



DEBRIS FLOW HAZARDS

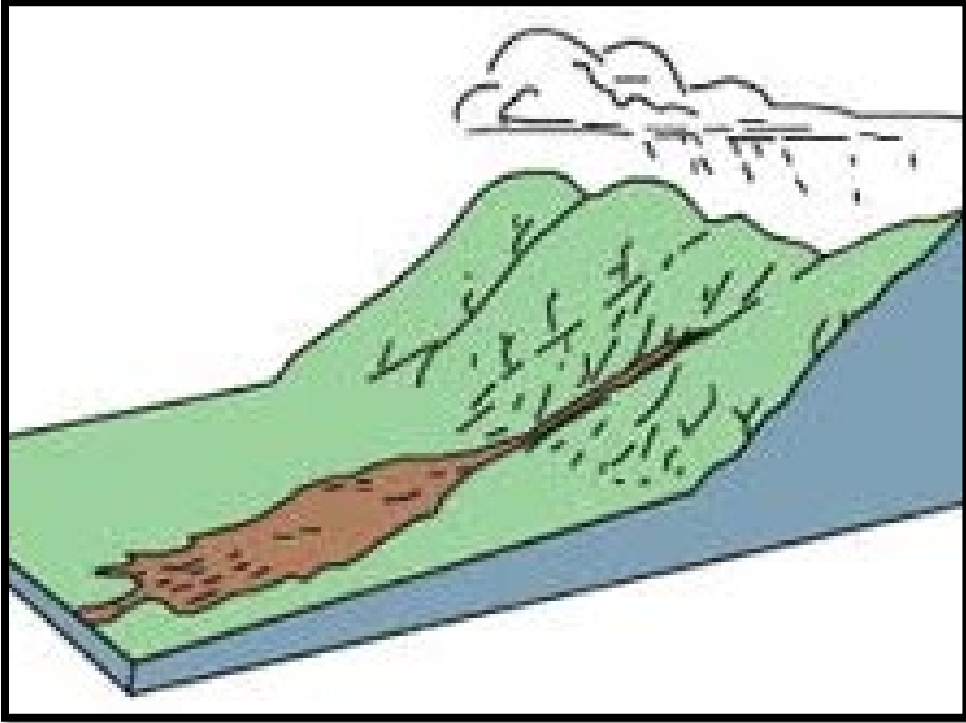
CZU LIGHTNING COMPLEX POST FIRE
PREPARATION



OBJECTIVES

- Educate the community about debris flows.
- Explain the associated risks and why they should care.
- Inform affected residents about County response measures.
- Communicate importance of early evacuation.





WHAT IS A DEBRIS FLOW?

- Rainfall saturates loose soil and rock, creating a moving mass with trees and other debris that travels downslope.
- They are typically triggered by intense rainfall.
- Debris flows can travel more than 30 mph, destroying everything in their path.

DEBRIS FLOWS HISTORY IN SANTA CRUZ COUNTY

- Santa Cruz County has a long history of debris flows, which existed prior to Lightning Complex fire.
- Important to note that Debris flows can occur where none have in the past, and also can revisit previous sites.



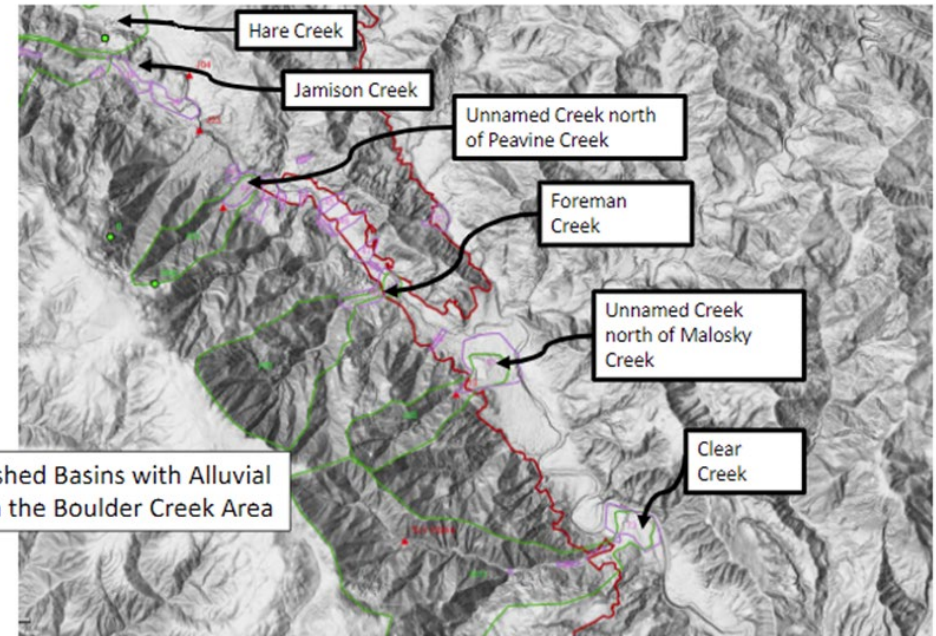
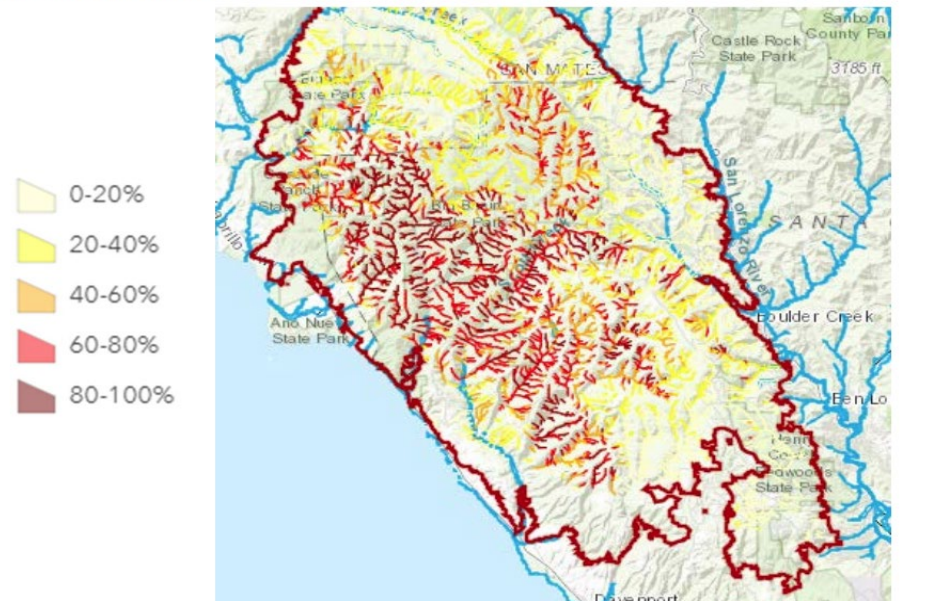


POST-FIRE DEBRIS FLOW HAZARD IS INCREASED

- Wildfires burn the upper soil layers, creating water repellent soil.
- Steep, burned and denuded slopes deposit rocks, soil, and trees into swales and drainages.



Debris Flow Segment Probability – 24 mm per hour storm (≈ 0.25 inches in 15 minutes)



POST-FIRE DEBRIS FLOW RISKS



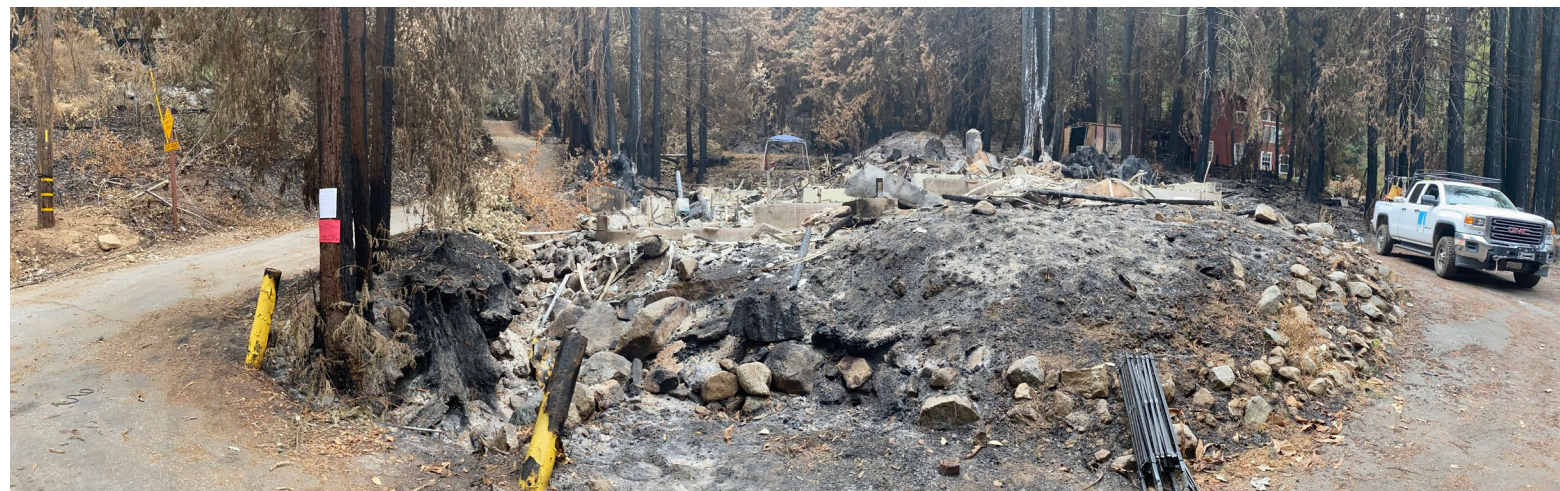
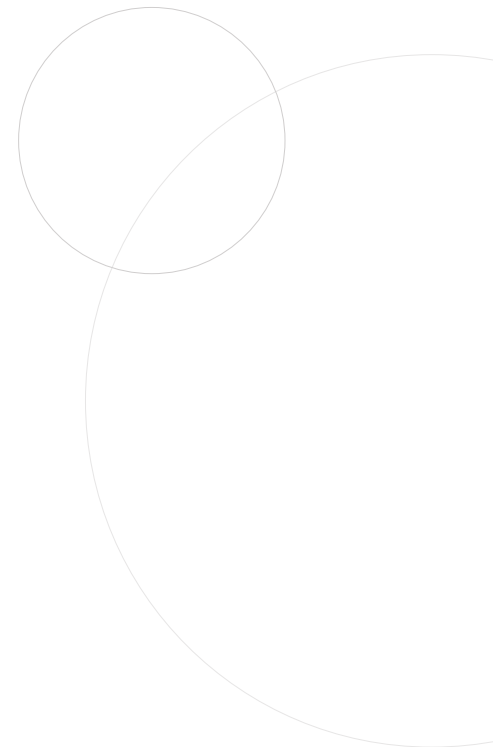
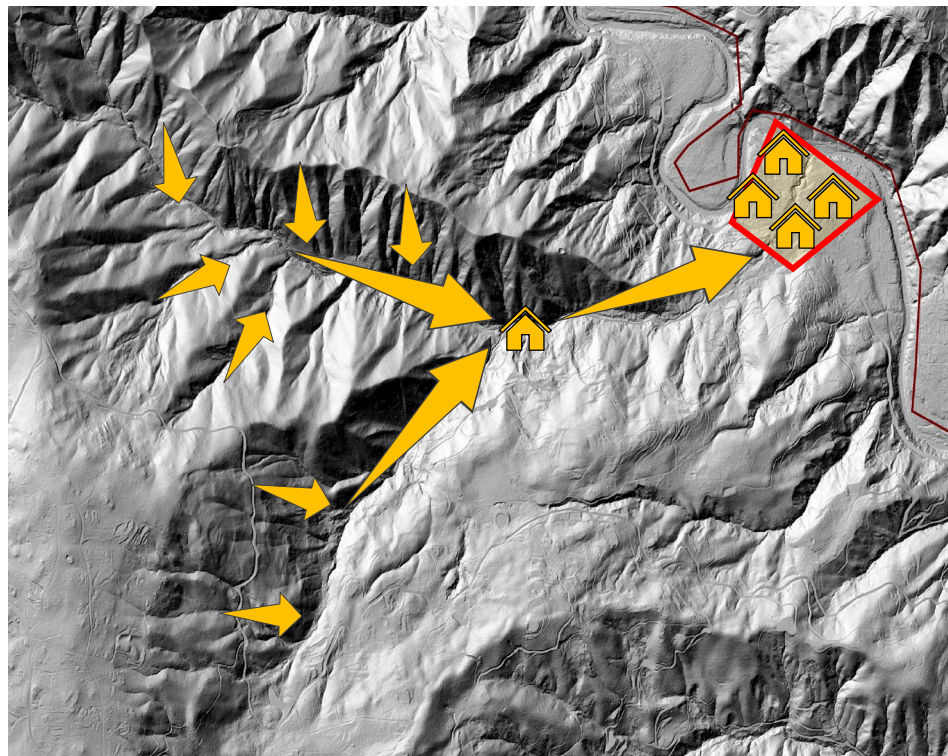
- The post-fire Watershed Emergency Response Team (WERT) preliminary report indicates a high probability of debris flows.
- Many areas downslope of the burn area have alluvial fans indicating past debris flows.



WHO IS AT RISK?

People living downslope of the burn area have an increased risk

- In or near drainage channels
- On or below a burned slope
- At the mouth of a drainage basin





DEBRIS FLOW RISK FACTS

- RESIDENTS CANNOT ANTICIPATE WHEN OR WHERE A DEBRIS FLOW WILL HAPPEN
- YOU CANNOT “FIGHT” OR “RIDE OUT” A DEBRIS FLOW
- ONCE YOU SEE OR HEAR A DEBRIS FLOW IT IS TOO LATE!
- ONLY EFFECTIVE PROTECTION IS **EARLY EVACUATION**



Triggered by high-intensity, short-duration bursts of rain.



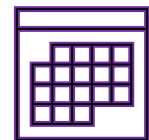
Triggered by rainfall in the upper burn area



Debris flows can move at avalanche speed.



Debris flows are already a common phenomenon in the Santa Cruz Mountains, and the risk is increased by fire.



Just because an area hasn't seen a debris flow in decades, doesn't mean the hazard doesn't exist.

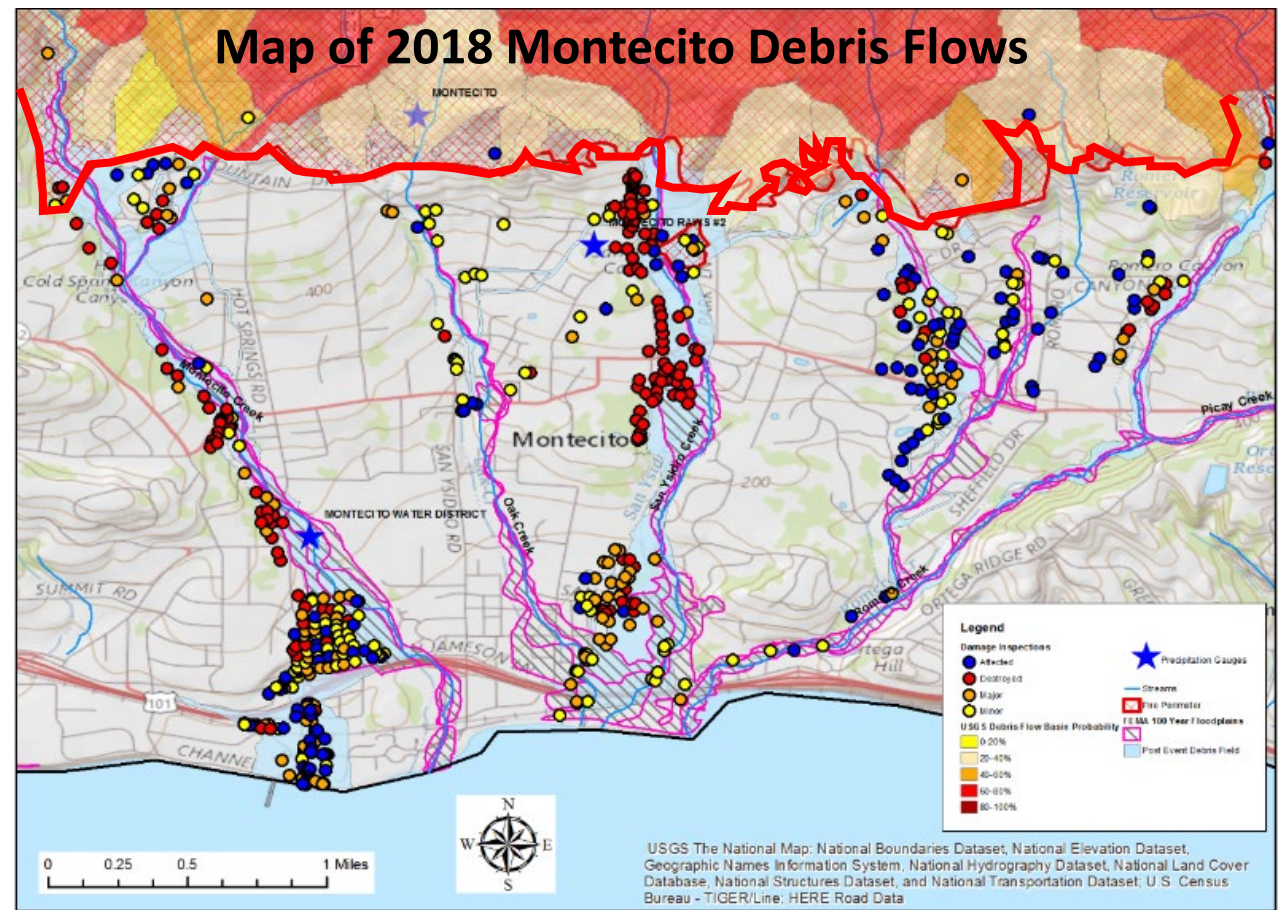


MONTECITO SANTA BARBARA COUNTY JANUARY 9, 2018

- Post-Thomas Fire: December 4 – January 12
- 280,00 acres burned, including hills above Montecito
- Debris Flow Evacuation Warning: > 24 hrs.
- Debris Flow: January 9, 3:45 – 4:00 am
- Structures destroyed/damaged: 425 (~\$450 million)
- Fatalities/missing: 21/2

LESSONS FROM SANTA BARBARA COUNTY

- Debris flows can extend out many miles
- Early, consistent public messaging is a must
- Evacuation preparation must be done early
- People who evacuated from a fire were less likely to evacuate for a potential debris flow
- Debris flows need to be taken as seriously as a wildfire



Montecito, Santa Barbara County, 2018

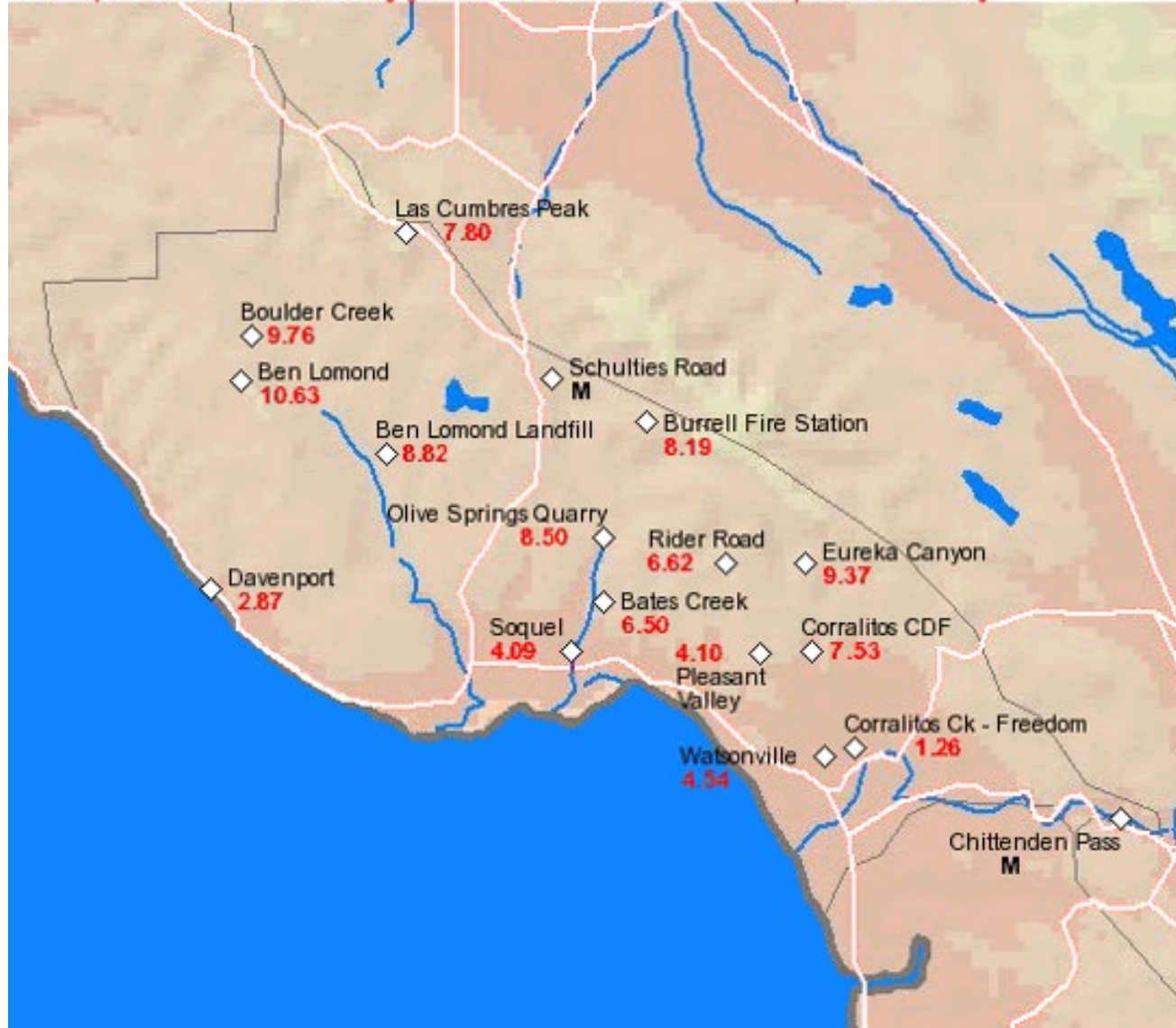
Santa Cruz County

24 Hour Precipitation (Inches) Ending Tue Oct 13 2009 at 09 PM PDT

National Weather Service Monterey - San Francisco / California Nevada River Forecast Center



This map contains data from automated gages that have not been verified for accuracy. M denotes missing.



COUNTY STEPS TO PROTECT LIVES





COUNTY STEPS TO PROTECT LIVES

Identify Areas at Risk

- Map debris flow runout areas using the preliminary WERT report findings and additional mapping by the County, consulting geologists, California Geologic Survey and USGS
- Identify homes and structures in the channels and runout areas

Evacuation Planning

- Multi-agency coordination, including National Weather Service
- Work with Calfire and local Fire Districts to develop evacuation zones
- Work with Calfire and Sheriff's office on evacuation planning
- Identify areas for Public Works to monitor and also stage equipment



COUNTY STEPS TO PROTECT LIVES

Evacuation Planning (continued)

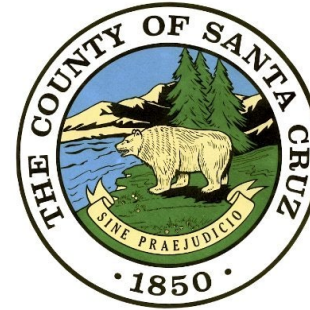
- Make maps available to the Public
- Continuous weather monitoring
 - Frequent Conversations with National Weather Service (NWS)
 - NWS notifies County of forecasted rainfall events that meet “trigger” thresholds
- Public Works Rain Gauges
 - Tuning of real-time rain gauges to appropriate thresholds
 - Provide real-time rainfall rates in the burn areas
- Send emergency ALERT to those in evacuation zones, in consultation with DPW Flood Control and National Weather Service

COUNTY STEPS TO PROTECT LIVES

Communicate to the Public

(In English and Spanish)

- Clearly communicate risks and evacuation plans to public
- Social media, Board presentations, “town halls”, press briefings
- Publicize evacuation shelter locations
- Issue warnings as far in advance as possible
- Messaging in clear terminology





PUBLIC MESSAGING - WHAT CAN I DO?



Evacuate! No way to precisely predict when and where they will happen.



Don't re-occupy home sites in debris flow hazard areas without clearance from a licensed professional geologist.



Existing homes: Contact a licensed professional geologist to get an assessment of your property, debris flow risk factors and mitigation options (deflection walls or berms).



Sign up for emergency alerts and pay attention to weather forecasts for the burn area.



Make a plan. May be evacuated multiple times.



During a storm that could cause a debris flow, stay alert and awake in order to heed evacuation warnings.



Do not wait for someone to tell you to evacuate. Do self-monitoring as well, and if you don't feel safe – leave!

NEXT STEPS

- Continue mapping efforts
- Evacuation planning
- Public messaging
- Updates to the Board





THANK YOU

