlines criteria for various land use permit entitlements some of which are aimed at protecting habitats, natural resources and vegetation, such as significant trees, and providing appropriate type, size and quality of landscaping. Coastal Permits are required for proposed development in certain areas of the coastal zone and apply to trees and vegetation.

CHAPTER 24.10 LAND USE DISTRICTS

Santa Cruz municipal code calls for shaded parking lot surface areas and perimeter tree plantings.

City of Santa Cruz 2030 General Plan

The City of Santa Cruz 2030 General Plan provides the following:

- Vision for Santa Cruz’s future physical, social, cultural, environmental, and economic development
- Strategies and specific actions that will allow the community’s vision to be maintained or accomplished
- Basis for judging whether specific development proposals and public projects are in harmony with community goals
- Protects natural resources and community welfare
- Authorizes the design of projects that will enhance the character and safety of the community and preserve and environmental resources
- Guides planning and implementing programs, such as the zoning and subdivision ordinances, specific plans, impact fee studies, and the Capital Improvements Program

Chapter 1: Introduction presents the vision of Santa Cruz, which calls attention to the greenbelt surrounding the City and the emphasis the community places on the natural environment.

Chapter 3: Community Design promotes street trees as a way to enhance the character of the community. Notes that street trees improve the aesthetics of transportation corridors and

entrances into the City. Recognized trees for their role in improving and promoting the use of pedestrian paths. A goal of this chapter includes planning for trees along pedestrian corridors.

Chapter 4: Land Use requires tree wells along sidewalks and/or trees on private property in development, redevelopment, and maintenance projects.

Chapter 6: Economic Development promotes energy efficient infrastructure, green buildings, sustainable energy, and environmentally oriented businesses.

Chapter 8: Hazards, Safety, and Noise describes the responsibility of fire protection services, identifies areas at high risk of wildfire risk and explains fire mitigation efforts.

Chapter 10: Natural Resources and Conservation describes the natural resources present in Santa Cruz, provides information on the existing conditions and visions for the urban forest. Explains the benefits of trees in the urban forest, including minimizing the heat island effect and capturing stormwater. Designates the urban forest as green infrastructure that serves the community in temperature control and stormwater runoff.

Outlines the following goals for the urban forest:

- Considers significant and heritage trees
- Encourages community educational programs to promote and celebrate the urban forest
- Promotes increasing street tree plantings, tree diversity, and native tree species
- Recommends an approved street tree list



Climate Action Plan

Chapter 1: Climate Change and the City of Santa Cruz recognizes the central coast ecosystem will likely be impacted by changes in environmental conditions.

Chapter 5: Sustainable Transportation & Land Use Planning supports the preservation of natural areas around Santa Cruz through land use planning that promotes infill development and also promotes bicycle and pedestrian corridors.

Chapter 6: Water Conservation & Solid Waste Management supports the Water Conservation Plan and efficient use of water for landscaping.

Chapter 7: Solar Santa Cruz outlines the need to switch to renewable energy sources to meet greenhouse gas reduction targets.

Chapter 8: Sustainability Through Public Partnerships, Education & Outreach lists the City's Environmental Programs, including Urban Tree Programs. It considers improvements to the City's parks, open spaces, and urban forest as a way to reduce greenhouse gas emissions and improve sustainability. This chapter promotes collaboration with community groups to support tree planting and maintenance and prioritizes tree protection and preservation, and water-wise landscaping in development projects.

The Climate Action Plan is being updated in 2021 as an equitable and community driven process where carbon sequestration will be a key carbon mitigation strategy.

Climate Adaptation Plan

The Climate Adaptation Plan outlines the actions Santa Cruz is planning to lessen the impacts of climate change on the community.

Chapter 1: Introduction provides adaptation measures that relate to the urban forest including tree species selection and forest management practices that decrease vulnerability to storm damage and wildfire. Considers street trees as infrastructure.

Chapter 3: Vulnerability Assessment Updates & Projected Impacts acknowledges threats resulting from climate change and provides a vulnerability assessment. Some vulnerabilities relate to the urban forest including (1) intense storms leading to tree or branch failure, (2) sea level rise and associated saltwater intrusion into irrigation supplies negatively impacting trees and other vegetation, (3) heat waves and tree canopy helping to mediate high temperatures.

Chapter 4: Adaptation Strategies explains steps the City of Santa Cruz is taking in order to be more resilient in the face of climate change. Actions include obtaining grant funding to complete an urban tree inventory, planting 500 trees in addition to the ~300 trees planted each year, and undertaking restoration projects. Goals include increasing tree canopy, diversifying the tree species represented in urban areas. Protecting and preserving tree canopy is listed as important in the implementation process.



City of Santa Cruz Park Master Plan 2030

Guides the future management and improvement of parks, facilities, beaches, and open spaces in Santa Cruz.

Chapter 2: Introduction & Inventory—Who We Are & What We Have describes the features available at the current parks, open space lands, beaches, and facilities in Santa Cruz. Provides Master Plans for specific parks, open spaces, and beaches, several of which consider incorporation and management of trees.

Chapter 3: Community Outreach & Needs Assessment—What We Need & Want presents the community's desire to continue preserving green space and providing recreational opportunities.

Chapter 4: Implementation—Where We're Headed and How We're Getting There outlines steps the City can take to meet their goals. Trees are included in goals in the following ways:

- Increase the number of trees to provide increased canopy cover and reduce the heat island effect, store carbon, and provide habitat
- Expand the tree planting program
- Prevent the spread of *Phytophthora*, a threatening disease that impacts native tree species
- Complete a community tree inventory
- Increase tree canopy by 10% from 2008 to 2020
- Promote the Urban Forestry Program

- Preserve trees
- Celebrate Arbor Day
- Increase neighborhood tree planting and tree planting on public property
- Expand the Heritage Tree Grant Program

Stormwater Management Plan (2009)

The Stormwater Management Program aims to reduce the amount of pollutants in the City's stormwater runoff.

Chapter 1: Municipal Operations Program Pollution Prevention and Good Housekeeping explains site Best Management Practices (BMPs) that are implemented to minimize or prevent the discharge of pollutants into the storm drain system. Inspections of the Parks and Recreation Department yard occur, where City equipment related to tree maintenance is stored and repaired when necessary.

Chapter 6: Post Construction Stormwater Management Program explains when permits for development or redevelopment projects are needed and the applicable requirements. Considers tree preservation in project plans for stormwater runoff and erosion.

Chapters 7 & 8 Industrial & Commercial Facilities Programs: aims to prevent the discharge of pollutants from industrial and commercial facilities to the City storm drain system and the environment, including pesticides and fertilizers which may be used on trees.

Local Coastal Program

Provides the basis for conservation and development of the coastal zone, with the following goals:

- Preserve natural resources
- Maintain already developed areas
- Prioritize land use/development dependent upon the coastal environment
- Maximize opportunities for all people to access the coast
- Protect undeveloped coastal areas and encourage development to areas with existing infrastructure

The Local Coastal Program (LCP) is currently being amended to reorganize the LCP to be consistent with the format of the General Plan and to incorporate sea level rise policies and visioning. The LCP amendment will be adopted in early 2021.

Environmental Quality Element explains policies and programs to minimize tree removal and promote consistent landscaping.

Community Design Element protects heritage trees by requiring (1) plans that include impacts to trees on properties undergoing construction, (2) replacement plantings if trees are removed, (3) minimal tree removal between the public road and the coast. Promotes incorporating species that support wildlife. Encourages developing an approved tree planting list that outlines approved and discouraged trees species and calls for the Master Street Tree List to include native and drought tolerant species.

Beach and South of Laurel Plan supports the heritage tree preservation program and streetscape design that considers and incorporates existing heritage trees.

Lighthouse Field State Beach Plan requires native, drought tolerant trees and other landscaping be used around parking areas.

San Lorenzo Urban River Plan encourages maintaining trees in the San Lorenzo Flood Control Improvement Project and incorporates trees in new developments, parking lots, and along the river trail between Soquel Drive and Laurel Street.

Santa Cruz Harbor Urban River Plan provides protections for healthy trees and promotes native, drought-tolerant species in landscaping.

Western Drive Master Plan encourages the preservation and maintenance of existing trees, restoration efforts that incorporate new tree plantings, and trees as visual screening for adjacent subdivisions. The plan also provides a list of recommended street tree species for the area.

“Requiring tree planting per a certain number of [parking] spaces is a great way to provide a better urban forest and urban cooling.”

**Planning
Department Partner,
City of Santa Cruz**



City of Santa Cruz Integrated Pest Management (IPM) Guidance Manual

The Integrated Pest Management (IPM) Guidance Manual explains IPM policies and procedures adopted by the City Council in order to (1) reduce or cease the use of pesticides, (2) establish an IPM Program, (3) provide educational programming, and (4) annually report pesticide use on City property.

The IPM Program is followed by the Parks and Recreation Department in the management of street trees. The example IPM Plan and the supplemental training manual provide examples of how the IPM guidelines can be used in relation to the control of pests associated with street trees. Potential pesticides for the management pests, including those that relate to street trees, are considered in the reduced pesticide list and this list indicates when exemptions are required (e.g. herbicides for tree stump injection and chemicals for tree roots in sewer laterals).

The City is currently engaged in a process to review its IPM policy and procedures.

City of Santa Cruz Integrated Pest Management (IPM) Annual Report 2001

The Department of Parks & Recreation reported on their use of biological, mechanical, and cultural control methods to manage scale insects on street trees. Furthermore, City Departments reported on numerous weed suppression activities on public property. The report shows a marked decrease in the use of pesticides as a result of the IPM policies and procedures adopted by City Council in 1998.

Standard Planting Detail

Curb, Gutter, and Sidewalk Detail includes standards for landscape strips.

Driveway Approach Type “A” Driveway with Planter denotes standards for planters.

Tree Planting Detail illustrates and describes expectations for tree planting, including tree size, planting location, materials, and tree maintenance.

Bioretention Facility provides design details for planters.

Tree Sidewalk Policy Program

The public sidewalk policy ensures sidewalks meet the standards of the Public Works Department and Americans With Disabilities Act (ADA) when trees are planted in the adjacent landscape strip. Ensures trees do not conflict with existing infrastructure or encroach the sidewalk. Includes the following:

- Provides minimum space requirements for tree planting wells
- Requires street trees be located a specified distance from existing utilities and infrastructure
- Requires property owners to call the City’s Underground Service Alert number to locate utilities prior to tree planting
- Allows for the use of tree grates that meet width requirements
- Requires concrete work resulting from tree well cut-outs be performed by permitted, licensed contractors
- Outlines the permit process
- Informs participants of potential tree root damage to existing infrastructure



Area Plans and Tree Planting by Area

Currently, Santa Cruz has eight specific Area Plans adopted by City Council between 1980 and 2014 (Map 3). The Area Plans are intended to be used in combination with the General Plan and Zoning Ordinances, yet are superseded by the City Ordinance. They provide more in-depth recommendations for policy and programming that align with the character of the particular area and promote sustaining the unique attributes that make the areas distinct. The plans are used to guide any land use changes, development, and improvement projects in the specified area.

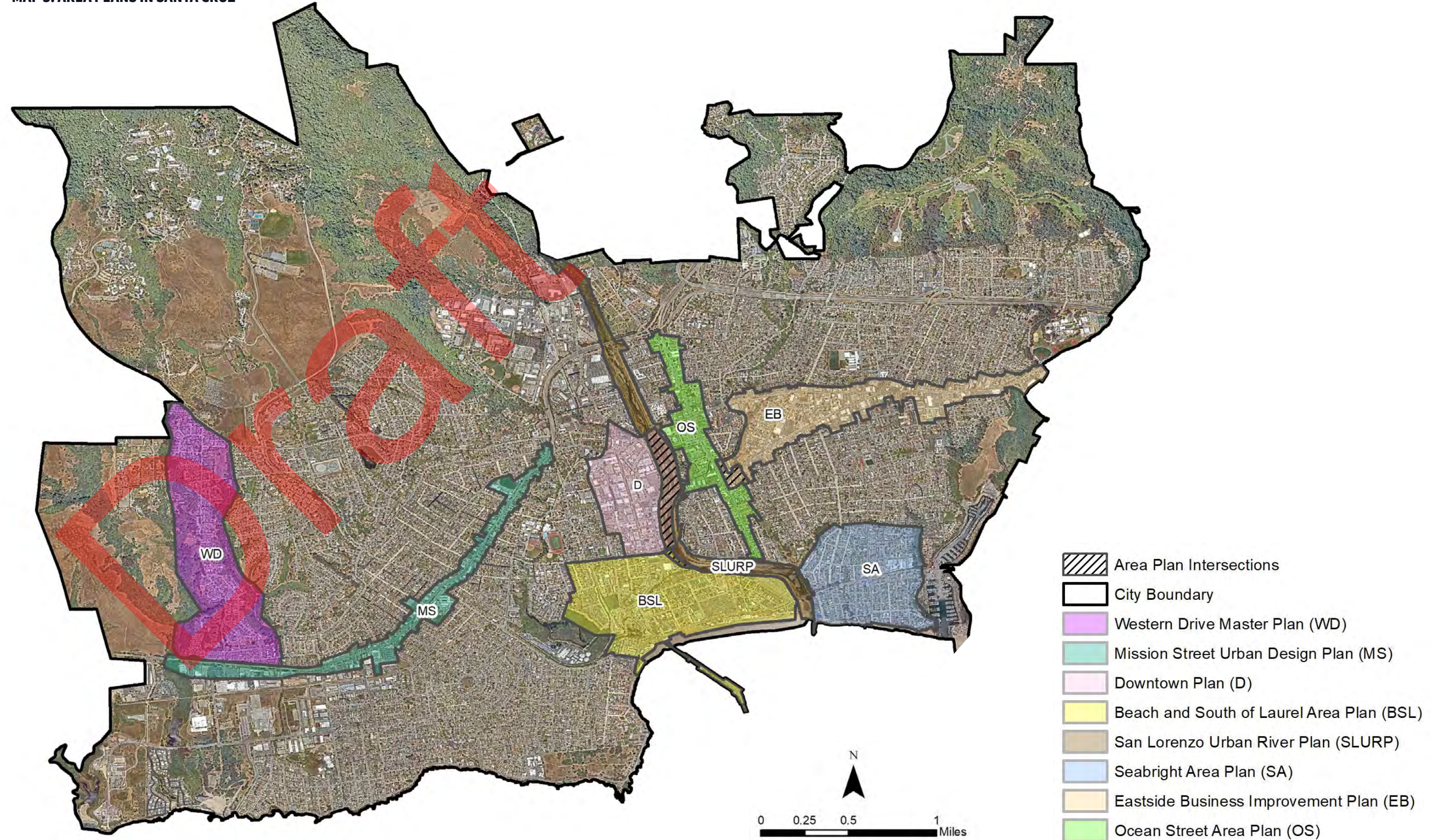
Urban planning, circulation, streetscape, architecture with the goal of improving aesthetics and linkages are considered in ways that maintain the characteristics that set the area apart from the rest of Santa Cruz.

Area Plans impact urban forestry operations because they include design guidelines and recommendations for general concept trees and/or street trees. All of the Area Plans except for the Seabright Area Plan suggest trees that should be incorporated into the area or provide a tree list. Planning provides recommendations for the stature and properties of trees to be planted in certain areas but leaves specifics about which species to be planted to the Public Works and the Urban Forester. In most cases, these recommendations are followed, but the City-wide approved street tree planting supersedes the Area Plan tree species lists and recommendations. The Urban Forester follows tree planting palettes that are included in the Area Plans to ensure consistency along main

arterials, commercial areas, and medians. Furthermore, the Urban Forester strictly adheres to the tree lists and example species provided in the Mission Street, Ocean Street, and Downtown Plans during street tree plantings. Other Plans are considered, but street tree planting in residential parcels can deviate from the Area Plan tree palettes. Allowing property owners to choose their preferred tree species typically results in a higher sense of ownership and enhanced care.

Some Area Plans mention creating a master tree list. Although there is not currently a Master Tree List, the City has an Approved Street Tree Planting List that guides species selection for street tree plantings. The Street Tree List is a dynamic document subject to ongoing review. This living document reflects appropriate species for the area and can incorporate new varieties and cultivars developed in the industry. Importantly, it can be adapted by the Urban Forester to ensure the tree species selected are compatible with individual circumstances and are suitable given any project constraints. Street tree plantings along sidewalks are almost exclusively non-native and native species are used when there is not a sidewalk, along levees and riverbanks, and other areas that are conducive.

MAP 3: AREA PLANS IN SANTA CRUZ





EASTSIDE BUSINESS IMPROVEMENT PLAN

The Eastside Business Area (1996) is a commercial district located east of downtown and between Water Street to Soquel Avenue. Located along a knoll, there is a steep grade change on the west end of the business district that provides a distinct transition into the area. The Water Street entry is located along a creek and there are riparian plantings on the east and west sides of Soquel Avenue. Within the area, there is a mixture of retail and office buildings which are surrounded by residential areas. The retail stores and medical providers in the Eastside Business Area offer diverse services and products. The businesses range from auto dealers and markets to restaurants and fitness centers. Some of the structures in the area are part of early Spanish settlements, with a row of businesses located along the traditional Spanish plaza. With a rich history and stages of development, the area is characterized by a variety of architectural styles.

Adopted: 1996

Last Revised: 1996

Tree Palette or Specific Tree Requirements: Yes

Design and Construction Standards for trees or planters: Yes

Specific Recommendations:

- Street tree plantings on the retail side of road
- Dense landscaping to provide visual barriers of cut slopes and backs of buildings
- Tree planting in sidewalk wells

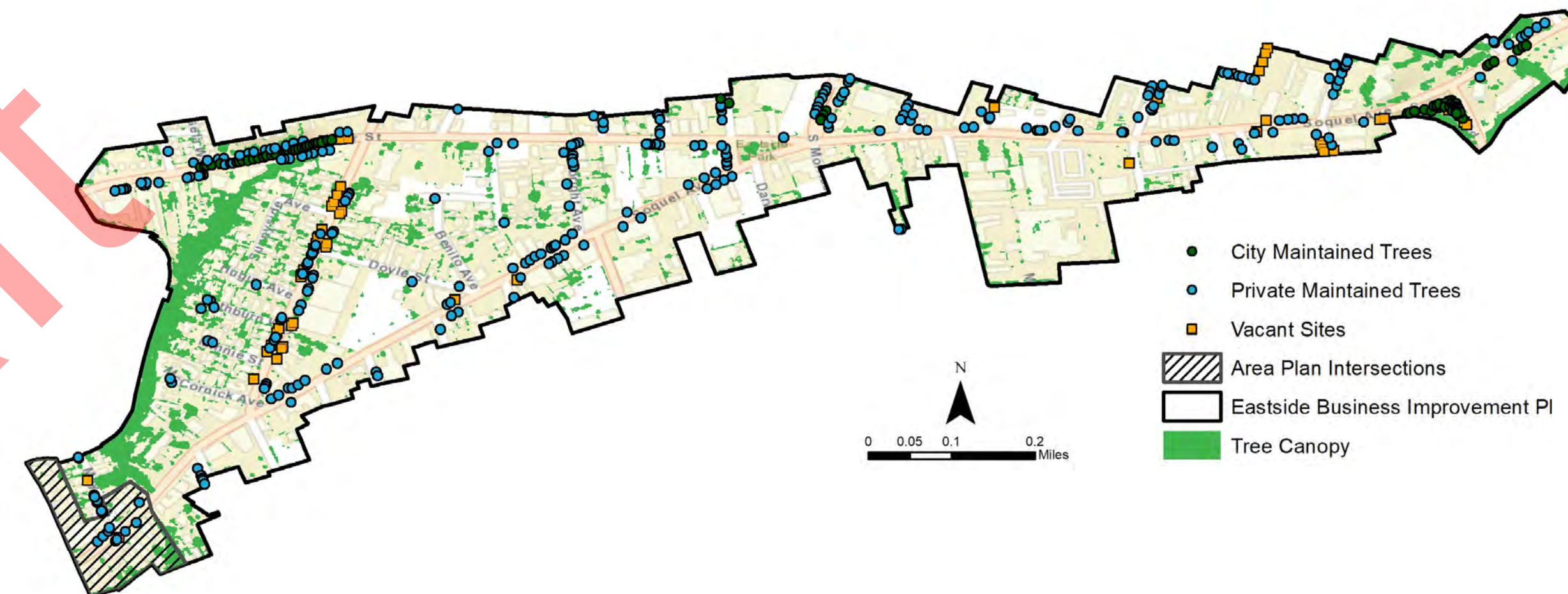
- Landscape screening for parking lots
- Widely spaced trees along storefronts
- Promote wider sidewalks to accommodate street tree plantings when possible
- Promote trees in parking area medians
- Consistent plantings of particular tree species

Street Tree Composition in the Eastside Business Area (2020):

- Total number of trees: 335 (80 CITY: 318 PO)
- Total number of vacant sites: 54
- Stocking level: 84.2%
- Total number of species: 55
- Top 5 species:
 - Hollywood juniper (*Juniperus Torulosa*)
 - Mexican fan palm (*Washingtonia robusta*)
 - Callery pear (*Pyrus calleryana*)
 - coast redwood (*Sequoia sempervirens*)
 - queen palm (*Syagrus romanzoffiana*)

Eastside Business Improvement Plan suggests planting flowering trees, trees that can be trimmed to avoid sign conflicts, and trees that can be used for screening. The top species in this area align with these criteria.

MAP 4: EASTSIDE BUSINESS IMPROVEMENT PLAN AREA





WESTERN DRIVE MASTER PLAN

The area encompassed in the Western Drive Master Plan is a marine terrace with unique geological features. A large portion of the terrace remains undeveloped and has been preserved as a public resource, and native and non-native trees such as blue gum, coastal redwood, cypress, and California myrtle (i.e., Pacific wax myrtle) are common. The steep slopes have highly erodible soils, making a balance between vegetation retention to avoid landslides and vegetation removal for fire mitigation an ongoing consideration. Precipitation drains into Moore Creek, but the terrace also contains springs and surface water seeps. Large, mature trees are one of the distinguishing characteristics in this area and street trees are depicted in all renderings of the road.

“Street trees, as part of this urban forest, should be viewed as the intrinsically valuable part of infrastructure that they are (in terms of absorbing pollutants, reducing urban heat islands, capturing stormwater, calming traffic, raising property values, etc.)”

CAL FIRE Partner

Adopted: 1980

Last Revised: 1980

Tree Palette or Specific Tree Requirements: Yes

Design and Construction Standards for trees or planters: Yes

Specific Recommendations:

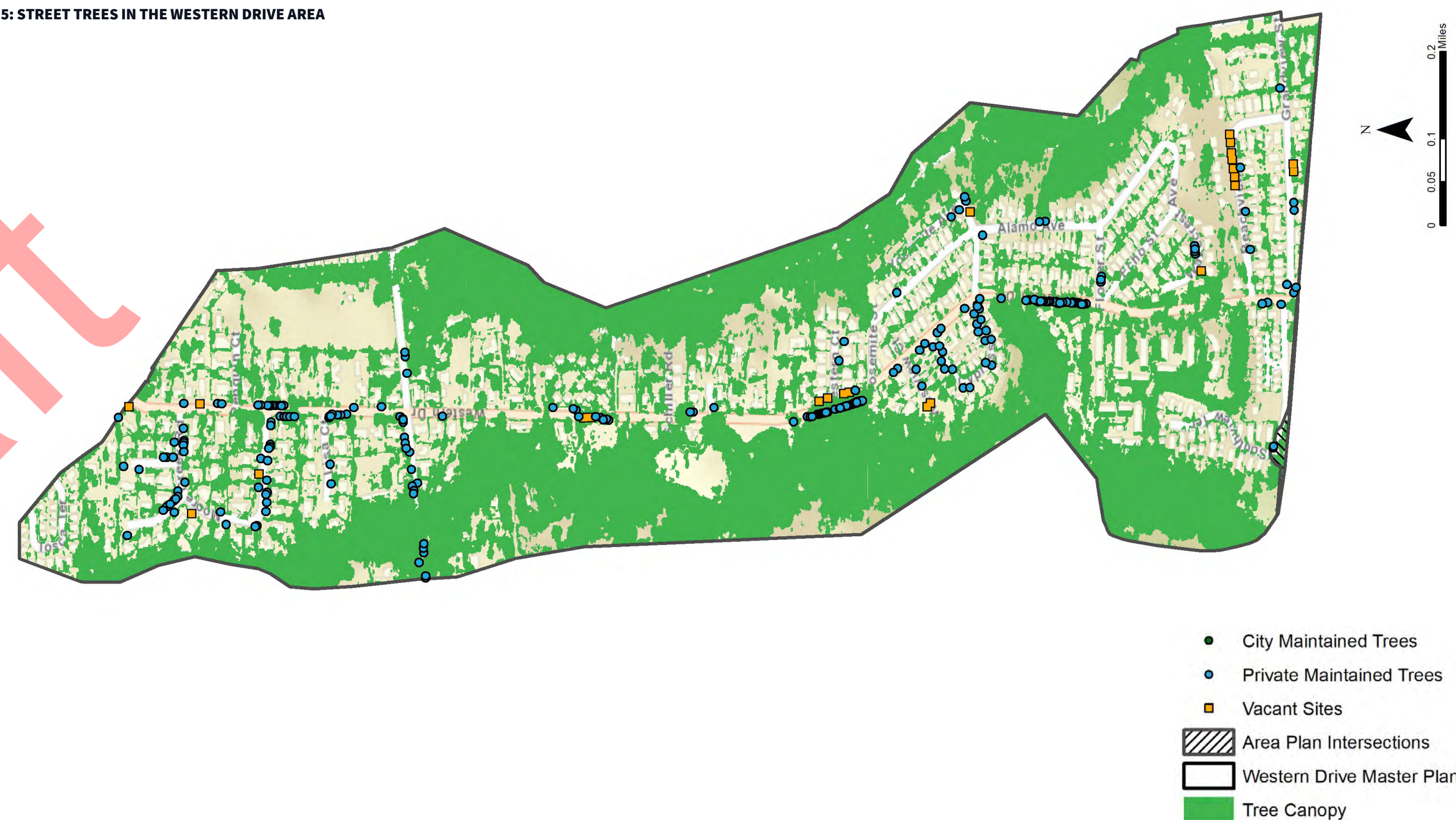
- Retention of trees
- Landscapes to reduce the impact of development

Street Tree Composition in the Western Drive Area (2020):

- Total number of trees: 267 (0 CITY; 267 PO)
- Total number of vacant sites: 31
- Stocking level: 88.4%
- Total number of species: 51
- Top 5 species:
 - blue gum eucalyptus (*Eucalyptus globulus*)
 - Monterey cypress (*Cupressus macrocarpa*)
 - London plane tree (*Platanus X hispanica*)
 - coastal live oak (*Quercus agrifolia*)
 - Florida hopbush (*Dodonaea viscosa*)

The top two most commonly planted street trees identified in the Western Drive Area are included in the list of Recommended Landscape Materials. All of the street trees within this area are maintained by private property owners, and therefore property owners play a large role in the species palette within this area.

MAP 5: STREET TREES IN THE WESTERN DRIVE AREA





“Whether in a single development or an entire neighborhood plan, the use of street trees plays a large role in creating places of lasting value so there is great opportunity in successful tree selection.”

**City of Santa Cruz,
Planning Department Partner**

DOWNTOWN PLAN

The Downtown Plan area is surrounded by the Mission to the north and Beach Hills to the south and is in close proximity to the San Lorenzo River to the east (Map 6. Riverfront and park sites contain historic landmarks (e.g. Post Office and Town Clock), which enhance the character of the Downtown Area. Many residents are employed at retail, commercial, and professional offices in the Downtown Area. The Downtown Area is also a gathering place for recreational activities, as it provides pedestrian linkages to natural spaces and historical sites, offers retail stores, restaurants, and cultural events.

Trees are considered as a way to enhance pedestrian environments and are recommended for planting near walkways as part of a plan to bring balance between pedestrians and vehicle activity. Overall, the plan calls for a number of different tree species, that provide a variety of characteristics. The Plan also provides tree spacing and tree height and clearance recommendations and envisions continuous Boulevard tree plantings within parking zones.

Adopted: 1991

Last Revised: 2017

Tree Palette or Specific Tree Requirements: Yes

Design and Construction Standards for trees or planters: Yes

Specific Recommendations:

- Uninterrupted plantings on both sides of Church Street and on Locust Street (e.g. London plane)

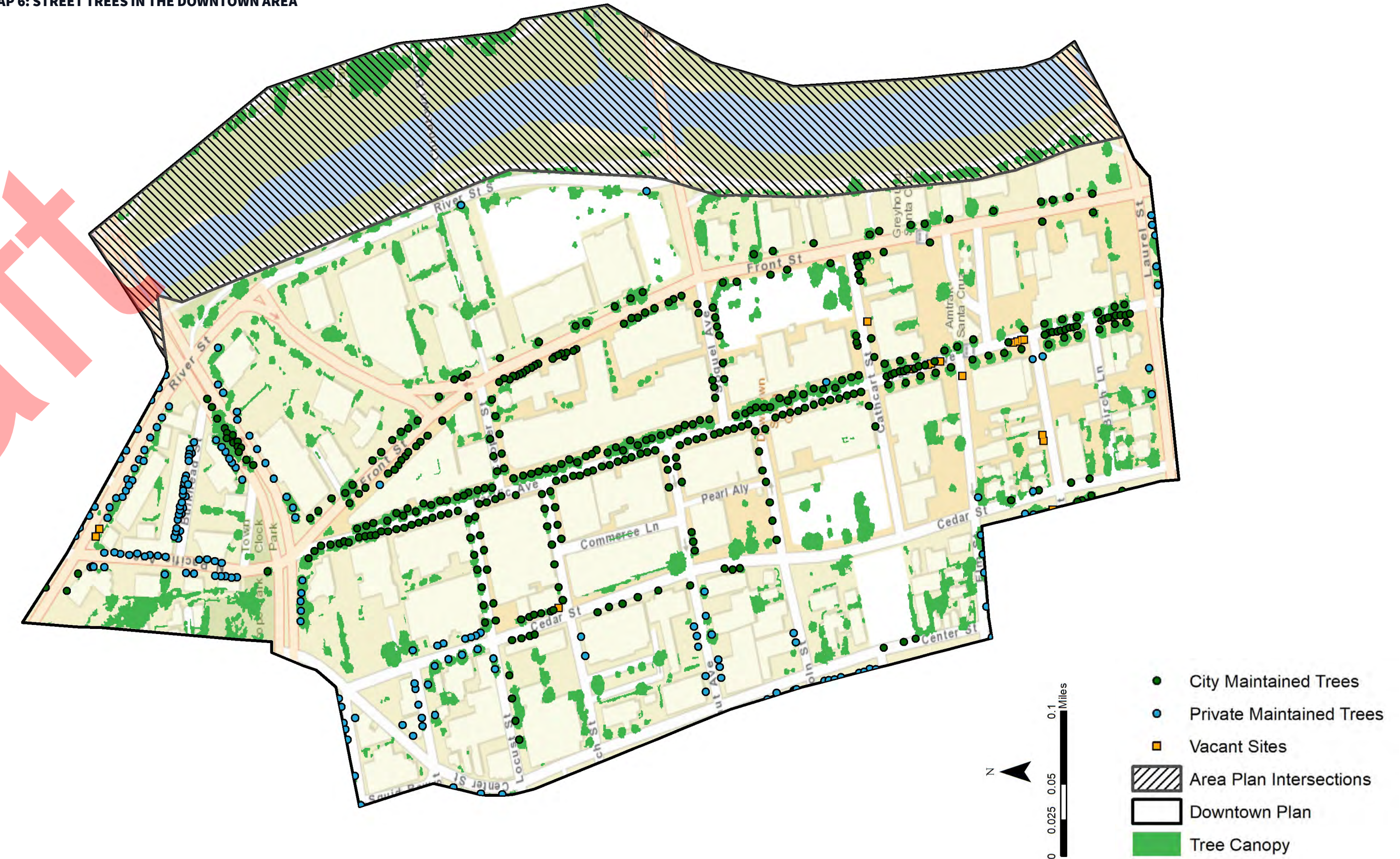
- Special trees at the "T" intersections and within the median south of Cathcart Street (e.g. London plane and Jacquemontii birch, and other specimen trees that contrast with the flowering trees)
- Plantings at the East Gateway, and Water to Mission Street (e.g. redwoods in medians)
- Large, distinctive, open trees for Soquel Avenue and Lincoln Street
- Flowering trees along Birch Lane

Street Tree Composition in the Downtown Area (2020):

- Total number of trees: 559 (400 CITY: 175 PO)
- Total number of vacant sites: 16
- Stocking level: 97.2%
- Total number of species: 44
- Top 5 species:
 - London plane tree (*Platanus X hispanica*)
 - Callery pear (*Pyrus calleryana*)
 - Japanese flowering cherry (*Prunus serrulata*)
 - European white birch (*Betula pendula*)
 - crape myrtle (*Lagerstroemia indica*)

The Downtown Area Plan calls for an asymmetrical lining of street trees with high, branching trees on the east side of streets and flowering trees on the west side. It also recommends the use of several particular species, some of which are included in the top 5 species within this area.

MAP 6: STREET TREES IN THE DOWNTOWN AREA





WEST CLIFF DRIVE ADAPTATION AND MANAGEMENT PLAN (A PUBLIC WORKS PLAN)

The West Cliff Drive Adaptation and Management Plan is currently underway. It specifies short term (10-15 year) coastal armoring, landscaping and transportation improvements as well as visions for future coastal adaptation strategies. The Plan calls for assessment of protection of Cypress trees root systems lining West Cliff Drive

SAN LORENZO URBAN RIVER PLAN

The San Lorenzo Urban River Plan builds upon previous plans for the San Lorenzo River, Branciforte Creek, and Jessie Street Marsh. The San Lorenzo River brings water from the Santa Cruz mountains through Santa Cruz, providing habitat for a variety of flora and fauna and supporting the northernmost Cottonwood-Sycamore riparian forest. Recent land use changes such as logging, dams, levees, and development have negatively impacted these riparian areas leading to loss of habitat, poor water quality, and increased water contaminants. Valued as birding hot spots and salmon and steelhead runs, the City of Santa Cruz began efforts to monitor the health of these areas and begin planning to conserve the natural resources.

Adopted: 2003

Last Revised: 2003

Tree Palette or Specific Tree Requirements: Yes

Design and Construction Standards for trees or planters: Yes

Specific Recommendations:

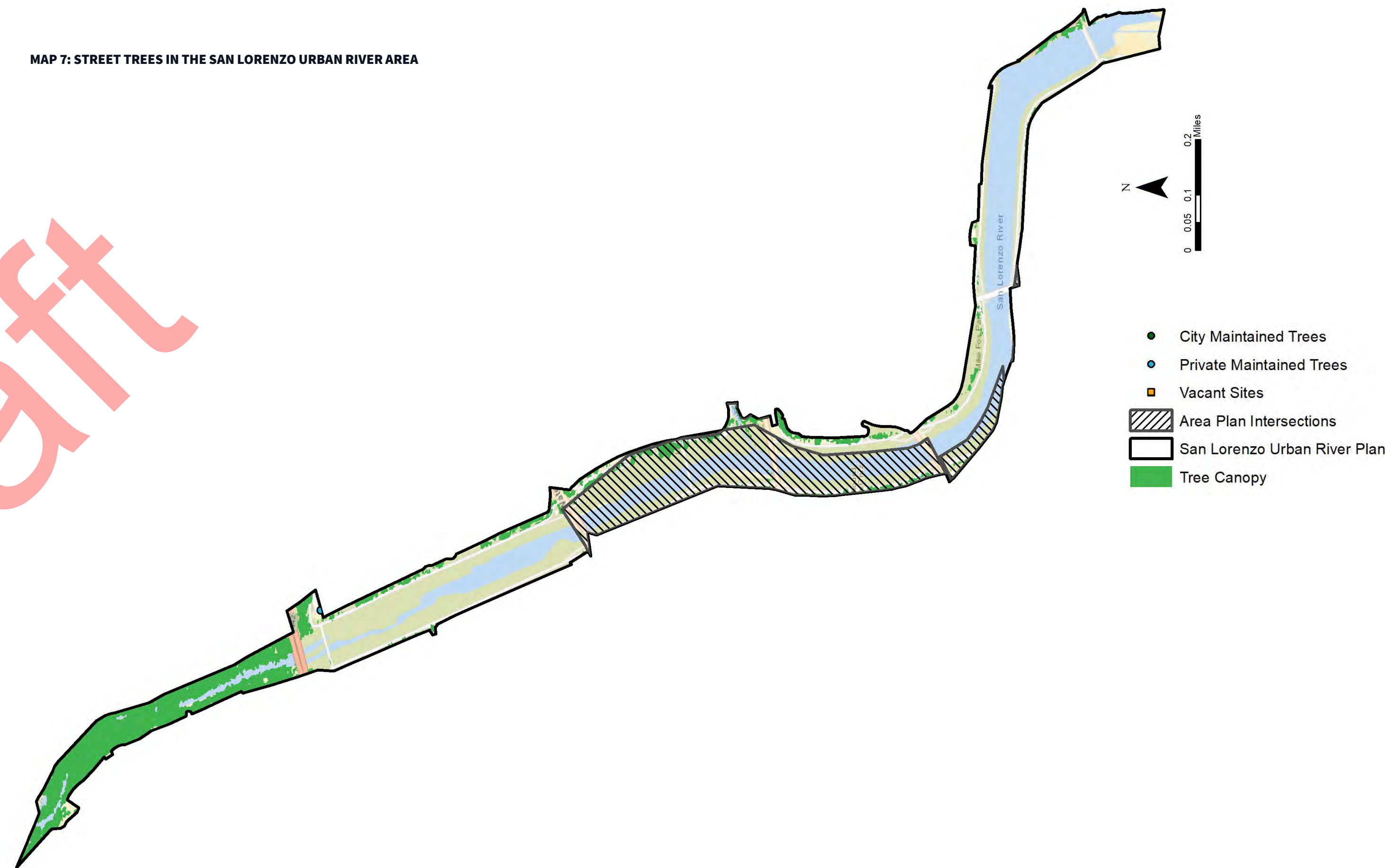
- Remove non-native trees and plant native species
- General improvements including planting street trees and parking lot trees

Street Tree Composition in the San Lorenzo Urban River Area (2020):

- Total number of trees: 1 (0 CITY: 1 PO)
- Total number of vacant sites: 0
- Stocking level: 100%
- Total number of species: 1
- Species: silver dollar eucalyptus (*Eucalyptus cinerea*)

There is currently only one street tree site in the area included in the San Lorenzo Urban River Plan because it does not have a public sidewalk. If development on the riverbank were to include sidewalks, then appropriate trees would be selected from the Approved *Street Tree List*.

MAP 7: STREET TREES IN THE SAN LORENZO URBAN RIVER AREA





SEABRIGHT AREA PLAN

The Seabright Area is a distinct, historic, residential neighborhood abutting Monterey Bay and framed by the San Lorenzo River to the east. The area is a relatively flat, marine terrace, only 25 feet above sea level. In the mid to late 1800s, settlers began to acquire property in what is now part of East Cliff, a river bluff in the Seabright Area. Here, Alhambra, a resort camp with small cottages, was built amongst cypress trees. The incorporation of a railway station and population growth spurring from the University encouraged the development of smaller lots and the layout for the current neighborhood.

The Seabright Area Plan provides valuable information on the benefits of trees and calls out significant cypress trees. It provides historic information on a tree inventory, tree maintenance responsibilities, Heritage Trees, and the permitting process for tree maintenance.

“My first recollection of Seabright was in the early eighties (that’s 1880s), when what is now known as Seabright was open field and Camp Alhambra was in a large grove of cypress trees, extending over what is now known as Pilkington and Alhambra streets.”

Miss Forbes
Reminiscences of Seabright, 1915

Adopted: 1981

Last Revised: 1981

Tree Palette or Specific Tree Requirements: No

Design and Construction Standards for trees or planters: Yes

Specific Recommendations:

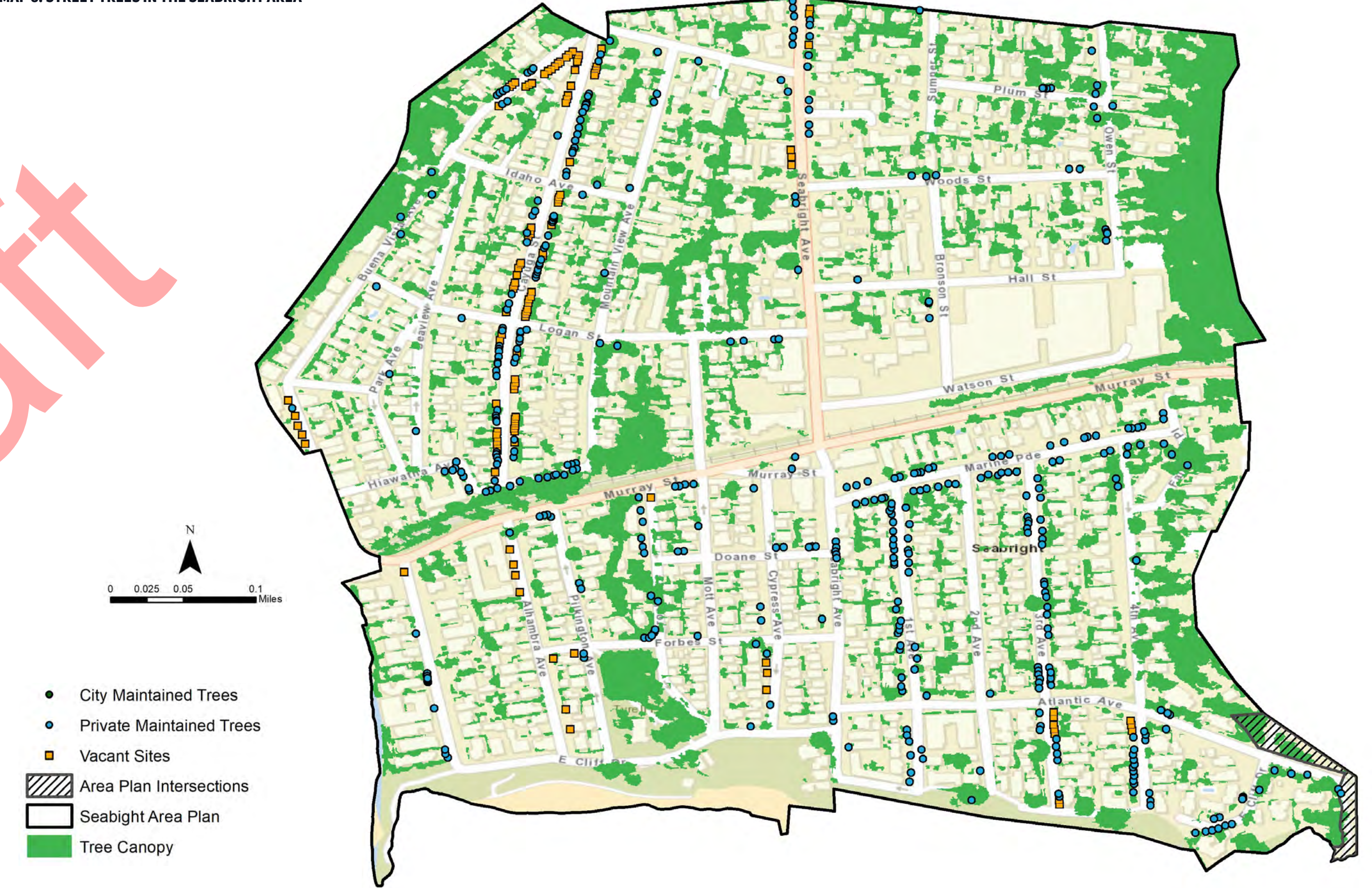
- Retain Heritage trees

Street Tree Composition in the Seabright Area (2020):

- Total number of trees: 417 (0 CITY: 538 PO)
- Total number of vacant sites: 121
- Stocking level: 77.5%
- Total number of species: 84
- Top 5 species:
 - crape myrtle (*Lagerstroemia indica*)
 - Japanese flowering cherry (*Prunus serrulata*)
 - coastal live oak (*Quercus agrifolia*)
 - eastern redbud (*Cercis canadensis*)
 - Mexican fan palm (*Washingtonia robusta*)

The Seabright Area Plan does not provide a tree palette or recommend the planting of any particular tree species. All of the street trees in this area are maintained by adjacent property owners and the Approved Street Tree Planting List is followed.

MAP 8: STREET TREES IN THE SEABRIGHT AREA





BEACH AND SOUTH OF LAUREL AREA PLAN

The area contained in the Beach and South of Laurel Plan contains residential neighborhoods that are contrasted with striking physical assets that draw over 2 million tourists annually (e.g. Beach, Wharf, and Boardwalk). It is an oceanside basin surrounded by West Cliff, Beach Hill, and the mouth of the San Lorenzo River. The area is shaped by frequently occurring flood events.

Adopted: 1998

Last Revised: 1998

Tree Palette or Specific Tree Requirements: Yes

Design and Construction Standards for trees or planters: Yes

Specific Recommendations:

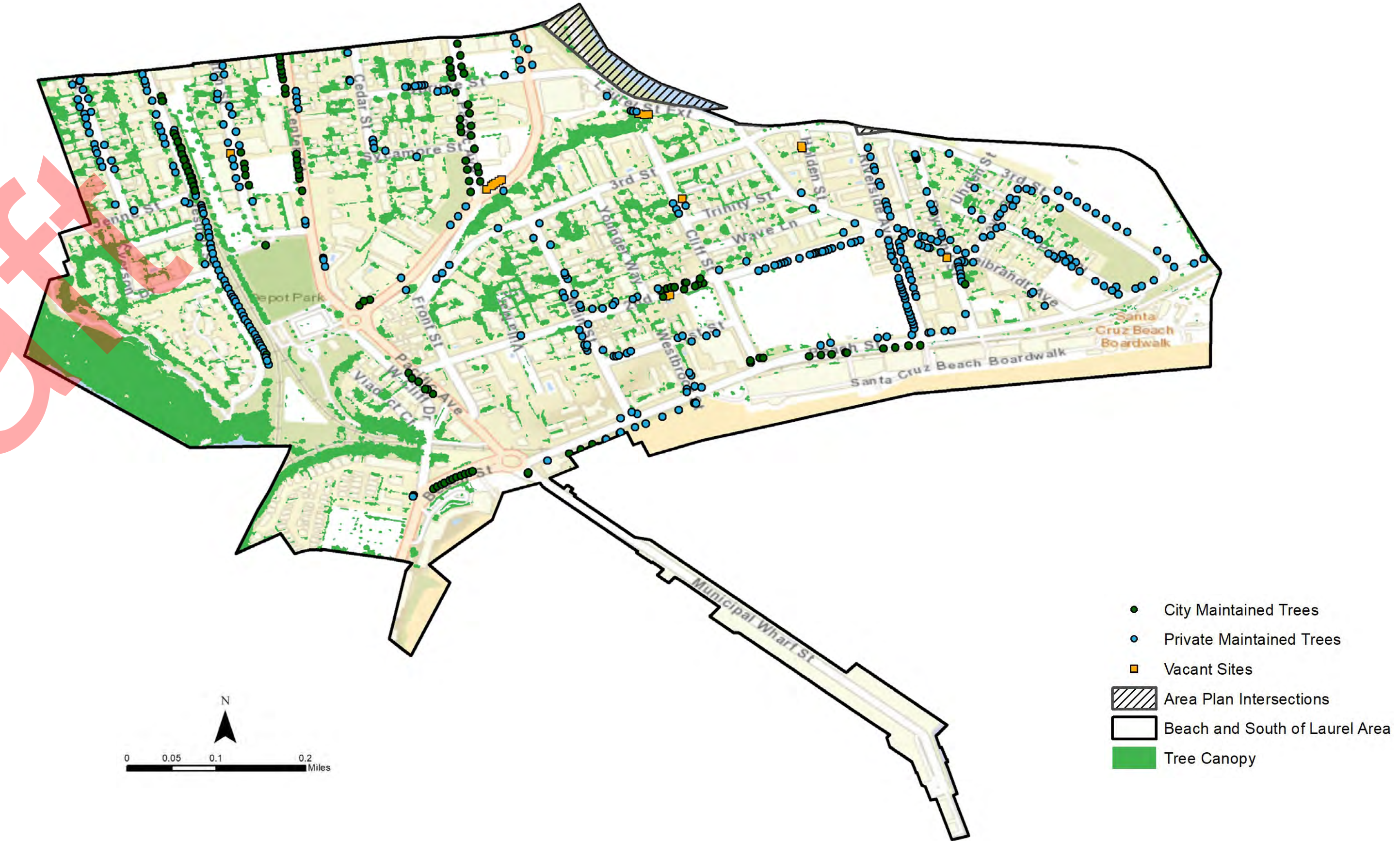
- Street tree plantings to buffer pedestrians from road
- Local streets throughout the neighborhoods to be planted with the same, single species of street tree
- Parking lot trees to reduce heat

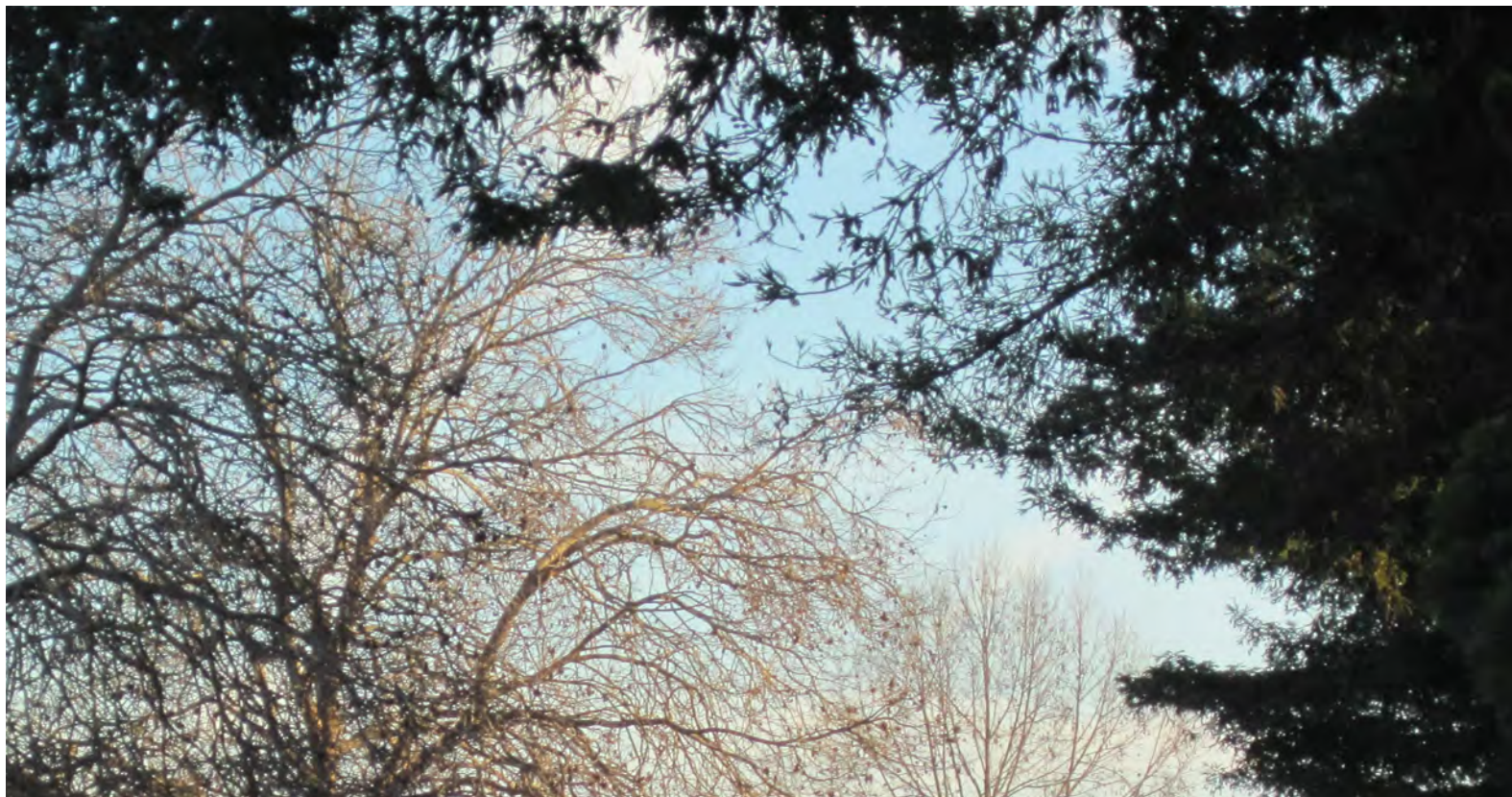
Street Tree Composition in the Beach and South of Laurel Area (2020):

- Total number of trees: 508 (114 CITY: 412 PO)
- Total number of vacant sites: 18
- Stocking level: 96.6%
- Total number of species: 41
- Top 5 species:
 - London plane tree (*Platanus X hispanica*)
 - crape myrtle (*Lagerstroemia indica*)
 - Mexican fan palm (*Washingtonia robusta*)
 - California sycamore (*Platanus racemosa*)
 - Callery pear (*Pyrus calleryana*)

The Beach and South of Laurel Plan specifically recommends the use of particular species. One of the recommended species is also one of the most commonly planted street trees in this area. Many of the street trees in this area are maintained by adjacent property owners. During street tree giveaways, residents are allowed to choose their preferred tree species.

MAP 9: STREET TREES IN THE BEACH AND SOUTH OF LAUREL AREA





OCEAN STREET AREA PLAN

The Ocean Street Area Plan focuses on revitalizing the Ocean Street corridor, a 1.2 mile length of Ocean Street that runs south from Highway 17 to the San Lorenzo River. This major gateway contains a variety of land uses, with an assortment of building types containing services such as retail stores, hotels and motels, medical and dental offices, business offices, and residential neighborhoods. Most of the City Government's main offices are located along the corridor. This corridor sees large flows of commuter, visitor, and truck traffic and largely consists of four lanes, a bike lane, off street parking, a center median with tree plantings, and a sidewalk. The Area Plan is meant to fulfill the General Plan 2030 goal to promote mixed-use development that positively impacts the character of the City, linkages, and streetscape enhancements.

“Show people two streets, one with a great street tree canopy and one without, and ask people which they would rather walk down. The preference is almost always for trees.”

Planning Department Partner, City of Santa Cruz

Adopted: 2014

Last Revised: 2014

Tree Palette or Specific Tree Requirements: Yes

Design and Construction Standards for trees or planters: Yes

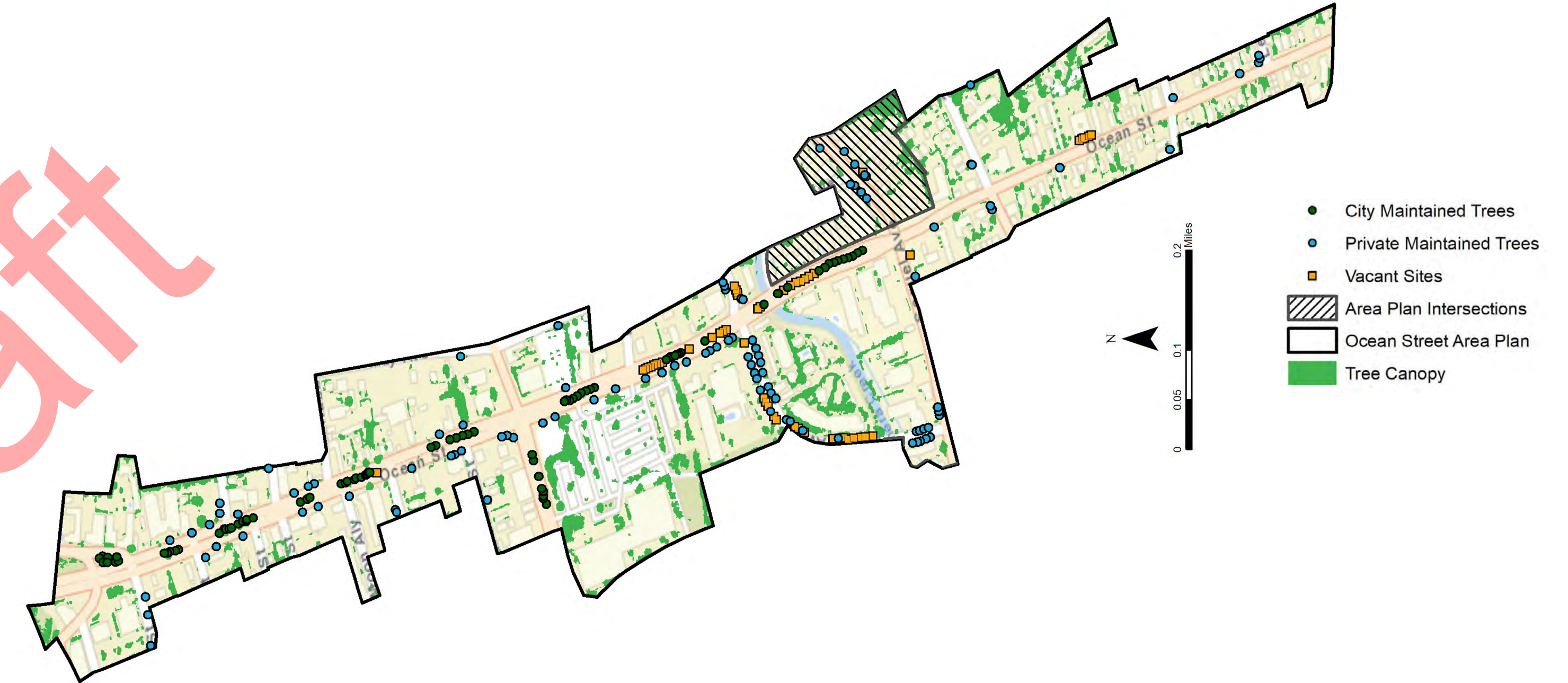
Specific Recommendations:

- Protecting trees
- Drought tolerant plants for low maintenance in medians
- Gateway improvements that incorporate landscaping
- Street trees to improve pedestrian amenities

Street Tree Composition in the Ocean Street Area (2020):

- Total number of trees: 188 (106 CITY: 132 PO)
- Total number of vacant sites: 50
- Stocking level: 80.0%
- Total number of species: 33
- Top 5 species:
 - coast redwood (*Sequoia sempervirens*)
 - Hollywood juniper (*Juniperus Torulosa*)
 - windmill palm (*Trachycarpus fortunei*)
 - California sycamore (*Platanus racemosa*)
 - London plane tree (*Platanus X hispanica*)

MAP 10: STREET TREES IN THE OCEAN STREET AREA





MISSION STREET URBAN DESIGN PLAN

As one of the most widely-used corridors in Santa Cruz, the construction projects to widen Mission Street initiated the development of the Mission Street Urban Design Plan. The Mission Street Urban Design Plan was adopted by California Department of Transportation (Caltrans) and City Council in 2002 for around 2.25 miles of the Mission Street corridor, several parcels deep, where it is now concurrent with the State Route 1. Most of the corridor interfaces with key commercial retail and office buildings, but there are several residential parcels as well. Businesses along the corridor provide various auto and visitor services (e.g. gas stations, restaurants, and hotels). As such, the Plan encourages varied building styles and landscapes and addresses the circulation conflict between the dual purposes of the corridor: access to local services and regional traffic thoroughfare and provides a unified vision for the commercial corridor.

Adopted: 2002

Last Revised: 2002

Tree Palette or Specific Tree Requirements: Yes

Design and Construction Standards for trees or planters: Yes

Specific Recommendations:

- Streetscape improvements that incorporate trees
- A Street Tree Program to support revitalization along the corridor

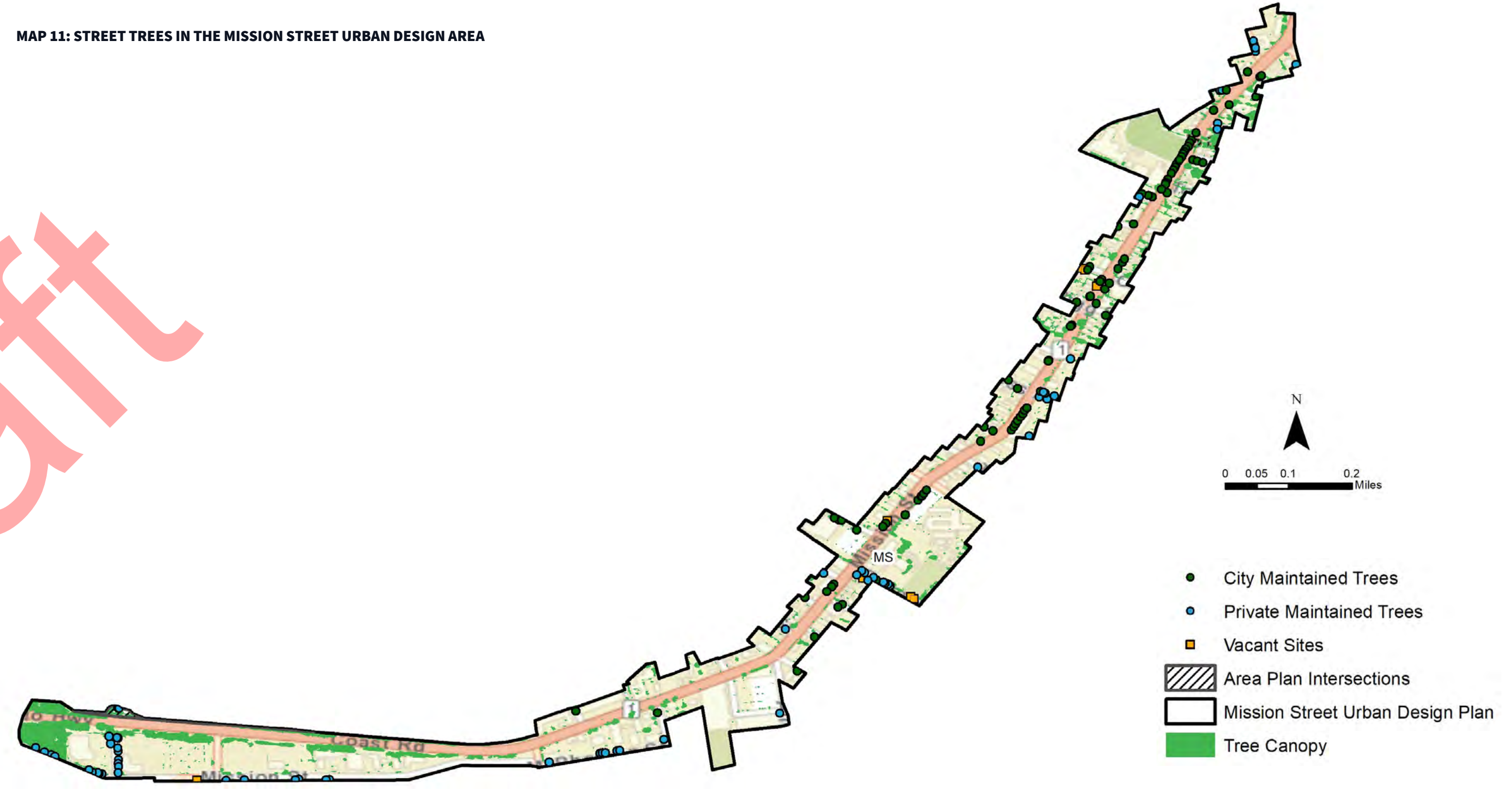
- Retaining existing evergreens and mature trees.
- Indicate all existing street trees and where street tree plantings are feasible

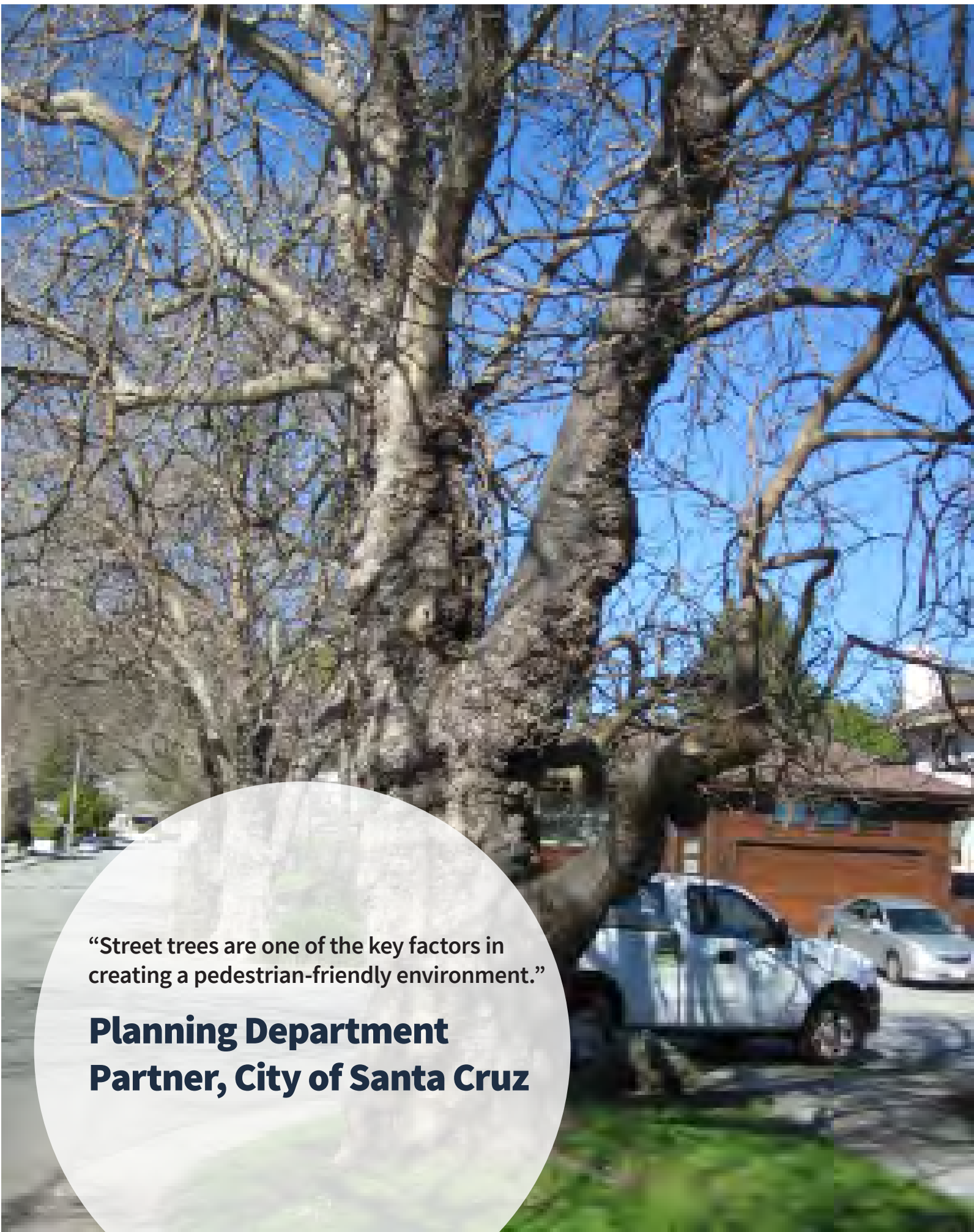
Street Tree Composition in the Mission Street Area:

- Total number of trees: 150 (94 CITY: 69 PO)
- Total number of vacant sites: 13
- Stocking level: 92.0%
- Total number of species: 39
- Top 5 species:
 - London plane tree (*Platanus X hispanica*)
 - crape myrtle (*Lagerstroemia indica*)
 - Callery pear (*Pyrus calleryana*)
 - Chinese pistache (*Pistacia chinensis*)
 - coast redwood (*Sequoia sempervirens*)

The Mission Street Urban Design Plan provides a tree list. Only one of the top 5 species planted within this area is not included on the list.

MAP 11: STREET TREES IN THE MISSION STREET URBAN DESIGN AREA





“Street trees are one of the key factors in creating a pedestrian-friendly environment.”

**Planning Department
Partner, City of Santa Cruz**

Conclusion

Santa Cruz is known as the community where the redwoods meet the ocean and residents appreciate the many natural resources that surround them. Because of the value the community places on natural resources, the City has a long-standing history of urban forestry and street tree programming. Building upon this history and well-established tree protection ordinances, the program is strengthened by a newly completed, comprehensive tree inventory and inventory management system, which allows managers to make data-driven decisions when addressing maintenance needs.

A Resource Analysis (2020) benchmarks the composition, benefits, and value of the community tree resource. The Street Tree Management Plan builds upon the information in the inventory and Resource Analysis. It outlines a comprehensive 5-year work plan with annual maintenance quotas to demonstrate how to address all maintenance priorities identified by the tree inventory over the next five years.

Street trees make up an estimated 4.3% of the land area in Santa Cruz and are integral to the wellbeing of the community. The overall species diversity is well exceeding the national average and the industry rule of thumb. Nevertheless, urban forest managers are dedicated to increasing diversity, especially at the area and neighborhood levels. The City is interested in increasing tree canopy and, as part of the Climate Action Plan 2030, is engaging the community to determine canopy goals for the urban forest as well as the street tree component.

The Urban Forestry Office has capable and dedicated staff. Although, due to resource and operational challenges, urban forestry operations are at, or above, capacity. The street tree budget is limited and continues to decrease, resulting in staffing reductions and the transition of care of rights-of-way street trees adjacent to private property to property owners (1985). The transition from City to private street tree care has been to the detriment of the street trees. While the care of street trees is largely the responsibility of private property owners (84.5%), permits are required for street tree planting, pruning, and removal. This results in an overwhelming volume of tree permits which are all handled by the Urban Forester.

The City is responsible for the maintenance of 15.5% of street trees, or those trees adjacent to City property. Staff in the Parks and Recreation Department realize that current funding levels are not adequate to maintain all the street trees adjacent to City property on a proactive cycle. A subset of the trees are prioritized and maintained on a 2-year cycle, including those in the Downtown Area and along main corridors, all other maintenance is ad-hoc.

Municipal Code designates that property owners are responsible for the maintenance of adjacent street trees and for resolving any safety concerns in the parkway. Despite this, the maintenance of street trees adjacent to private properties is variable and, in many cases, not performed regularly or to industry standards. Many homeowners may be unaware of these

responsibilities or may not have the knowledge or the resources to properly care for trees. As a result of the inconsistencies in tree maintenance, not all trees are receiving adequate care. Overall, there is a need for more education regarding the care of trees planted in the rights-of-ways.

Trees in Santa Cruz are protected under the Heritage Tree Ordinance and the Street Tree Ordinance. Some street trees are of heritage tree size and are therefore protected by both ordinances. As a whole, mitigation requirements are followed by residents and the resulting funds help to replenish tree canopy on public property and rights-of-ways throughout the community. Street tree planting occurs in vacant City-maintained sites when possible and in sites adjacent to private property upon resident or neighborhood requests for trees. Planting also occurs to commemorate significant events or people, but it is not currently guided by the tree inventory or prioritized by the amount of environmental or socioeconomic benefits that could be gained from strategic tree planting. Tree plantings follow the Approved Street Tree Planting List and/or recommended species provided in the Specific Area Plans. Notably, in the areas where planning is guided by a Specific Area Plan, the street tree inventory aligns with the recommended tree species or the overarching tree list for the area. Urban forest managers are considering the future impacts of climate change when selecting tree species and they plan to incorporate experimental species that are suitable for the projected climate conditions.

Santa Cruz is built out, but infill development and redevelopment projects occur on a regular basis. During these projects, street trees are considered, but due to ongoing space limitations, tree wells may not be incorporated or are reduced in size to accommodate development. City Staff are highly collaborative and share the common goal to have tree lined streets. Therefore, they work together to implement the most practical solutions on a case by case basis. In doing so, the City has successfully avoided many tree-infrastructure conflicts. Sometimes conflicts arise because, by definition, street trees are planted amongst other infrastructure and space is limited.

The STMP can help guide the Urban Forestry Office as staff continue to work toward solutions to increase the level of care for street trees. The STMP identifies 8 goals that focus on strengthening the street tree resource and an additional 14 goals for the urban forest. It also benchmarks the current performance of Santa Cruz’s street tree program using the Sustainability Indicators (Appendix I). Moving forward, this tool can be used to better understand how the program can meet industry recommendations and improve the effectiveness of their management approach.



Street Tree Work Plan – 5 Year

Over the next five years, the street tree work plan provides a roadmap through annual work plans to efficiently address the maintenance needs of all street trees by prioritizing primary maintenance needs. The work plan does not account for changes in priority maintenance needs. Staff will continue to schedule work based on the highest known maintenance priority. The highest level of priority maintenance should occur first. In other words, if a tree that is recommended for a routine prune during the initial inventory collection, but a service request and/or further inspection indicates a heightened maintenance priority, lesser priorities should be organized accordingly.

Work plans include consideration for City-managed street trees and street trees maintained by adjacent property owners (Tables 8 to 10; Appendix H). For City-managed trees, priority maintenance will be followed by routine maintenance, and the establishment of an ongoing 5-year maintenance cycle (and 1-2 years for downtown trees).

For the 10,686 street trees maintained by adjacent property owners, 246 trees were identified with priority maintenance tasks. These trees require the City to notify the adjacent property owners to indicate the necessary maintenance. In addition, the City will notify property owners of 456 street trees in need of removal and stump grinding.

There are 104 potential tree planting locations within the City-maintained rights-of-way and 2,315 potential tree planting locations within the rights-of-way abutting private property. As the Santa Cruz Tree Trust Fund is used for street tree planting, regardless of maintenance designation, the planting plan includes all street tree sites.

Total City-maintained trees: 1,628

Total adjacent property owner-maintained trees: 10,722



YEAR 1 WORK PLAN

In the interest of safety, Year 1 will address priority removals and priority pruning. Trees with priority removals have a high volume of dead wood or pose immediate risk to public safety. At a minimum, trees designated as Priority 1 removal should be addressed in Year 1. Large trees or trees that are located at, or near, City facilities, schools, and along major arterial roads should be addressed before small trees or trees within areas with lower occupancy rates.

To address City-maintained trees in need of priority prunes and removals, the city will address all five Priority 1 prunes and 23 Priority 2 prunes. City-maintained trees with Priority 1 and 2 removals (11) are also scheduled for Year 1. In addition, the City will notify property owners responsible for the maintenance of the 280 identified rights-of-way trees with the recommendation of Priority 1, 2, or 3 removal as well as 246 trees identified with Priority 1 and 2 pruning in Year 1.

Structural pruning is extremely beneficial for the future health and structure of young trees. Most structural defects that occur in older trees could have been prevented through the strategic pruning of young trees. Structural pruning can promote desirable and stable branch structure, which can result in reduced maintenance costs later in the life of the tree, as well as, extend the overall lifespan. Because structural pruning is most beneficial for trees when they are young, the city will conduct structural prunes on the trees recommended for this specialized structural pruning within the first year of the Plan. In addition, adjacent property

owners will be notified of all 13 trees with the recommendation of structural prune.

Routine pruning includes trees recommended for large and small routine prune and trees with no maintenance recommendation. The type of prune can provide managers with a general idea of the equipment needed to complete the task (small routine prunes should not require climbing equipment or aerial lifts). In total, routine prunes identified for City-maintained trees include 1,081 trees, excluding the Downtown Area. These trees are scheduled for pruning on a five-year cycle. In addition, there are 378 trees in the Downtown area recommended for routine pruning. These trees are scheduled for pruning on a two-year cycle. To offset the priority maintenance needs, 336 City-maintained trees are scheduled for routine pruning in year 1.

Considering these 2,419 planting sites and sites created from the removal of trees recommended for priority removal, managers should aim to plant approximately 761 trees annually over the next five years (Table 9).

- Priority Pruning (28 CITY: 246 PO)
- Priority Removal (11 CITY: 280 PO)
- Routing Maintenance (336 CITY: 1,548 PO)
- Structural Prune: (1 CITY: 13 PO)
- Planting (32 CITY: 729 PO)

Year 1 Total Cost for city-maintained tree maintenance and all planting: \$473,220 (\$381,900 Maintenance: \$91,320 Planting)

YEAR 2 WORK PLAN

Year 2 maintenance includes non-priority tree removal and stump grinding, with 191 tree removals in Year 2, which will complete this task. Routine pruning will continue for 442 City-maintained trees, including 189 in the Downtown Area, and 1,536 adjacent property owner-maintained trees.

- Tree Removal and Stump Grind: (15 CITY: 176 PO)
- Routine Maintenance (442 CITY: 1,536 PO)
- Planting (32 CITY: 718 PO)

Year 2 Total Cost for city-maintained tree maintenance and all planting: \$617,100 (\$527,100 Maintenance: \$90,000 Planting)

YEAR 3 WORK PLAN

In Year 3, routine pruning will continue to occur for 1,957 trees. As trees are planted, structural prunes should occur regularly during Year 3 through Year 5 of the Plan, otherwise many of the trees recommended for structural prune will have grown and will likely require elevated maintenance and care. Some structural pruning can be completed as trees are planted, but most will require additional visitation within two years after establishment. On average, 754 trees need structural prunes annual over the last three years of the Plan.

- Routine Maintenance (421 CITY: 1,536 PO)
- Structural Prune: (32 CITY: 729 PO)
- Planting (32 CITY: 718 PO)

Year 3 Total Cost for city-maintained tree maintenance and all planting: \$578,300 (\$488,300 Maintenance: \$90,000 Planting)

YEAR 4 WORK PLAN

Routine pruning will continue for 1,957 trees completing one full-cycle for the majority of trees and two full cycles for Downtown trees in Year 4. Structural prunes will continue on 750 trees.

- Routing Maintenance (421 CITY: 1,536 PO)
- Structural Prune: (32 CITY: 718 PO)
- Planting (32 CITY: 718 PO)

Year 4 Total Cost for city-maintained tree maintenance and all planting: \$580,100 (\$490,100 Maintenance: \$90,000 Planting)

YEAR 5 WORK PLAN

Trees with priority pruning will be added back into the routine pruning cycle in Year 5. In total, 2,180 trees are scheduled for routine maintenance. Structural prunes will continue on 750 trees.

- Routine Maintenance (431 CITY: 1,749 PO)
- Structural Prune: (32 CITY: 718 PO)
- Planting (32 CITY: 718 PO)

Year 5 Total Cost for city-maintained tree maintenance and all planting: \$587,300 (\$497,300 Maintenance: \$90,000 Planting)

"Our sidewalks cannot accommodate tree wells in most locations."

**Climate Action Partner,
City of Santa Cruz**

TABLE 8: CITY-MAINTAINED STREET TREE WORK PLAN

Estimated Costs for Each Activity		Year 1			Year 2			Year 3			Year 4			Year 5			Total 5-Year Work Plan Cost
Maintenance Activity	Diameter Class (inches)	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Total 5-Year Cost
Routine pruning (includes trees with no maintenance specified)	0 - 3	\$300	49	\$14,700	\$300	49	\$14,700	\$300	49	\$14,700	\$300	49	\$14,700	\$300	53	\$15,900	\$74,700
	4 -	\$300	50	\$15,000	\$300	47	\$14,100	\$300	47	\$14,100	\$300	47	\$14,100	\$300	49	\$14,700	\$72,000
	8 - 13	\$800	48	\$38,400	\$800	46	\$36,800	\$800	46	\$36,800	\$800	46	\$36,800	\$800	46	\$36,800	\$185,600
	14 - 21	\$1,800	0	\$0	\$1,800	42	\$75,600	\$1,800	41	\$73,800	\$1,800	41	\$73,800	\$1,800	42	\$75,600	\$298,800
	22 - 35	\$1,800	0	\$0	\$1,800	38	\$68,400	\$1,800	36	\$64,800	\$1,800	36	\$64,800	\$1,800	38	\$68,400	\$266,400
	36 +	\$1,800	0	\$0	\$1,800	16	\$28,800	\$1,800	13	\$23,400	\$1,800	13	\$23,400	\$1,800	14	\$25,200	\$100,800
Activity Total(s)			147	\$68,100		238	\$238,400		232	\$227,600		232	\$227,600		242	\$236,600	\$998,300
Routine pruning Downtown (includes trees with no maintenance specified)*	0 - 3	\$500	16	\$8,000	\$500	15	\$7,500	\$500	16	\$8,000	\$500	15	\$7,500	\$500	16	\$8,000	\$39,000
	4 -	\$500	53	\$26,500	\$500	54	\$27,000	\$500	53	\$26,500	\$500	54	\$27,000	\$500	53	\$26,500	\$133,500
	8 - 13	\$1,000	40	\$40,000	\$1,000	39	\$39,000	\$1,000	40	\$40,000	\$1,000	39	\$39,000	\$1,000	40	\$40,000	\$198,000
	14 - 21	\$2,200	63	\$138,600	\$2,200	63	\$138,600	\$2,200	63	\$138,600	\$2,200	63	\$138,600	\$2,200	63	\$138,600	\$693,000
	22 - 35	\$2,800	11	\$30,800	\$2,800	11	\$30,800	\$2,800	11	\$30,800	\$2,800	11	\$30,800	\$2,800	11	\$30,800	\$154,000
	36 +	\$2,800	6	\$16,800	\$2,800	7	\$19,600	\$2,800	6	\$16,800	\$2,800	7	\$19,600	\$2,800	6	\$16,800	\$89,600
Activity Total(s)			189	\$260,700		189	\$262,500		189	\$260,700		189	\$262,500		189	\$260,700	\$1,307,100
Priority Pruning	0 - 3	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$0
	4 -	\$300	5	\$1,500	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$1,500
	8 - 13	\$800	4	\$3,200	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$3,200
	14 - 21	\$1,800	4	\$7,200	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$7,200
	22 - 35	\$1,800	7	\$12,600	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$12,600
	36 +	\$1,800	8	\$14,400	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$14,400
Activity Total(s)			28	\$38,900		0	\$0		0	\$0		0	\$0		0	\$0	\$38,900
Structural Prune	0 - 3	\$300	1	\$300	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300
	4 -	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$0
	8 - 13	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$0
	14 - 21	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
	22 - 35	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
	36 +	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
Activity Total(s)			1	\$300		0	\$0		0	\$0		0	\$0		0	\$0	\$300
Tree Removal & Stump Grinding	0 - 3	\$500	4	\$2,000	\$500	4	\$2,000	\$500	0	\$0	\$500	0	\$0	\$500	0	\$0	\$4,000
	4 -	\$500	2	\$1,000	\$500	0	\$0	\$500	0	\$0	\$500	0	\$0	\$500	0	\$0	\$1,000
	8 - 13	\$1,000	0	\$0	\$1,000	2	\$2,000	\$1,000	0	\$0	\$1,000	0	\$0	\$1,000	0	\$0	\$2,000
	14 - 21	\$2,200	1	\$2,200	\$2,200	5	\$11,000	\$2,200	0	\$0	\$2,200	0	\$0	\$2,200	0	\$0	\$13,200
	22 - 35	\$2,800	2	\$5,600	\$2,800	3	\$8,400	\$2,800	0	\$0	\$2,800	0	\$0	\$2,800	0	\$0	\$14,000
	36 +	\$2,800	1	\$2,800	\$2,800	1	\$2,800	\$2,800	0	\$0	\$2,800	0	\$0	\$2,800	0	\$0	\$5,600
Activity Total(s)			11	\$13,900		15	\$26,200		0	\$0		0	\$0		0	\$0	\$40,100
Program Administration																	
All Maintenance Activity Grand Total			376			442			421			421			431		2,091
Cost Grand Total				\$381,900			\$527,100			\$488,300			\$490,100			\$497,300	\$2,384,700
Current Annual Budget (Office of the Urban Forester Budget**)				\$150,000			\$150,000			\$150,000			\$150,000			\$150,000	\$750,000
Shortfall/Gap				-\$231,900			-\$377,100			-\$338,300			-\$340,100			-\$347,300	-\$1,634,700

TABLE 9: STREET TREE PLANTING PLAN

Estimated Costs for Each Activity		Year 1			Year 2			Year 3			Year 4			Year 5			Total 5-Year Cost
		Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Total 5-Year Cost
Tree Planting	Planting Identified Sites	\$120	486	\$58,320	\$120	475	\$57,000	\$120	475	\$57,000	\$120	475	\$57,000	\$120	475	\$57,000	\$286,320
	Planting Replacement Trees	\$120	275	\$33,000	\$120	275	\$33,000	\$120	275	\$33,000	\$120	275	\$33,000	\$120	275	\$33,000	\$165,000
	Structural Prune	\$300	0	\$0	\$300	0	\$0	\$300	761	\$228,300	\$300	750	\$225,000	\$300	750	\$225,000	\$678,300
Tree Planting Activity Total(s)			761	\$91,320	750	\$90,000	1,511	\$318,300	1,500	\$315,000	1,500	\$315,000	\$1,129,620				
Program Administration																	
Cost Grand Total		\$91,320			\$90,000			\$318,300			\$315,000			\$315,000			\$1,129,620
Tree Planting Costs		Current Annual Planting Budget			\$15,000			\$15,000			\$15,000			\$15,000			\$75,000
		Shortfall/Gap			-\$76,320			-\$75,000			-\$303,300			-\$300,000			-\$1,054,620

TABLE 10: ADJACENT PROPERTY OWNER MAINTAINED STREET TREE WORK PLAN

Maintenance Activity	Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Total
	# of Trees	# of Trees	# of Trees	# of Trees	# of Trees	# of Trees
Routine pruning (includes trees with no maintenance specified)	1,548	1,536	1,536	1,536	1,794	7,950
Priority Pruning	246	0	0	0	0	246
Structural Prune	13	0	0	0	0	13
Tree Removal & Stump Grinding	280	176	0	0	0	456
All Maintenance Activity Grand Total	2,087	1,712	1,536	1,536	1,794	8,665

“The redwood is the glory of the Coast Range. It extends along the western slope, in a nearly continuous belt about ten miles wide, from beyond the Oregon boundary to the south of Santa Cruz, a distance of nearly four hundred miles, and in massive, sustained grandeur and closeness of growth surpasses all the other timber woods of the world.”

John Muir



Street Tree Master Plan—Goals and Actions

The goals and existing policies and actions proposed by the Street Tree Master Plan are organized by focus areas:

1. Street Tree Management
2. Urban Forest Policy and Regulation
3. Urban Forest Vision

Each area of focus is supported by measurable goals and specific actions that are intended to guide Santa Cruz's street tree programming over the next 20 years, providing the foundation for annual work plans and budget forecasts. Many goals and actions support more than one focus area.

For each action, the STMP identifies a priority, a suggested timeframe for accomplishing the action, an estimated cost range, and potential partners. Priority is identified as:

- High—An action that is critical to protecting existing community assets, reducing/managing risk, or requires minimal resources to accomplish
- Medium—An action that further aligns programming and resource improvements that have been identified as desirable by the community, partners, and/or urban forest managers, but that may require additional investment and financial resources over and above existing levels
- Low—An action that is visionary, represents an increase in current service levels, or requires significant investment

The estimated cost is categorized in the following ranges:

- \$ = less than \$25,000
- \$\$ = \$25,000 - \$100,000
- \$\$\$ = more than \$100,000

The STMP is intended to be a dynamic tool that can and should be adjusted in response to accomplishments, new information and/or changes in community expectations, and available resources. In addition to serving as a day-to-day guide for planning and policy making, the STMP should be reviewed regularly for progress and to ensure that the actions and sub actions are integrated into the annual work plan.

With appropriate care and planning, street trees have the potential to increase in value over time. As young trees mature and their leaf surface and canopies grow, so too will the overall benefits and value from the community's urban forest. The objectives and strategies of the STMP are intended to support this process, as well as provide overarching goals for the urban forest, in an appropriate manner that encourages the sustainable stewardship of community trees with consideration for safety, cost efficiency, and community values. The STMP includes strategies for measuring the success over time.

Plan Focus Areas

The STMP identifies three focus areas and 23 supporting goals, which are intended to adequately manage the City's street trees, enhancement of the tree resource and the environmental benefits provided by trees, and to provide a visionary framework for the overall urban forest. The STMP identifies three major focus areas:

- Street Tree Management
- Urban Forest Policy and Regulation
- Urban Forest Vision

Focus Area: Street Tree Management

Street trees are significant contributors to the aesthetic and charm of the community. *Street Tree Management* is a focus area which has goals that aim to create consistent city-wide planting plans and species recommendations, increase the resources available to manage and expand the street tree resource. Proactive and consistent management of this resource will ensure sustainability, safety, and a stable flow of benefits now and for future generations.

GOAL 1: Manage the street tree resource

With the completion of the 2020 tree inventory, proactive management of the street tree resource is imperative for staff's ability to determine and prioritize tree care and tree planting and to address the needs of street trees in an efficient and timely manner.

Objectives for this goal feature the optimization of the use of the community tree inventory software management system to set pruning/maintenance cycles and establish tree planting / replacement plans.

GOAL 2: Promote street tree health and good structure

When trees are well-maintained throughout their lifetimes, the risks trees pose to the public are reduced. Promoting tree health and good structure decreases the chances of having hazardous trees in the community.

Objectives for this goal include regular inspection of City-maintained street trees and enhanced care for street trees adjacent to private property.

GOAL 3: Enhance resiliency with a comprehensive tree species palette

Environmental changes and introduction of pests and pathogens are putting greater pressure on trees. Trees that are maladapted to the local climate and vulnerable to pests can be costly, both to manage or remove. With a comprehensive and consolidated tree species list that includes proven species that are adapted to local conditions, and species that demonstrate some resilience to pest and disease there is the potential for longer-lived trees.

The primary objective for this goal is to develop a Master Street Tree List and emphasize right tree right place philosophies.

GOAL 4: Increase street tree planting efforts

While maintaining existing trees is important for sustaining tree canopy cover, it is equally important to plant trees to account for the loss of tree canopy that results from removals. Increasing existing street tree planting efforts will enable the City to sustain the tree canopy for which it has direct responsibility and control over.

Objectives for this goal include developing planting plans and expanding opportunities for additional space and funds for tree planting.

GOAL 5: Increase the environmental benefits resulting from street trees

Street trees comprise a fraction of the urban forest, yet they provide benefits to the entire community. Striving to increase the benefits provided by street trees will result in greater equitable distribution of benefits to all.

Objectives for this goal are to collaborate with other City Departments to ensure the use of trees in designs, expand tree canopy in underserved areas, and enhance the use of trees to benefit wildlife and mediate the impacts of the urban environment.

GOAL 6: Advocate for tree lined streets

Trees enhance the aesthetics of the community and improve the urban environment for residents and visitors. Tree lined streets encourage greater economic development and business success.

Objectives for this goal include promoting the use of trees in landscapes and working with the Downtown Association to resolve concerns about trees.

GOAL 7: Provide predictable and sustainable funding for the street tree resource

Stable and predictable funding is critical to effective and efficient management of the street tree resource. Budget cuts have historically resulted in the loss of staff and decreased services provided to street trees.

Objectives for this goal focus on attaining adequate funding to ensure the care of all community trees.

GOAL 8: Strive for optimal staffing levels

The Urban Forestry Office is responsible for providing quality, efficient, and cost-effective services for street trees. This level of service is influenced by the number of staff, the workload, and the ability to engage in professional development.

Objectives for this goal include optimization of existing staff and consideration for additional staff to more effectively manage the current workload.

**Focus Area:
Urban Forest Policy and Regulation**

The focus area *Urban Forest Policy and Regulation* recognizes that the tree resource is a publicly owned asset that provides critical benefits to health, economic, social, aesthetic, and quality of life for residents and visitors. The replacement value of the existing community tree resource (all public trees) is more than \$52 million. Annually the community tree resource provides \$50,118 in benefits each year (2020 Resource Analysis).

Protecting this resource ensures the community will continue to receive these benefits and more from the urban forest.

GOAL 9: Encourage a culture of safety

When all City Staff share core values and behaviors that promote safety, everyone, including the community, is safer.

GOAL 10: Enhance risk management and public safety

When trees are well-maintained throughout their lifetimes, the risks trees pose to the public are reduced. Promoting tree health and good structure decreases the chances of having hazardous trees in the community and decreases the demand for reactive and emergency tree care.

Objectives for this goal include providing proactive management of the community tree resource that aligns with industry standards and creating a risk management policy.

GOAL 11: Promote tree protection

This goal ensures an appropriate regulatory framework is in place to support the community's vision for the urban forest.

Objectives for this goal focus on cost recovery for tree removals and improper maintenance, implementing protections for trees during construction, and revisiting Municipal Code.

GOAL 12: Strive for uniformity between City plans, policies, guiding documents, and Departments

Inconsistencies across City policies, documents, and departments can create confusion between departments and the community. Policy uniformity promotes strong and efficient policy that aligns with community expectations.

Objectives for this goal include furthering communication among City Departments and unifying guiding documents.

GOAL 13: Encourage tree establishment through efficient and sustainable irrigation solutions

All trees, especially newly planted trees, need some level of water to thrive. Identifying efficient and cost-effective means for watering trees is critical for their health. Additionally, achieving this goal is imperative for meeting community expectations regarding efficiently managing this community asset.

Objectives for this goal include providing irrigation to establish trees and sustain existing trees.

GOAL 14: Use trees to enhance the aesthetics and function of the urban landscape

Considering trees during planning and design allows for further tree canopy to help mitigate the effects of urbanization and create more pleasing environments.

Objectives for this goal include planning for trees during development projects and using alternative designs to allow greater opportunities for tree planting.

GOAL 15: Follow Integrated Pest Management (IPM) protocols and best management practices when addressing pests and diseases

Pests and diseases will always be a threat to the urban forest and the City should continue following the IPM protocols.

The objective for this goal aims for the City to continue using best management practices when addressing tree pests and/or diseases.

**Focus Area:
Urban Forest Vision**

The focus area *Urban Forest Vision* aims to foster a greater connection between the urban forest, managing partners, and the community.

GOAL 16: Promote species diversity in the urban forest

Currently, Santa Cruz is excelling and species diversity is much greater than the industry-accepted rule-of-thumb suggests that no community should have any one species represent more than 10% of the overall population and no genus should represent more than 20% of the population. Despite Santa Cruz' success in this area, with a changing climate and potential pest threats, striving for even greater diversity will promote a more sustainable urban forest.

Objectives for this goal include setting species diversity goals for the community tree resource.

GOAL 17: Expand canopy cover and the resulting environmental benefits

The amount and distribution of leaf surface area is the driving force behind the urban forest's ability to produce benefits for the community (Clark et al, 1997). As canopy cover increases, so do the benefits contributed by leaf area. Santa Cruz's current canopy cover is estimated to be 38.2%.

Objectives for this goal include further analysis of the extent and distribution of canopy cover, evaluating potential canopy goals, promoting equitable distribution of

canopy, and facilitating tree planting on public and private property.

GOAL 18: Celebrate the importance of urban trees

Community designations and events surrounding the urban forest build awareness and excitement that encourage constituents to help build upon existing canopy.

Objectives for this goal include maintaining the Tree City USA designation and continuing to recognize the urban forest.

GOAL 19: Partner with other city departments and other stakeholders to develop a cohesive city-wide Urban Forest Master Plan

An Urban Forest Master Plan is a guiding document resulting from the coordinated efforts amongst stakeholders. It provides comprehensive information, community visions, recommendations, and timelines to guide for the efficient and safe management of a city's tree canopy.

The objective for this goal is to develop an Urban Forest Master Plan.

GOAL 20: Promote community engagement and stewardship of the urban forest

This goal and supporting objectives supports the development of programs, activities, and materials that increase awareness and appreciation for the urban forest and trees in general.

Objectives for this goal include updating the website for urban forest to include outreach

and education materials, enhancing citizen and volunteer engagement, and providing accessible and translated outreach materials.

GOAL 21: Contribute to a fire safe community

In the last decade, California has experienced catastrophic losses as a result of wildfire. With prolonged periods of drought and a changing climate, wildfire is likely to continue to be a threat to communities that neighbor the wildland urban interface. The risk of living in these areas can be reduced through numerous wildfire mitigation strategies.

The objective for this goal is critical for managing and reducing the risks that come with living in an area vulnerable to wildfire and the responsibility that comes with that exposure.

GOAL 22: Repurpose woody materials whenever possible

Using woody materials that result from tree removals reduces waste and allows managers to recover value from felled community trees. Repurposing woody material into wood products and mulch can provide revenue and prevent the need to purchase wood mulch used to care for the urban forest.

Objectives for this goal include developing a wood utilization program.

Street Tree Management

GOAL 1:

Manage the street tree resource

PERFORMANCE MEASURE:

A known and planned duration between maintenance activities for City-maintained street trees.

RATIONALE:

Trees are an asset valued by the community. A high level of standard coupled with an up-to-date inventory allows staff to identify and track maintenance needs and provide excellent customer service.

RISK:

A lack of understanding of the age, structure, benefits, and maintenance needs of public trees makes the community tree resource vulnerable canopy cover loss. It also creates challenges in responding to pests and could increase the costs of managing such threats.

BENEFIT:

A better understanding of the street tree resource enables staff to prioritize tasks and improve efficiency.

OBJECTIVE:

Maintain a tree inventory that can be used to manage the street tree resource.

ACTIONS:

- Identify maintenance needs using the online tree inventory and work plans developed in the STMP
- Maintain and regularly update the street tree inventory as tree work occurs
 - Develop procedures and assign responsibilities for inventory maintenance
 - After trees are removed, convert sites to potential planting sites to guide future planting plans.
 - Update diameter measurements and tree condition.
 - Consider updating tree inventory data specification to include tree distance and direction from buildings in order to project energy benefits in a future Resource Analysis
 - Train any new staff to manage the inventory
 - Require contractors to regularly update inventory records as work is performed
- Use the street tree inventory and work plan to notify property owners about any tree maintenance needed.

GOAL 2:

Promote street tree health and good structure

PERFORMANCE MEASURE:

Reductions in tree/limb failure and removal. Greater tree longevity and reduced risk.

RATIONALE:

Tree health improves and liability declines when timely maintenance is programmed and provided.

RISK:

Inexpensive and minor tree issues can develop into expensive and high-risk problems without proper maintenance.

BENEFIT:

An understanding of the condition, structure, and overall health allows managers to identify and address issues before they become critical, resulting in a healthier, longer living street tree resource.

OBJECTIVE:

Regularly inspect City-maintained street trees.

ACTIONS:

- Care for City-maintained street trees on a routine cycle
- Continue to maintain trees in the Downtown Area on a 2-year cycle
- Consider maintaining street trees on a 4-year cycle as presented in the 5-year work plan
- Ensure maintenance cycles include the following:
 - Scheduled maintenance and inspection at reasonable intervals
 - Avoid pruning trees that do not require maintenance
 - Adequate records of the inspection and activity via updates to the inventory software

- Timely response to discovered defects (e.g. disease or decay)
- Timely response to complaints and concerns
- Stable funding

- Follow an annual work plan
 - Identify 12-month goals and the resources necessary for their completion
 - Review STMP goals, actions, and timeline
 - Develop an annual budget and justification for work plans

OBJECTIVE:

Elevate the care of street trees maintained by adjacent property owners.

ACTIONS:

- Consider taking responsibility for the maintenance of street trees abutting private property
- Notify property owners of necessary maintenance tasks identified in the inventory
- Use TreeKeeper® software to generate and organize mailing sheets that provide the specifics of the tree and explain the necessary priority maintenance
- Promote routine maintenance for adjacent property owner-maintained street trees
- Include a mailer on the estimated cost of the work
- Expand the Heritage Tree Grant Program to better ensure street trees maintained by adjacent property owners receive adequate care (Park Master Plan)

Street Tree Management (continued)

GOAL 3:

Enhance resiliency with a comprehensive tree species palette

PERFORMANCE MEASURE:

An updated, City-approved Master Street Tree List.

RATIONALE:

Environmental changes can render some species maladapted while other species, including newly developed, resistant varieties and cultivars, may indicate better performance. Periodic updates will ensure the species list reflects current information.

RISK:

Using multiple, disjunct documents creates confusion and makes implementation difficult.

BENEFIT:

A single, comprehensive Master Street Tree List consolidates species selection and requirements, reduces redundancy, and supports efficient planning.

OBJECTIVE:

Create a Master Street Tree List.

ACTIONS:

- Update approved street tree list to serve as a comprehensive and overarching list of approved species for the rights-of-way (Santa Cruz Municipal Code 13.30)
- Consolidate Area Plan Street Tree Lists into the Master Tree List
 - Create sub-lists for Specific Areas with planting palettes and include distinctions for specific considerations, such as locations on the coastline where sea water intrusion is likely, or anticipated, as a result of climate change
 - Explore potential city analogs to determine species that may perform well under future climate conditions (e.g. Bastin et al. 2019)
 - As Area Plans are updated, reference a Master Tree List

- Expand the Approved Street Tree Planting List to include:

- Tree selection of commercial, residential, medians, wide right of ways, narrow rights of ways, major boulevards, natural areas/zones (e.g. flood zones)

- Define sites the trees are most suitable for:

- Rights-of-way
- Parks/lawns
- Near/under utilities
- Parking lots
- Flood zones

- Include planter space and soil volume recommendations

- Species that can thrive in recently developed or redeveloped areas

- Species that tolerate heavy clay soils
- Species that tolerate irrigation challenges

- Native (Local Coastal Program) or well-adapted tree species

- Species that mitigate flooding issues
- Species that are salt tolerant (Climate Adaptation)
- Drought-tolerant species (Local Coastal Program)
- Species able to withstand heat waves (Climate Adaptation)
- Species and varieties that are pest and disease resistant and avoid planting species with similar vulnerabilities to existing trees
- Species with minimal leaf drop and litter creation
- Species that are attractive to wildlife
- Species that are not hosts for major pests and diseases

- Indicate carbon sequestration potential of each species on list

- Choose species that may be suitable for predicted future climatic conditions

- Monitor and phase out species that are poorly adapted
- Track species performance to determine which species succumb or withstand changes in climate or salt levels
 - Reach out to Urban Foresters and green industry members in the region for conversations on suitable trees to include in the planting palette
 - Reach out to Urban Foresters and green industry members areas with climates similar to what is expected for Santa Cruz under climate change projections

- Plant experimental species for consideration in the street tree list

- Diversify species palette based on climate expectations

- Make the Master Street Tree List available on the City website

- Consider creation of a brochure with photos to synthesize data for working with adjacent property owners for planting/selection

- Provide links to trees on the website

- Create a committee with various stakeholders and experts to review the planting list annually and update as needed (per Municipal Code)

- Identify nurseries that can provide hard to obtain species

- Work with a broker to locate desirable species or contract growing for hard-to-find species

- Develop species pallets based on diversity goals

OBJECTIVE:

Set emphasis on the right tree in the right place.

ACTIONS:

- Consider tree stature and space limitations to reduce hardscape and utility conflicts
- Provide recommendations for small-stature tree species that can be planted under utility lines to prevent future conflicts
- Avoid planting species of trees that have historically resulted in hardscape damage (including species called out in the General Plan)
 - Continue to promote species that are integral to the community character in wide medians and other conducive planting spaces (e.g. redwoods)
- Avoid planting species that result in sidewalk slipping hazards
- Continue to coordinate with the Public Works Department to avoid and/or to identify solutions for conflicts between trees and other infrastructure (e.g. root pruning, root barriers, tree removal, etc.)
- Match tree species to soil and water conditions
- Consider mature crown spread
- Optimize shade and environmental benefits by planting large stature trees where feasible

Street Tree Management (continued)

GOAL 4:

Increase Street Tree Planting Efforts

PERFORMANCE MEASURE:

Number of planted and amount of tree canopy cover.

RATIONALE:

The benefits that the urban forest provides is directly related to the amount of tree canopy cover and leaf surface area.

RISK:

Reduction or stagnation of tree canopy cover may result in fewer benefits.

BENEFIT:

Expanded tree canopy increases the benefits provided by trees, and greater species diversity makes the urban forest more resilient.

OBJECTIVE:

Create a City-wide Street Tree Planting Plan (Municipal Code 13.30, General Plan).

ACTIONS:

- Increase street tree plantings (General Plan)
 - Recommend large canopy trees where there is space (e.g. medians and large planters)
- Expand the tree planting program (Park Master Plan)
 - Follow the tree planting plan outlined in the STMP
 - Continue to require permits for tree planting in the rights-of-way to track modifications to the street tree inventory
 - Track permitting metrics through the inventory
 - Continue to promote a diverse set of tree species to meet diversity standards and the various preferences of community members
- Consider direction and requirements from Area Plans when developing planting project plans
 - Eastside Business Improvement Area
 - Incorporate several street tree species to promote the species diversity standards
 - Create a street tree scheme
 - Western Drive
 - Incorporate species included in the Recommended Landscape Materials list
 - Downtown Plan
 - Incorporate the example street tree species mentioned in the Plan whenever possible
 - Avoid underperforming species or those with known pest or pathogen problems
- San Lorenzo Urban River Plan

- Encourage the use of native tree species whenever possible
- Seabright Area Plan
 - Incorporate the example street tree species mentioned in the Plan whenever possible
 - Follow the approved species list
- Ocean Street Area Plan
 - Incorporate the example street tree species mentioned in the Plan whenever possible
- Mission Street Area
 - Adhere to the Mission Street Urban Design Tree List
- Encourage tree establishment through staking, watering, and mulching
- Check new tree plantings for establishment
- Consider the annual cost of maintenance prior to planting a tree

OBJECTIVE:

Expand opportunities for street tree planting.

ACTIONS:

- Collaborate with community groups to support tree planting and maintenance (Climate Action Program and Climate Action Plan 2030)
- Continue to allow property owners to choose the species being planted in the rights-of-way adjacent to their property
- Continue to facilitate neighborhood and community tree planting events
- Maintain or increase the funding available through the Heritage Tree Grant to help private property owners pay for sidewalk repairs that are a result of tree root lifting and buckling

- Incorporate tree wells in development and redevelopment projects (General Plan)
- Continue to work with the Public Works Department and property owners to support the addition of sidewalk cutouts to incorporate trees
 - Consider the use of Heritage Tree Grant Funds or the Tree Trust Funds to pay for sidewalk cutouts for street tree planting sites adjacent to private property.
- Continue to look for grant funding to increase street tree planting
- Consider conducting a comprehensive land cover assessment and planting priority analysis to determine potential rights-of-way sites that provide the maximum environmental benefit
 - Identify planting sites that would provide more equitable distribution of tree canopy cover
- Improve street tree planting details and standards
- Continue to implement bump-outs, re-route sidewalks, incorporate tree grates, and plant street trees at the back of the sidewalk
- Establish minimum street tree soil volume requirements
- Adapt existing planting spaces to ensure adequate soil volume

Street Tree Management (continued)

GOAL 5:

Increase the environmental benefits resulting from street trees

PERFORMANCE MEASURE:

Increase in the cumulative value in environmental services.

RATIONALE:

The City has direct influence over street trees and can therefore use them to provide environmental services to the community.

RISK:

Greater impacts from environmental stressors.

BENEFIT:

Environmental services provided by street trees benefit the whole community.

OBJECTIVE:

Retain large trees and create additional opportunities for the incorporation of large (preferably California native species) into streetscapes.

- Collaborate with Planning to ensure trees are included in designs
- Evaluate opportunities to plant street trees to better distribute environmental benefits throughout the community equitably
- Use street trees wherever possible to support stormwater and parking lot shading goals
- Minimize conflicts with wildlife and tree work by continuing to consider mating and nesting patterns
- Identify planting sites that would have the greatest impact of reducing urban heat islands and stormwater runoff
- Plant street trees to minimize heat island effect (General Plan, Park Master Plan)
- Plant trees to store carbon (Park Master Plan) and meet greenhouse gas reduction targets (Climate Action Plan)

GOAL 6:

Advocate for tree lined streets

PERFORMANCE

Measure: Enhanced aesthetics through street tree plantings as measured through community values, perceived safety, or business activity and tourism levels.

RATIONALE:

Areas with sufficient canopy cover are valued by the community and result in increased activity, tourism, and instill a sense of pride.

RISK:

A lack of trees, which could have been avoided through alternative design.

BENEFIT:

Aesthetically pleasing atmospheres foster livelier and more engaged communities.

OBJECTIVE:

Encourage tree lined streets to enhance the well-being and aesthetics of the community.

ACTIONS:

- Promote street trees to enhance the character of the community (General Plan)
 - Consider equity in street tree planning, planting, and outreach efforts
 - Focus on overcoming barriers to street tree plantings in neighborhoods and corridors with low tree density
 - Identify and adapt plantings to reflect the values by different cultural neighborhoods within the City
- Continue to follow tree planting palettes identified for the Specific Areas in Santa Cruz to promote the desired sense of place for that area
 - Consider median plantings in new developments or areas undergoing significant reconstruction

- Continue to use engineering projects such as curb extensions and chokers to increase the amount of space available for street trees
- Use street trees to promote the use of pedestrian paths (General Plan)
- Promote tree lined streets as a traffic calming and pedestrian safety mechanism
- Work with the City's Green Business Program to incorporate street trees into the checklist of certification measures.

OBJECTIVE:

Work with the Downtown Association to resolve conflicts with businesses visibility and signage.

ACTIONS:

- Ensure that canopy raising pruning is done correctly to promote good structure, and the corresponding strength.
- Educate business owners about the benefits of trees and landscapes to retail sales and the time spent in an establishment.
- Continue to promote trees with high, airy canopies to minimize conflicts with signage.
- Resolve conflicts with signage policies and requirements
 - Encourage flexibility from the typical signage height (8 ft store front).
 - Promote sandwich boards where trees are causing conflict.
 - Explore the use of map kiosks for areas where trees are causing conflict.
 - Continue to promote species with high canopies in front of stores
- Ensure canopy raising pruning is done in a manner that does not negatively impact the long-term structure of the tree.

Street Tree Management (continued)

GOAL 7:

Predictable and sustainable funding for the street tree resource

PERFORMANCE MEASURE:

Sustainable and adequate funding to sustain the street tree resource.

RATIONALE:

The amount of funding impacts the timing and opportunities for tree care. Funding for tree maintenance has continually decreased since the turn of the century. As a result, street tree maintenance is largely the responsibility of property owners adjacent to the rights-of-way, but the General Fund provides funding for a subset of City-maintained street trees.

RISK:

Inadequate funding can, and has, led to inadequate care of street trees. This will compromise the health of the urban forest and possibly increase risk and liability.

BENEFIT:

Sustainable street tree funding mechanisms provide stability in economic downturns and provide the street trees with regular care.

OBJECTIVE:

Explore the feasibility of the City taking responsibility for the maintenance of street trees adjacent to private property.

ACTIONS:

- Explore support for a Street Tree District overlay that would provide dedicated funding to maintenance of street trees currently cared for by adjacent property owners
- Conduct outreach campaigns to gauge constituent support for establishing a Street Tree District and the necessary Special Assessment
- Conduct a cost analysis to explore the feasibility of a Special Assessment to care for all trees
 - Organize maintenance areas by region to maximize cost savings
- Explore community support for Landscape Maintenance Districts in new developments

OBJECTIVE:

Secure funding for the care of City-maintained street trees.

ACTIONS:

- Identify sources for additional funding
- Continue to leverage with other Departments to provide care for street trees
- Coordinate with Economic Development, the Climate Action Program, and other stakeholders such as the Downtown Association to engage with state and elected officials to identify and access funding for multi-dimensional, collaborative projects that meet multiple goals.
- Continue to actively apply for grant funding
 - Consider hiring a grant writer or partnering with other Departments to pursue grants
- Collaborate with City leadership to evaluate:
 - Appraisal fees for trees damaged in vehicular accidents
 - Larger in-lieu fees for mitigation
 - Larger fines for malicious damage to public trees
 - Explore the potential of a gas tax (see Yuba City)
 - Explore impact fees, allocation of roadway project dollars towards forestry, or donations
 - Explore bond measures to help fund City maintenance of street trees
- Continue to contribute mitigation fees to the Tree Trust Fund
- Secure sufficient fiscal resources to drive a phased implementation of the STMP

Street Tree Management (continued)

GOAL 8:

Strive for optimal staffing levels

PERFORMANCE MEASURE:

Work plan and load are aligned with available resources and funding

RATIONALE:

Additional staff would allow the Urban Forestry Office to perform the current administrative and outreach workload.

RISK:

Inability to complete the necessary tasks.

BENEFIT:

Inventory management, permitting, enforcement, and cost recovery can be performed at a more optimal level.

OBJECTIVE:

Optimize the Urban Forestry Office's ability to manage the current workload.

ACTIONS:

- Continue to keep a full-time Urban Forester position, but consider reallocation of duties
 - Transition non-tree canopy, collateral duties to other Offices where appropriate
 - Reallocate duties to allow time for grant applications and administration
 - Reallocate duties to allow time for inventory management
- Consider increasing staffing levels to handle the current workload
 - Assistant arborist
 - Consider ISA certification for this position
 - Scheduling maintenance workers, posting notices/picking up notices, coordinating emergency response

- Facilitating permits
- Monitor mitigation trees and enforce replanting if trees die (currently, this is not done)
- TreeKeeper maintenance (this is a new task)
- 1 additional full-time maintenance worker
- 0.5 Administrator
 - Permitting paperwork
 - Cost recovery
 - Outreach and education (online and in person)
- Explore the use of fellows from programs such as Climate Corps or Civicspark to add capacity

OBJECTIVE:

Encourage employees to engage in professional development.

ACTIONS:

- Continue to promote, support, and incentivize employee ISA certified arborist credentials and other professional development opportunities

Urban Forest Policy and Regulation

GOAL 9:

Encourage a culture of safety

PERFORMANCE MEASURE:

Promoting a culture of safety results in reduced workplace accidents, less down-time, and greater productivity.

RATIONALE:

Staff occasionally use equipment that requires continual maintenance inspections and safety checks. With every staff member engaging in safe behaviors, everyone (even the community) is safer.

RISK:

Tree work is dangerous, this risk is exacerbated when unsafe practices are used, or there is a lack of understanding of safety policies.

BENEFIT:

Fewer accidents and claims against the City, resulting from improved public safety.

OBJECTIVE:

Implement policies and procedures that make that tree work as safe as possible.

ACTIONS:

- Encourage supervisors to keep complete and updated records of safety tailgates
- Ensure trainings occur on a regular basis
 - Continue the use of certified consultants for specialized trainings
 - Provide in-house training for staff to help recognize/report hazards, along with basic pruning/proper maintenance
- Provide updated materials in safety trainings

Urban Forest Policy and Regulation (continued)

GOAL 10:

Enhance risk management and public safety

PERFORMANCE MEASURE:

Number of claims against the City.

RATIONALE:

When the minimum level of care is met for all community trees, the potential for all the trees to reach maturity increases, as does the benefits provided by those trees.

RISK:

The street tree resource and the greater urban forest could suffer significant losses to tree canopy cover as a result of removals due to lack of maintenance.

BENEFIT:

Regular maintenance and inspection of the community tree resource promotes better tree health and structure, which reduces the number of removals, branch and tree failures as a result of poor structure, and increases the benefits provided to the community.

OBJECTIVE:

Establish a risk management policy.

ACTIONS:

- Work with Risk Management to set risk tolerance thresholds for trees where the risk cannot be mitigated
- Consider having a Certified Arborist with a Tree Risk Assessment Qualified (TRAQ) Certification assess risk and recommend mitigation measures
- Coordinate inspection of all trees with pruning cycles
 - Update inventory accordingly
- Train staff on how to complete limited visual assessments
 - Familiarize staff on tree defects and conditions that affect likelihood of failure
 - Establish a reporting protocol for staff to report recognized and observed hazards
- Implement mitigation options based on level of risk and conditions present
 - Removals should be prioritized and performed as soon as possible
 - Consider moving targets (e.g., tables, benches, etc.) to reduce risk
 - Consider diverting use around trees identified with risk
 - Install structural support systems where recommended
 - Retain and monitor trees identified for moderate to low risk



“Street trees are a valuable resource in reducing urban runoff.”

**Public Works
Department Partner,
City of Santa Cruz**

Urban Forest Policy and Regulation (continued)

GOAL 11:

Promote tree protection

PERFORMANCE MEASURE:

Increased cost recovery for tree losses.

RATIONALE:

Trees take a long time to grow. Preserving and protecting existing trees ensures that the stream of benefits provided by community trees is not lost or disrupted and has the opportunity to increase the stream of benefits.

RISK:

Loss of tree canopy cover and associated environmental benefits.

BENEFIT:

Preservation of community trees ensures the environmental benefits are sustained and trees that have been preserved and protected have the potential to provide even more benefits to the community over the course of their lifetimes.

OBJECTIVE:

Enhance methods for cost recovery in the case of tree removals or improper tree maintenance.

ACTIONS:

- Enhanced enforcement and mitigation measures for trees that are removed
 - Explore adding this to the Heritage Tree Ordinance
- Explore an alternative tree removal appraisal value process
- Explore altering the fee increments
- Explore fees for delaying maintenance until emergency permits are necessary

OBJECTIVE:

Continue to implement tree protection during construction.

ACTIONS:

- Use tree protection zones
- Follow ANSI standards and ISA Best Management Practices for root management

OBJECTIVE:

Explore revising and amending Municipal Code to promote the protection of community trees.

ACTIONS:

- Consider revising Municipal Code 13.30
- Require contractors to be ISA certified and adhere to ANSI Standards and Best Management Practices for tree care
 - A certified arborist or certified tree trimmer should be present while work is being completed
 - Provide exception for tree removal and stump grinding, certification not required
- Consider updates to enforcement measures that will aid in cost recovery
- Specify requirements for utility maintenance
 - ANSI A-300 – Part 7: Integrated Vegetation Management (most current revision)
- Review/revise planting standards for current industry recommendations

- ANSI A-300 – Part 6: Planting and Transplanting (most current revision)

- Review/revise development standards
 - Include options and recommendations for designs that increase below-grade soil volume
- Consider revising Municipal Code 9.56
- Require contractors to be ISA certified and adhere to ANSI Standards and Best Management Practices for tree care
 - A certified arborist or certified tree trimmer should be present while work is being completed
 - Provide exception for tree removal and stump grinding, certification not required
- Explore enhancing protection policies around non heritage trees (trees <14" dbh)
 - Community engagement is required

Urban Forest Policy and Regulation (continued)

GOAL 12:

Strive for uniformity between City plans, policies, guiding documents, and departments

PERFORMANCE MEASURE:

Number of policies, documents, and departments that cross reference the STMP and BMPs for tree care.

RATIONALE:

Uniform policies reduce confusion between departments and community members and transcends departmental changes.

RISK:

When policies have inconsistencies, setting a high standard of care is difficult.

BENEFIT:

Strong and efficient policy that aligns expectations.

OBJECTIVE:

Continue to communicate and coordinate with other departments.

ACTIONS:

- Continue to designate trees as green infrastructure (trees are recognized as infrastructure in the General Plan and Climate Adaptation Plan)
- Collaborate with the Department of Public Works and other City Departments to update the tree planting detail
- Continue to consider street trees and the urban forest in other guiding and planning documents
- Reference the STMP as guiding documents are developed
- Promote trees as an essential tool for City initiatives toward climate change goals
- Incorporate progress reporting on the STMP to the annual Climate Action Plan update
 - Add STMP "State of the Urban Forest Report" as part of the Climate Action Plan reporting and annual update
 - Tie STMP with the Climate Action Plan and scheduled updates

GOAL 13:

Encourage tree establishment through efficient and sustainable irrigation solutions

PERFORMANCE MEASURE:

Reduced tree mortality.

RATIONALE:

Tree planting efforts are only successful if a tree lives past the initial planting to live long enough to provide the intended benefits.

RISK:

The community never realizes the benefits provided by trees if they never become established.

BENEFIT

Reduced tree mortality rates will ensure more efficient use of available funds for tree planting, as more trees will reach maturity and provide the expected benefits to the community.

OBJECTIVE:

Provide water to trees efficiently and sustainably.

ACTIONS:

- Promote water-wise plants (Climate Action Plan)
- Implement irrigation systems in medians
- Explore the use of tree water bags and other water-efficient systems
- Encourage residents to water trees
 - Provide education and outreach to residents on the importance of watering trees
 - Calculate and educate the community on the estimated cost of watering a tree
- Use mulch around establishing street trees

OBJECTIVE:

Upgrade existing and planned planting sites to encourage root establishment.

ACTIONS:

- Modify planting sites to provide adequate soil volume for the establishment of extensive root systems wherever possible
- Evaluate planter and pavement design options to reduce conflicts between trees and infrastructure

Urban Forest Policy and Regulation (continued)

GOAL 14:

Use trees to enhance the aesthetics and function of the urban landscape

PERFORMANCE MEASURE:

Inclusion of trees infrastructure.

RATIONALE:

Considering trees as a key element in cityscapes and an important part of design allows for their incorporation while minimizing conflicts with other infrastructure.

RISK:

Trees conflicting with other infrastructure can initiate expensive repairs or cause the need for tree removals.

BENEFIT:

Planning for trees limits the need to mitigate conflicts between trees and other infrastructure and promotes tree longevity through decreased removals.

OBJECTIVE:

Emphasize incorporating trees in development and redevelopment projects.

ACTIONS:

- Encourage the incorporation of parkways and tree wells in designs whenever possible
- Implement innovative structure and designs that allow for the growth and success of large-statured street trees in areas typically considered too difficult to plant trees or with limited space
- Explore below ground modifications to increase soil volume
- Require infill development and development projects that plan for the incorporation of street trees
- Revisit the Specific Area Plans to evaluate progress on the recommendations that relate to the urban forest

OBJECTIVE:

Collaborate with Planning and Public Works Departments to find practical solutions to allow for trees in areas with hardscape limitations.

- Work with Public Works to create revised planting details
- Support land use and planning that increases connectivity between parks, urban centers, and neighborhoods to decrease habitat fragmentation and promote canopy connectivity and wildlife corridors.
 - Develop tree planting initiatives for areas with low canopy or fragmented forest areas.
- Consider the use of shared neighborhood solar gardens to allow for greater tree planting on individual parcels and prevent conflicts with street trees

OBJECTIVE:

Develop policies around parking lot shade.

ACTIONS:

- Collaborate with the Planning Department to develop requirements for parking lot shade standards in future planning documents
 - Allow for trees
 - Consider parking lot canopies as potential community solar locations

OBJECTIVE:

Incorporate trees into stormwater management systems to improve stormwater capture.

ACTIONS:

- Expand the use of trees in storm water infrastructure
- Retrofit, enhance, or supplement existing stormwater management systems with trees wherever possible
- Explore integrating tree planting into storm water management requirements
- Promote the incorporation of trees in green storm water infrastructure such as curb cuts

Urban Forest Policy and Regulation (continued)

GOAL 15:

Follow Integrated Pest Management (IPM) protocols and best management practices when addressing pests and diseases

PERFORMANCE

Measure: Reduced impact from pests and pathogens.

RATIONALE:

When managing and preventing pests, there is not a “one size fits all” approach. Using comprehensive information about pests in combination with pest control methods promotes economical management of pests and disease.

RISK:

Undesirable species may become established and threaten the urban forest.

BENEFIT:

Using comprehensive information and best management strategies can lessen the detrimental effects if pests and pathogens become established.

OBJECTIVE:

Continue to address pests and diseases using best management practices.

ACTIONS:

- Continue to follow the City of Santa Cruz Integrated Pest Management (IPM) Guidance Manual (or updated policy guidance)
- Establish procedures and protocols for the response and management of an introduced pest or pathogen
 - Coordinate with UC Cooperative Extension, County Ag., CAL FIRE Forest Health staff for testing and identification
- Promote cultural practices that limit the movement of tree materials that may be harboring pests or pathogens (e.g. untreated logs, firewood, wood chips, etc.)
- Prevent the spread of *Phytophthora*, a threatening disease that impacts native tree species (Park Master Plan)
- Complete training and licensing for the proper use of pesticides, herbicides, and fungicides as permitted under the City of Santa Cruz IPM Guidance Manual (or updated policy guidance)
- Diversify the tree resource to promote greater resiliency to pests and pathogens, particularly reducing reliance on common genera



Urban Forest Vision

GOAL 16:

Promote species diversity in the urban forest

PERFORMANCE MEASURE:

Increased tree diversity at the cultivar, species, and genus levels.

RATIONALE:

Increasing genus and species diversity in new and replacement tree plantings will reduce reliance on abundant groups and make the urban forest more resilient to changes in the climate or pest and disease pressures.

RISK:

A high reliance on certain species or genera creates challenges in responding to pests and pathogens and likely increases the costs and implications.

BENEFIT:

Diversity allows for greater adaptability and response to changes in the environment, increasing the chances of sustaining the current tree resource.

OBJECTIVE:

Promote species diversity to build a more sustainable urban forest.

ACTIONS:

- Continue to meet tree diversity standards
 - Strive for no species representing more than 5% of the overall diversity
 - Encourage tree diversity at the genus and family level
 - Reduce monoculture plantings in neighborhoods and along main corridors
 - In areas where a uniform row of trees is desired, select a variety of trees with similar stature and form
 - Use alternative design elements to provide a cohesive character
- Experimentally plant species that are predicted to perform well in the area (e.g. McBride and Lacan, 2018)
- Review the Biodiversity technical memo during the Climate Action Plan 2030 development process
- Promote tree species that provide habitat for wildlife (Local Coastal Program, Park Master Plan)
- Avoid planting species of trees with similar vulnerabilities to pests and disease as current species

GOAL 17:

Expand tree canopy cover and the resulting environmental benefits

PERFORMANCE MEASURE:

Increased tree canopy cover.

RATIONALE:

The benefits that the urban forest provides are directly related to the amount of tree canopy cover and leaf surface area.

RISK:

Reduction or stagnation of tree canopy cover may result in fewer benefits.

BENEFIT:

Expanded tree canopy increases the benefits provided by trees.

OBJECTIVE:

Increase tree canopy throughout the community.

ACTIONS:

- Explore setting a canopy goal for the urban forest
 - Involve the community
 - Set a canopy goal for street trees
 - Set a canopy goal in the Climate Action Plan 2030
- Continue to promote an ideal age distribution
- Conduct a Planting Priority Analysis to identify areas that could support additional tree plantings on both public and private property
 - Use strategic tree plantings to reduce energy consumption, and mitigate the effects of the heat island,
 - Prioritize plantings for stormwater management
 - Consider areas expected to experience brackish conditions
 - Develop a planting plan based on the areas identified in the Planting Priority Analysis as high and very-high priority

- Promote equitable distribution of canopy throughout the community
 - Use land cover mapping to determine canopy cover by areas of interest, such as neighborhood and census tract
 - Evaluate distribution of tree canopy by socioeconomics, including median income, race, and education
 - Further analyze canopy cover by ownership or maintenance jurisdiction
- Continue to facilitate tree plantings with community groups on public property
- Promote tree planting on private property
 - Increase programming to support tree planting on private property (much of the City property is planted out)
 - Support tree planting at schools
 - Increase neighborhood tree planting (Park Master Plan)
- Continue to coordinate with schools to promote tree plantings on school campuses

OBJECTIVE:

Increase carbon sequestration as a carbon neutrality strategy in coordination with Climate Action Plan 2030.

ACTIONS:

- Actively participate in the Climate Action Plan 2030 process in 2021
- Identify how street tree carbon sequestration will help the City achieve its 2030 climate goals
- Seek opportunities for carbon mitigation through street tree carbon sequestration as evaluated and recommended in the Climate Action Plan 2030

Urban Forest Vision (continued)

GOAL 18:

Celebrate the importance of urban trees

PERFORMANCE MEASURE:

Recognition as a Tree City USA and hosting Arbor Day activities/celebrations.

RATIONALE:

Observing and recognizing the benefits provided by the urban forest encourages community engagement and promotes appreciation for trees.

RISK:

When community members are unaware of the benefits of the urban forest, they are likely to be less supportive of programming and the resources needed to care for it.

BENEFIT:

Community awareness and appreciation of the urban forest promotes support for the necessary resources to maintain it.

OBJECTIVE:

Maintain the Tree City USA designation.

ACTIONS:

- Continue to meet all requirements to maintain the Tree City USA designation
 - Continue to follow the Tree Ordinance
 - Continue to spend more than \$2/capita on the urban forestry department
 - Continue to provide information about Arbor Day on the City website
- Celebrate Arbor Day (Park Master Plan)
- Plant a tree or trees in a prominent location to memorialize the adoption of the Climate Action Plan 2030 as was done in 2012 with the Climate Action Plan 2020.

GOAL 19:

Partner with other city departments and other stakeholders to develop a cohesive city-wide Urban Forest Master Plan

PERFORMANCE MEASURE:

A cohesive document guiding the management of the urban forest.

RATIONALE:

Street trees represent a fraction of the urban forest; therefore, it is important to work with community members and other City Departments to develop a cohesive urban forest master plan to promote a shared vision for the future of Santa Cruz's urban forest.

RISK:

Lack of a uniform direction for urban forest management.

BENEFIT:

A visionary document that identifies opportunities for enhancing the urban forest.

OBJECTIVE:

Create a city-wide Urban Forest Master Plan.

ACTIONS:

- Consider potential updates to Municipal Code relating to the urban forest
- Pursue funding for an Urban Forest Master Plan
 - Conduct a resource analysis of community trees to review the composition of public trees and quantify the benefits they provide
- Encourage community involvement in the vision for the urban forest

Urban Forest Vision (continued)

GOAL 20:

Promote community engagement and stewardship of the urban forest

PERFORMANCE MEASURE:

Participation in forestry programming.

RATIONALE:

An educated and engaged community is more likely to support and advocate for the urban forest.

RISK:

Apathy towards the urban forest may result in loss of benefits provided by the urban forest to the community.

BENEFIT:

A community that supports the urban forest is more apt to care for its trees and sustain the benefits it provides.

OBJECTIVE:

Update the Parks and Recreation Department webpage to include information on tree care.

ACTIONS:

- Incorporate online tree-related information on the City website
- Create a main website landing page for answering tree-related questions and facts about trees in Santa Cruz
 - Communicate care and maintenance requirements/standards for street trees
 - Identify and share (or develop if necessary) educational materials in multiple different languages on various tree topics including:
 - how to plant a tree
 - how to prune a tree
 - how to fertilize and mulch
 - how to irrigate
 - how to hire an arborist or tree care company
 - Right Tree Right Place practices
 - planting for energy conservation
 - common pests
- Provide a public access to TreeKeeper® to provide species and benefit information to the community
- Share the Street Tree Master Plan through the web page

OBJECTIVE:

Enhance citizen and volunteer engagement in care for street trees.

ACTIONS:

- Increase private property owner maintenance of street trees
 - Use targeted outreach to increase private property owner awareness of responsibilities for street trees
 - Identify and seek to overcome barriers to street tree maintenance by private property owners
- Increase volunteer engagement in care for street trees
 - Explore strategic partnership with a non-profit entity or entities to promote development and maintenance of the urban forest
 - Partner with nonprofit organizations to implement plantings of fruit trees and orchards
 - Consider creation of a TreeTenders or similar community forestry volunteer program

OBJECTIVE:

Continue to use multiple methods of accessible and translated outreach to engage a greater proportion of the community.

ACTIONS:

- Work with groups such as California ReLeaf, California Urban Forests Council (CUFC) and the CUFC Central Coast Regional Council to discuss the creation of a dedicated urban forestry nonprofit group

- Encourage community educational programs to promote and celebrate the urban forest (General Plan)
- Continue to sponsor and promote tree-related events, significant trees, the benefits of trees, and the importance of tree care
- Use the following outlets
 - social media
 - online surveys
 - pop-up events in numerous parts of the City, and Earth Day and Arbor Day events
- Include tree-related information in the Parks and Recreation Department's social media presence
- Partner with Public Works to incorporate trees in their outreach and education through radio blasts and school outreach related to the benefits of trees to stormwater management, including runoff reduction and improved water quality.
- Where flooding occurs (saltwater/freshwater) educate about leaching following storm events
- Send PSA reminders about timely tree care
- Consider implementing a Tree Smarts Campaign
- Identify funding sources (e.g., grants) for development of engagement/education materials
- Consider engaging with non-traditional, highly visible partners to convey messages (e.g., tech companies, sports teams, local celebrities or popular businesses).

Urban Forest Vision (continued)

GOAL 21:

Contribute to a fire safe community

PERFORMANCE MEASURE:

Reduction in ladder fuels and implementation of the Santa Cruz Community Wildfire Protection Plan.

RATIONALE:

Santa Cruz is vulnerable to wildfires.

RISK:

Wildfires can result in the staggering loss of property and life. Recovery from wildfires can have negative economic impacts for years to come.

BENEFIT:

Reduced likelihood of losses to property and life.

OBJECTIVE:

Mitigate the risks of wildfire.

ACTIONS:

- Continue to collaborate with Mitigating the risks of fire other City Departments, the Fire Safe Santa Cruz County Council, and community members to mitigate fire hazards
 - Continue to participate in the Neighborhood FireWise Council
 - Continue to implement shaded fuel breaks
 - Continue to ensure access to fire hydrants and water mains and meters
- Collaborate with the County to implement the Santa Cruz Community Wildfire Protection Plan
 - Continue to identify and mitigate known risks
 - Continue to promote fire-resistant building materials
 - Continue to provide educational materials on creating a fire safe home

GOAL 22:

Repurpose woody materials whenever possible

PERFORMANCE MEASURE:

Reduced amount of woody material entering the landfill.

RATIONALE:

Tree removals result in woody materials that are chipped and used at city dog parks and medians, but any material larger than 15 inches in diameter is taken to the landfill. Alternatively, woody materials can be repurposed into wood products.

RISK:

Tree removals generate a substantial amount of woody material that could be treated as waste.

BENEFIT:

Repurposing felled trees is one way to recover the costs of removal and divert woody material from the landfill and reduce greenhouse gas footprints in finished wood products.

OBJECTIVE:

Identify a wood reutilization policy.

ACTIONS:

- Determine wood utilization needs
- Encourage removed trees are used in the most beneficial manner
 - Partner with contracting arborists, artisans, woodworkers and others to help facilitate proper removal, transportation, storage and sale of raw materials
 - Continue to partner with the Tannery Arts Center to repurpose large redwood trees
 - Explore reusing trees as part of living shoreline features
- Expand the practice of generating and using wood chips from tree removals
 - Partner with Resource Recovery staff to create consistently high-quality mulch for use in tree plantings and park maintenance
 - Provide the community with an opportunity to pick up wood chips for landscaping needs
 - Determine the locations and capacities for wood mulch storage
 - Explore partnerships for wood mulch storage
- Explore opportunities with CAL FIRE's Urban Wood Utilization Grants, the Urban Wood Network, or other efforts currently underway

Appendix A: Resources

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City of Santa Cruz Area Plans and Planning Documents

These lists are current as of December 2020. Documents are subject to revision outside of and independent of the STMP.

AREA PLANS

[Beach and South of Laurel Area Plan](#) 1998

[Downtown Plan](#) 2017

[Eastside Business Improvement Plan](#) 1996

[Mission Street Urban Design Plan](#) 2002

[Ocean Street Area Plan](#) 2014

[San Lorenzo Urban River Plan](#) 2003

[Seabright Area Plan](#) 1981

[Western Drive Master Plan](#) 1980

ADDITIONAL PLANNING DOCUMENTS

[2030 General Plan](#) 2012

[City of Santa Cruz Municipal Code](#), Sections 9.56 and 13.30

[Public Works Sidewalk Program and Tree Planting Detail](#)

[Climate Action Plan](#) 2012

City of Santa Cruz Tree Planting Lists

This list is current as of December 2020. Documents are subject to revision outside of and independent of the STMP.

[Approved Street Trees of Santa Cruz](#) 2001

[Western Drive Master Plan](#)- Recommended Landscape Materials 1980

[Mission Street Urban Design Plan](#)- Mission Street Urban Design Tree List 2002

[Local Hazard Mitigation Plan](#) 2017

Other Resources

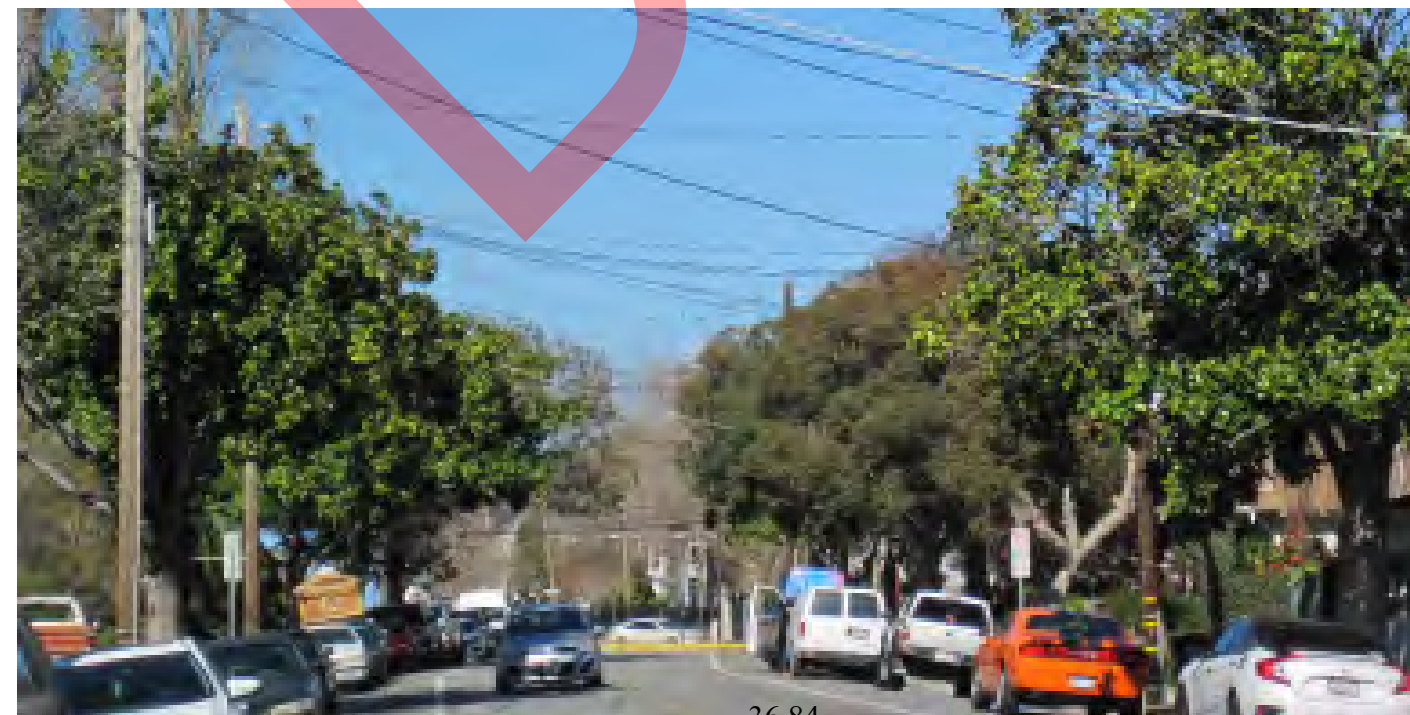
Tree Care Industry Standards

ANSI Z133 Safety Standard 2017

ANSI A300 Standards

ANSI Z60.1 Nursery Stock Standard 2014

International Society of Arboriculture Best Management Practices



Santa Cruz Has Two 'Mysterious' Trees From Long, Long Ago

By Margaret Koch
Sentinel Staff Writer

Santa Cruz has two of what may be the most mysterious trees in the state. The living fossil, **Down Redwood** (*Metasequoia*), is thriving here: one tree where busy shoppers pass it daily in a downtown parking lot without knowing it is unusual; the other recently discovered in a local backyard garden and transplanted into Harvey West park.

But to start at the beginning: The tree is called **Down Redwood** because it is a living fossil, a leafy left-over of the Age of Reptiles, reaching back almost to the dawn of time.

A fabulous history lies back of the **Down Redwood** and its entry into this country. Telling part of the story this past week was Dotly Gray, nurseryman and rancher near Sacramento who was visiting in **Santa Cruz**. While he was here he also paid a visit to one of his **Down Redwood** seedlings which is now about 15 feet tall.

In 1919, according to Gray, a Japanese paleobotanist was reviewing fossils of the Arctic circle. He found one, a forerunner of present-day *Sequoias*, and named it *Metasequoia*. There were no known living trees at that time.

A few years later in China, a forester collecting trees in the back country found a strange new tree in a remote spot passed only by caravans from Outer Mongolia.

A sample was taken in University of Chung King and there was identified as the fossil tree *Metasequoia*. News of the find flashed around the world.

Dr. Ralph Chuney, head of the University of California Paleobotanical department and president of the Save-The-Redwood-League, flew at once to China. He organized a caravan, arranged for guides and loaded the **Down Redwood**. He was able to bring about 600 seeds back to the United States, according to Gray. These he shared with Gray, who is a former UC student. Each man planted about 300 seeds.

Santa Cruz received two to be planted at the entrance to Harvey West park. They were planted and dedicated but several years later they were gone, with no one knowing exactly



'Mystery' **Down Redwood**, found by Dr. L. D. Rhoades in his 36th avenue backyard, has been transplanted to Harvey West park. Dr. Rhoades is shown looking at the new leaves beginning to come. The trees are deciduous. Inside their leaves park fall.

"I planted those seeds and a pruned those seeds and cared for them myself, too," Gray commented.

Tender loving care paid off. The seeds grew and became tiny trees. At once Gray found himself besieged by people who offered as much as \$50 for a single seedling. Gray began distributing the trees to universities, arboreta, colleges, civic organizations and parks, with the understanding that when planted, they were to be dedicated to the California pioneers.

Santa Cruz received two to be planted at the entrance to Harvey West park. They were planted and dedicated but several years later they were gone, with no one knowing exactly what had happened to them.

However, and finally, Harvey West has acquired another **Down Redwood**—the gift of retired Professor L. D. Rhoades of 800-20th avenue. Dr. Rhoades moved here two years ago from North Dakota where he headed the chemistry department at North Dakota State for 40 years.

In his garden here he noticed a **Down Redwood** young tree about which he made inquiry. It was a **Down Redwood**—where it came from, he has no idea. The former residents of the house had not planted it.

"I left this tree should be in spot where it could be seen by the public," he announced.

He contacted Carl Bowdoin, of the **Santa Cruz** parks and recreation department. The tree, which is about 10 feet tall, was moved to Harvey West.

Gray claims the parking lot tree, next to The **Seaside**, is one of his best of seedlings.

"It's the right size," he said. "But how did it get here?"

He has no idea where the 36th avenue **Down Redwood** tree came from. The mysterious "living fossil" tree is still causing mysteries.

Leask's



Appendix B:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

A Federation of United States industry sectors (e.g. businesses, professional societies and trade associations, standards developers, government agencies, institutes, and consumer / labor interest groups) that coordinates the development of the voluntary consensus standards system.

AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

An organization that supports professionals who operate, improve, or maintain public works infrastructure by advocating to increase awareness, and providing education, credentialing, as well as other professional development opportunities.

ARBORIST

A person that specializes in the cultivation and management of trees.

ARBORICULTURE

The science, art, technology, and business of tree care.

BEST MANAGEMENT PRACTICES (BMP)

Management practices and processes used when conducting forestry operations, implemented to promote environmental integrity.

CAPITAL IMPROVEMENT PROJECTS (CIP)

Infrastructure projects and equipment purchases identified by a government in order to maintain or improve public resources. Projects such as (1) constructing a facility, (2) expanding, renovating, replacing, or rehabilitating an existing facility, or (3) purchasing major equipment are identified, and then purchasing plans and development schedules are developed.

CLIMATE ACTION PLAN (CAP)

Governments lead initiatives to decrease greenhouse gas emissions and prepare for the impacts of climate change.

COMMUNITY URBAN FOREST

The collection of publicly owned trees within an urban area, including street trees and trees in parks and other public facilities.

DRIP LINE AREA

The area measured from the trunk of the tree outward to a point at the perimeter of the outermost branch structure of the tree.

DUTCH ELM DISEASE (DED)

A wilt disease of elm trees caused by plant pathogenic fungi. The disease is either spread by bark beetles or tree root grafts.

EMERALD ASH BORER (EAB)

The common name for *Agrilus planipennis*, an emerald green wood boring beetle native to northeastern Asia and invasive to North America. It feeds on all species of ash.

FORESTER

A profession, where a person manages a forest resource.

GREENHOUSE GAS (GHG)

A gas that traps heat in Earth's atmosphere.

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Computer-based tools designed to increase the organization and understanding of spatial or geographic data. Many different kinds of data can be displayed on one map for visualization and interpretation.

HERITAGE TREE GRANT

A fund used to assist property owners in maintaining any heritage trees on their property and for street tree maintenance (e.g., pruning, cabling) and sidewalk repairs in the rights-of-way.

INTEGRATED PEST MANAGEMENT (IPM)

Using pest and environmental information to determine if pest control actions are warranted. Pest control methods (e.g. biological control, habitat manipulation, cultural control, plant resistance, and chemical control) are chosen based on economic and safety considerations.

i-TREE

A computer program with tools used to determine the costs and benefits of urban trees based on inventory data, operations costs, and other factors.

INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA)

An international nonprofit organization that supports professionals in the field of arboriculture by providing professional development opportunities, disseminating applicable research findings, and promoting the profession.

INVENTORIED TREES

Includes all public trees collected in the inventory as well as trees that have since been collected by city staff.

LIABILITY FUND

A City of Santa Cruz fund directed toward risk management.

MAJOR MAINTENANCE

Includes major pruning or cabling and any other similar act, which promotes the life, growth, health or beauty of trees, except watering and minor pruning.

MAJOR TRIMMING AND PRUNING

The removal of branches of three inches in diameter or greater.

MIGRATORY BIRD TREATY ACT (MBTA)

A United States federal law adopted to protect migratory birds.

NATURAL AREA

A defined area where native trees and vegetation are allowed to grow and reproduce naturally with little or no management except for control of undesirable and invasive species.

OPEN SPACE

A defined area of undeveloped land that is open to the public. The land can include native or naturalized trees and vegetation.

PLANT HEALTH CARE (PHC)

A program that consists of (1) routinely monitoring landscape plant health and (2) individualized plant management recommendations in order to maintain or improve the vitality, appearance, and safety of trees and other plants.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Equipment worn to enhance workplace safety and minimize the risk of physical hazards (e.g. gloves, hard hats, bodysuits, and foot, eye, or ear protection).

PRIVATE TREE

Any tree located on private property, including residential and commercial parcels.

PUBLIC TREE

Any tree located in the public ROW, city park, and/or city facility.

RIGHT TREE RIGHT PLACE

The practice of installing the optimal species for a particular planting site. Considerations include existing and planned utilities and other infrastructure, planter size, soil characteristics, water needs as well as the intended role and characteristics of the species.

STREET TREE

Any tree growing within the tree maintenance strip whether or not planted by the city.

STREET TREE MANAGEMENT PLAN (STMP)

A document that provides comprehensive information, recommendations, and timelines to guide for the efficient and safe management of a city's street tree resource.

STRUCTURAL AND TRAINING PRUNING

Pruning to develop a sound and desirable scaffold branch structure in a tree and to reduce the likelihood of branch failure.

TREE

Any live woody plant having one or more well-defined perennial stems with a diameter at maturity of six inches or more measured at fifty-four inches above ground level (breast height).

TREE CANOPY

The layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

TREE CITY USA

A national recognition program through the Arbor Day Foundation that advocates for green urban areas through enhanced tree planting and care. Any incorporated municipality is eligible, as long as it meets the program's standards to have a (1) tree board or department, (2) tree care ordinance, (3) budget over \$2 per capita, and (4) proclamation and observance of Arbor Day.

TREE TRUST FUND

A fund used to plant street trees, it is generated through private donations and revenue from citations and mitigation fees.

TREE IN PROXIMITY TO TRAILS/FACILITIES

A tree that, as a result of size and location, has the potential to impact or interfere with the use, safety, and/or condition of a defined trail, structure, or facility (e.g., picnic table, bench, parking area, etc.)

TREEKEEPER*

A tree inventory software program that aids urban forest managers in planning and tracking work and calculating the benefits of the tree inventory

TREE RISK ASSESSMENT QUALIFIED (TRAQ)

An International Society of Arboriculture qualification. Upon completion of this training, tree care professionals demonstrate proficiency in assessing tree risk.

URBAN FOREST

The collection of privately owned and publicly owned trees and woody shrubs that grow within an urban area.

URBAN FOREST MANAGEMENT PLAN (UFMP)

A document that provides comprehensive information, recommendations, and timelines to guide for the efficient and safe management of a city's tree canopy. The Plan uses an adaptive management model to provide reasoned and transparent calls to action from an inventory of existing resources.

URBAN FORESTRY

The cultivation and management of native or introduced trees and related vegetation in urban areas for their present and potential contribution to the economic, physiological, sociological, and ecological well-being of urban society.

URBAN TREE CANOPY ASSESSMENT (UTC)

A document based off of GIS mapping data that provides a birds-eye view of the entire urban forest and establishes a tree canopy baseline of known accuracy. The UTC helps managers understand the quantity and distribution of existing tree canopy, potential impacts of tree planting and removal, quantified annual benefits trees provide to the community, and benchmark canopy percent values.

WILDFIRE URBAN INTERFACE (WUI)

A transition zone where homes are located on the edge of fire prone areas and are at an increased risk of personal injury or property damage resulting from a wildfire.



Appendix C: Methodology

i-Tree Canopy

In this assessment, iTree Canopy (v7.0) was used. This program, in conjunction with 2020 Landsat / Copernicus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency and 2,000 points of reference, mapped land cover in Santa Cruz.

Annual benefit estimates are based on the following: carbon monoxide (CO) 0.450 T/mi²/yr valued at \$1,333.50, nitrogen dioxide (NO₂) 0.694 T/mi²/yr valued at \$478.88, ozone (O₃) 15.122 T/mi²/yr valued at \$4,344.87, PM2.5-10 (particulate matter between 2.5 and 10 micrometers in diameter) 4.750 T/mi²/yr valued at \$6,268.44, PM2.5 (particulate matter less than 2.5 micrometers in diameter) 0.469 T/mi²/yr valued at \$155,399.87, sulfur dioxide (SO₂) 0.432 T/mi²/yr valued at \$150.92, sequestered carbon dioxide (CO₂) 0.874 kT/mi²/yr valued at \$23,256.92, avoided runoff 6.896 Mgal/mi²/yr valued at \$8,936.00. Further stormwater benefits, without estimated values, follow: evaporation 36.069 Mgal/mi²/yr, interception 36.257 Mgal/mi²/yr, transpiration 60.221 Mgal/mi²/yr, potential evaporation 289.676 Mgal/mi²/yr, potential evapotranspiration 248.177 Mgal/mi²/yr.

Inventory Collection

Methods of Inspection

Assessment of the trees was limited to visual inspection at ground level. Diameter to the nearest inch, and average canopy height to the nearest foot, were collected. All of the trees onsite were evaluated for condition and maintenance recommendations.

LIMITED VISUAL ASSESSMENT

Many factors can limit collecting specific and accurate data when performing only visual evaluations of trees. Future tree performance, potential response to treatments, responses to site disturbances or pruning, and responses to weather events cannot be predicted when performing visual assessments.

All observations were made from the ground (Level 2), and no root collar excavations or aerial inspections were requested or performed. No Resistograph®, ground-penetrating radar or other technologies were utilized during the inspection. The recommendations presented here are based on current data, photographs, and conditions that existed at the time of the evaluation and cannot be a predictor of the ultimate outcome for the trees in the future. The assumption of risk is the responsibility of the tree owner and risk reduction measures should include consideration of the level of risk the tree owner is willing to assume.

TECHNOLOGY

Trees were mapped on a pen tablet computer running ROVER™, a DRG developed Geographic Information System (GIS) data collection tool and edited/updated for this survey. Using basemaps, such as digital aerial photos, trees were plotted with approximate locations and referenced to Global Positioning System coordinates for accuracy. During the assessment, condition, maintenance need/priority, and observable defects were updated and are defined as follows:

CONDITION

The trees were individually rated based on a classification system developed by the International Society of Arboriculture (ISA). Condition indicates the current state of a tree's health, structural soundness, overall shape, and growth rate. Symptoms of poor condition include discoloration, decay, dieback, decreased internodal length, and/or disfigured or necrotic stems or roots. To some extent, condition class is also a reflection of the life expectancy of the tree. Crown development, trunk condition, major branch structure, twig growth rate, insects/diseases, and root condition are all considered. Classes are described below:

Excellent 100% condition class

The tree is nearly perfect in condition, vigor, and form. This rarely used category is generally applicable to small diameter trees that have been recently transplanted and are well established.

Very Good 90% condition class

Overall, the tree is healthy and satisfactory in condition, vigor, and form. The tree has no major structural problems, no mechanical damage, and may only have insignificant aesthetic, insect, disease, or structure problems.

Good 80% condition class

The tree has no major structural problems, no significant mechanical damage, may have only minor aesthetic insect, disease, or structure problems, and yet is in good health.

Fair 60% condition class

The tree may exhibit the following characteristics: minor structural problems and/or mechanical damage, significant damage from non-fatal or disfiguring diseases, minor crown imbalance or thin crown, or stunted growth compared to adjacent trees. This condition also includes trees that have been topped but show reasonable vitality and show no obvious signs of decay.

Poor 40% condition class

The tree appears unhealthy and may have structural defects such as codominant stems, severe included bark, or severe trunk and/or limb decay. A tree in this category may also have severe mechanical damage, crown dieback, or poor vigor threatening its ability to thrive. Trees in poor condition may respond to appropriate maintenance procedures, although these procedures may be cost-prohibitive to undertake.

Critical 20% condition class

The tree has a major structural problem that presents an unacceptable risk, has very little vigor, and/or has an insect or disease problem that is fatal and may threaten other trees on the property.

Dead 0% condition class

This category refers only to dead trees.

MAINTENANCE RECOMMENDATIONS

Maintenance recommendations were recorded in classes based on conditions observed in the individual trees. Structure, vigor and environment all contribute to the maintenance need.

Details of the classification system are below:

Priority 1 Removal

These trees have defects that cannot be cost-effectively or practically treated, have a high amount of deadwood, and pose an immediate hazard to property or person. The arborist recommends they be removed as soon as possible.

Priority 2 and 3 Removal

These trees are not as great a liability as priority 1 Removals, being smaller and/or far less hazardous, although they are also recommended for removal. Smaller dead trees and failed transplants are in this category. Large trees in this category are generally poorly sited, of inferior quality, and pose little to no threat to the community. Priority 2 Removals should be removed prior to Priority 3 removals.

Priority 1 Pruning

Trees in this category need pruning to remove hazardous deadwood limbs greater than four inches in diameter and/or have broken, hanging, or diseased scaffold limbs.

Priority 2 Pruning

These trees need pruning to remove hazardous deadwood limbs greater than two, but less than four inches in diameter.

Large Tree Routine Prune

These trees require routine horticultural pruning to correct structural problems or growth patterns that would eventually obstruct traffic or interfere with signs or buildings. Trees in this category are large enough to require bucket truck access or manual climbing.

Small Tree Routine Prune

These trees require routine horticultural pruning to correct structural problems or growth patterns that would eventually obstruct traffic or interfere with utility wires or buildings. These trees are small growing, mature trees that can usually be evaluated and pruned from the ground.

Structural Prune

Trees in this category are young trees that require pruning to aid in the development of proper structure and form.

Stump Removal

These sites have stumps which need to be removed before a new tree can be planted.

Plant Tree

These sites are currently vacancies that would support the growth of a tree.

Plant

The size of the site is designated as small, medium, or large (indicating the ultimate size that the tree will attain), depending on the growing space available and the presence of overhead wires.

Further Inspection Required

Tree requires further inspection that is outside the scope of inventory collection.

Observations

In addition to prioritizing workloads for tree maintenance, observations were made at the discretion of the inventory arborist for each inventoried tree.

Site Observations

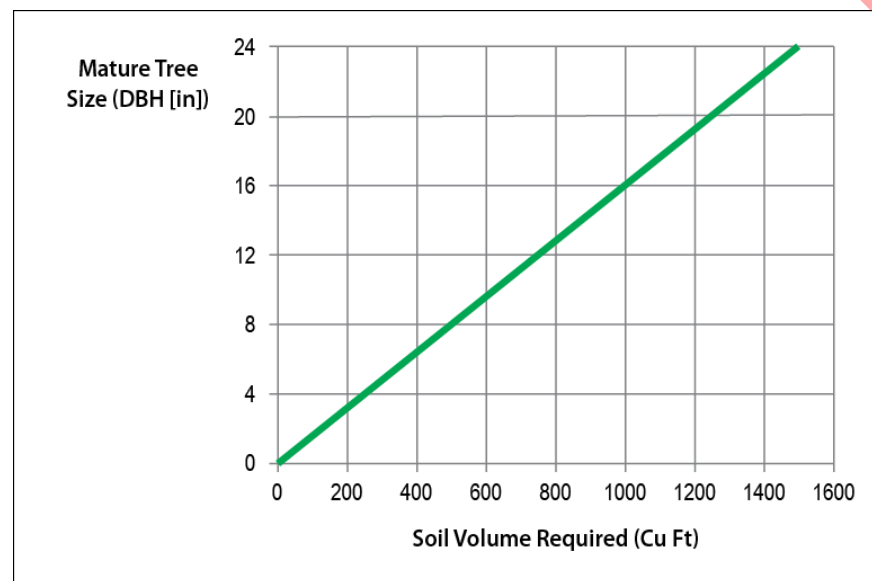
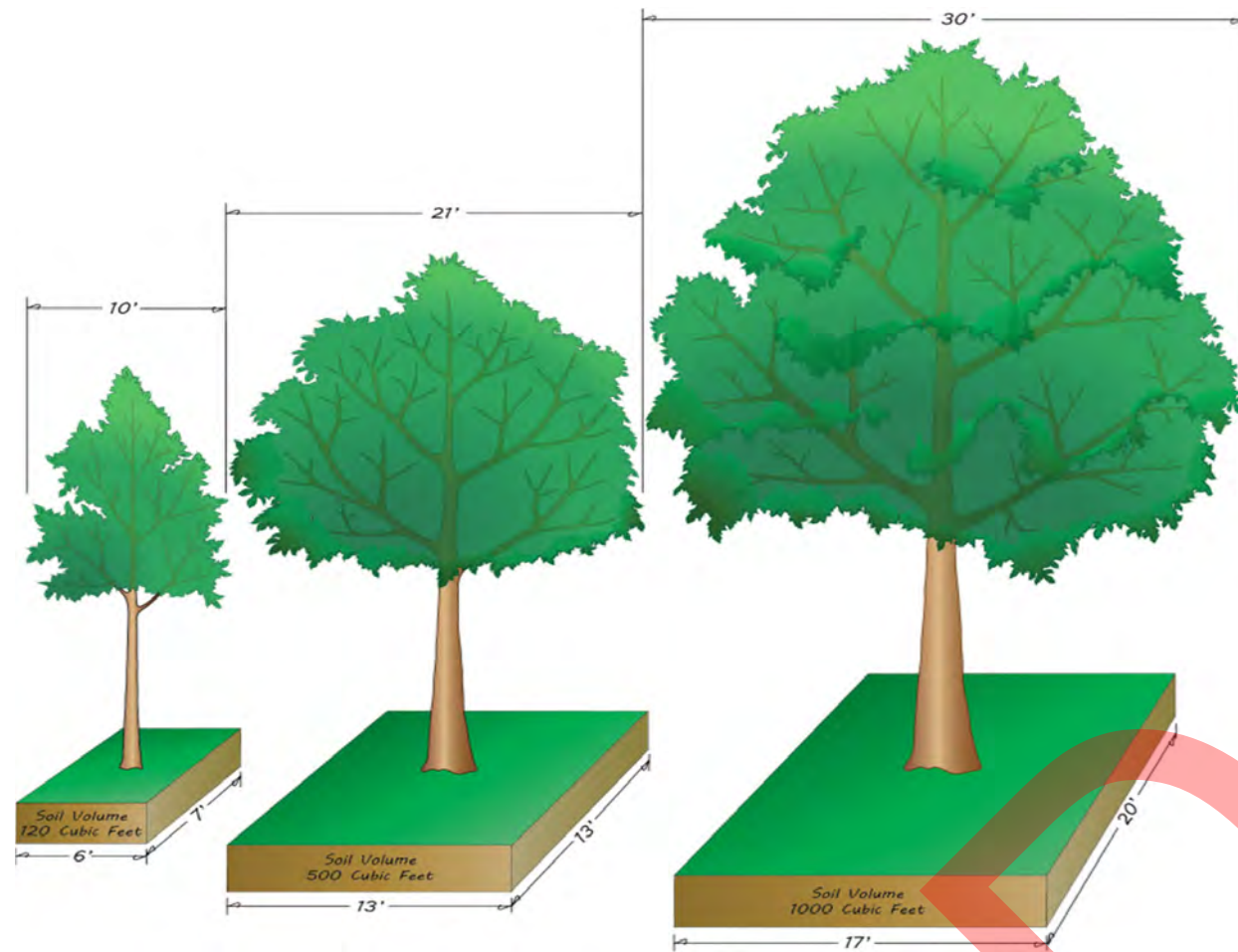
The collection included information on the following site observations:

- City Planted
- Clearance Required (from building, signs, and roads)
- Hardscape Damage–Damage to sidewalks and curbs by tree roots are noted
- Overhead Utilities–Trees whose crown is within ten feet of primary distribution lines and/or have been previously pruned away from the primary distribution lines



Appendix D: Soil Volume and Tree Stature

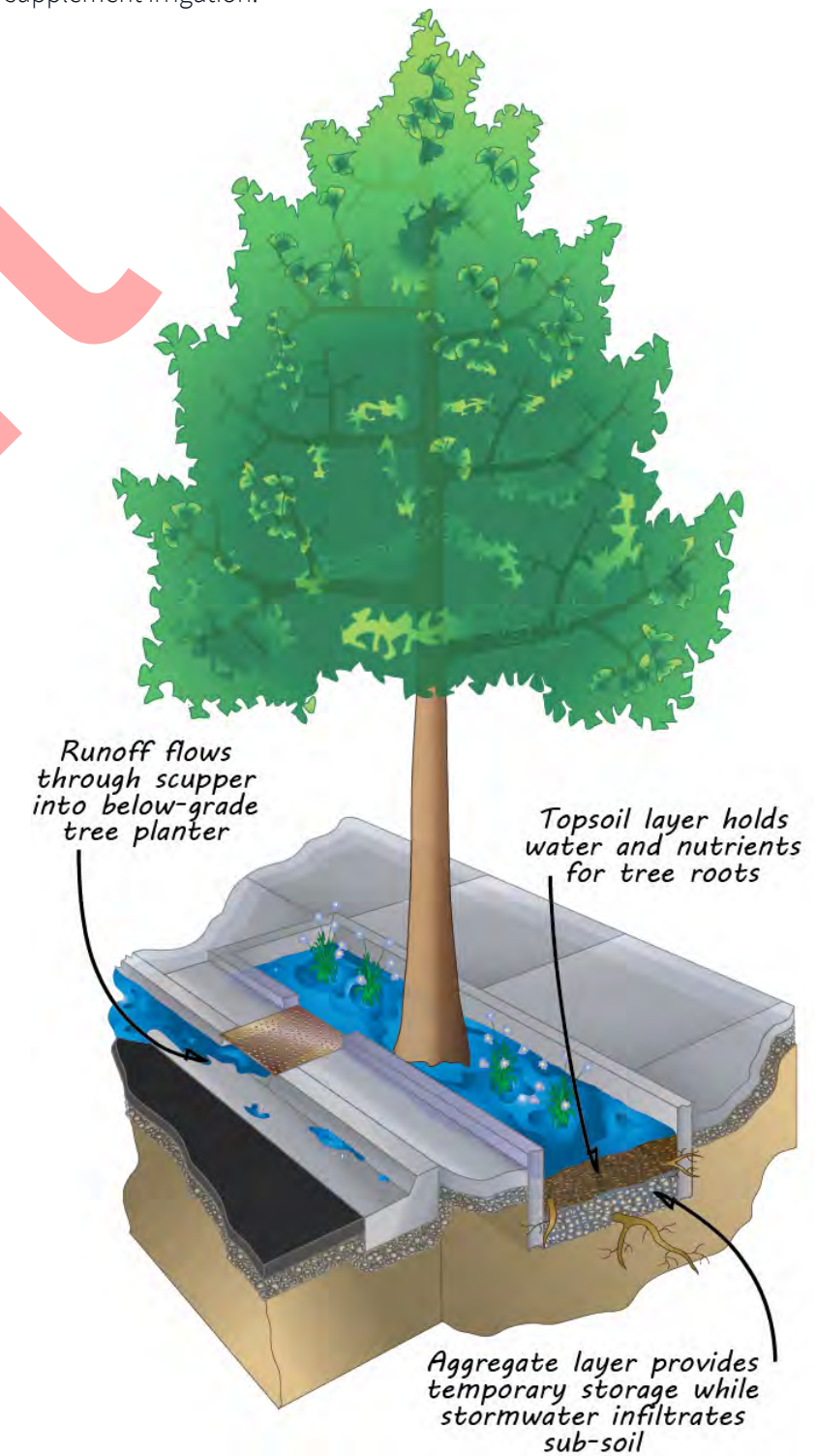
Tree growth is limited by soil volume. Larger stature trees require larger volumes of uncompacted soil to reach mature size and canopy spread (Casey Trees, 2008).



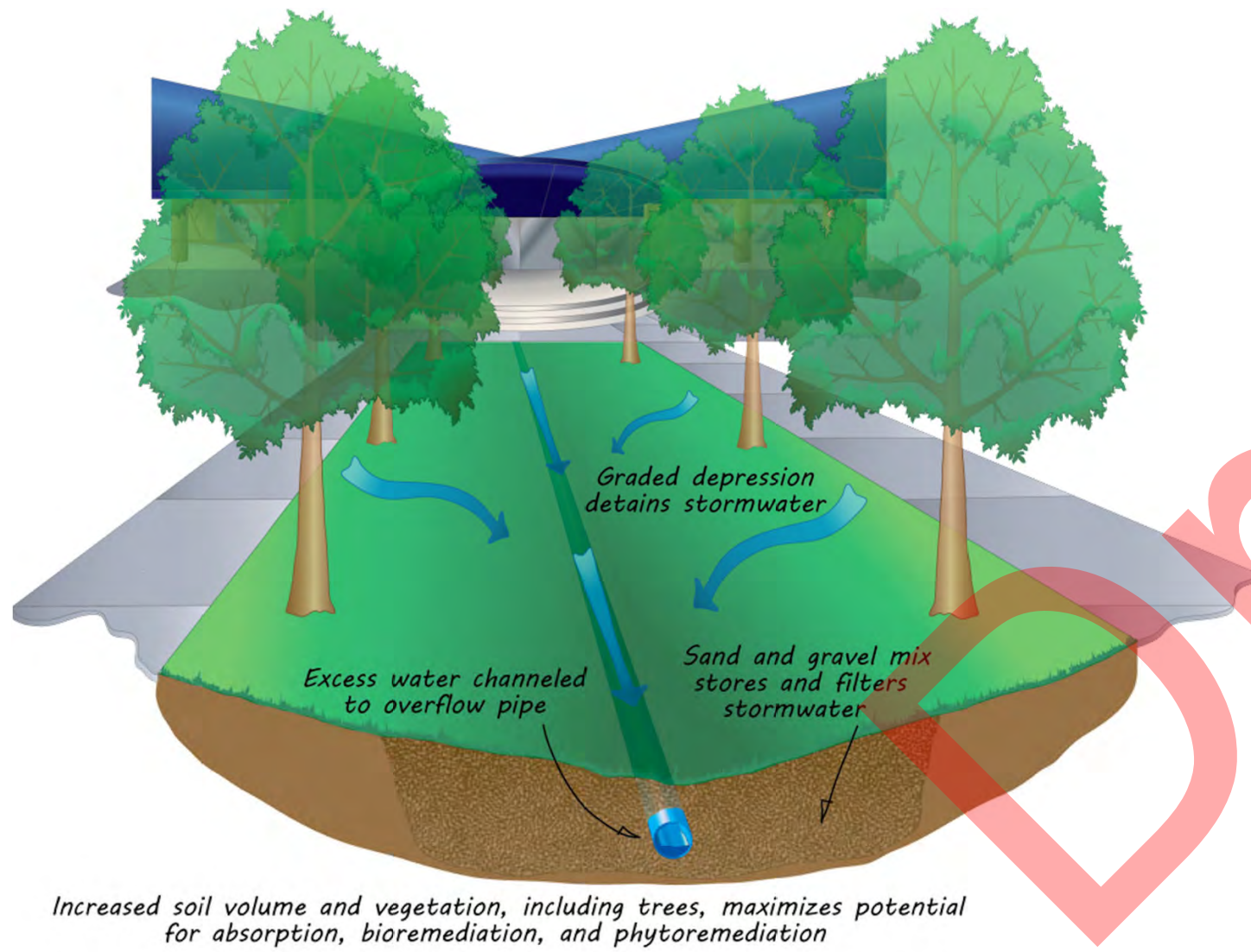
Appendix E: Alternative Planter Designs

Content developed by DRG

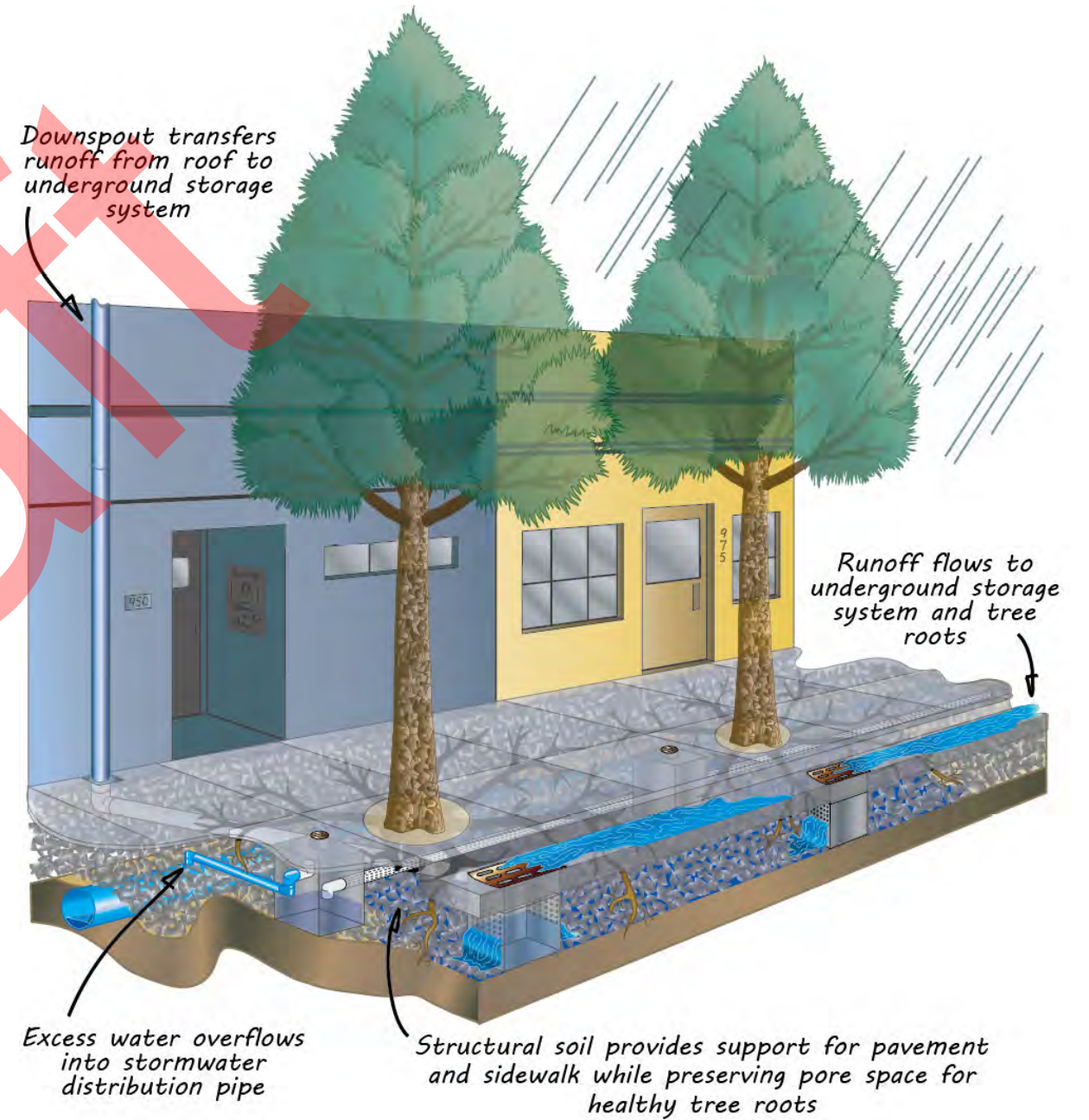
Stormwater tree pits are designed to collect runoff from streets, parking lots, and other impervious areas. Stormwater is directed into scuppers that flow into below-grade planters that then allow stormwater to infiltrate soils to supplement irrigation.



Bioswales are landscaped drainage areas with gently sloped sides designed to provide temporary storage while runoff infiltrates the soil. They reduce off-site runoff and trap pollutants and silt.

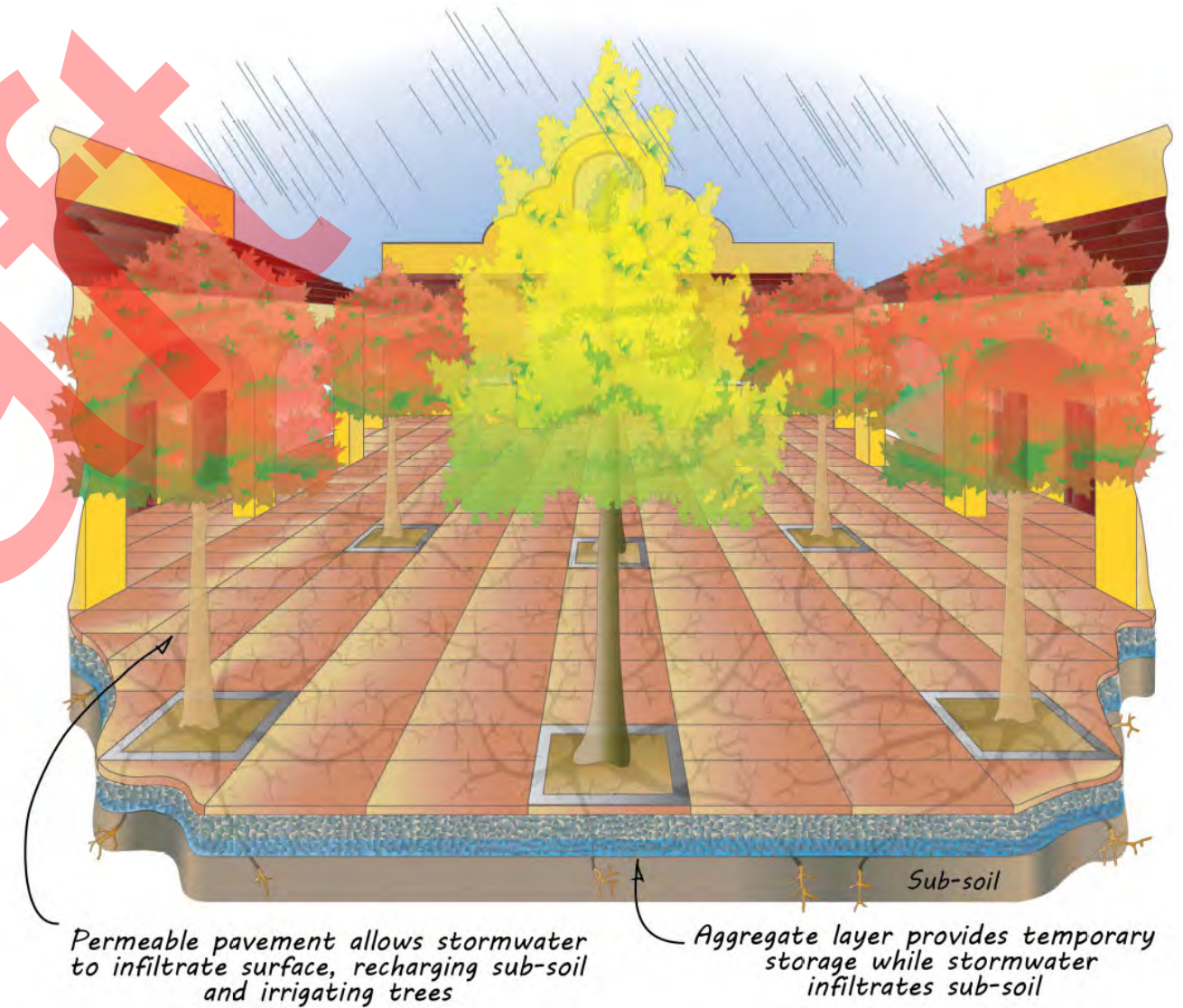
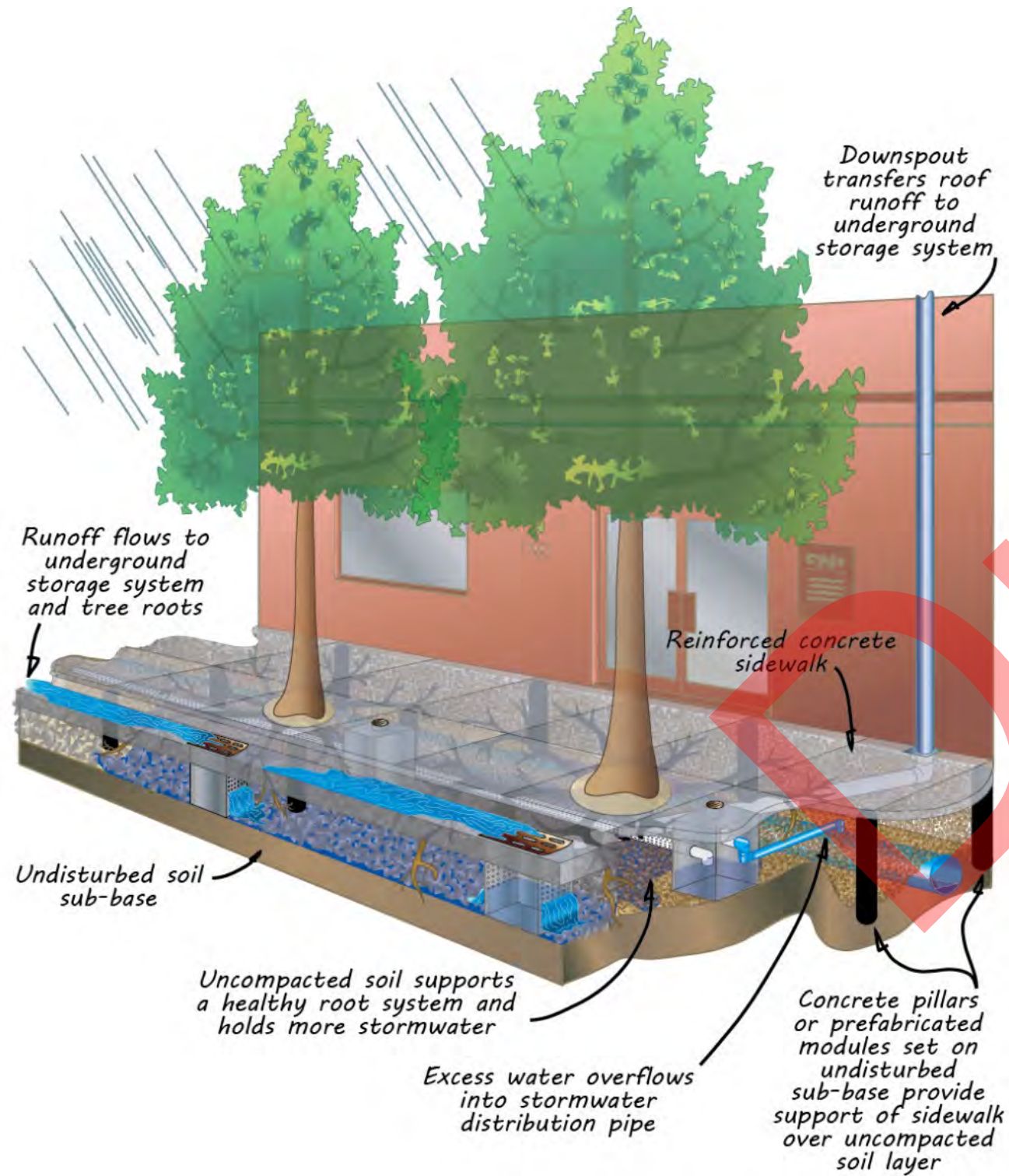


Structural soil is a highly porous, engineered aggregate mix, designed for use under asphalt and concrete as a load-bearing and leveling layer. The created spaces allow for water infiltration and storage, in addition to root growth.



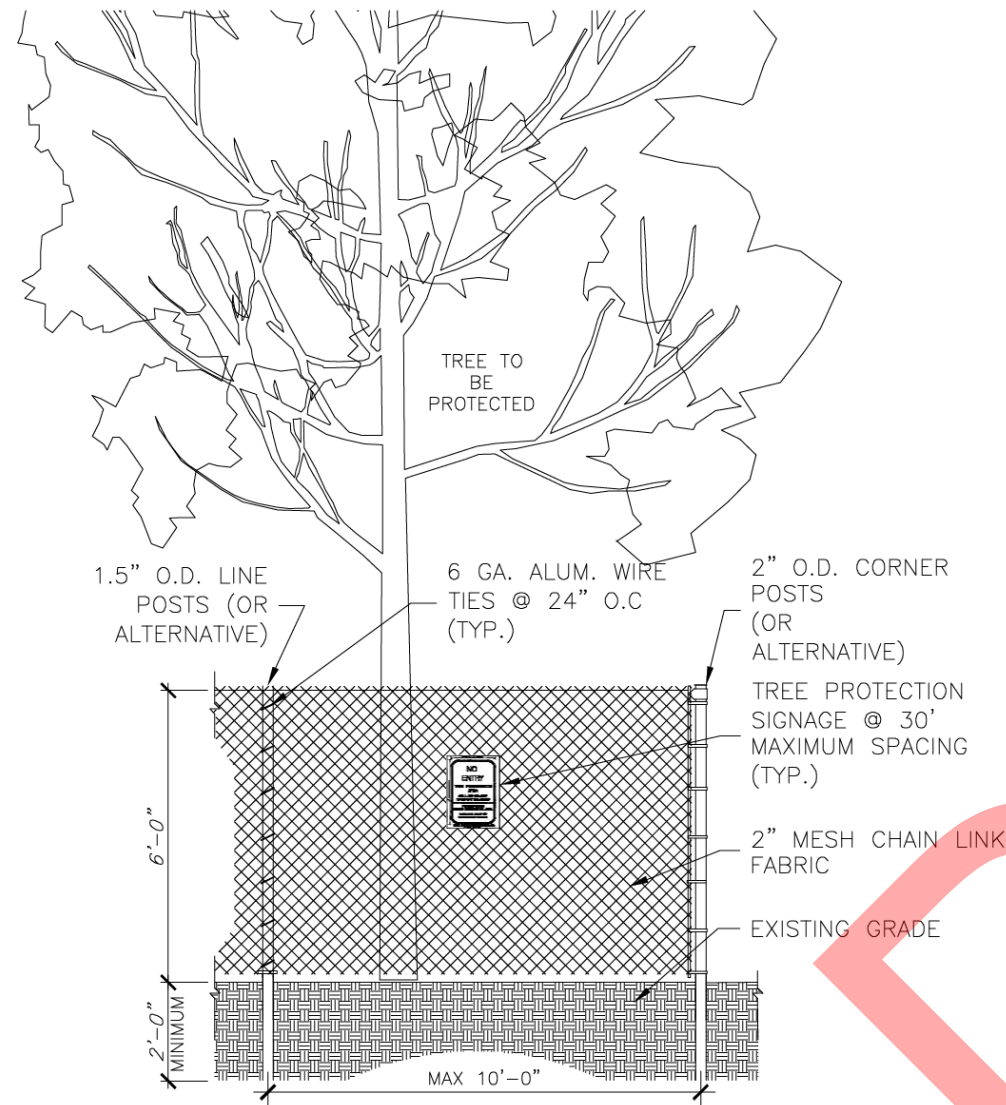
Suspended sidewalks use pillars or structured cell systems to support reinforced concrete, increasing the volume of uncompacted soil in subsurface planting areas and enhancing both root growth and stormwater storage.

Permeable pavements allow stormwater and oxygen to infiltrate the surface, promoting tree health and groundwater recharge.



Appendix F: Guidelines for Tree Preservation

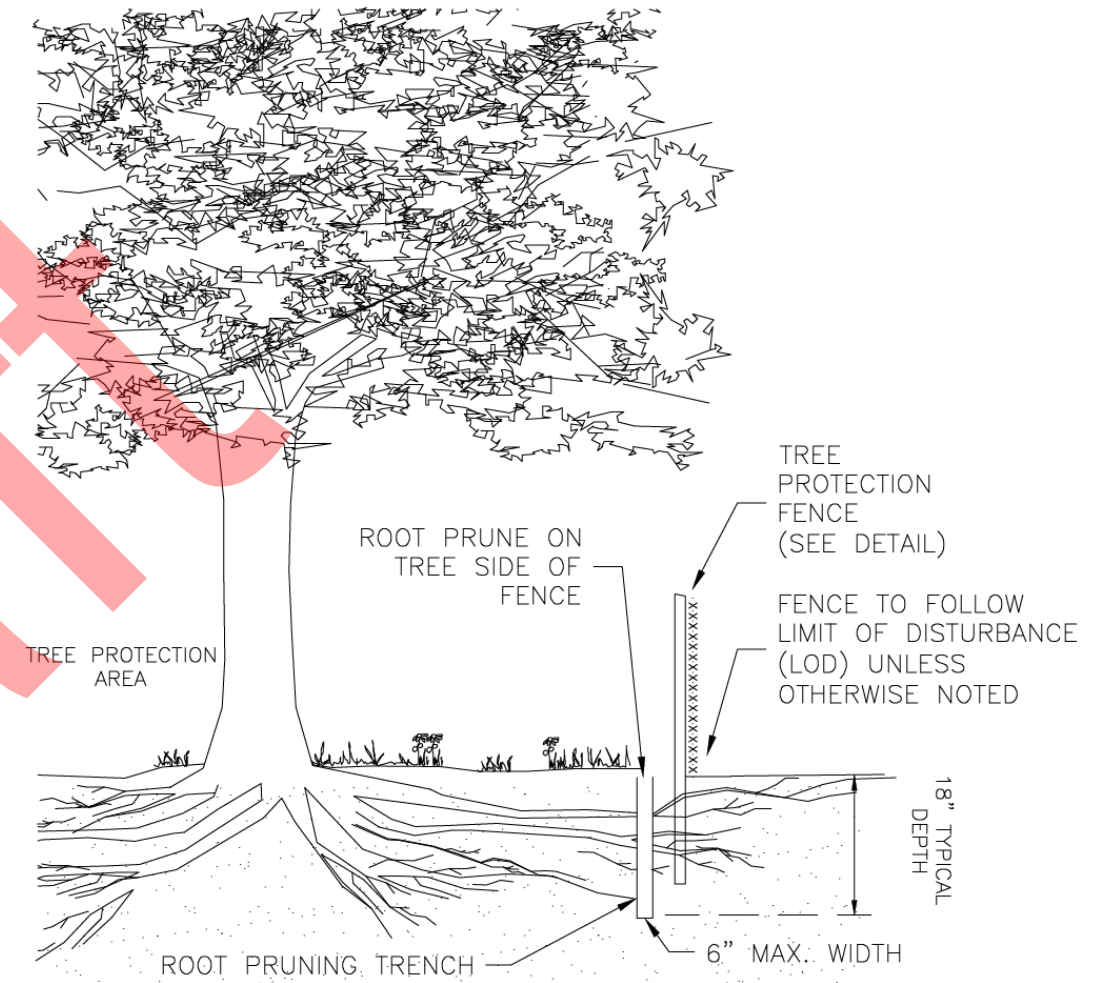
Content developed by DRG



NOTES:

1. TREE PROTECTION FENCE SHALL BE INSTALLED PRIOR TO ANY SITE WORK, CLEARING OR DEMOLITION.
2. SUPER SILT FENCE MAY BE USED IN LIEU OF WELDED WIRE FOR TREE PROTECTION PROVIDED IT IS INSTALLED AND MAINTAINED AS A TREE PROTECTION MEASURE AND IS POSTED WITH TREE PROTECTION SIGNS.
3. TREE PROTECTION FENCE SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION. REMOVE FENCE ONLY WITH APPROVAL AND AFTER ALL SITE WORK HAS BEEN COMPLETED.

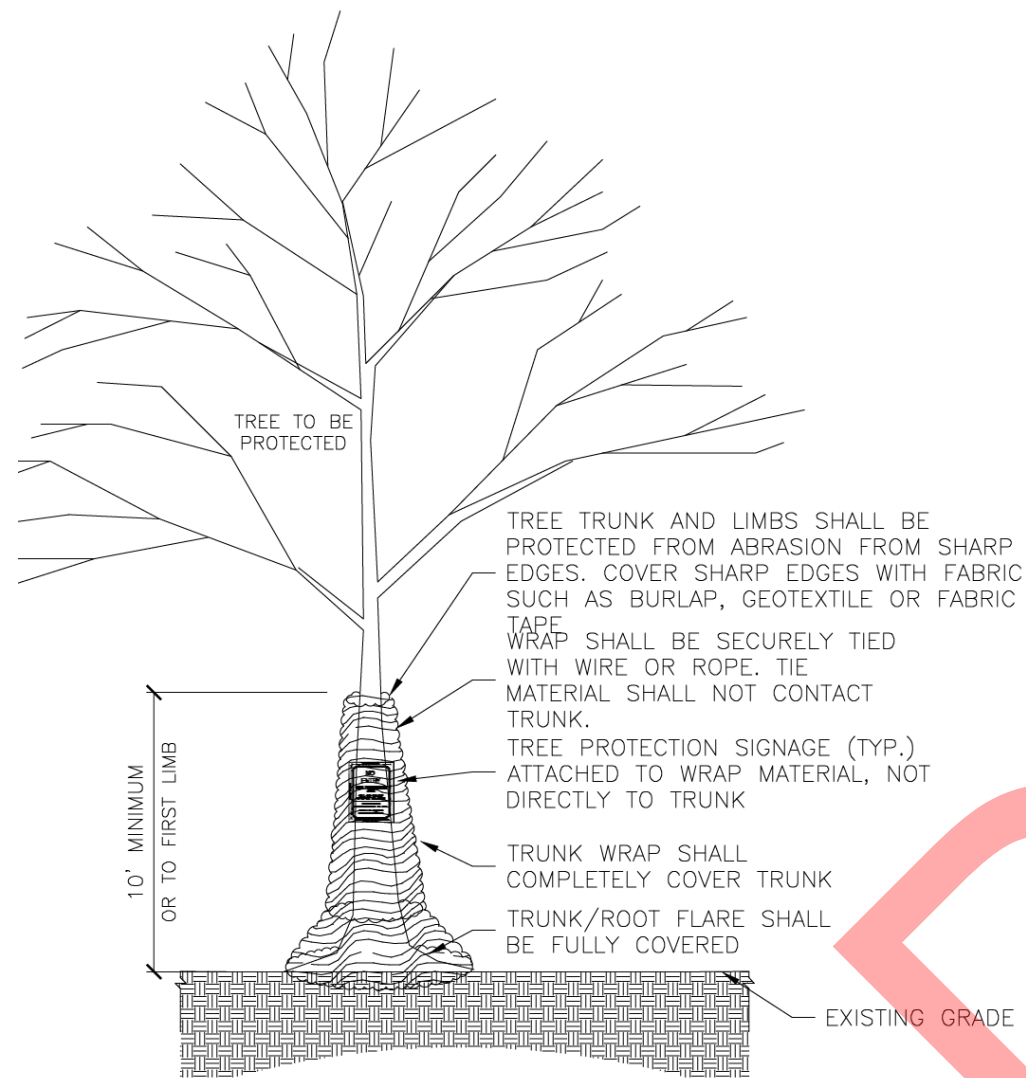
1 CHAIN LINK TREE PROTECTION FENCE (TYPICAL)
TP1 SCALE: NTS



NOTES:

1. TREE PROTECTION AREA WILL BE DETERMINED AS PART OF THE PLAN REVIEW PROCESS. EXACT LOCATION, DEPTH AND METHODS OF ROOT PRUNING TO BE DETERMINED IN THE FIELD BY PROJECT ARBORIST.
2. EXACT LOCATION OF TREE PROTECTION AREAS SHALL BE STAKED OR FLAGGED PRIOR TO TRENCHING.
3. TRENCH SHOULD BE BACKFILLED IMMEDIATELY OR INCORPORATED WITH SILT FENCE INSTALLATION.
4. ROOTS SHOULD BE SEVERED BY TRENCHER, VIBRATORY PLOW OR APPROVED EQUIVALENT. ROOTS OVER 1.5" DIAMETER SHOULD BE CLEANLY CUT BY HAND. ROOT PRUNING ADJACENT TO SPECIMEN TREES MAY REQUIRE SOIL REMOVAL BY SUPERSONIC AIR TOOL TO MINIMIZE TREE AND ROOT IMPACTS.

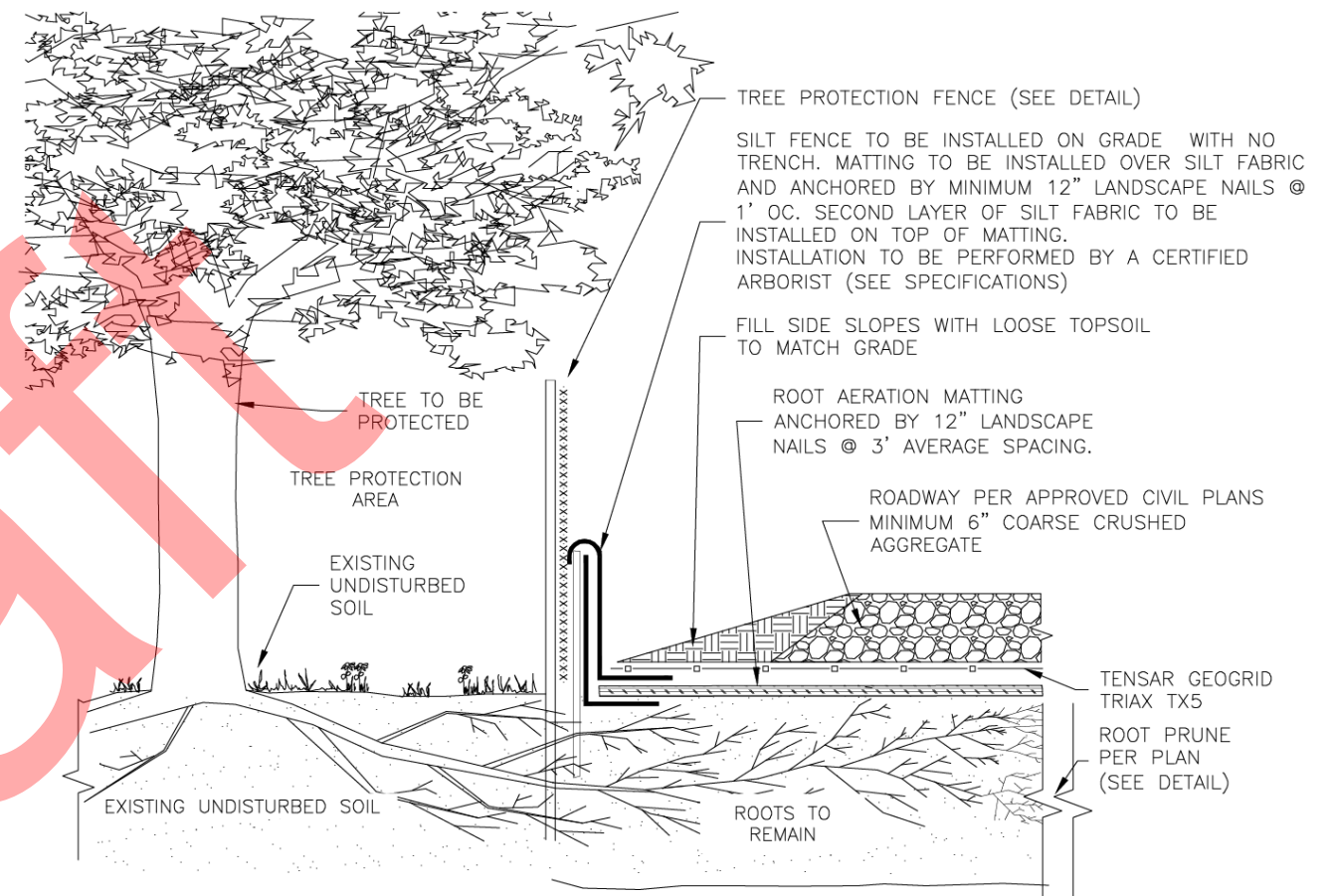
2 ROOT PRUNING (TYPICAL)
TP1 SCALE: NTS



NOTES:

1. TRUNK WRAP MATERIAL SHALL BE DOUBLE SIDED GEOCOMPOSITE, GEONET CORE WITH NON-WOVEN COVERING (SUCH AS TENAX TENDRAIN 770/2) OR EQUIVALENT.
2. WRAP SHALL BE INSTALLED BY A CERTIFIED ARBORIST.
3. WRAP SHALL BE INSTALLED PRIOR TO ANY SITE WORK, CLEARING OR DEMOLITION.
4. WRAP SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION. REMOVE WRAP ONLY WITH APPROVAL AND AFTER ALL SITE WORK HAS BEEN COMPLETED.
5. WRAP SHALL BE REMOVED PROMPTLY AFTER CONSTRUCTION.
6. MAJOR SCAFFOLD LIMBS MAY ALSO REQUIRE THIS PROTECTION AS DIRECTED BY THE PROJECT ARBORIST.

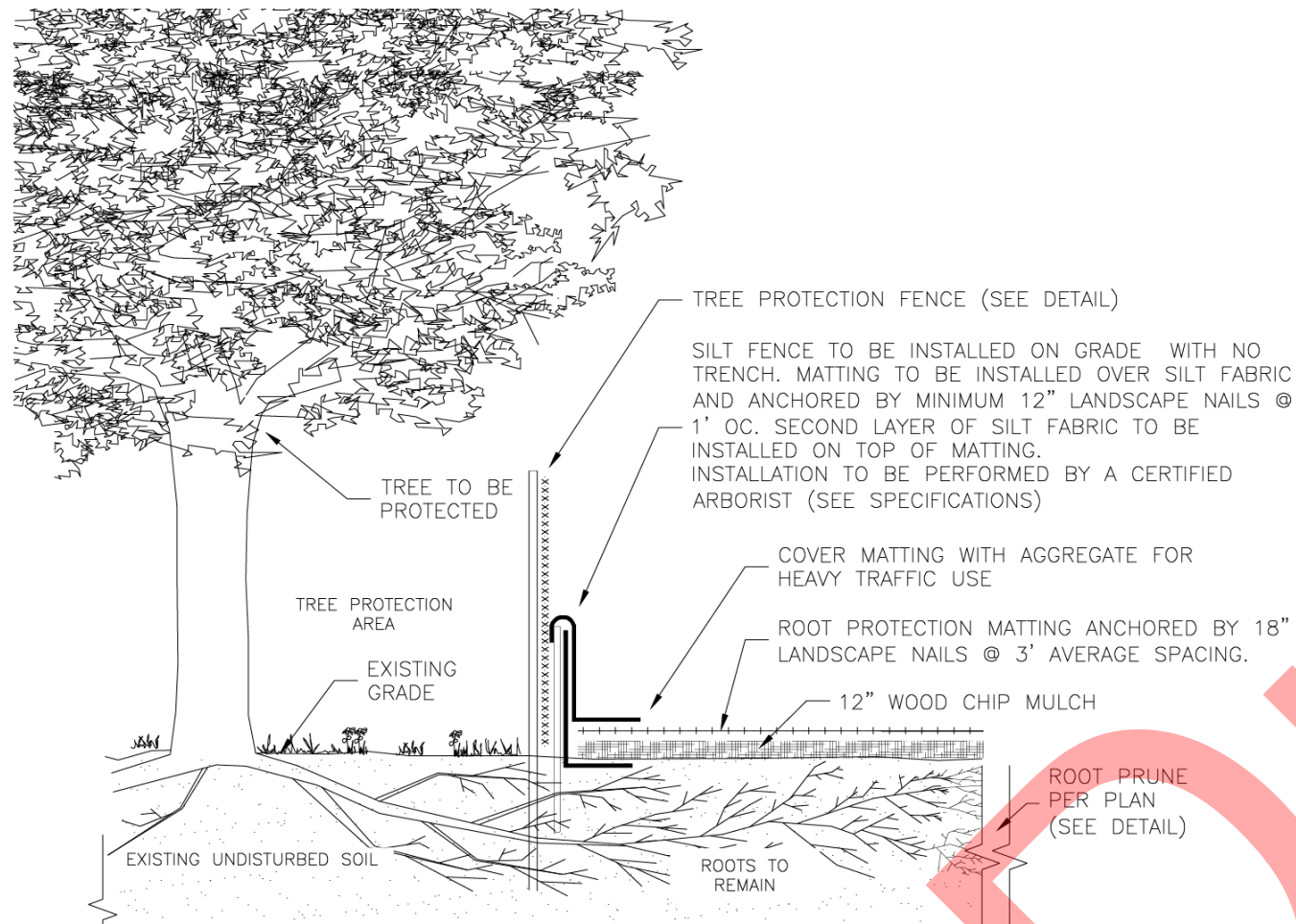
3 TREE TRUNK & LIMB PROTECTION WRAP (TYP)
TP1 SCALE: NTS



NOTES:

1. MATTING MATERIAL SHALL BE DOUBLE SIDED GEOCOMPOSITE, GEONET CORE WITH NON-WOVEN COVERING (SUCH AS TENAX TENDRAIN 770/2) OR APPROVED EQUIVALENT.
2. RAM SHALL BE ANCHORED BY 12" LANDSCAPE NAILS @ 3' AVERAGE SPACING.
3. RAM SHALL BE INSTALLED BY A CERTIFIED ARBORIST EXPERIENCED WITH THESE SYSTEMS.
4. ANY REQUIRED SITE PREPARATION/GRADING TO BE DONE USING SSAT TO MINIMIZE ROOT DAMAGE.
5. ALL ADJACENT WORK SHALL BE SUPERVISED BY CERTIFIED ARBORIST
6. GEOGRID SHALL BE TENSAR TRIAX TX5 OR APPROVED SUPERIOR.
7. AGGREGATE FILL SHALL BE TAPERED TO MATCH EXISTING GRADE WHOLLY ON RAM MATERIAL.
8. GEOGRID AND RAM PLACEMENTS SHALL BE OVERLAPPED BY 2'.
9. TOPSOIL MAY BE PLACED LOOSELY ON SIDE SLOPES AS REQUIRED TO MATCH GRADE. TOPSOIL SHALL NOT BE COMPACTED. RAM MUST EXTEND TO DAYLIGHT AND MAY BE TRIMMED AT FINAL TOE OF SLOPE.
10. SILT FENCE SHALL NOT BE TRENCHED AND MUST BE COORDINATED WITH ARBORIST FOR INSTALLATION.
11. EQUIPMENT/TRAFFIC SHALL NOT TRAVEL DIRECTLY ON RAM/GEOGRID. TRAFFIC MAY TRAVEL ON FINAL FILL ONLY.

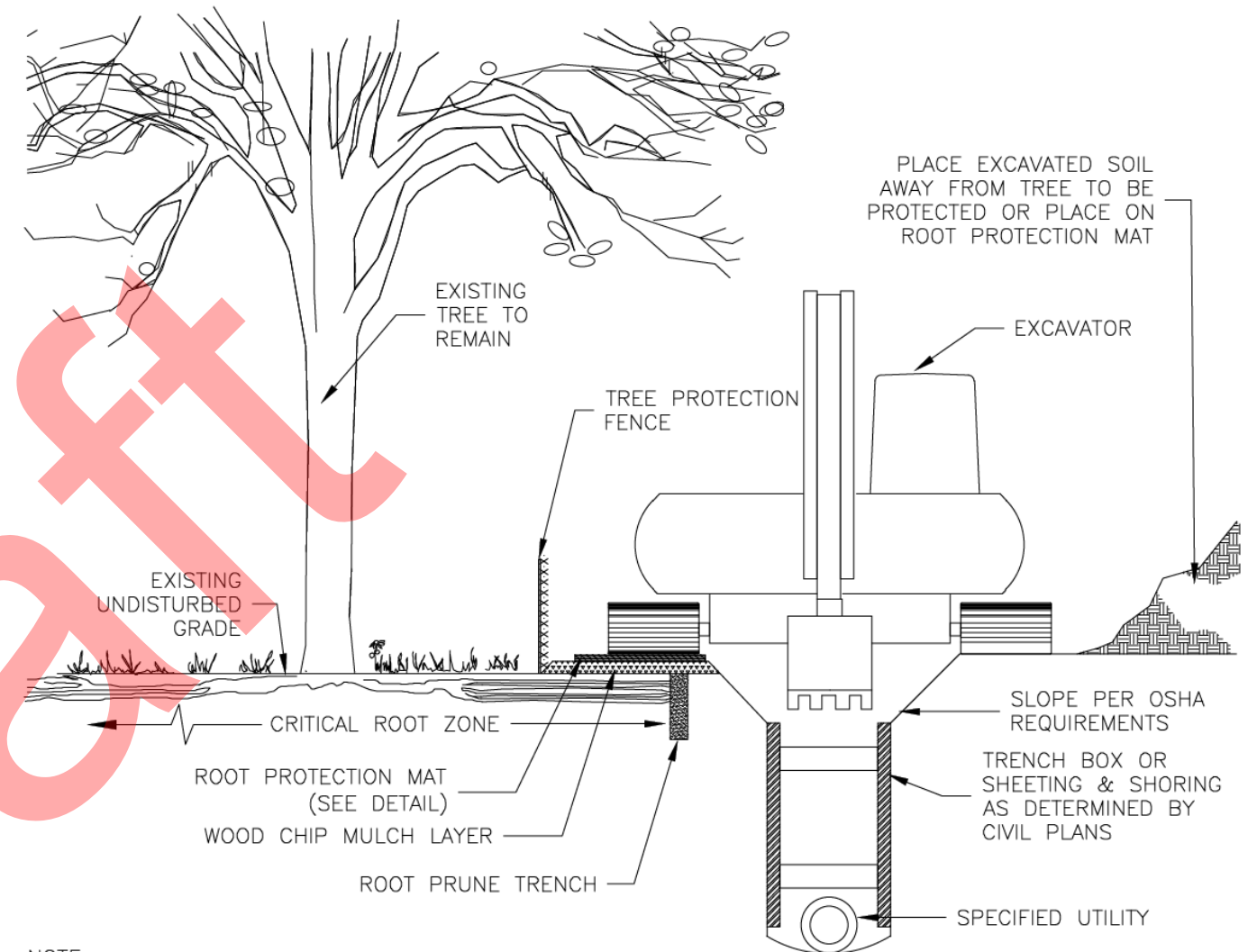
4 ROOT AERATION MATTING WITH GEOGRID FOR ROADWAY (TYP)
TP1 SCALE: NTS



NOTES:

1. MATTING MATERIAL SHALL BE DOUBLE SIDED GEOTEXTILE, GEONET CORE WITH NON-WOVEN COVERING (SUCH AS TENAX TENDRAIN 770/2) OR APPROVED EQUIVALENT.
2. RPM SHALL BE INSTALLED BY A CERTIFIED ARBORIST.
3. TO BE USED FOR DESIGNATED TEMPORARY CONSTRUCTION ACCESS AND STOCKPILE AREAS.
4. MATTING SHALL BE PLACED ON 12" WOOD CHIP MULCH UNLESS OTHERWISE DIRECTED.
5. FOR HEAVY TRAFFIC AREAS, MATTING SHALL BE COVERED WITH 6-8" WELL GRADED CRUSHED AGGREGATE. ADDITIONAL LAYERS OF GEOTEXTILE MAY BE NEEDED.

5 TEMPORARY ROOT PROTECTION MATTING (TYPICAL)
 TP1 SCALE: NTS



NOTE:

1. EXACT RPM DIMENSIONS TO BE DETERMINED BY PROJECT ARBORIST
2. ARBORIST TO COORDINATE WITH SITE SUPERINTENDENT FOR PIPE LAYOUT, DEPTH, SIZE OF EQUIPMENT, WIDTH OF TRENCH, AND OVERDIG TO DETERMINE LOCATION AND LAYOUT OF TREE PROTECTION.
3. ARBORIST TO COORDINATE WITH SITE SUPERINTENDENT FOR OVERHEAD CLEARANCE ISSUES. MAY REQUIRE SELECT PRUNING OR TEMPORARY GUYING.
4. ARBORIST TO MONITOR BACK FILL AND RESTORATION ADJACENT TO PROTECTED TREES.

6 TREE PROTECTION FOR UNDERGROUND UTILITY (TYP)
 TP1 SCALE: NTS



Construction Site Management

Preservation of existing mature trees before, during, and after new construction and redevelopment is beneficial for a number of reasons, including:

- To sustain both the function and value of existing trees and tree canopy.
- To promote public safety and reduce liability by carefully maintaining the health of preserved trees.
- To contain costs associated with site restoration.
- To reduce or avoid soil compaction and degradation and preserve soil volume.
- To avoid physical injury to existing trees.
- To avoid root injury to trees.
- To protect soils and the hydraulic integrity of the entire site.
- To protect existing irrigation, utilities and underground drainage.
- To prevent sediment-laden and/or polluted runoff from entering drainage systems and water bodies (streams, wetlands, lakes, bays).

Best Management Practices

Pre-construction

- The Project Manager shall know and understand the development and building regulations concerning trees and vegetation in the area.
- The Project Manager shall ensure that irrigation and drainage systems are operable and adequate.

- The Project Manager shall ensure all temporary erosion sediment control measures are in place prior to groundbreaking.
- The Project Arborist will be responsible for decisions related to vegetation on site before, during, and after construction.
- The Project Arborist shall perform a site inventory of all existing trees in order to record the variety, location, size, and health of each tree. Site inventory includes determining size, species, numbers, and numbers of trees/plants on site.
- Trees that require removal or pruning to accommodate future structures and construction equipment should also be identified.
- The Project Arborist shall submit a Tree Protection Plan (TPP) that identifies all significant trees that will remain on the project site.
- The TPP will indicate the Tree Protection Zone (TPZ) for each tree as (at a minimum) the greater of: 6-feet, or by multiplying each tree's diameter at 4.5-feet above existing grade (DBH) by a factor of one to determine the diameter, in feet, of the area above and below ground to be protected.
- The TPZ may exceed the Critical Root Zone (CRZ), which is not less than half the distance between the trunk and the outer edge of the tree's canopy, or drip line, but the TPZ may not be smaller than the CRZ.
- The TPP will contain the expected tree

- protection techniques that will be used on the project.
- The TPP will also list a timetable for project meetings with the Project Team including a pre-construction meeting and the schedule for the Project Arborist monitoring.
- Prior to approval of the TPP, the City shall collect an assurance device in the form of a deposit equal to the tree appraisal value of all protected trees as determined under the methods established by the Council of Trees & Landscape Appraisers Guide for Plant Appraisal (9th Edition or most current).

Construction site preparation

- Staging areas for equipment shall be established far enough from existing trees to ensure adequate protection of the root zone.
- Entry and exit routes shall be established and fenced off with chain link or construction fencing. When planning routes, avoid utility access corridors.
- Irrigation and drainage systems shall be protected from damage unless plans call for renovation of such systems.
- Prior to beginning construction activities, the Project Arborist will supervise and verify the following tree protection measures are in place and comply with the approved TPP:
 - A 6-inch layer of coarse mulch or wood chips is to be installed within the TPZ of protected trees. Mulch shall be kept 12-inches away from the trunk.

- Trunks of trees shall be protected with a single wrap of Geocomposite. Geocomposite shall be double sided, Geonet core with non-woven covering (such as Tenax Tendrain 770/2), or equivalent. Tree trunks will be protected with wrap.
- Trees that have been identified in the site inventory as posing a health or safety risk may be removed or pruned by no more than one-third, subject to approval of the required permit by the Planning Division. Pruning of existing limbs and roots shall only occur under the direction of the Project Arborist.
- A protective barrier shall be installed around the Tree Protection Zone (TPZ). The Fence shall be construction of a 6-foot high chain link. Posts shall be 2-inches in diameter, driven 2-feet into the ground. The distance between posts shall be not more than 10-feet. The enclosed area is the TPZ and shall have a warning sign displayed prominently at 20-foot (maximum) intervals along the fence. The warning sign shall be a minimum 8.5-inches x 11-inches and clearly state the following: "WARNING - Tree Protection Zone". Fencing may be moved within the TPZ if authorized by the Project Arborist and City Staff but not closer than the drip line from the trunk of any tree.
- Movable barriers of chain link fencing secured to cement blocks may be substituted for "fixed" fencing if the Project Arborist and City Staff agree that the fencing will need to be moved to accommodate

certain phases of construction. Moving TPZ fencing shall be prohibited without authorization from the Project Arborist and City Staff.

- Should temporary access into the TPZ be approved, an additional layer of approved tree matting shall be placed over the Critical Root Zone (CRZ).
- Tree Growth Regulators may be used as approved by the Project Arborist and City Staff. Paclobutrazol soil applied tree growth regulator (Cambistat® or equivalent) shall be applied to indicated trees by a qualified applicator. Applications shall follow manufacturer's label and applicable laws. TGR reduces canopy growth and increases fibrous root system growth over 2 to 3-years. This can increase tolerance to drought, stress and improve absorption of nutrients and moisture during the stress recovery period.

DURING CONSTRUCTION

During the Construction phase, the Project Arborist should inspect the site on a regular basis to ensure the TPP is being adhered to and report any conflicts or deviations to the City Planner or City Representative. The Project Arborist also needs to be available at the site to monitor construction activities that require encroachment within the TPZ, such as grading or trenching. It may also be necessary to have other key project team members available to monitor these activities.

The Project Arborist shall specify to construction personnel that the following conditions shall be avoided:

- Allowing run off or spillage of damaging materials into the area below any tree canopy.
- Storing construction materials or portable toilets, stockpiling of soil, or parking or driving vehicles within the TPZ.
- Cutting, breaking, skinning, or bruising roots, branches, or trunks without first obtaining authorization from the Project Arborist.
- Allowing fires under and adjacent to trees.
- Discharging exhaust into foliage.
- Securing cable, chain, or rope to trees or shrubs.
- Trenching, digging, or otherwise excavating within the CRZ or TPZ of the tree(s) without first obtaining authorization from the Project Arborist.
- Applying soil sterilizers under pavement near existing trees.

The Project Arborist shall provide periodic inspections during construction. 4-week intervals should be sufficient to access and monitor the effectiveness of the TPP and to provide recommendations for any additional care or treatment. Inspections that are more frequent may also be required based on the approved TPP.

The following activities should be observed and inspected by the Project Arborist during the construction phase to ensure compliance with the approved TPP:

- Only excavation by hand or compressed air shall be allowed within the TPZ of trees. Machine trenching shall not be allowed.

- In order to avoid injury to tree roots, when a trenching machine is being used outside of the TPZ of trees, and roots are encountered smaller than 2-inches, the wall of the trench adjacent to the trees shall be hand-trimmed, making clear, clean cuts through the roots. All damaged, torn, and cut roots shall be given a clean cut to remove ragged edges, which promote decay. Trenches shall be filled within 24-hours; where this is not possible, the side of the trench adjacent to the trees shall be kept shaded with four layers of dampened, untreated burlap, watered as frequently as necessary to keep the burlap wet. Roots 2-inches or larger, when encountered, shall be reported immediately to the Project Arborist, who will decide whether the Contractor may cut the root as mentioned above or shall excavate by hand or with compressed air under the root. All exposed roots are to be protected with dampened burlap.
- Where possible, route pipes outside of the TPZ of a protected tree to avoid conflict with roots.
- Where it is not possible to reroute pipes or trenches, the contractor shall bore or tunnel beneath the TPZ of the tree. The boring shall take place not less than 3-feet below the surface of the soil in order to avoid encountering "feeder" roots. All boring equipment must be staged outside of the TPZ.
- All grade changes adjacent to the TPZ of a significant tree shall be supervised by the

Project Arborist. Cuts or fills of soil adjacent to the TPZ will have a retaining wall system installed as approved by the Project Arborist and City Staff.

- Any damage due to activities shall be reported to the Project Arborist and City Staff within 6-hours so that remedial action can be taken.
- The Project Arborist shall be responsible for the preservation of the designated trees. Should the builder fail to follow the tree protection specifications, it shall be the responsibility of the Project Arborist to report the matter to City Staff as an issue of non-compliance.

Additionally, it is the responsibility of the Project Manager to ensure compliance with the following activities:

- Construction shall be monitored regularly to ensure compliance with specifications. Work shall be stopped if construction site management BMPs are not being followed by the contractor.
- Cement washout pits and chemical holding areas shall be located away from tree protection areas, streams, and wetlands.
- Contractor parking and material storage shall be limited to already impacted areas away from tree roots.
- Site offices and equipment shall not encroach into tree protection areas.
- Refueling and maintenance areas shall be kept away from trees, native soils, water bodies and drainage systems. Fuel spills will not be tolerated on construction sites.

- To the extent possible, construction equipment shall be kept away from all on-site vegetation, especially those within designated protection areas.

POST-CONSTRUCTION

The post-construction phase does not end when the equipment leaves and the new tenants move in. Important follow-up monitoring of the protected trees will help ensure their survival and identify signs of early stress.

The applicant shall arrange with the Project Arborist for the long-term care and monitoring of preserved trees by complying with the following conditions:

- Complete post-construction tree maintenance, including pruning, mulching, fertilization, irrigation, and soil aeration where necessary.
- Remove, by hand, all soil and root protection material such as wood chips, gravel, and plywood.
- Provide for remediation of compacted soil by methods such as aeration or vertical mulching.
- In the absence of adequate rainfall, apply at least 1-inch of water per week in the CRZ by deep watering.
- Fertilize trees with slow release phosphorus, potassium, calcium, magnesium, and other macro- and micro-nutrients as indicated by a soil test, but wait at least 1-year to apply any nitrogen.

- Fertilize lightly with slow-release nitrogen after 1-year, and then make annual light nitrogen applications for the next 3 to 5-years.
- Inspect trees annually for at least 3 to 5-years after construction to look for changes in condition and signs of insects or disease and to determine maintenance needs.
- Remove trees that are badly damaged or are in irreversible decline as determined by the Project Arborist and City Staff.
- Continue to protect not only the large, established trees on the site but also those newly planted in the landscape.
- Maintain TPP during the installation of new landscaping.
- Provide annual inspection reports to the City.
- Review TPP prior to the installation of landscaping and walkways/sidewalks.

Mitigating Tree and Infrastructure Conflicts

Conflicts may occur when tree roots grow adjacent to paving, foundations, sidewalks, or curbs (hardscape). Improper or careless extraction of these elements can cause severe injury to the roots and instability or even death of the trees. The following alternatives must first be considered before root pruning within the TPZ of a tree.

Removal of Pavement or Sidewalk

Removal of existing pavement over tree roots shall include the following precautions: break hardscape into manageable pieces with a jackhammer or pick and hand-load the pieces onto a loader. The loader must remain outside the TPZ on undisturbed pavement or off exposed roots. Do not remove base rock that has been exploited by established absorbing roots. Apply untreated wood chips over the exposed area within 1-hour, then wet the chips and base rock and keep moist until the overlay surface is applied.

Replacement of Pavement or Sidewalk

An alternative to the severance of roots greater than 2-inches in diameter should be considered before cutting roots. If an alternative is not feasible, remove the sidewalk, as stated above, cut roots with a sharp, clean saw, as approved by the Project Manager or Project Arborist and replace sidewalk using #3 dowels at the expansion joint if within 10-feet of a protected tree. Use wire mesh reinforcement if within 10-feet of the trunk of a tree.

Alternative Methods to Reduce Root Pruning

- Grinding a raised sidewalk edge.
- Ramping the walking surface over the roots or lifted slab with pliable paving.
- Routing the sidewalk around the tree roots.
- Install boardwalk, flexible paving, or rubberized sections.

New sidewalk or driveway design should consider alternatives to conventional pavement and sidewalk materials. Substitute permeable materials for typical asphalt or concrete overlay, sub-base or footings to consider are permeable paving materials (such as ECO-Stone or RIMA pavers), interlocking pavers, flexible paving, wooden walkways, and brick or flagstone walkways on sand foundations.

Avoid tree and infrastructure conflicts and associated costs by the following planting practices:

- Plant deep rooting trees that are proven to be non- or minimally invasive.
- Over soil that shrinks and swells, install a sidewalk with higher strength that has wire mesh and/or expansion slip joint dowel reinforcement.
- Fracture soil with an air spade and backfill with sand prior to planting to promote deep rooting and improved drainage.
- Install root barrier only along the hardscape area of the tree and allow roots to use open lawn or planter strip areas.
- Dedicate at least 10-feet of planting space for the growth of each new tree.
- Provide a dedicated irrigation system or zone for the tree so the trees do not have to compete and are not dependent on the turf and shrub irrigation.
- Avoid planting trees over underground drainage systems where root intrusion will impede function of the system.

Alternative Base Course Materials: When designing hardscape areas near trees, the project architect or engineer should consider the use of recommended base course material such as an engineered structural soil mix. An approved structural soil mix will allow a long-term, cost-effective tree and infrastructure compatibility that is particularly suited for the following types of development projects:

- Repair or replacement of sidewalk greater than 40-feet in length;
- Planting areas that are designed over structures or parking garages;
- Confined parking lot medians and islands or other specialized conditions as warranted.

Training

- The Project Arborist should provide training to all construction personnel to ensure they understand all construction site BMPs.
- The Construction Supervisor and Architect should have current training and education dealing with construction site management. This training should include topics regarding protecting trees and erosion control on construction sites.

Appendix G: Inventory Report Template

The City of Santa Cruz street tree inventory includes trees that are maintained by adjacent property owners. In order to inform residents of the priority maintenance needs identified by the inventory, TreeKeeper® was used to generate inventory reports. An example inventory report is presented here.

Sites	
Site Attributes	
Address	Street
Side	Area
Overhead Utilities	Hardscape Damage
Species Attributes	
Species	DBH
Total Tree Height	Type of Defect
Condition	Maintenance Need
Clearance Required	





Appendix H: Estimated costs to maintain trees currently maintained by Adjacent Property Owners

TABLE 11: ESTIMATED COSTS TO MAINTAIN PO TREES, INCLUDING CURRENT PRIORITY TASKS

Estimated Costs for Each Activity		Year 1			Year 2			Year 3			Year 4			Year 5			Total 5-Year Work Plan Cost
Maintenance Activity	Diameter Class (inches)	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Total 5-Year Cost
<i>Routine pruning (includes trees with no maintenance specified)</i>	0 - 3	\$300	248	\$74,400	\$300	247	\$74,100	\$300	247	\$74,100	\$300	247	\$74,100	\$300	248	\$74,400	\$371,100
	4 -	\$300	434	\$130,200	\$300	432	\$129,600	\$300	432	\$129,600	\$300	432	\$129,600	\$300	451	\$135,300	\$654,300
	8 - 13	\$800	384	\$307,200	\$800	378	\$302,400	\$800	378	\$302,400	\$800	378	\$302,400	\$800	463	\$370,400	\$1,584,800
	14 - 21	\$1,800	249	\$448,200	\$1,800	247	\$444,600	\$1,800	247	\$444,600	\$1,800	247	\$444,600	\$1,800	300	\$540,000	\$2,322,000
	22 - 35	\$1,800	162	\$291,600	\$1,800	162	\$291,600	\$1,800	162	\$291,600	\$1,800	162	\$291,600	\$1,800	212	\$381,600	\$1,548,000
	36 +	\$1,800	71	\$127,800	\$1,800	70	\$126,000	\$1,800	70	\$126,000	\$1,800	70	\$126,000	\$1,800	120	\$216,000	\$721,800
Activity Total(s)			1,548	\$1,379,400		1,536	\$1,368,300		1,536	\$1,368,300		1,536	\$1,368,300		1,794	\$1,717,700	\$7,202,000
<i>Priority Pruning</i>	0 - 3	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$0
	4 -	\$300	17	\$5,100	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$5,100
	8 - 13	\$800	79	\$63,200	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$63,200
	14 - 21	\$1,800	51	\$91,800	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$91,800
	22 - 35	\$1,800	50	\$90,000	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$90,000
	36 +	\$1,800	49	\$88,200	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$88,200
Activity Total(s)			246	\$338,300		0	\$0		0	\$0		0	\$0		0	\$0	\$338,300
<i>Structural Prune</i>	0 - 3	\$300	12	\$3,600	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$3,600
	4 -	\$300	1	\$300	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300
	8 - 13	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$0
	14 - 21	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
	22 - 35	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
	36 +	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
Activity Total(s)			13	\$3,900		0	\$0		0	\$0		0	\$0		0	\$0	\$3,900
<i>Tree Removal & Stump Grinding</i>	0 - 3	\$500	54	\$27,000	\$500	16	\$8,000	\$500	0	\$0	\$500	0	\$0	\$500	0	\$0	\$35,000
	4 -	\$500	59	\$29,500	\$500	53	\$26,500	\$500	0	\$0	\$500	0	\$0	\$500	0	\$0	\$56,000
	8 - 13	\$1,000	77	\$77,000	\$1,000	43	\$43,000	\$1,000	0	\$0	\$1,000	0	\$0	\$1,000	0	\$0	\$120,000
	14 - 21	\$2,200	50	\$110,000	\$2,200	31	\$68,200	\$2,200	0	\$0	\$2,200	0	\$0	\$2,200	0	\$0	\$178,200
	22 - 35	\$2,800	29	\$81,200	\$2,800	27	\$75,600	\$2,800	0	\$0	\$2,800	0	\$0	\$2,800	0	\$0	\$156,800
	36 +	\$2,800	11	\$30,800	\$2,800	6	\$16,800	\$2,800	0	\$0	\$2,800	0	\$0	\$2,800	0	\$0	\$47,600
Activity Total(s)			280	\$359,400		176	\$238,100		0	\$0		0	\$0		0	\$0	\$593,600
All Maintenance Activity Grand Total			2,087	\$2,081,000		1,712	\$1,606,400		1,536	\$1,368,300		1,536	\$1,368,300		1,794	\$1,717,700	\$8,137,800

TABLE 12: ESTIMATED COSTS TO MAINTAIN PO TREES, INCLUDING CURRENT PRIORITY TASKS

Estimated Costs for Each Activity		Year 1			Year 2			Year 3			Year 4			Year 5			Total 5-Year Work Plan Cost
Maintenance Activity	Diameter Class (inches)	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Cost/tree	# of Trees	Total Cost	Total 5-Year Cost
Routine pruning (includes trees with no maintenance specified)	0 - 3	\$300	313	\$93,900	\$300	311	\$93,300	\$300	312	\$93,600	\$300	311	\$93,300	\$300	317	\$95,100	\$469,200
	4 -	\$300	537	\$161,100	\$300	533	\$159,900	\$300	532	\$159,600	\$300	533	\$159,900	\$300	553	\$165,900	\$806,400
	8 - 13	\$800	472	\$377,600	\$800	463	\$370,400	\$800	464	\$371,200	\$800	463	\$370,400	\$800	549	\$439,200	\$1,928,800
	14 - 21	\$1,800	312	\$561,600	\$1,800	352	\$633,600	\$1,800	351	\$631,800	\$1,800	351	\$631,800	\$1,800	405	\$729,000	\$3,187,800
	22 - 35	\$1,800	173	\$311,400	\$1,800	211	\$379,800	\$1,800	209	\$376,200	\$1,800	209	\$376,200	\$1,800	261	\$469,800	\$1,913,400
	36 +	\$1,800	77	\$138,600	\$1,800	93	\$167,400	\$1,800	89	\$160,200	\$1,800	90	\$162,000	\$1,800	140	\$252,000	\$880,200
Activity Total(s)			1,884	\$1,644,200		1,963	\$1,804,400		1,957	\$1,792,600		1,957	\$1,793,600		2,225	\$2,151,000	\$9,185,800
Priority Pruning	0 - 3	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$0
	4 -	\$300	22	\$6,600	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$6,600
	8 - 13	\$800	83	\$66,400	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$66,400
	14 - 21	\$1,800	55	\$99,000	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$99,000
	22 - 35	\$1,800	57	\$102,600	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$102,600
	36 +	\$1,800	57	\$102,600	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$102,600
Activity Total(s)			274	\$377,200		0	\$0		0	\$0		0	\$0		0	\$0	\$377,200
Structural Prune	0 - 3	\$300	13	\$3,900	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$3,900
	4 -	\$300	1	\$300	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300	0	\$0	\$300
	8 - 13	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$800	0	\$0	\$0
	14 - 21	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
	22 - 35	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
	36 +	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$1,800	0	\$0	\$0
Activity Total(s)			14	\$4,200		0	\$0		0	\$0		0	\$0		0	\$0	\$4,200
Tree Removal & Stump Grinding	0 - 3	\$500	58	\$29,000	\$500	20	\$10,000	\$500	0	\$0	\$500	0	\$0	\$500	0	\$0	\$39,000
	4 -	\$500	61	\$30,500	\$500	53	\$26,500	\$500	0	\$0	\$500	0	\$0	\$500	0	\$0	\$57,000
	8 - 13	\$1,000	77	\$77,000	\$1,000	45	\$45,000	\$1,000	0	\$0	\$1,000	0	\$0	\$1,000	0	\$0	\$122,000
	14 - 21	\$2,200	51	\$112,200	\$2,200	36	\$79,200	\$2,200	0	\$0	\$2,200	0	\$0	\$2,200	0	\$0	\$191,400
	22 - 35	\$2,800	31	\$86,800	\$2,800	30	\$84,000	\$2,800	0	\$0	\$2,800	0	\$0	\$2,800	0	\$0	\$170,800
	36 +	\$2,800	12	\$33,600	\$2,800	7	\$19,600	\$2,800	0	\$0	\$2,800	0	\$0	\$2,800	0	\$0	\$53,200
Activity Total(s)			290	\$373,300		191	\$264,300		0	\$0		0	\$0		0	\$0	\$633,400
Program Administration																	
All Maintenance Activity Grand Total			2,462			2,154			1,957			1,957		2,225			10,755
Cost Grand Total				\$2,398,900			\$2,068,700			\$1,792,600			\$1,793,600			\$2,151,000	\$10,200,600
Current Annual Budget				\$150,000			\$150,000			\$150,000			\$150,000			\$150,000	\$750,000
Shortfall/Gap				-\$2,248,900			-\$1,918,700			-\$1,642,600			-\$1,643,600			-\$2,001,000	-\$9,450,600



Appendix I: Indicators of a Sustainable Urban Forest

Indicators of a Sustainable Urban Forest		Assessed Performance Level		
		Low	Medium	High
The Trees	Urban Tree Canopy		X	
	Equitable Distribution	X		
	Size/Age Distribution		X	
	Condition of Public Trees - Streets, Parks		X	
	Condition of Public Trees - Natural Areas	X		
	Trees on Private Property	X		
	Species Diversity			X
	Suitability		X	
	Space and Volume	X		
The Players	Neighborhood Action		X	
	Large Private & Institutional Landholder Involvement	X		
	Green Industry Involvement	X		
	City Department/Agency Cooperation		X	
	Funder Engagement	X		
	Utility Engagement		X	
	State Engagement	X		
The Mgmt Approach	Public Awareness		X	
	Regional Collaboration	X		
	Tree Inventory			X
	Canopy Assessment		X	
	Management Plan	X		
	Risk Management Program	X		
	Maintenance of Publicly-Owned Trees (ROWs)	X		
	Maintenance Program of Publicly-Owned Natural Areas		X	
	Planting Program		X	
	Tree Protection Policy			X
	City Staffing and Equipment		X	
Funding	X			
Disaster Preparedness & Response		X		
Communications			X	
<i>Totals</i>		13	13	4

THE TREES				
Indicators of a Sustainable Urban Forest	Overall Objective or Industry Standard	Performance Levels		
		Low	Medium	High
Urban Tree Canopy	Achieve the desired tree canopy cover according to goals set for the entire city and neighborhoods. Alternatively, achieve 75% of the total canopy possible for the entire city and in each neighborhood.	Canopy is decreasing. - and/or - No canopy goals have been set.	Canopy is not dropping, but not on a trajectory to achieve the established goal.	Canopy goal is achieved, or well on the way to achievement.
Location of Canopy (Equitable Distribution)	Achieve low variation between tree canopy and equity factors citywide by neighborhood. Ensure that the benefits of tree canopy are available to all, especially for those most affected by these benefits.	Tree planting and public outreach and education is not determined by tree canopy cover or benefits.	Tree planting and public outreach and education is focused on neighborhoods with low tree canopy.	Tree planting and public outreach and education is focused in neighborhoods with low tree canopy and a high need for tree benefits.
Age of Trees (Size and Age Distribution)	Establish a diverse-aged population of public trees across the entire city and for each neighborhood. Ideal standard: 9-17" DBH: 30% Over 24" DBH: 10%	No current information is available on size. - OR - Age distribution is not proportionally distributed across size classes at the city level.	Size classes are evenly distributed at the city level, though unevenly distributed at the neighborhood level.	Age distribution is generally aligned with the ideal standard diameter classes at the neighborhood level.
Condition of Publicly Owned Trees (trees managed intensively)	Possess a detailed understanding of tree condition and potential risk of all intensively-managed, publicly-owned trees. This information is used to direct maintenance actions.	No current information is available on tree condition or risk.	Information from a partial or sample or inventory is used to assess tree condition and risk.	Information from a current, GIS-based, 100% complete public tree inventory is used to indicate tree condition and risk.
Condition of Publicly-Owned Natural Areas (trees managed extensively)	Possess a detailed understanding of the ecological structure and function of all publicly-owned natural areas (such as woodlands, ravines, stream corridors, etc.), as well as usage patterns.	No current information is available on tree condition or risk.	Publicly-owned natural areas are identified in a sample-based "natural areas survey" or similar data.	Information from a current, GIS-based, 100% complete natural areas survey is utilized to document ecological structure and function, as well as usage patterns.
Trees on Private Property	Possess a solid understanding of the extent, location and general condition of trees on private lands.	No data is available on private trees.	Current tree canopy assessment reflects basic information (location) of both public and private canopy combined.	Detailed information available on private trees. Ex. bottom-up sample-based assessment of trees.
Diversity	Establish a genetically diverse population of publicly-owned trees across the entire city and for each neighborhood. Tree populations should be comprised of no more than 30% of any family, 20% of any genus, or 10% of any species.	No current information is available on species. - OR - Fewer than five species dominate the entire tree population citywide.	No species represents more than 20% of the entire tree population citywide.	No species represents more than 10% of the entire tree population citywide.
Climate Resilience/Suitability	Establish a tree population suited to the urban environment and adapted to the overall region. Suitable species are gauged by exposure to imminent threats, considering the "Right Tree for the Right Place" concept and invasive species.	No current information is available on species suitability. - OR - Less than 50% of trees are considered suitable for the site.	50% to 75% of trees are considered suitable for the site.	More than 75% of trees are considered suitable for the site.
Space and Soil Volume	Establish minimum street tree soil volume requirements to ensure there is adequate space and soil for street trees to thrive. Minimum soil volumes by mature size: 1000 cubic feet for large trees; 600 cubic feet for medium trees; 300 cubic feet for small trees.	Minimum street tree soil volumes have not been established.	Minimum street tree soil volume has been established based on mature size of tree.	Minimum street tree soil volumes have been established and are required to be adhered to for all new street tree planting projects.

THE PLAYERS				
Indicators of a Sustainable Urban Forest	Overall Objective or Industry Standard	Performance Levels		
		Low	Medium	High
Neighborhood Action	Citizens understand, cooperate, and participate in urban forest management at the neighborhood level. Urban forestry is a neighborhood-scale issue.	Little or no citizen involvement or neighborhood action.	Some active groups are engaged in advancing urban forestry activity, but with no unified set of goals or priorities.	The majority of all neighborhoods are organized, connected, and working towards a unified set of goals and priorities.
Large Private & Institutional Landholder Involvement	Large, private, and institutional landholders embrace citywide goals and objectives through targeted resource management plans.	Large private land holders are unaware of issues and potential influence in the urban forest. No large private land management plans are currently in place.	Education materials and advice is available to large private landholders. Few large private landholders or institutions have management plans in place.	Clear and concise goals are established for large private land holders through direct education and assistance programs. Key landholders and institutions have management plans in place.
Green Industry Involvement	The green industry works together to advance citywide urban forest goals and objectives. The city and its partners capitalize on local green industry expertise and innovation.	Little or no involvement from green industry leaders to advance local urban forestry goals.	Some partnerships are in place to advance local urban forestry goals, but more often for the short-term.	Long-term committed partnerships are working to advance local urban forestry goals.
City Department and Agency Cooperation	All city departments and agencies cooperate to advance citywide urban forestry goals and objectives.	Conflicting goals and/or actions among city departments and agencies.	Informal teams among departments and agencies are communicating and implementing common goals on a project-specific basis.	Common goals and collaboration occur across all departments and agencies. City policy and actions are implemented by formal interdepartmental and interagency working teams on all city projects.
Funder Engagement	Local funders are engaged and invested in urban forestry initiatives. Funding is adequate to implement citywide urban forest management plan.	Little or no funders are engaged in urban forestry initiatives.	Funders are engaged in urban forestry initiatives at minimal levels for short-term projects.	Multiple funders are fully engaged and active in urban forestry initiatives for short-term projects and long-term goals.
Utility Engagement	All utilities are aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.	Utilities and city agencies act independently of urban forestry efforts. No coordination exists.	Utilities and city agencies have engaged in dialogues about urban forestry efforts with respect to capital improvement and infrastructure projects.	Utilities, city agencies, and other stakeholders integrate and collaborate on all urban forestry efforts, including planning, site work, and outreach/education.
State Engagement	State departments/agencies are aware of and vested in the urban forest and cooperates to advance citywide urban forest goals and objectives.	State departments/agencies and City agencies act independently of urban forestry efforts. No coordination exists.	State department/agencies and City agencies have engaged in dialogues about urban forestry efforts with respect to capital improvement and infrastructure projects.	State departments/agencies, City agencies, and other stakeholders integrate and collaborate on all urban forestry efforts, including planning, site work, and outreach/education.
Public Awareness	The general public understands the benefits of trees and advocates for the role and importance of the urban forest.	Trees are generally seen as a nuisance, and thus, a drain on city budgets and personal paychecks.	Trees are generally recognized as important and beneficial.	Trees are seen as valuable infrastructure and vital to the community's well-being. The urban forest is recognized for the unique environmental, economic, and social services it provides to the community.
Regional Collaboration	Neighboring communities and regional groups are actively cooperating and interacting to advance the region's stake in the city's urban forest.	Little or no interaction between neighboring communities and regional groups.	Neighboring communities and regional groups share similar goals and policy vehicles related to trees and the urban forest.	Regional urban forestry planning, coordination, and management is widespread.

THE MANAGEMENT				
Indicators of a Sustainable Urban Forest	Overall Objective or Industry Standard	Performance Levels		
		Low	Medium	High
Tree Inventory	Comprehensive, GIS-based, current inventory of all intensively-managed public trees to guide management, with mechanisms in place to keep data current and available for use. Data allows for analysis of age distribution, condition, risk, diversity, and suitability.	No inventory or out-of-date inventory of publicly-owned trees.	Partial or sample-based inventory of publicly-owned trees, inconsistently updated.	Complete, GIS-based inventory of publicly-owned trees, updated on a regular, systematic basis.
Canopy Assessment	Accurate, high-resolution, and recent assessment of existing and potential city-wide tree canopy cover that is regularly updated and available for use across various departments, agencies, and/or disciplines.	No tree canopy assessment.	Sample-based canopy cover assessment, or dated (over 10 years old) high resolution canopy assessment.	High-resolution tree canopy assessment using aerial photographs or satellite imagery.
Management Plan	Existence and buy-in of a comprehensive urban forest management plan to achieve city-wide goals. Re-evaluation is conducted every 5 to 10 years.	No urban forest management plan exists.	A plan for the publicly-owned forest resource exists but is limited in scope, acceptance, and implementation.	A comprehensive plan for the publicly owned forest resource exists and is accepted and implemented.
Risk Management Program	All publicly-owned trees are managed for maximum public safety by way of maintaining a city-wide inventory, conducting proactive annual inspections, and eliminating hazards within a set timeframe based on risk level. Risk management program is outlined in the management plan.	Request-based, reactive system. The condition of publicly-owned trees is unknown.	There is some degree of risk abatement thanks to knowledge of condition of publicly-owned trees, though generally still managed as a request-based reactive system.	There is a complete tree inventory with risk assessment data and a risk abatement program in effect. Hazards are eliminated within a set time period depending on the level of risk.
Maintenance Program of Publicly-Owned Trees (trees managed intensively)	All intensively-managed, publicly-owned trees are well maintained for optimal health and condition in order to extend longevity and maximize benefits. A reasonable cyclical pruning program is in place, generally targeting 5 to 7 year cycles. The maintenance program is outlined in the management plan.	Request-based, reactive system. No systematic pruning program is in place for publicly-owned trees.	All publicly-owned trees are systematically maintained, but pruning cycle is inadequate.	All publicly-owned trees are proactively and systematically maintained and adequately pruned on a cyclical basis.
Maintenance Program of Publicly-Owned Natural Areas (trees managed extensively)	The ecological structure and function of all publicly-owned natural areas are protected and enhanced while accommodating public use where appropriate.	No natural areas management plans are in effect.	Only reactive management efforts to facilitate public use (risk abatement).	Management plans are in place for each publicly-owned natural area focused on managing ecological structure and function and facilitating public use.
Planting Program	Comprehensive and effective tree planting and establishment program is driven by canopy cover goals, equity considerations, and other priorities according to the plan. Tree planting and establishment is outlined in the management plan.	Tree establishment is ad hoc.	Tree establishment is consistently funded and occurs on an annual basis.	Tree establishment is directed by needs derived from a tree inventory and other community plans and is sufficient in meeting canopy cover objectives.
Tree Protection Policy	Comprehensive and regularly updated tree protection ordinance with enforcement ability is based on community goals. The benefits derived from trees on public and private property are ensured by the enforcement of existing policies.	No tree protection policy.	Policies are in place to protect trees, but the policies are not well-enforced or ineffective.	Protections policies ensure the safety of trees on public and private land. The policies are enforced and supported by significant deterrents and shared ownership of city goals.
City Staffing and Equipment	Adequate staff and access to the equipment and vehicles to implement the management plan. A high level urban forester or planning professional, strong operations staff, and solid certified arborist technicians.	Insufficient staffing levels, insufficiently-trained staff, and/or inadequate equipment and vehicle availability.	Certified arborists and professional urban foresters on staff have some professional development, but are lacking adequate staff levels or adequate equipment.	Multi-disciplinary team within the urban forestry unit, including an urban forestry professional, operations manager, and arborist technicians. Vehicles and equipment are sufficient to complete required work.

THE MANAGEMENT (CONTINUED)				
Indicators of a Sustainable Urban Forest	Overall Objective or Industry Standard	Performance Levels		
		Low	Medium	High
Funding	Appropriate funding in place to fully implement both proactive and reactive needs based on a comprehensive urban forest management plan.	Funding comes from the public sector only, and covers only reactive work.	Funding levels (public and private) generally cover mostly reactive work. Low levels of risk management and planting in place.	Dynamic, active funding from engaged private partners and adequate public funding are used to proactively manage and expand the urban forest.
Disaster Preparedness & Response	A disaster management plan is in place related to the city's urban forest. The plan includes staff roles, contracts, response priorities, debris management and a crisis communication plan. Staff are regularly trained and/or updated.	No disaster response plan is in place.	A disaster plan is in place, but pieces are missing and/or staff are not regularly trained or updated.	A robust disaster management plan is in place, regularly updated and staff is fully trained on roles and processes.
Communication	Effective avenues of two-way communication exist between the city departments and between city and its citizens. Messaging is consistent and coordinated, when feasible.	No avenues are in place. City departments and public determine on an ad-hoc basis the best messages and avenues to communicate.	Avenues are in place, but used sporadically and without coordination or only on a one-way basis.	Avenues are in place for two way communication, are well-used with targeted, coordinated messages.

Appendix J: Gantt Chart

City of Santa Cruz Street Tree Master Plan		Goals & Objectives										2026	2031	2036	Timeframe	Priority	
		Cost	2021	2022	2023	2024	2025	2030	2035	2040	-	-	-				
Goal 1: Manage the street tree resource																	
	Objective 1.1: Maintain a tree inventory that can be used to manage the street tree resource	\$	[Bar from 2021 to 2040]													Ongoing	High
Goal 2: Promote street tree health and good structure																	
	Objective 2.1: Regularly inspect City-maintained street trees	\$	[Bar from 2021 to 2040]													Ongoing/ every 2 to 5 Years	High
Goal 3: Enhance resiliency with a comprehensive tree species palette																	
	Objective 3.1: Create a Master Street Tree List	\$															
	Objective 3.2: Set emphasis on the right tree in the right place	\$	[Bar from 2021 to 2040]													Ongoing	High
Goal 4: Increase street tree planting efforts																	
	Objective 4.1: Create a City-wide street tree Planting Plan (Municipal Code 13.30, General Plan)	\$	[Bar from 2021 to 2025]													5 Years	Moderate
	Objective 4.2: Expand opportunities for street tree planting	\$ - \$\$\$	[Bar from 2021 to 2040]													Ongoing	Moderate
Goal 5: Increase the environmental benefits resulting from street trees																	
	Objective 5.1: Retain large trees and create additional opportunities for the incorporation of large (preferably California native species) into streetscapes	\$ - \$\$\$	[Bar from 2021 to 2040]													Ongoing	Moderate
Goal 6: Advocate for tree lined streets																	
	Objective 6.1: Encourage tree lined streets to enhance the well-being and aesthetics of the community	\$ - \$\$	[Bar from 2021 to 2040]													Ongoing	Moderate
	Objective 6.2: Work with the Downtown Association to resolve conflicts with businesses visibility and signage	\$	[Bar from 2021 to 2025]													5 Years	Moderate
Goal 7: Provide predictable and sustainable funding for the street tree resource																	
	Objective 7.1: Explore the feasibility of the City taking responsibility for the maintenance of street trees adjacent to private property	\$\$\$	[Bar from 2021 to 2030]													10 Years	Low
	Objective 7.2: Secure funding for the care of City-maintained street trees	\$\$\$	[Bar from 2021 to 2030]													10 Years	Low
Goal 8: Strive for optimal staffing levels																	
	Objective 8.1: Optimize the Urban Forestry Office's ability to manage the current workload	\$-\$	[Bar from 2021 to 2030]													10 Years	Moderate
	Objective 8.2: Encourage employees to engage in professional development	\$	[Bar from 2021 to 2040]													Ongoing	Moderate

\$ = less than \$25,000 \$\$ = \$25,000-\$100,000 \$\$\$ = more than \$100,000

Appendix J: Gantt Chart (continued)

City of Santa Cruz Street Tree Master Plan		Goals & Objectives										2026	2031	2036	Timeframe	Priority	
		Cost	2021	2022	2023	2024	2025	2030	2035	2040	2026	2031	2036				
Goal 9: Encourage a culture of safety	Objective 9.1: Implement policies and procedures that make that tree work as safe as possible	\$	[Gantt bar from 2021 to 2040]													Ongoing	High
Goal 10: Enhance risk management and public safety	Objective 10.1: Establish a risk management policy	\$	[Gantt bar from 2021 to 2021]													1 Year	High
Goal 11: Promote tree protection	Objective 11.1: Enhance methods for cost recovery in the case of tree removals or improper tree maintenance	\$	[Gantt bar from 2021 to 2025]													5 Years	Moderate
	Objective 11.2: Continue to implement tree protection during construction	\$	[Gantt bar from 2021 to 2040]													Ongoing	High
	Objective 11.3: Explore revising and amending Municipal Code to promote the protection of community trees	\$	[Gantt bar from 2021 to 2025]													5 Years	Moderate
Goal 12: Strive for uniformity between City plans, policies, guiding documents, and departments	Objective 12.1: Continue to communicate and coordinate with other departments	\$	[Gantt bar from 2021 to 2040]													Ongoing	High
Goal 13: Encourage tree establishment through efficient and sustainable irrigation solutions	Objective 13.1: Provide water to trees efficiently and sustainably	\$ - \$\$	[Gantt bar from 2021 to 2025]													5 Years / Ongoing	High
	Objective 13.2: Upgrade existing and planned planting sites to encourage root establishment	\$ - \$\$	[Gantt bar from 2021 to 2040]													Ongoing	Moderate
Goal 14: Use trees to enhance the aesthetics and function of the urban landscape	Objective 14.1: Emphasize incorporating trees in development and redevelopment projects	\$	[Gantt bar from 2021 to 2040]													Ongoing	Moderate
	Objective 14.2: Collaborate with Planning and Public Works Departments to find practical solutions to allow for trees in areas with hardscape limitations	\$	[Gantt bar from 2021 to 2040]													Ongoing	Moderate
	Objective 14.3: Develop policies around parking lot shade	\$	[Gantt bar from 2021 to 2025]													5 Years	Moderate
	Objective 14.4: Incorporate trees into stormwater management systems to improve stormwater capture	\$	[Gantt bar from 2021 to 2040]													Ongoing	Moderate
Goal 15: Follow Integrated Pest Management (IPM) protocols and best management practices when addressing pests and diseases	Objective 15.1: Continue to address pests and diseases using best management practices	\$	[Gantt bar from 2021 to 2040]													Ongoing	Low-Moderate
Goal 16: Promote species diversity in the urban forest	Objective 16.1: Promote species diversity to build a more sustainable urban forest	\$	[Gantt bar from 2021 to 2040]													Ongoing	Moderate
Goal 17: Expand tree canopy cover and the resulting environmental benefits	Objective 17.1: Increase tree canopy throughout the community	\$	[Gantt bar from 2021 to 2040]													Ongoing	High
	Objective 17.2: Increase carbon sequestration as a carbon neutrality strategy in coordination with Climate Action Plan 2030	\$	[Gantt bar from 2021 to 2040]													Ongoing	Moderate
Goal 18: Celebrate the importance of urban trees	Objective 18.1: Maintain the Tree City USA designation	\$	[Gantt bar from 2021 to 2040]													Ongoing	Low-Moderate
Goal 19: Partner with other city departments and other stakeholders to develop a cohesive city-wide Urban Forest Master Plan	Objective 19.1: Create a city-wide Urban Forest Master Plan	\$\$\$	[Gantt bar from 2021 to 2030]													10 Years	Low
Goal 20: Promote community engagement and stewardship of the urban forest	Objective 20.1: Update the Parks and Recreation Department webpage to include information on tree care	\$	[Gantt bar from 2021 to 2021]													1 Year	Moderate
	Objective 20.2: Enhance citizen and volunteer engagement in care for street trees	\$	[Gantt bar from 2021 to 2040]													Ongoing	Low-Moderate
	Objective 20.3: Continue to use multiple methods of accessible and translated outreach to engage a greater proportion of the community	\$	[Gantt bar from 2021 to 2040]													Ongoing	Low-Moderate
Goal 21: Contribute to a fire safe community	Objective 21.1: Mitigate the risks of wildfire	\$	[Gantt bar from 2021 to 2040]													Ongoing	Moderate
Goal 22: Repurpose woody materials whenever possible	Objective 22.1: Identify a wood reutilization policy	\$	[Gantt bar from 2021 to 2025]													5 Years	Low

\$ = less than \$25,000 \$\$ = \$25,000-\$100,000 \$\$\$ = more than \$100,000